Appendix 3-H: Peck Water Conservation Improvements Supporting Documents

(Please see Appendix CD for additional documents)

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September 27, 2012

Approved Christopher Stone
Christopher Stone

TO: Christopher Stone

FROM: Ken Zimmer Ken Z
Water Conservation Planning Section
Water Resources Division

PECK ROAD SPREADING BASIN PUMP STATION AND PIPELINE PROJECT CONCEPT REPORT

Background

Peck Road Spreading Basin is located in the City of Arcadia within a blue line stream at the confluence of Santa Anita and Sawpit Washes. The spreading basin is supplied by uncontrolled storm flows from both washes, and occasionally imported water is routed through the basin. The spreading basin, also referred to as Peck Pit, actually consists of two deep pits that combine to form one basin with a total storage capacity of 3,260 acre-feet (AF). The facility is one of the largest water conservation facilities that recharges the Main San Gabriel Groundwater Basin.

The bike path around the basin drops down to elevation 300 feet when it parallels the spillway. The spillway is 15 feet higher than the bike path at this location, and discharges into the lined Rio Hondo Channel. The basin has one outlet located at elevation 300 feet, which also conveys flows to the Rio Hondo Channel.

The Peck Road Spreading Basin has very low percolation rates. Uncontrolled storm flows bring silts into the basin, which form a clogging layer of soil at the bottom of the basin. The deep nature of the basin makes it difficult to maintain. In addition, sediment has accumulated at the outlet of Santa Anita Wash which restricts flow in the basin between the two deep pits. Water levels have to exceed elevation 300 feet for water to flow freely between the two sections of the spreading basin.

The low percolation rate of Peck Road Spreading Basin limits the amount of water that can be captured for recharge. During large storms, once the spreading basin is full, the remaining storm flows pass over the spillway or are drained through a County-operated outlet at elevation 300 feet into the concrete-lined Rio Hondo Channel. During larger or less frequent storm events, the downstream Rio Hondo Coastal Basin Spreading Grounds typically has limited intake capacity and the water may be wasted to the ocean.

The spreading basin can be accessed by the public from the Peck Road Water Conservation Park. The park is maintained by the County of Los Angeles Department of Parks and Recreation, and provides the public with green areas, fishing, walking, and bicycle trails.

<u>The Project</u>

The proposed improvements include sediment removal and constructing a pump station, pipeline, and outlet structure. The pump station at Peck Road Spreading Basin will convey stored water to the San Gabriel River between the Santa Fe Dam outlet and the 10 Freeway, where percolation rates are very high. The San Gabriel River is a soft-bottom channel, located approximately one and a half miles east of the spreading basin that recharges the Main San Gabriel Basin.

Two 25 cubic feet per second (cfs) vertical fixed turbine pumps are proposed to be placed inside a concrete underground pump station at the north end of Peck Road Spreading Basin and would pump during the storm season when the basin elevation is between 290 and 315 feet. The water will flow through 7,000 feet of 36-inch steel-lined reinforced concrete pipe along Clark Street as well as some Hansen Quarry private property in the City of Arcadia. Pipeline easements will need to be obtained for the areas where the new pipeline will be installed. The entire pipeline will be under pressure as the river is located at a higher elevation than the spreading basin. The pipeline will outlet into the San Gabriel River, where the water can percolate into the soft-bottom channel.

The proposed improvements will also remove approximately 101,000 cubic yards of sediment from the middle of Peck Road Spreading Basin near the outlet of the Santa Anita Wash. A large portion of the concrete-lined channel of the Santa Anita Wash has been buried under years of accumulated sediment. The sediment will be transported to Manning Pit in the City of Irwindale. The removal of sediment will allow the pump station to convey water from both pits.

Based on the available storage capacity of the spreading basin and historical data of the inflow into the basin, it is estimated that 1,800 AF of water in an average year and 3,400 AF of water in a wet year, could be pumped to recharge the Main San Gabriel Basin using the middle reach of the San Gabriel River. The majority of this conserved stormwater would otherwise be wasted to the ocean.

Currently Parks and Recreation is planning improvements at the Peck Road Water Conservation Park that include new pedestrian paths and roads, landscaping with native plants, and the addition of picnic and play areas. A joint effort between Public Works and Parks and Recreation will be pursued to discuss operations of the project that will both maximize water conservation and enhance the park's recreational activities.

Benefit Cost Analysis

The cost to construct the pump system and pipeline from the Peck Road Spreading Basin to the San Gabriel River is approximately $6,000,000. The estimated electricity cost to operate the pump is approximately $47,000 annually. The project will provide an annual stormwater conservation benefit during an average year of approximately $1,000,000 based on the current cost of $550 per AF for untreated imported water. The cost recovery period for this project is approximately six years.

The Main San Gabriel Basin Watermaster and the Upper San Gabriel Municipal Water District support the project and have been partners in the Integrated Regional Water Management Plan process to secure grant funding.

Environmental

The project is within a blue line stream and will require an environmental document. The environmental document will be prepared and all necessary regulatory permits will be obtained. During the course of the conceptual design, the Environmental Protection Agency issued Total Maximum Daily Load (TMDL) requirements for Peck Road Spreading Basin. At this time it is not known how these requirements may affect our ability to pump water from the basin to the San Gabriel River. Due to concerns with nutrients, organochlorine pesticides, and polychlorinated biphenyls it may be necessary to perform a full cleanout of Peck Road Spreading Basin along with the project, which is estimated to cost an additional $12,000,000.

Recommendation

The proposed project will increase the replenishment of groundwater in the Main San Gabriel Basin from storm runoff, therefore reducing the San Gabriel Valley's reliance on imported water. By pumping the water from the Peck Road Spreading Basin and recharging it into the San Gabriel River, an additional 1,800 AF on average could be conserved annually in addition to about 6,300 AF conserved from percolation in Peck Road Spreading Basin.

The Water Conservation Planning Section will continue to work with Watershed Management Division to address the TMDL issues at Peck Road Spreading Basin. If a full cleanout is required, the Water Conservation Planning Section will create a project concept report and conceptual plan for sediment removal. Final design will be delayed until these issues are resolved.

Several agencies have shown interest in the project including Parks and Recreation, Upper San Gabriel Valley Municipal Water District, and the Main San Gabriel Basin Watermaster. All interested parties will be approached to discuss cost sharing for project implementation and grants will be pursued.

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Attach.

PECK ROAD SPREADING BASIN PUMP STATION AND PIPELINE PROJECT COST ESTIMATE

Item	Unit	Quantity	Unit Price ($)	Sub Cost ($)	Cost ($)
Sediment Removal					1,354,300
Basin Dewatering	LS	1	100,000	100,000	
Clearing and Grubbing	LS	1	25,000	25,000	
Tree Removal	EA	25	500	12,500	
Unclassified Excavation	CY	101,400	12	1,216,800	
Pump					1,340,400
Vertical Turbine Pump (25 cfs)	LS	2	275,000	550,000	
Electrical and Control Equipment	LS	1	300,000	300,000	
Electrical Service for Pumps	LS	1	100,000	100,000	
Pump Station Structure	LS	1	120,000	120,000	
Pump Vault	CY	80	3,000	240,000	
42" Reinforced Concrete Pipe	LF	50	320	16,000	
Inlet Structure	CY	12	1,200	14,400	
Pipeline					3,175,200
Storm Water Pollution Prevention Plan (SWPPP)	LS	1	10,000	10,000	
Implementation of SWPPP	LS	1	100,000	100,000	
AC Pavement Removal	SF	70,000	1	70,000	
Unclassified Excavation	CY	2,500	20	50,000	
Shoring	LF	7,000	50	350,000	
36" Steel Lined Reinforced Concrete Pipe	LF	7,000	350	2,450,000	
Manholes	EA	13	5,200	67,600	
Trench Backfill Slurry	CY	260	110	28,600	
AC Pavement	TON	700	70	49,000	
Outlet Structure					22,630
Concrete	CY	12	1,200	14400	
RipRap (light class)	CY	50	110	5500	
Metal Hand Railing	LF	30	91	2730	

TOTAL	$5,892,530

PECK ROAD SPREADING BASIN
PUMP AND PIPELINE CALCULATIONS

<u>Pipeline</u>

Design Flow — Q = 50 cfs

Head — $h_f = 365' - 290' = 75\,ft$

Length — L = 6,969 ft

Coefficient — C = 100 (for concrete pipes)

Head Loss — $h_f = 3.022\,\frac{v^{1.85}L}{C^{1.85}d^{1.165}}$ (with $v = \frac{Q}{A}$) Solve for diameter, d

$$75\,ft = 3.022\,\frac{\left(\frac{50\,ft^3/s}{\pi d^2/4\,ft^2}\right)^{1.85}(6969\,ft)}{(100)^{1.85}(d^{1.165})}$$

$$75\,ft = 3022\,d^{-4.865}$$

Diameter — $d \approx 2.68ft \approx 32.2\,in$ ➔Use 36" φ Pipe

Velocity — $v = \frac{Q}{A} = \frac{50ft^3/s}{\pi d^2/_4\,ft^2} = \frac{50\,ft^3/s}{\pi(3ft)^2/_4\,ft^2} = 7.07\,{}^{ft}/_{s}$

<u>Pump Calculations</u>

Flow — $Q = 50\,cfs$

Pipe Area — $A = \frac{\pi d^2}{4} = \frac{\pi(3\,ft)^2}{4} = 7.07\,ft^2$

Velocity — $v = \frac{Q}{A} = \frac{50\,{}^{ft^3}/_{s}}{7.07\,ft^2} = 7.07\,{}^{ft}/_{s}$

Head Losses

Static Head — $\Delta H = 365' - 290' = 75\,ft$

Velocity Head — $H_v = \frac{v^2}{2g} = \frac{(7.07\,{}^{ft}/_{s})^2}{2(32.2\,{}^{ft}/_{s^2})} = 0.78\,ft$

Friction Head — $H_f = f\,\frac{L}{d}\frac{v^2}{2g} = 0.017\left(\frac{6969ft}{3\,ft}\right)\left(\frac{\left(7.07\,{}^{ft}/_{s}\right)^2}{2\left(32.2\,{}^{ft}/_{s^2}\right)}\right) = 30.68\,ft$

Total Head — $TDH = \Delta H + H_v + H_f = 75 + 0.78 + 30.68 = 106.46\,ft$

➔ $Design\ pump\ for\ \approx 110\ feet$

Operation Costs

Pump Capacity $Q = 25\ CFS \times \frac{60\ sec}{1\ min} \times \frac{7.48\ gal}{1\ ft^3} = 11,220\ GPM$

Horse Power $HP = \frac{Total\ head \times Capacity}{3960 \times Efficiency} = \frac{110\ ft \times 11220\ GPM}{3960 \times 0.85} = 366.67\ HP$

KiloWatt-Hour $kWH = 366.67\ HP \times \frac{0.746\ kW}{1\ HP} \times \frac{15\ days\ pumping}{year} \times \frac{24\ hours}{1\ day} = 118{,}166 \frac{kWH}{yr}$

Electricity Cost $\frac{Cost}{yr} = Edison\ Rate \times \frac{kWH}{yr} = \frac{\$0.20}{KWH} \times 118{,}166 \frac{kWH}{yr} = \$23{,}633$

➔ *For two 25 cfs pumps, it'll cost about $47,266 to run the pumps in an average water year*

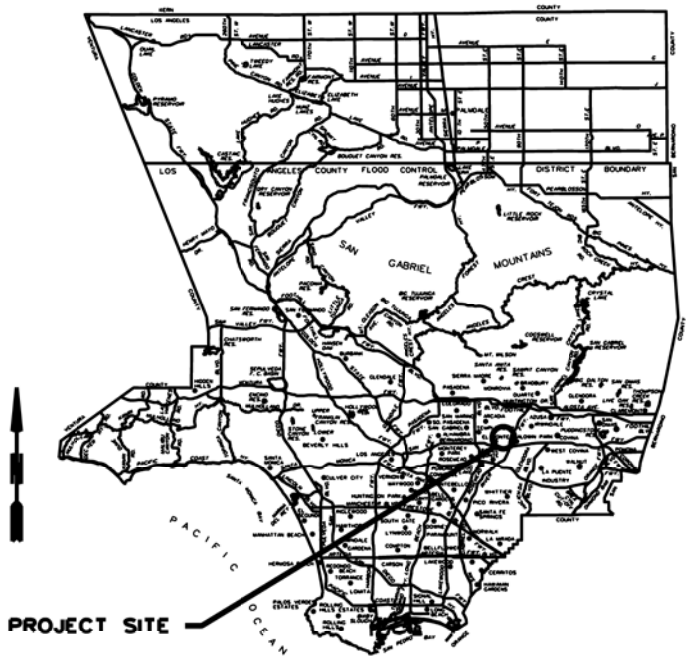
PECK ROAD SPREADING BASIN WATER CONSERVED BENEFIT

Pump Capacity	50	cfs
Pump Invert	290	ft. elevation
Basin Invert	280	ft. elevation

YEAR	# days pumped	Pumped
WY 2009-10	18	1800
Wet WY 2004-05	34	3,400

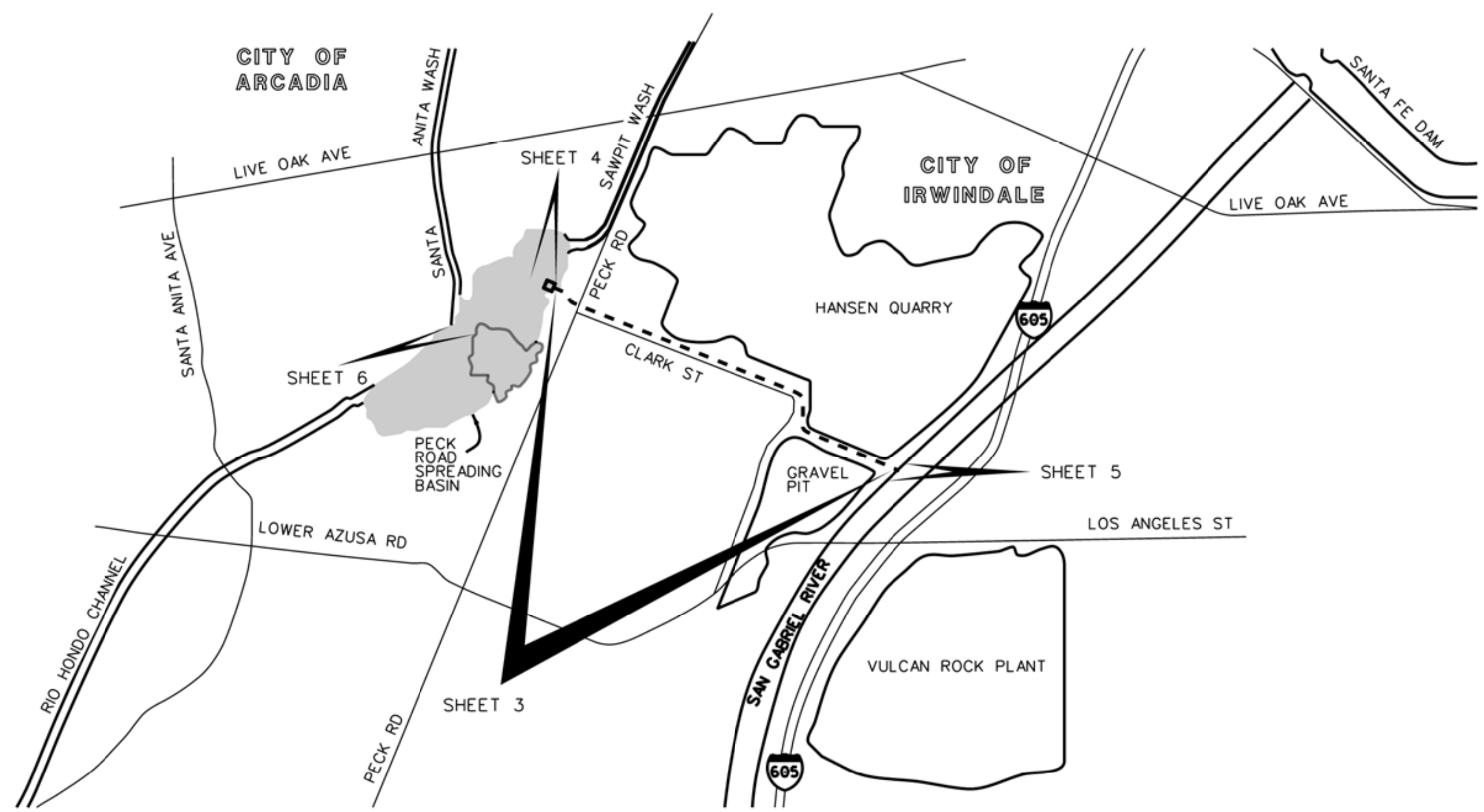
COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS

PECK ROAD SPREADING BASIN PUMP STATION AND PIPELINE



Thomas Bros. Pgs. 597 - F3

LOCATION MAP



VICINITY MAP
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INDEX TO PROJECT PLANS

SH. NO.	DESCRIPTION
1	TITLE SHEET
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3	PIPELINE ALIGNMENT DETAILS
4	PUMP STATION PLANS AND DETAILS
5	OUTLET STRUCTURE PLANS AND DETAILS
6	BASIN EXCAVATION

REFERENCES

1 TOPOGRAPHIC MAP NO. 221-T18 (JULY 1998)

CONCEPT ONLY

DATE	MK	DESCRIPTION

REVISIONS

K. ZIMMER CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

PROJECT ENGINEER DATE

COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS

PECK ROAD SPREADING BASIN PUMP STATION AND PIPELINE

TITLE SHEET

JOB HF13510002 DWG SHEET 1 OF 6

DRAFTER DESIGNER CHECKER CADD PROJECT FILE NAME

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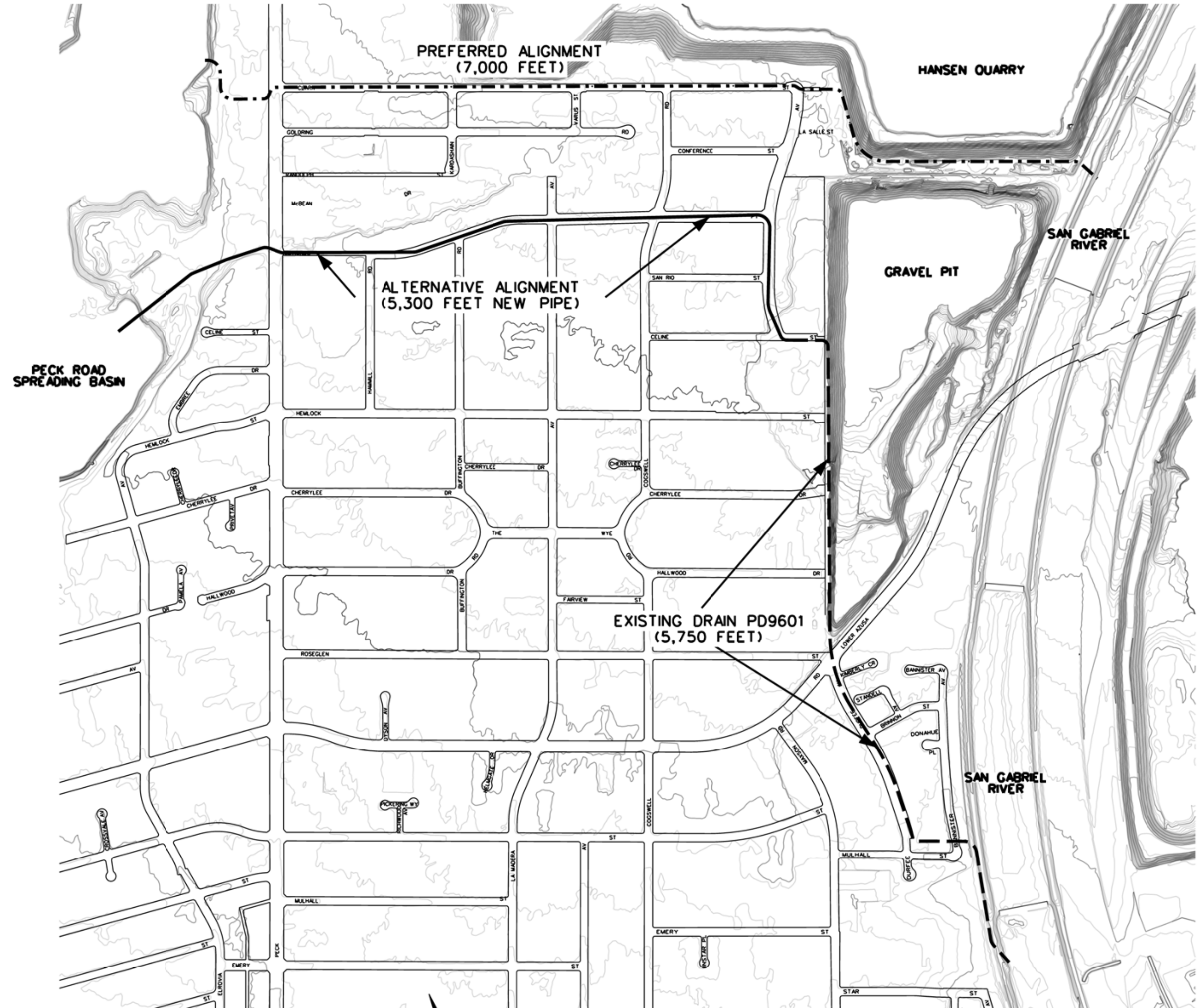

CONCEPT ONLY

PLAN VIEW

ALTERNATIVE PIPELINE ALIGNMENTS
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DATE	MK	DESCRIPTION
		REVISIONS

K. ZIMMER — CIVIL — PROJECT ENGINEER — DATE

COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS

PECK ROAD SPREADING BASIN
PUMP STATION AND PIPELINE

PIPE ALIGNMENT ALTERNATIVES

JOB HF13510002 | DWG | SHEET 2 OF 6

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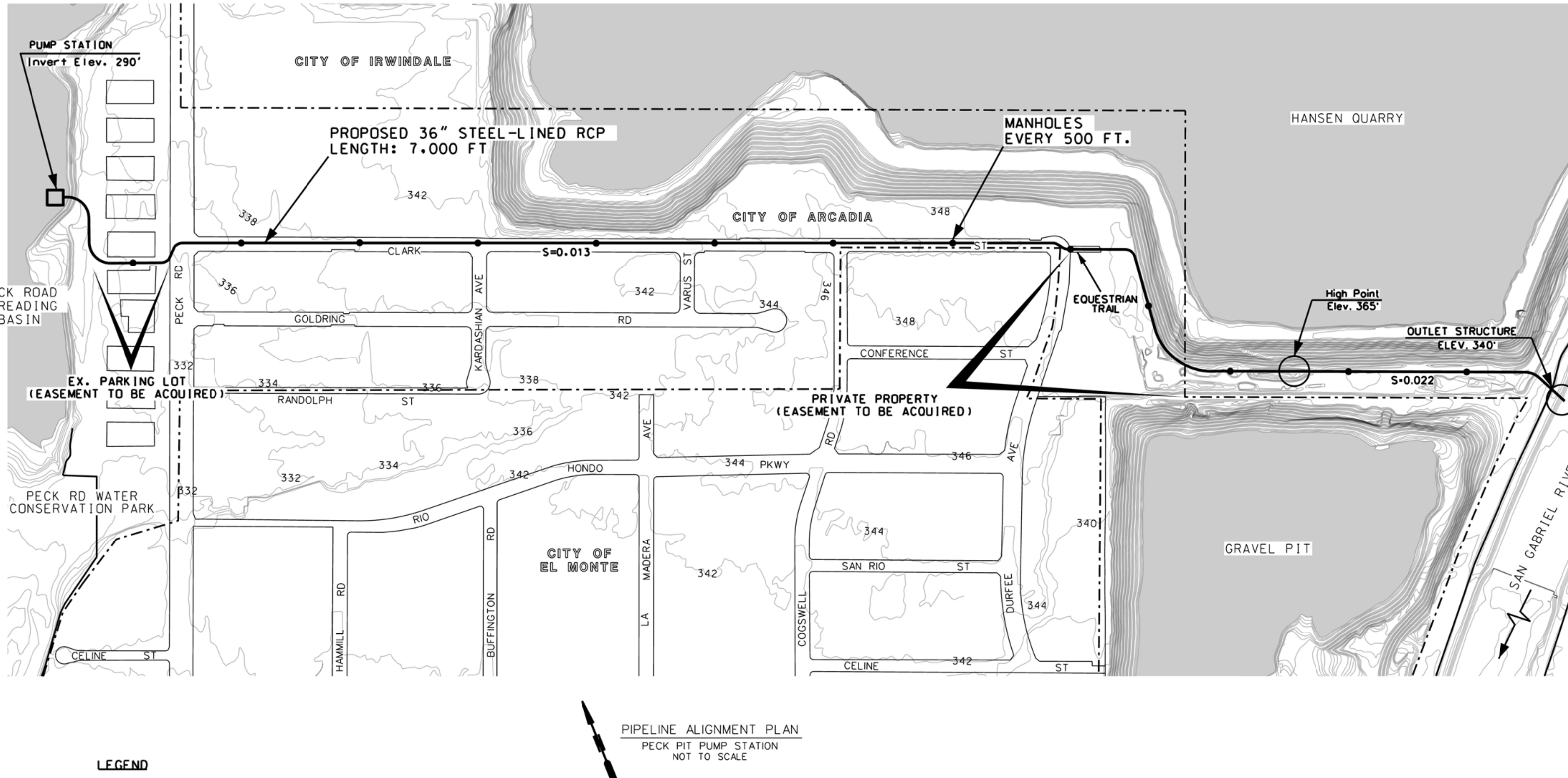

PIPELINE ALIGNMENT PLAN
PECK PIT PUMP STATION
NOT TO SCALE

LEGEND

- PUMP
- PIPE ALIGNMENT
- MANHOLE

DATE	MK	DESCRIPTION
		REVISIONS

K. ZINNER
CIVIL
STATE OF CALIFORNIA

PROJECT ENGINEER DATE

COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS

PECK ROAD SPREADING BASIN
PUMP STATION AND PIPELINE

PIPELINE ALIGNMENT DETAILS

JOB HF13510002 DWG

SHEET 3 OF 6

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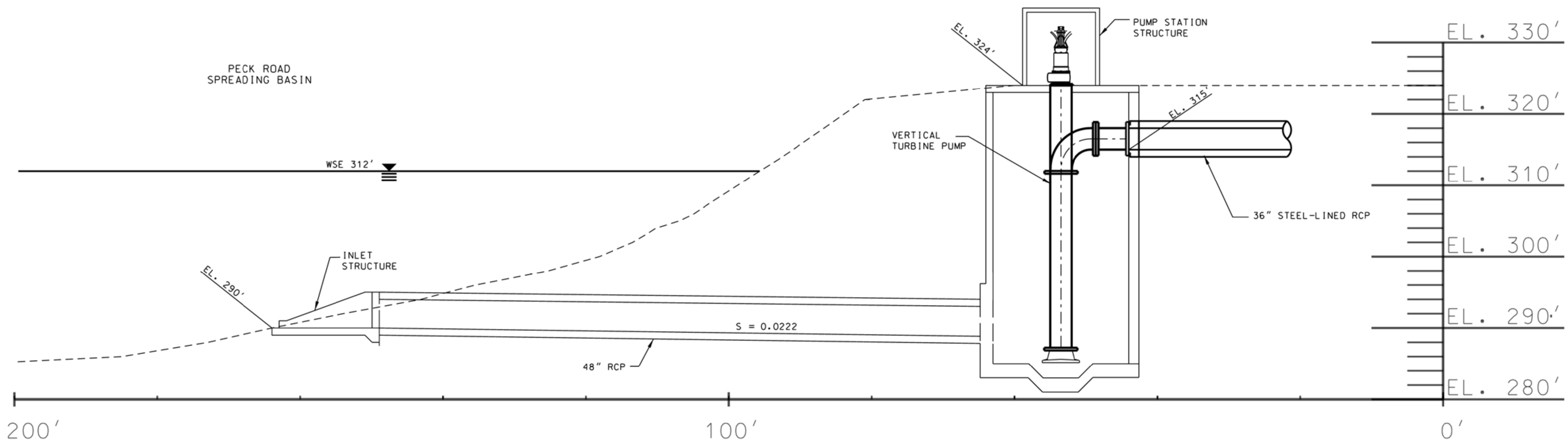
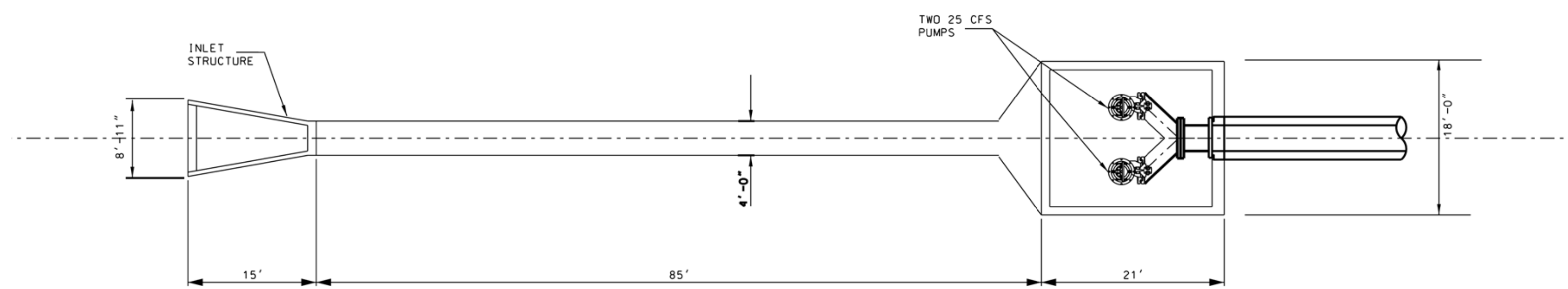


ELEVATION
PUMP STATION
SCALE: 14.4" = 100'



PLAN VIEW
PUMP STATION
SCALE: 14.4" = 100'

CONCEPT ONLY

DATE	MK	DESCRIPTION
		REVISIONS

K. ZIMMER
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

PROJECT ENGINEER DATE

COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS

PECK ROAD SPREADING BASIN
PUMP STATION AND PIPELINE

PUMP STATION
PLAN AND DETAILS

JOB HF13510002 DWG SHEET 4 OF 6

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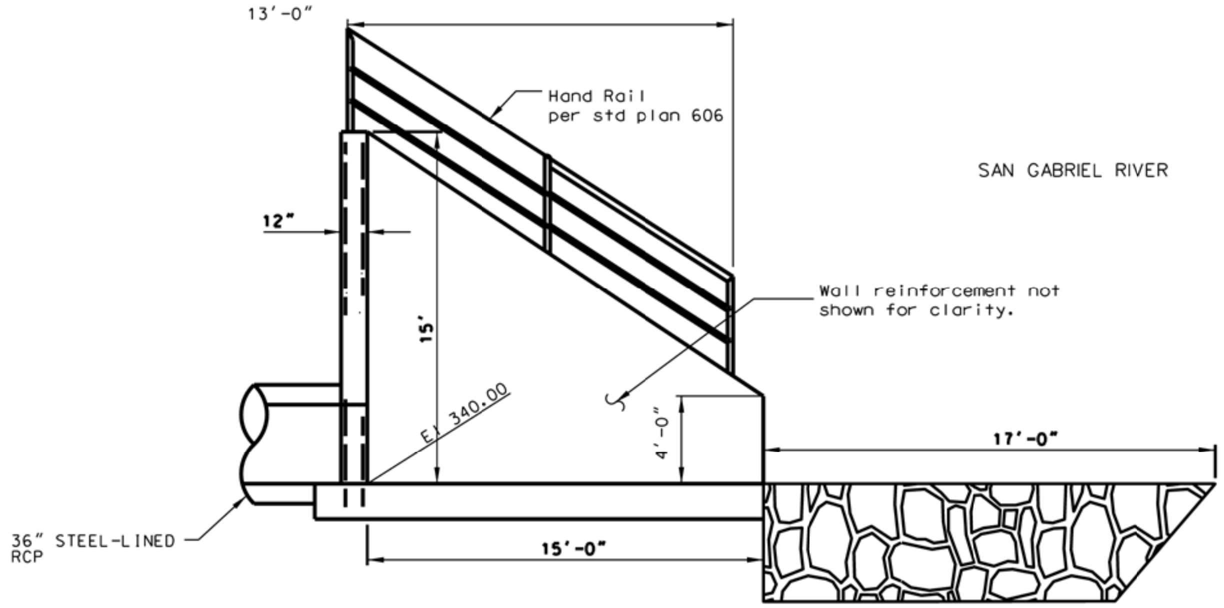

SECTION A-A
OUTLET STRUCTURE
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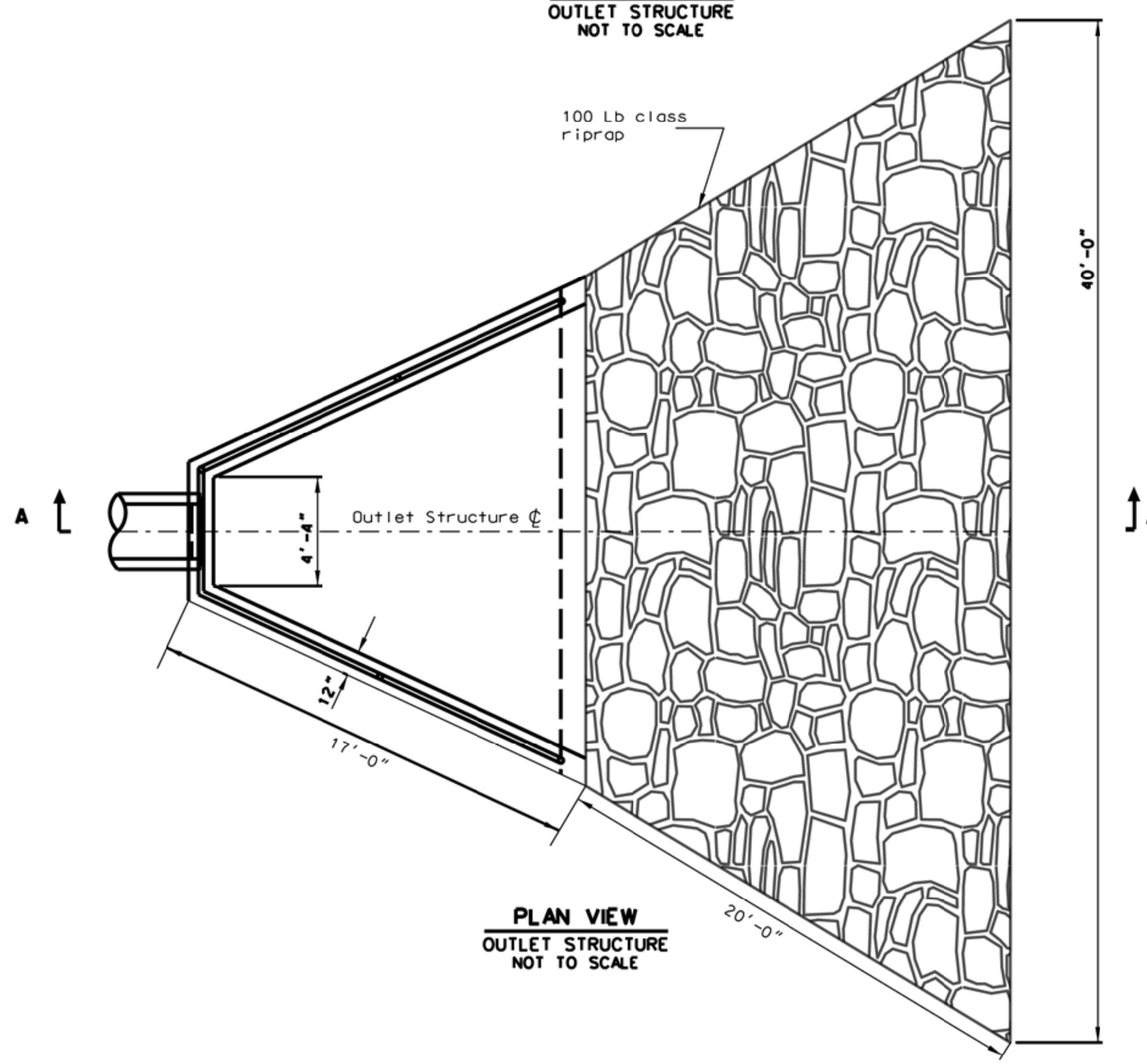

PLAN VIEW
OUTLET STRUCTURE
NOT TO SCALE

CONCEPT ONLY

DATE	MK	DESCRIPTION
REVISIONS		

PROJECT ENGINEER — DATE

COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS

PECK ROAD SPREADING BASIN
PUMP STATION AND PIPELINE

OUTLET STRUCTURE
PLAN AND DETAILS

JOB HF13510002 | DWG | SHEET 5 OF 6

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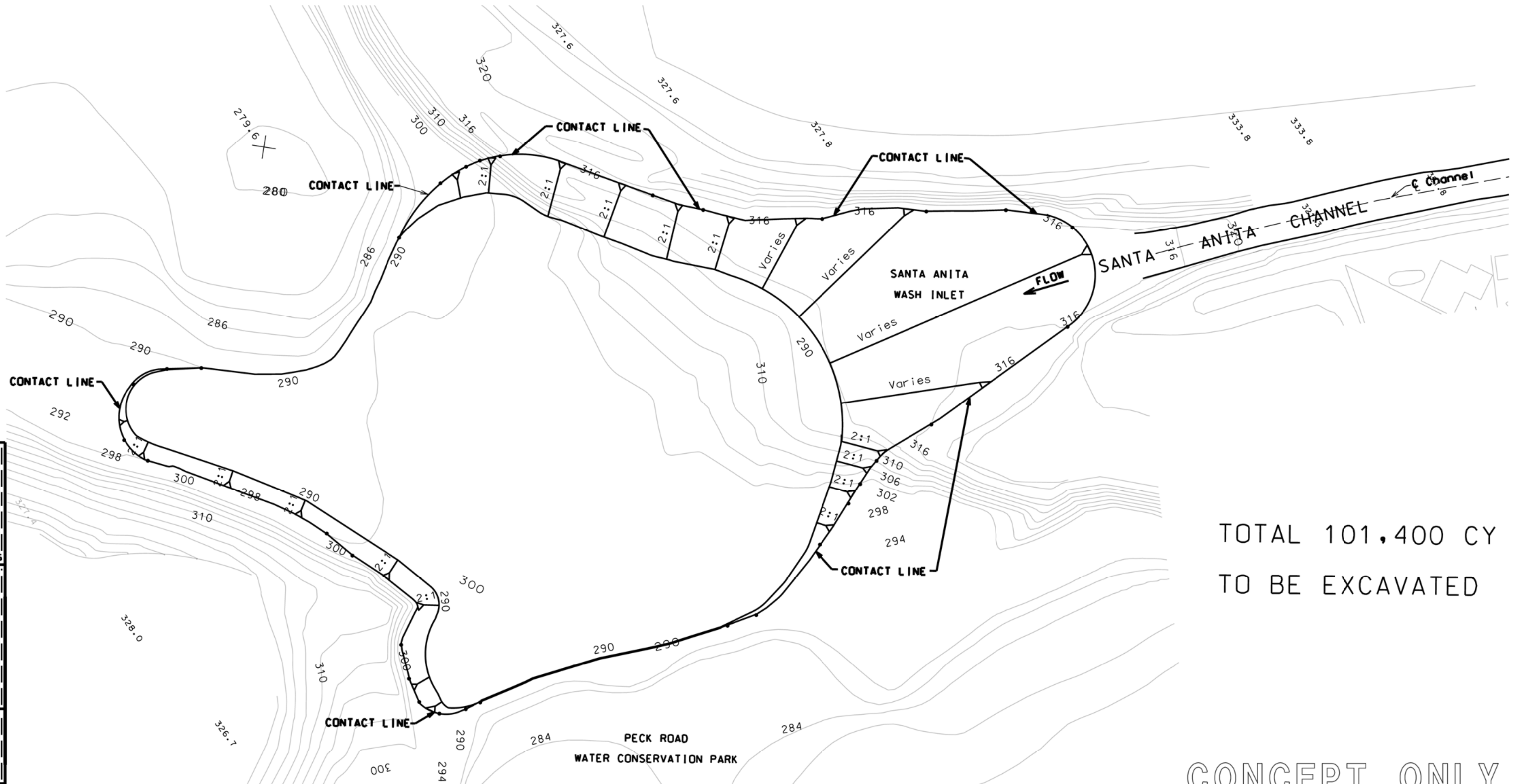

PLAN VIEW
PECK PIT EXCAVATION
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DATE	MK.	DESCRIPTION

REVISIONS

PROJECT ENGINEER — DATE

COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS

PECK ROAD SPREADING BASIN
PUMP STATION AND PIPELINE

BASIN EXCAVATION

JOB HF13510002 DWG

SHEET 6 OF 6

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Appendix 3-I: San Jose Creek Water Reclamation Plan East Process Optimization Project Supporting Documents

(Please see Appendix CD for additional documents)

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CLEARWATER PROGRAM

Master Facilities Plan

FINAL

SCH# 2008101074

November 2012

CH2MHILL

SANITATION DISTRICTS OF LOS ANGELES COUNTY

MWH

BUILDING A BETTER WORLD

CLEARWATER PROGRAM

Master Facilities Plan

FINAL

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State Clearinghouse Number: 2008101074

November 2012

Also Available at:

www.ClearwaterProgram.org

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Chapter 1
INTRODUCTION

1.1 Background

The Sanitation Districts of Los Angeles County (Sanitation Districts) have prepared the Clearwater Program Master Facilities Plan (MFP) to identify a recommended plan that will meet the wastewater management needs of the Joint Outfall System (JOS) through the year 2050. The associated joint environmental impact report/environmental impact statement (EIR/EIS), available under separate cover, was prepared by the environmental consulting firm ICF International. An executive summary for both the MFP and EIR/EIS is also available under separate cover. The Sanitation Districts are the lead agency for the EIR under the California Environmental Quality Act, and the U.S. Army Corps of Engineers is the federal lead agency for the EIS under the National Environmental Policy Act. The Clearwater Program MFP and EIR/EIS were prepared in conformance with the California State Water Resources Control Board's policy for implementing the Clean Water State Revolving Fund (SRF) Program for construction of wastewater management facilities. A summary of the SRF requirements is provided in Appendix A of this document.

1.2 Sanitation Districts of Los Angeles County

The Sanitation Districts are a regional organization consisting of 23 independent special districts serving the wastewater and solid waste management needs of approximately 5.4 million people in Los Angeles County. The Sanitation Districts' service area, shown on Figure 1-1, covers approximately 820 square miles and encompasses 78 cities and unincorporated territory within the county.

The Sanitation Districts were originally formed under authority provided by the County Sanitation District Act of 1923. This act authorized the formation of sanitation districts by drainage areas rather than political boundaries, thereby allowing for the economies of scale associated with the regionalization of wastewater services and facilities. In 1949, the act was amended to include solid waste management services.

The 23 independent districts that compose the Sanitation Districts work cooperatively under a Joint Administration Agreement (JAA) with one administrative staff headquartered near Whittier, California. Each district has a separate board of directors consisting of the presiding officers of the governing bodies of the local jurisdictions situated within that district. Each district is required to pay its proportionate share of the joint administration costs, pursuant to the terms of the JAA. Appendix B contains a list of jurisdictions served by the Sanitation Districts and the district(s) within each.

The Sanitation Districts' 1,400 miles of main trunk sewers and 11 wastewater treatment plants convey and treat about half the wastewater in Los Angeles County. The total permitted capacity of the 11 wastewater treatment plants is 650 million gallons per day (MGD). The Sanitation Districts' solid waste management sites provide about one-third of the countywide solid waste management needs. The Sanitation Districts operate three sanitary landfills, four landfill energy recovery facilities, two recycle

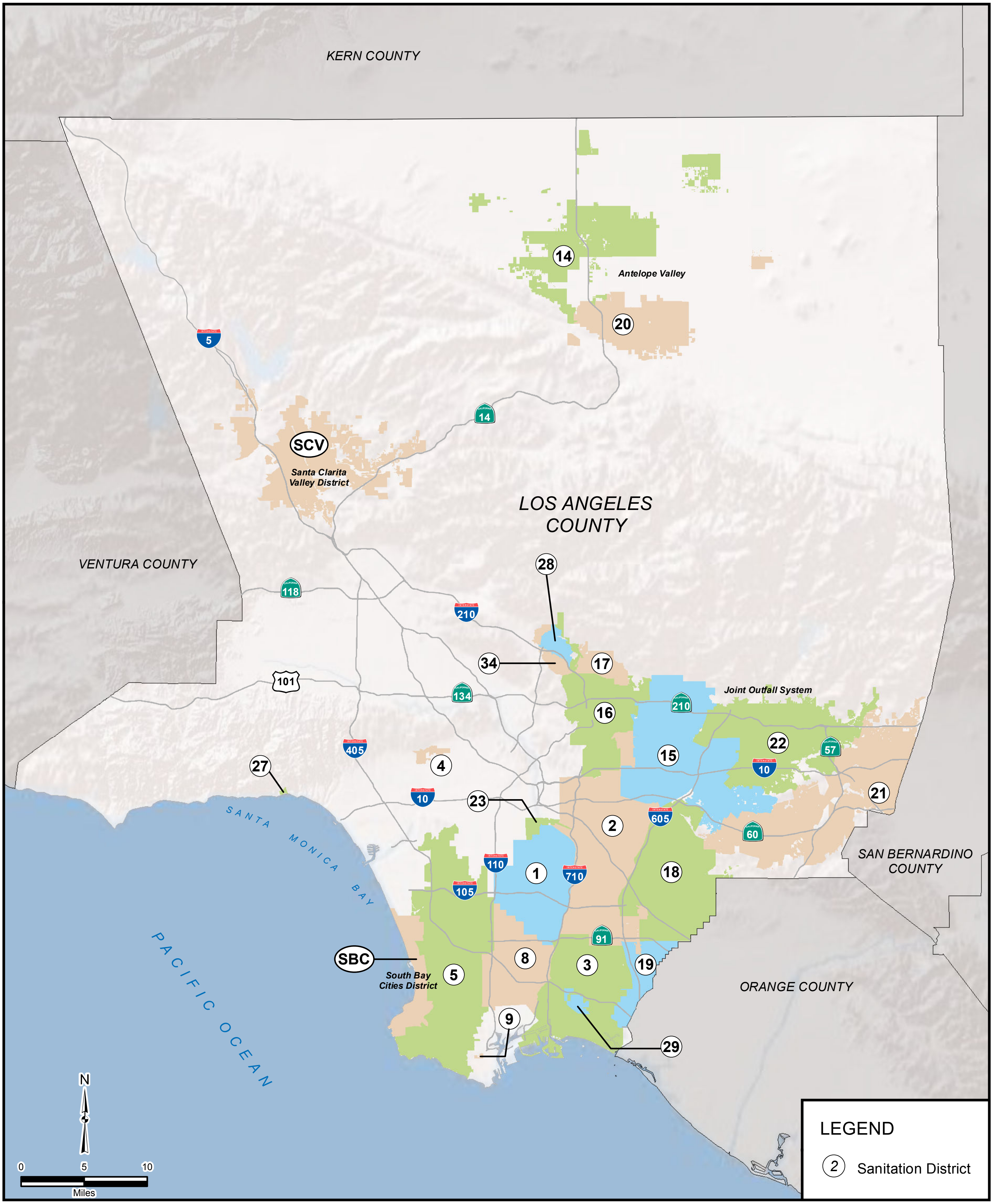


FIGURE 1-1

Sanitation Districts' Service Area

Source: Sanitation Districts of Los Angeles County 2011, Thomas Bros 2011, ESRI 2011

centers, and three materials recovery/transfer facilities, and participate in the operation of two refuse-to-energy facilities.

1.2.1 Mission Statement

The Sanitation Districts' mission is *to protect public health and the environment through innovative and cost-effective wastewater and solid waste management, and in doing so convert waste into resources such as recycled water, energy, and recycled materials*.

1.2.1.1 Public Health and Environmental Protection

The Sanitation Districts are committed to the protection of public health and the environment. The evolution of proper sanitary practices, including wastewater and solid waste management, has virtually eliminated waterborne disease in the United States and contributed to a longer life expectancy. The tertiary-treated wastewater produced by the Sanitation Districts, which essentially meets or exceeds state and federal drinking water standards, is safe for indirect potable reuse and unrestricted direct human contact (e.g., swimming). The proper disposal of refuse prevents the spread of pathogens and disease, while advanced landfill liner and gas collection systems ensure the preservation of groundwater and air quality.

1.2.1.2 Innovative and Cost-Effective Services

The Sanitation Districts' wastewater and solid waste management systems provide essential public services at some of the most competitive rates in Southern California and the rest of the country. Over the years, the Sanitation Districts have consistently engaged in research and studies; designed and constructed state-of-the-art conveyance, treatment, and disposal facilities; and pioneered efficiencies in operations and maintenance. These innovations have proven integral in controlling overall costs.

1.2.1.3 Water Reclamation and Reuse

In 1949, the Chief Engineer and General Manager of the Sanitation Districts prepared a visionary report recognizing the key role that highly treated wastewater (recycled water) would have in Southern California. The report recommended the adoption of a policy looking toward reclamation. The first water reclamation plant (WRP) was built in 1962. In 2010, the Sanitation Districts' ten WRPs produced approximately 165 MGD of high-quality recycled water. Approximately 84 MGD (93,000 acre-feet per year[1]) of recycled water was reused at 640 sites throughout Los Angeles County. Uses include groundwater recharge; industrial, commercial, and recreational applications; habitat maintenance; and agricultural and landscape irrigation. Assuming this water would otherwise have been supplied by imported water, these recycled water efforts have avoided approximately 250,000 megawatt hours (MWh) of annual power consumption, offsetting 73,000 metric tons of carbon dioxide equivalents (CO_2e).

1.2.1.4 Beneficial Use of Biosolids

Biosolids are a byproduct of the wastewater treatment process. The Sanitation Districts produce approximately one-half million tons of biosolids each year. As part of the treatment process, biogas is produced and is then converted to electricity or utilized for process heating. Biosolids have been

[1] One acre-foot is the approximate amount of water used by two single family homes in Southern California each year.

beneficially used for a variety of applications, including as an ingredient in high-quality compost, a soil amendment for agriculture, and an emissions-reducing agent in cement kilns.

1.2.1.5 Green Energy Production and Use

The Sanitation Districts, having successfully pioneered renewable energy technologies at their wastewater and solid waste facilities, are leaders in the production and use of green power. The production of renewable energy from biogas conserves fossil fuels and reduces greenhouse gas emissions. In 2010, the Sanitation Districts produced 750,000 MWh of power offsetting 220,000 metric tons of CO_2e. This is enough renewable energy to power 120,000 homes.

1.3 Joint Outfall System

Consistent with the Sanitation Districts' regional approach to wastewater management, 17 of the districts participate in the Joint Outfall Agreement (JOA), which provides for a combined investment in wastewater conveyance and treatment facilities. These 17 districts, collectively known as the Joint Outfall Districts, are located in the metropolitan Los Angeles area in the eastern and southern portions of Los Angeles County. The Joint Outfall Districts extend south from the San Gabriel Mountains to the Palos Verdes Peninsula and are bound on the east by Orange and San Bernardino Counties, on the west by the Santa Monica Bay and the cities of Glendale and Los Angeles, and on the south by the San Pedro Bay. District No. 2 is the appointed agent for the 17 districts with respect to matters necessary to carry out the purposes of the JOA.

The Joint Outfall Districts have constructed a regional, interconnected system of wastewater conveyance and treatment facilities known as the Joint Outfall System, or JOS, shown on Figure 1-2. The JOS provides wastewater management services for 4.8 million people in 73 cities as well as some unincorporated areas of Los Angeles County. The service area, which covers 660 square miles, generally slopes downward from the northeast to the southwest. The JOS was designed to take advantage of this regional topography. Wastewater is collected by approximately 8,500 miles of city- and county-owned local sewers and then conveyed, primarily via gravity, through the Sanitation Districts' 1,230 miles of sewers that interconnect seven JOS wastewater treatment plants with a total treatment capacity of 592.5 MGD. The JOS service area, the individual district boundaries, and the location of wastewater treatment plants are shown on Figure 1-2.

1.3.1 JOS Wastewater Treatment System

The JOS has conceptually developed into two wastewater treatment subsystems: a downstream (or coastal) subsystem and an upstream (or inland) subsystem.

The coastal subsystem consists of the Joint Water Pollution Control Plant (JWPCP), which is located in the city of Carson at the terminus of the JOS trunk sewer network. The JWPCP, which has a permitted capacity of 400 MGD, is the Sanitation Districts' largest wastewater treatment facility. It provides secondary treatment and disinfection to all influent wastewater. All JWPCP effluent (treated wastewater) is discharged one and a half miles out in Pacific Ocean. The JWPCP also provides centralized solids processing for all JOS wastewater treatment facilities.

The inland subsystem consists of six upstream WRPs that provide higher levels of treatment to wastewater selectively routed from predominately residential areas. Residential wastewater is relatively low in dissolved solids, such as salts, so it is more suitable for reuse after treatment than industrial wastewater. The Pomona Water Reclamation Plant (POWRP), San Jose Creek Water Reclamation Plant

FIGURE 1-2

CLEARWATER Program

Joint Outfall System

Source: Sanitation Districts of Los Angeles County 2011, Thomas Bros 2011, ESRI 2011

(SJCWRP), Whittier Narrows Water Reclamation Plant (WNWRP), Los Coyotes Water Reclamation Plant (LCWRP), and Long Beach Water Reclamation Plant (LBWRP) provide tertiary treatment, and the La Cañada Water Reclamation Plant (LACAWRP) provides disinfected, secondary treatment. The combined permitted capacity of the six upstream WRPs is 193 MGD. All recycled water produced at the WRPs that is not reused is discharged to nearby rivers or creeks and eventually flows to the ocean. All solids generated at the WRPs are returned to the JOS trunk sewer system and conveyed to the JWPCP for processing.

Overall, the Joint Outfall Districts realize several significant benefits that stem from being divided into two wastewater treatment subsystems. First, it facilitates the partial segregation of easily reclaimable wastewater with low dissolved solids from wastewater with high dissolved solids through the selective routing of residential and industrial flows. Second, recycled water is made available to the locations where reuse demands are greatest with minimal need for distribution systems and pumping. Third, the upstream locations of the WRPs provide hydraulic relief for the downstream wastewater conveyance system, which reduces the capital costs associated with constructing new relief sewers. Finally, the downstream location of the JWPCP allows for economies of scale associated with centralized solids processing and ocean disposal of effluent that is too salty for reuse.

1.3.2 JOS Conveyance System

The Sanitation Districts own, operate, and maintain over 1,230 miles of sewers in the JOS. However, the majority of the sewer lines located within the boundaries of the JOS are the responsibility of private property owners or local jurisdictions. In general, the conveyance system consists of four types of sewers. Ranging from smallest to largest, these include lateral lines, local sewer lines, district trunk sewers, and Joint Outfall (JO) trunk sewers. The privately owned lateral lines connect residences and businesses to the local sewers. The local sewers that feed into the district trunk sewers are generally owned, operated, and maintained by the local cities or Los Angeles County's Consolidated Sewer Maintenance District. The Sanitation Districts' trunk sewers are the responsibility of the individual districts within which they are located. The purpose of these lines is to collect wastewater from the local sewers and convey it to the larger JO trunk sewers. The JO trunk sewers form the backbone of the regional conveyance system, and are owned, operated, and maintained by the Joint Outfall Districts. Approximately 480 miles of the JOS sewers are JO trunk sewers.

The JOS conveyance system also includes 50 pumping plants, which are located in areas where wastewater will not flow by gravity to the treatment plants. However, because the JOS was designed to take advantage of the slope of regional topography, the need for pumping plants and the associated energy costs are minimized.

1.3.3 JOS Ocean Discharge System

The JOS ocean discharge system consists of two onshore tunnels, a manifold structure, and four offshore ocean outfalls. The two 6-mile long onshore tunnels convey effluent from the JWPCP to the manifold structure located at Royal Palms Beach near White Point. The first tunnel was constructed in 1937 and is 8 feet in diameter; the second was constructed in 1958 and is 12 feet in diameter. The manifold structure is an underground reinforced concrete vault where the effluent transitions from the two tunnels to four ocean outfalls. A system of valves controls which of the four ocean outfalls are active at any given time. The outfalls extend seaward from the manifold structure. Approximately 1,400 feet offshore, the ocean outfalls change from underground pipelines to seafloor pipelines. The 60-inch diameter outfall was constructed in 1937, the 72-inch diameter outfall was constructed in 1947, the 90-inch diameter outfall was constructed in 1957, and the 120-inch diameter outfall was constructed in 1966. The effluent is discharged through diffusers (i.e., the section of the outfall pipelines containing open portholes) up to one and a half miles offshore at a depth of approximately 200 feet below sea level.

1.3.4 JOS Planning History

JOS facilities planning has evolved in response to the historic patterns of population growth, changing regulatory standards, and the needs of the JOS service area. During the early years (1924–1945), when the population of Los Angeles County more than doubled from 1.6 million to 3.2 million, the Sanitation Districts emphasized the economic and administrative advantages of a regional collection and disposal system. The Sanitation Districts' regional approach to wastewater management fostered cooperation between neighboring communities that led to mutually agreeable solutions to waste management problems and avoided legal disputes.

The early development of the JOS included a tributary network of trunk sewers that was gradually expanded to accommodate growth in the Los Angeles Basin. The JWPCP provided primary treatment to all influent wastewater, and all effluent was discharged to the ocean. As growth continued in northern and eastern portions of the county, the regional consolidation of sewerage facilities continued as local wastewater treatment plants in several cities were retired and sewers were constructed to convey flow to the JWPCP.

Also during this period, it became apparent that continued growth in this region would be limited by the availability of resources, especially water. Consequently, the Metropolitan Water District of Southern California was formed in 1928 to design and construct facilities to import water to Southern California from the Colorado River. In 1941, the Colorado River Aqueduct was completed and deliveries of imported water to Southern California began soon thereafter.

In the years following World War II (1945–1965), the population of Los Angeles County again more than doubled as thousands of war industry employees and their families remained in Southern California. This marked the beginning of Southern California's heavy dependence on imported water supplies. Despite the import of water from the Colorado River, the Los Angeles Basin's demands for water had outgrown the sustainable yields of local aquifers by 1954. By 1960, local aquifers within the Los Angeles Basin were being significantly overdrawn, and groundwater levels in several wells had declined considerably.

In response to the pressing need to develop new water supplies, the Sanitation Districts' JOS facilities planning began to focus not only on the concept of accommodating growth in the Los Angeles Basin, but also on the ability to augment the regional water supply through water recycling. In the early 1960s, wastewater flows in the JOS began to approach the capacity limits of downstream trunk sewers. A plan was developed to build WRPs at inland sites as an alternative to the massive expansion of the downstream sewer system and the JWPCP that would have otherwise been necessary. Studies found that it was economically feasible to withdraw wastewater with relatively low dissolved solids concentrations from the largely residential northern and eastern portions of the JOS and treat it to a level such that it would be suitable for reuse. The proposed inland WRPs were, thus, intended to serve two purposes: to provide hydraulic relief for downstream sewers and the JWPCP and to provide an alternative water source to the over-drafted aquifers of the Los Angeles Basin.

The basic considerations for water recycling in the JOS were first identified in a 1949 report prepared by the Sanitation Districts. A subsequent report in 1958 reaffirmed the findings of the 1949 report and called for the construction of the WNWRP to demonstrate the feasibility of full-scale water reclamation. The rationale for inland water recycling on a system-wide level in the JOS was formally presented in

Sanitation Districts' plans prepared during the early 1960s, first in the 1963 A Plan for Water Reuse and later in the 1965 Plan A.

1.3.4.1 A Plan for Water Reuse (1963)

In 1963, A Plan for Water Reuse (Parkhurst 1963) was prepared at the request of the Sanitation Districts' Board of Directors. This report concluded that inland water reclamation would (1) augment the Los Angeles Basin's water resources, (2) avoid the capital-intensive alternative of providing hydraulic relief capacity in large diameter downstream sewers, and (3) achieve "pay-as-you-go" financing of sewerage facilities through modular plant expansions scheduled at time intervals based on actual population growth rates. This report called for numerous relatively small WRPs located near potential recycled water users throughout the JOS. The report was intended to provide a basis for immediate action and for future facilities planning.

1.3.4.2 Plan A (1965)

In October 1965, the Sanitation Districts' Boards of Directors adopted Plan A (Sanitation Districts 1965), a long-range master plan for the development of the JOS through the year 2005. Central to this master plan was the staging of three new relatively large inland secondary treatment plants beside the San Gabriel River, and expansion of the existing WNWRP. The modular expansion of inland plants would provide maximum reuse potential, as well as timely hydraulic relief of trunk sewers leading to the JWPCP.

1.3.4.3 JOS Facilities Plan (1977)

During the early 1970s, legislative actions of the state and federal governments, combined with a decrease in the rate of population growth in Los Angeles County and the planned implementation of the State Water Project to bring water from Northern California to Southern California, changed the basic assumptions under which Plan A was developed. Actions by the Los Angeles Regional Water Quality Control Board (LARWQCB) under the Porter Cologne Water Quality Act of 1970 required changes in solids removal and biosolids management at the JWPCP to meet more rigorous effluent standards. In 1972, the State Ocean Plan and the Clean Water Act (CWA) required several major changes in the JOS including the provision of full secondary treatment at the JWPCP and the implementation of an industrial source control program to control discharges of heavy metals, synthetic organic pollutants, and other incompatible pollutants to the sewer system.

In response, tertiary treatment facilities were constructed at JOS WRPs. The implementation of the State Water Project effectively improved the mineral quality of the water supply and wastewater. It also increased the costs and energy requirements associated with conventional water supplies. The totality of these changes warranted a re-evaluation of the 1965 JOS Plan A, which ultimately took the form of the 1977 JOS Facilities Plan (1977 Plan) (Sanitation Districts 1977).

The stated goals of the 1977 Plan were to (1) bring the JOS into compliance with state and federal water quality legislation, (2) provide wastewater conveyance, treatment, and disposal facilities necessary to serve the population tributary to the JOS through the year 2000, and (3) maximize the potential for water reuse in the JOS. At the time the 1977 Plan was developed, wastewater management agencies located in critical air basins were required to base their facilities plans on the lowest population projection for the service area. Therefore, the 1977 Plan was based on California Department of Finance (DOF) Series E-0 population projection that identified a zero-growth condition in the JOS during the planning period (1976–2000).

Accordingly, the 1977 Plan recommended system upgrades and emphasized inland treatment and reuse of wastewater. Proposed system upgrades included the construction of facilities to provide full secondary treatment at the JWPCP and tertiary treatment at all WRPs. To facilitate increased water reuse in the JOS, the 1977 Plan proposed to expand the aggregate capacity of the WRPs from 125 to 150 MGD (through expansions at the LBWRP and SJCWRP) while downscaling the permitted capacity of the JWPCP from 385 MGD to between 265 and 300 MGD.

1.3.4.4 JOS 2010 Master Facilities Plan (1995)

During the 1980s, the actual JOS population growth rate was higher than that predicted by the 1977 Plan. The original population projection for the year 2000 was 3.65 million, while the actual population in 1995 was approximately 4.6 million. This difference resulted in the generation of significantly larger wastewater flows within the JOS. The 1977 Plan predicted year 2000 flows between 415 and 450 MGD. In 1989, the actual JOS flows were approximately 524 MGD. These larger flows necessitated the accelerated construction of projects recommended in the plan as well as the additional expansion of facilities beyond the plan's recommendations. The permitted capacity of the JWPCP remained at 385 MGD.

In the late 1980s and early 1990s, the JOS experienced a decrease in wastewater flows. One contributing factor was weather- and water-supply-related. Drought conditions occurred and were accompanied by water restrictions that reduced per-capita wastewater generation within the JOS. Also during this period, there was an economic downturn that affected commercial and industrial wastewater generation. The overall result was that the 1995 flows were down to 470 MGD from the 1989 high of 524 MGD.

Following the completion of the 1977 Plan, amendments to the CWA were implemented including Section 301(h), which allowed the EPA to modify the requirements for full secondary treatment of municipal wastewater for ocean discharge. To obtain a 301(h) waiver, an applicant was required to demonstrate no adverse impact on the marine environment from discharge. In the state of California, requirements for marine discharge are also specified in the State Ocean Plan. The Sanitation Districts determined that both the federal and state requirements could be achieved by chemically enhanced primary treatment and partial secondary treatment. The Sanitation Districts constructed these facilities at JWPCP and applied for the modification to full secondary treatment requirements per Section 301(h). Ultimately, this permit modification was not granted, and the Sanitation Districts negotiated a consent decree that included the implementation of full secondary treatment at the JWPCP.

The planning review required by the terms of this consent decree was contained within the JOS 2010 Master Facilities Plan (2010 Plan) published in 1995 (Sanitation Districts 1995a). The stated planning objectives for the 2010 Plan were to (1) provide full secondary treatment for all flows as required by a Consent Decree between the Sanitation Districts, the United States, the state of California, the Natural Resources Defense Council, and Heal the Bay, and (2) provide wastewater conveyance, treatment, and reclamation/disposal facilities to meet JOS service area needs through the year 2010 in a cost-effective and environmentally sound manner.

There were two sets of recommendations in the 2010 Plan. The first was for 400 MGD of secondary treatment capacity at the JWPCP. The plan provided detailed design criteria, site layouts, and a schedule indicating the implementation and commencement of facilities operation by the year 2002. The second set of recommendations were presented with less detail and called for the expansion of the SJCWRP from 100 to 125 MGD by the year 2006 and expansion of the LCWRP from 37.5 to 50 MGD by 2008.

The recommended improvements to the JWPCP were implemented. To date, neither the SJCWRP nor the LCWRP expansions have been implemented because the projected increases in system flows have not materialized and additional treatment capacity has not been needed.

1.3.4.5 JOS Nitrification/Denitrification Facilities Plan (2001)

The POWRP, SJCWRP, WNWRP, LCWRP, and LBWRP discharge effluent into the San Gabriel River or its tributaries. Discharge requirements are contained within the NPDES permits for each plant. In the early 2000s, the permit renewals for these facilities included limitations for ammonia, total inorganic nitrogen, and trihalomethanes based on the Basin Plan adopted by the LARWQCB in June 1994.

Process modifications were required at the WRPs to consistently achieve the established limits. In 2001, a Nitrification/Denitrification Facilities Plan (NDN Plan) (Sanitation Districts 2001) was prepared to address these changes to permit requirements. The stated objective of the NDN Plan was to identify, evaluate, and recommend those actions that the Sanitation Districts must take to consistently comply with the water quality objectives for ammonia, total inorganic nitrogen, trihalomethanes, and disinfection for the five WRPs by June 2003.

The recommended project alternative was to convert the subject WRPs from conventional activated sludge to the NDN process, provide ammonia addition capabilities, and complete studies demonstrating that the receiving waters are amenable to site-specific water quality objectives. All the WRPs have since been modified as recommended in the NDN Plan and are meeting discharge limits.

1.4 Clearwater Program

The Sanitation Districts are in the planning stage of the Clearwater Program. The overall goal of the MFP is *to identify a recommended plan that is protective of public health and will best meet the needs of the JOS through the year 2050 in a cost-effective and environmentally sound manner*.

1.4.1 Clearwater Program Objectives

The Clearwater Program has four primary objectives for the JOS:

- *Provide adequate system capacity to meet the needs of the growing population*
- *Provide for overall system reliability by allowing for the inspection, maintenance, repair, and replacement of aging infrastructure*
- *Provide support for emerging recycled water reuse and biosolids beneficial use opportunities*
- *Provide a long-term solution for meeting water quality requirements set forth by regulatory agencies*

These objectives are used to determine the viability of potential options and alternatives for meeting the goal of the Clearwater Program MFP.

1.4.1.1 System Capacity

JOS wastewater flow projections are evaluated in the MFP. The Southern California Association of Governments (SCAG) provided the Sanitation Districts with population forecasts through the year 2050 (SCAG 2008), which served as the basis for the flow projections. SCAG's population forecasts indicate the JOS service area population will increase to approximately 6.3 million by 2050. A geographic information system (GIS) model was used to derive flow projections from the population data. The population increase will result in an average wastewater flow of about 612 MGD by the year 2050. Based on these projections, the JOS system will experience a treatment capacity shortfall of approximately 20 MGD by the year 2050.

1.4.1.2 Aging Infrastructure

The Sanitation Districts' philosophy is to design, construct, and maintain reliable systems that have sufficient capacity and redundancy to provide the highest level of public safety and environmental protection. These systems are maintained with routine inspection, repair, and/or replacement as required. However, one critical component of the JOS, the onshore tunnels for the existing ocean discharge system, has not been inspected for over 50 years. Both tunnels cross the active Palos Verdes Fault, which is an additional area of concern. While the Sanitation Districts have no reason to believe serious problems exist with the tunnels, it is imperative they be properly inspected.

1.4.1.3 Emerging Reuse/Use Opportunities

Over 50 percent of recycled water produced by the six WRPs is reused at various sites throughout the local region, reducing the demand on potable freshwater sources, which in turn minimizes the need to import water. In addition, during the treatment process at the JWPCP, solids are treated to produce a biogas that is converted to electricity or used for process heating. As a result, the JWPCP is electrically self-sufficient, and excess electricity is supplied to the power grid. The Sanitation Districts also participate in a wide range of biosolids management programs that promote beneficial use of this wastewater byproduct. Biosolids are beneficially used in agriculture as a soil amendment, in the production of high quality compost, in conversion to renewable fuels, and to help reduce emissions from cement kilns. Environmental benefits associated with these biosolids management programs include a reduction in the consumption of energy and raw materials that would otherwise be required in the production of new materials. The Sanitation Districts are committed to continue supporting emerging recycled water reuse and biosolids beneficial use opportunities.

1.4.1.4 Water Quality Requirements

The Sanitation Districts maintain a strong record of compliance with water quality regulations and permit requirements. They have also assisted in the drafting and/or review of future requirements. The Sanitation Districts strive to continue providing long-term engineering solutions that meet the constantly evolving and increasingly stringent water quality requirements in a cost-effective and environmentally sound manner.

1.4.2 Project Purpose and Needs

Currently, the Sanitation Districts rely on two onshore tunnels and four offshore ocean outfall structures to convey effluent from the JWPCP in the city of Carson to the Pacific Ocean. The two tunnels were completed in 1937 and 1958 and have not been inspected for over 50 years. Inspection of the tunnels is not possible due to their overall length, limited access, interconnections between the tunnels, and continuous flow through the tunnels. Furthermore, in January 1995, the JOS service area was inundated by two major back-to-back storm events. The resulting peak wastewater flows in the sewerage system from these storm events nearly exceeded the capacity of the JWPCP ocean discharge system. If the tunnels were to be damaged or the capacity of the ocean discharge system exceeded, treated JWPCP effluent would need to be bypassed into the Wilmington Drain. If sufficient capacity were not available in the Wilmington Drain, the sewers tributary to the JWPCP could overflow and untreated wastewater could enter various water courses such as the Dominguez Channel and the Los Angeles River. The project purpose and needs are to inspect and upgrade the aging ocean discharge system, to provide sufficient capacity in the JOS to accommodate the estimated 2050 peak wastewater flows, and to comply with all applicable water quality standards including regulations prohibiting sewer overflows. To meet these needs, the Clearwater Program evaluated either modifying the existing ocean discharge system or constructing a new ocean discharge system.

1.4.3 Clearwater Program Scope

The Clearwater Program MFP and the associated EIR/EIS provide both program-level and project-level alternatives analyses.

1.4.3.1 Program Analysis

The term *program* is used in reference to options or alternatives that would be implemented over a long period of time and do not have a high level of detail. The planning horizon for the MFP is the year 2050, and, because of long-term uncertainties, it would be too speculative to consider the specifics of projects that potentially would not be required for decades to come. Furthermore, the JOS is hydraulically interconnected, and changes to one component of the system could have ramifications on the rest of the system. Therefore, due to the uncertainties associated with a long-term planning horizon and the complex interrelationship between the elements of the JOS, the MFP includes a comprehensive, program-level alternatives analysis that evaluates the entire system. For the purposes of developing options and evaluating program alternatives, the JOS was broken down into the following five program component areas based on primary functionality:

- Wastewater conveyance and treatment
- Solids processing
- Biosolids management
- WRP effluent management
- JWPCP effluent management

This programmatic approach, which is presented in Chapter 6, ensures the long-term, system-wide viability of projects being considered in the near future.

1.4.3.2 Project Analysis

The term *project* is used to describe a specific component of the comprehensive program. A project would be implemented in the short term; therefore, a greater level of detail is available for analysis in the MFP and the associated EIR/EIS. As presented in Chapter 6, a potential project—a new or modified ocean discharge system for JWPCP effluent management—was identified through the program-level alternatives analysis process, which resulted in a separate, project-level alternatives analysis process. For the purposes of developing options and evaluating project alternatives, the potential JWPCP ocean discharge system was broken down into the following five project component areas based on primary functionality:

- JWPCP shaft site
- Onshore alignment
- Intermediate shaft site

- Offshore alignment
- Diffuser area

Technical feasibility and preliminary environmental analyses were conducted and public input was solicited to develop and rank specific project alignments.

1.4.4 Recommended Plan

The recommended plan, presented in Chapter 7, is a combination of the top-ranked program-wide alternative and the top-ranked project-specific alternative.

1.4.5 Public Outreach Program

Public outreach is vital to the success of the Clearwater Program. Since 2006, the Sanitation Districts have held a series of public workshops and agency scoping meetings in Carson, Wilmington, San Pedro, Rancho Palos Verdes, and Whittier; met with over 500 community leaders, civic groups, public officials, regulatory agencies, environmental groups, and businesses; circulated thousands of newsletters; and established a project website (www.ClearwaterProgram.org) and telephone information line. The California Water Environment Association and the Water Environment Federation have recognized these outreach efforts with state and federal public education awards.

1.5 Master Facilities Plan Organization and Content

This MFP consists of seven chapters and accompanying appendices. The chapters and content are:

- **Chapter 1 - Introduction:** Background information on the Sanitation Districts, the JOS, and the Clearwater Program planning process.
- **Chapter 2 - Planning Area Characteristics:** Overview of the planning area's physical and environmental characteristics.
- **Chapter 3 - Laws and Regulations:** Delineation of appropriate laws and regulations that have the potential to impact the planning process.
- **Chapter 4 - Water, Wastewater, and Projections:** Assessment of current conditions and projection of future population, flows, and characteristics.
- **Chapter 5 - Existing Facilities Description and Needs Assessment:** Summary of existing JOS facilities and system infrastructure, as well as a determination of future needs.
- **Chapter 6 - Alternatives Analysis:** Development, evaluation, and ranking of program and project alternatives to meet identified needs of the JOS through the year 2050.
- **Chapter 7 - Recommended Plan Summary:** Detailed summary of the recommended plan and revenue program.

Chapter 2
PLANNING AREA CHARACTERISTICS

2.1 Physical Setting

2.1.1 Clearwater Program Planning Area

The Joint Outfall System (JOS) service area is located in the central, southern, and eastern portions of Los Angeles County extending from the San Gabriel Mountain foothills south to the Palos Verdes Peninsula and San Pedro Bay, and from San Bernardino and Orange Counties west to the cities of Glendale and Los Angeles and to the Santa Monica Bay. The approximately 660-square-mile Clearwater Program planning area, which coincides with the sphere of influence (SOI) for the JOS, is shown on Figure 2-1. The SOI extends approximately 60 square miles beyond the current JOS service area boundary.

2.1.2 Communities Within the Planning Area

The Clearwater Program planning area encompasses 73 cities and portions of unincorporated Los Angeles County. Table 2-1 lists the cities located within the planning area.

Table 2-1. Cities Located Within the Clearwater Program Planning Area

Alhambra	Downey	Lomita	Rosemead
Arcadia	Duarte	Long Beach	San Dimas
Artesia	El Monte	Los Angeles	San Gabriel
Azusa	El Segundo	Lynwood	San Marino
Baldwin Park	Gardena	Manhattan Beach	Santa Fe Springs
Bell	Glendora	Maywood	Sierra Madre
Bell Gardens	Hawaiian Gardens	Monrovia	Signal Hill
Bellflower	Hawthorne	Montebello	South El Monte
Bradbury	Hermosa Beach	Monterey Park	South Gate
Carson	Huntington Park	Norwalk	South Pasadena
Cerritos	Inglewood	Palos Verdes Estates	Temple City
City of Commerce	Irwindale	Paramount	Torrance
City of Industry	La Ca□ada Flintridge	Pasadena	Vernon
Claremont	La Habra Heights	Pico Rivera	Walnut
Compton	La Mirada	Pomona	West Covina
Covina	La Puente	Rancho Palos Verdes	Whittier
Cudahy	La Verne	Redondo Beach	
Culver City	Lakewood	Rolling Hills	
Diamond Bar	Lawndale	Rolling Hills Estates	

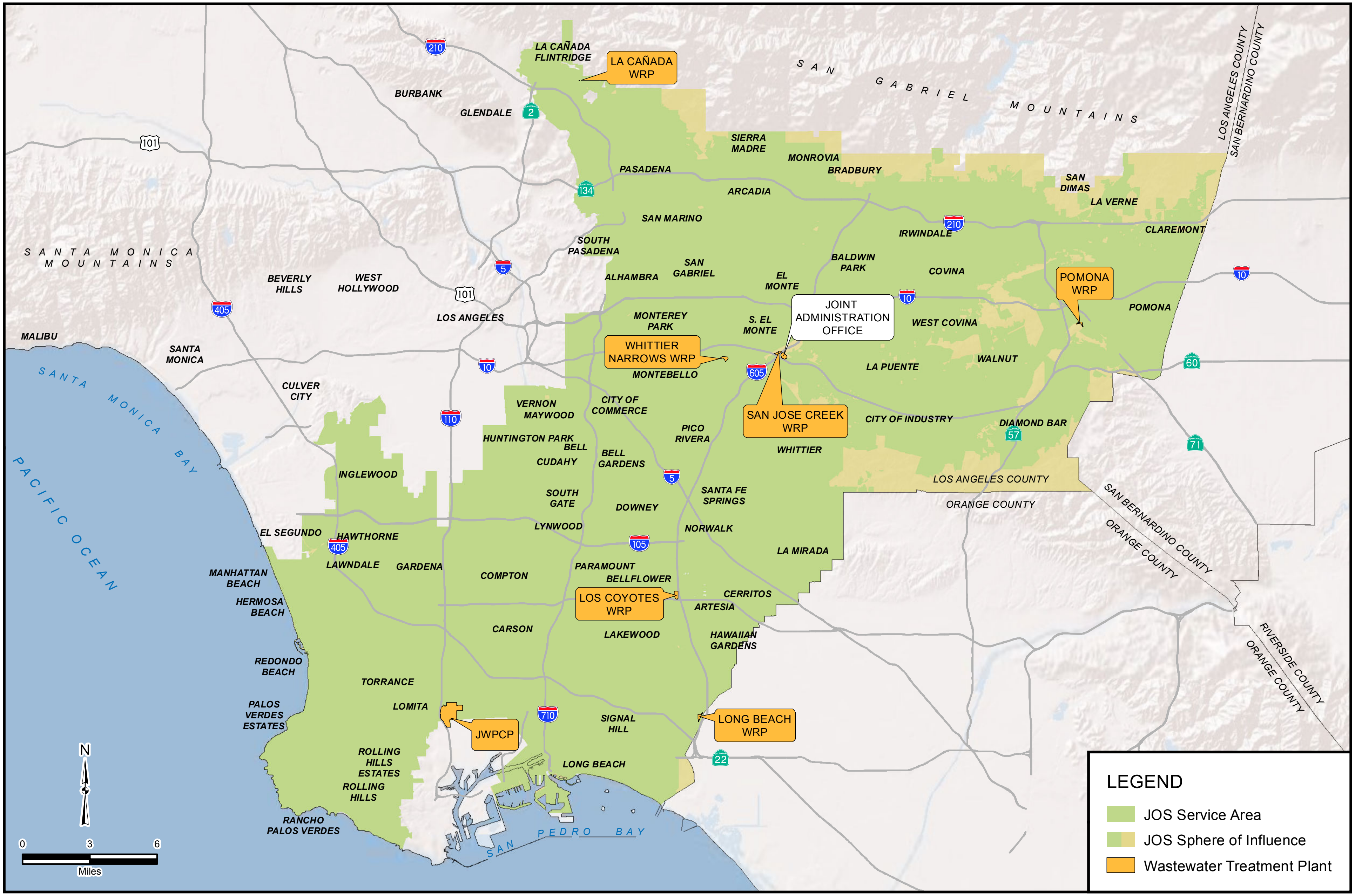


FIGURE 2-1

CLEARWATER Program

Clearwater Program Planning Area

Source: Sanitation Districts of Los Angeles County 2011, Thomas Bros 2011, ESRI 2011

2.1.3 Climate

Prevailing winds in the Los Angeles Region emanate from the west and southwest. Moist air from the Pacific Ocean is carried inland into the Los Angeles Basin until it is forced upward by the surrounding mountains. The resulting storms, most common from November through March, are typically followed by dry periods during summer months. Differences in topography are responsible for large variations in temperature, humidity, precipitation, and cloud cover throughout the region. The coastal plains, which are noted for their subtropical "Mediterranean" climate, are characterized by pronounced seasonal changes in rainfall (mild rainy winters and warm dry summers) but relatively modest transitions in temperature. The inland slopes and basins are characterized by more extreme temperatures and little precipitation. Precipitation generally occurs as rainfall, although snowfall can occur at high elevations. Most precipitation occurs during a few major storms (LARWQCB 1995).

Average annual temperatures in the JOS service area range from a minimum of 52 degrees Fahrenheit (°F) to a maximum of 77°F. During the dry season (April through October), average temperatures range from 57°F to 81°F; during the wet season (November through March), the range is from 46°F to 70°F. Total annual precipitation is about 15 inches, averaging about 2 inches during the dry season and 13 inches during the wet season. A monthly climate summary for the JOS services area is shown in Table 2-2.

Table 2-2. Joint Outfall System Service Area Monthly Climate Summary

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
Average Maximum Temperature (°F)	67.4	68.7	70.1	73.8	76.2	80.5	86.3	87.1	85.5	80.2	73.6	68.3	76.5
Average Minimum Temperature (°F)	43.6	45.2	47.1	50.0	54.0	57.5	61.3	62.1	60.2	55.1	48.0	43.7	52.3
Average Total Precipitation (inches)	3.3	3.6	2.5	1.0	0.3	0.1	0.0	0.1	0.2	0.5	1.4	2.2	15.2

Source: Los Angeles Almanac 2010

2.1.4 Geography and Topography

The JOS provides wastewater management services to communities within the San Gabriel Valley, the Los Angeles Coastal Plain, and the mountain foothills. Geographically, the JOS service area is bounded by the San Gabriel Mountains to the north, the Verdugo Mountains to the west, the Pacific Ocean to the west and south, and Orange and San Bernardino Counties and the Puente and San Jose Hills to the east. Major geographic and topographic features within and surrounding the JOS are shown on Figure 2-2. Due to the southward sloping topographic gradient within this area, the Los Angeles and San Gabriel Rivers and the Rio Hondo generally flow southward into the San Pedro Bay. The Sanitation Districts of Los Angeles County (Sanitation Districts) utilize the regional topography to provide gravity flow throughout the majority of the JOS service area. Further description of the regional geography and topography is provided in Chapter 8 of the Clearwater Program environmental impact report/environmental impact statement (EIR/EIS).

2.1.5 Geology

The JOS service area occupies an area within two adjoining geomorphic provinces: the Peninsular Ranges and the Transverse Ranges. The Peninsular Ranges geomorphic province extends south from the southeastern terminus of the Santa Monica Mountains and the foothills of the San Gabriel Mountains into Baja California and includes the southern portion of the JOS service area. The Transverse Ranges

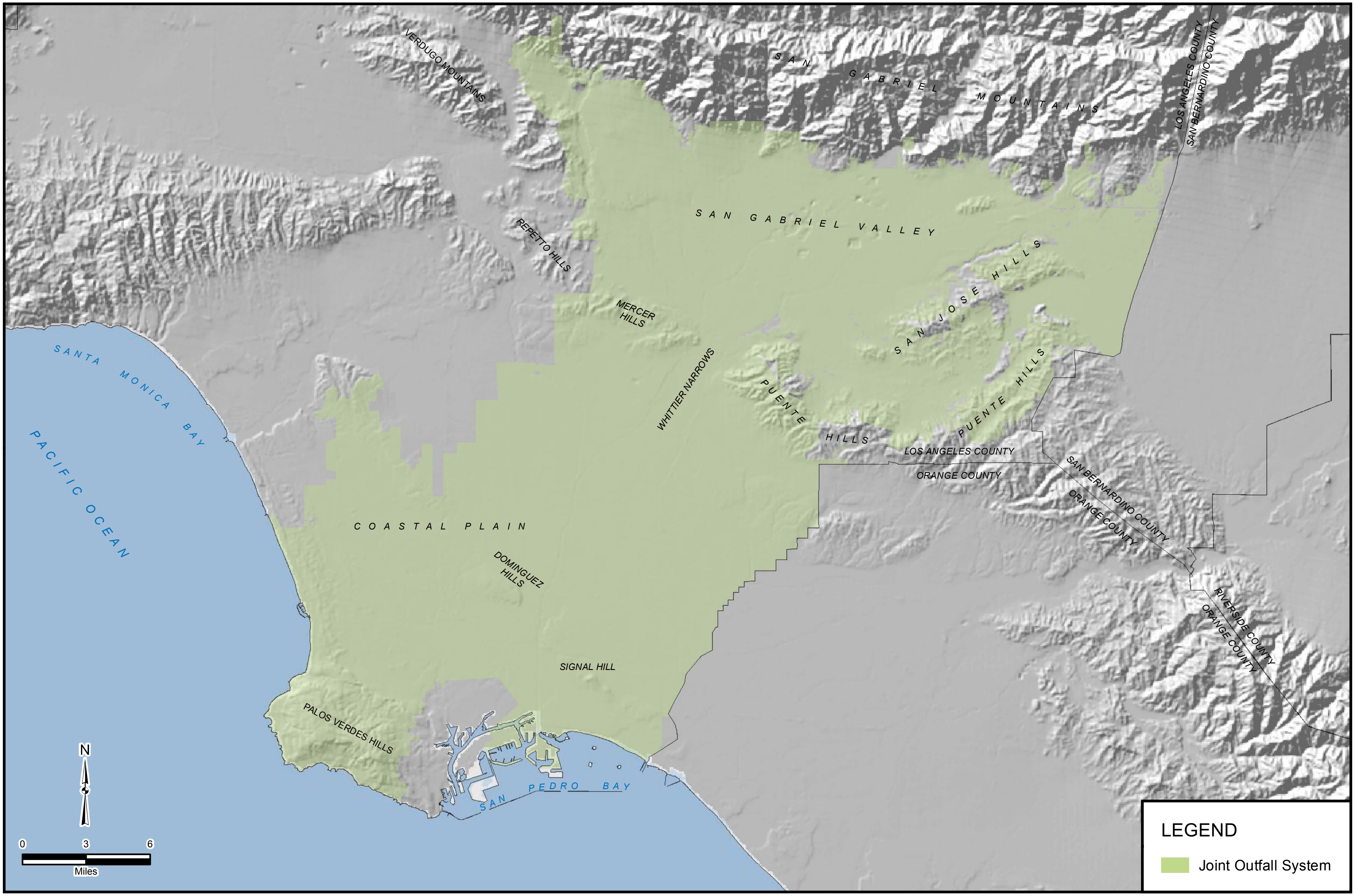


FIGURE 2-2

CLEARWATER Program

Major Geographic and Topographic Features within the JOS

Source: Sanitation Districts of Los Angeles County 2011, ESRI 2011

geomorphic province trends east-west along the northern border of the Peninsular Ranges geomorphic province and includes the northern portion of the JOS service area. The Coastal Plain lies within the Peninsular Ranges geomorphic province, while the San Gabriel Valley lies within the transition zone separating these two geomorphic provinces.

As shown on Figure 2-3, the JOS service area is located in a seismically active region. Because of the number of active faults in Los Angeles County, the JOS service area is within the highest seismic hazard risk zone as defined by both the California Department of Conservation Division of Mines and Geology and the Uniform Building Code standards. Further description of the regional geology is provided in Chapter 8 of the Clearwater Program EIR/EIS.

2.1.6 Hydrology

The major hydrologic features in the JOS service area are the Los Angeles River Basin, San Gabriel River Basin, and Los Angeles Coastal Plain as identified in the Water Quality Control Plan, Los Angeles Region, Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties. Precipitation in the Los Angeles area is characterized by intermittent but regular rainfall during winter months, with 85 percent of the annual precipitation occurring between November and March. Rainfall during the summer months is usually negligible. Precipitation as snow is common in higher elevations of the upper watersheds of the San Gabriel Mountains. Monthly precipitation totals are quite variable, but annual precipitation usually averages 10 to 20 inches. Annual precipitation typically is highest in the mountains and higher inland areas.

Major rivers of the region include the Los Angeles River, San Gabriel River, and Rio Hondo. The major creeks include the San Jose and Coyote Creeks. Other water bodies near or tributary to these streams are Big Dalton Wash; Puddingstone Wash and Reservoir; Legg Lake; and the Morris, Cogswell, Santa Fe, and San Gabriel Reservoirs. These water bodies are shown on Figure 2-4.

As shown in Figure 2-5, the major groundwater basins in the JOS service area include the Coastal Plain of Los Angeles, San Gabriel Valley, and Upper Santa Ana Valley Basins. Sub-basins within these major basins include the Central, West Coast, Raymond, Claremont Heights, Live Oak, Puente, Spadra, and Pomona Basins (Metropolitan Water District of Southern California [MWD] 2007). Groundwater is a significant source of water supply for some areas within the JOS, and the replenishment of coastal plain aquifers is vital to maintain the utility of these supplies. Imported water and recycled water are used to reduce water quality problems associated with groundwater overdraft and subsequent seawater intrusion.

Further description of the regional hydrology is provided in Chapter 11 of the Clearwater Program EIR/EIS, and a more extensive discussion of recycled water and other water resources is provided in Chapter 4 of this document.

2.1.7 Air Quality

The JOS service area lies completely within the South Coast Air Basin (SCAB), which is regulated by the South Coast Air Quality Management District (SCAQMD). The SCAB covers an area of approximately 6,745 square miles with a population of 14.6 million, and includes the metropolitan areas of Los Angeles, San Bernardino, and Riverside Counties, and all of Orange County as shown on Figure 2-6. It is bounded on the northwest by Ventura County and on the south by San Diego County. The northern boundary runs roughly along the Angeles National Forest, north of the ridge lines of the San Gabriel and San Bernardino Mountains. The eastern border runs north–south through the San Bernardino and San Jacinto Mountains.

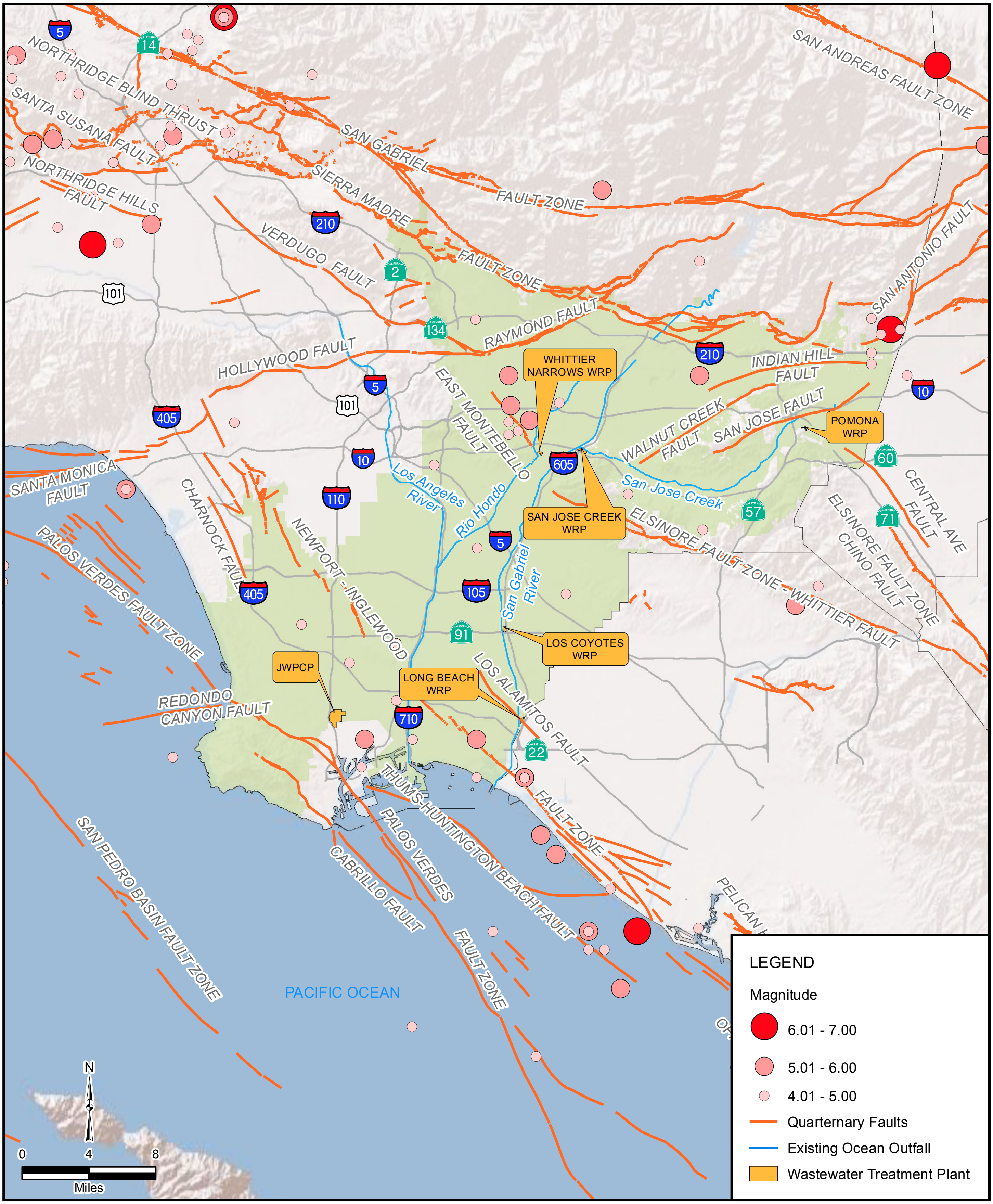


FIGURE 2-3

CLEARWATER Program

Regional Faults and Historical Earthquakes in the JOS Service Area

Source: Sanitation Districts of Los Angeles County 2011, USGS 2010, URS 2011, Thomas Bros 2011, ESRI 2011

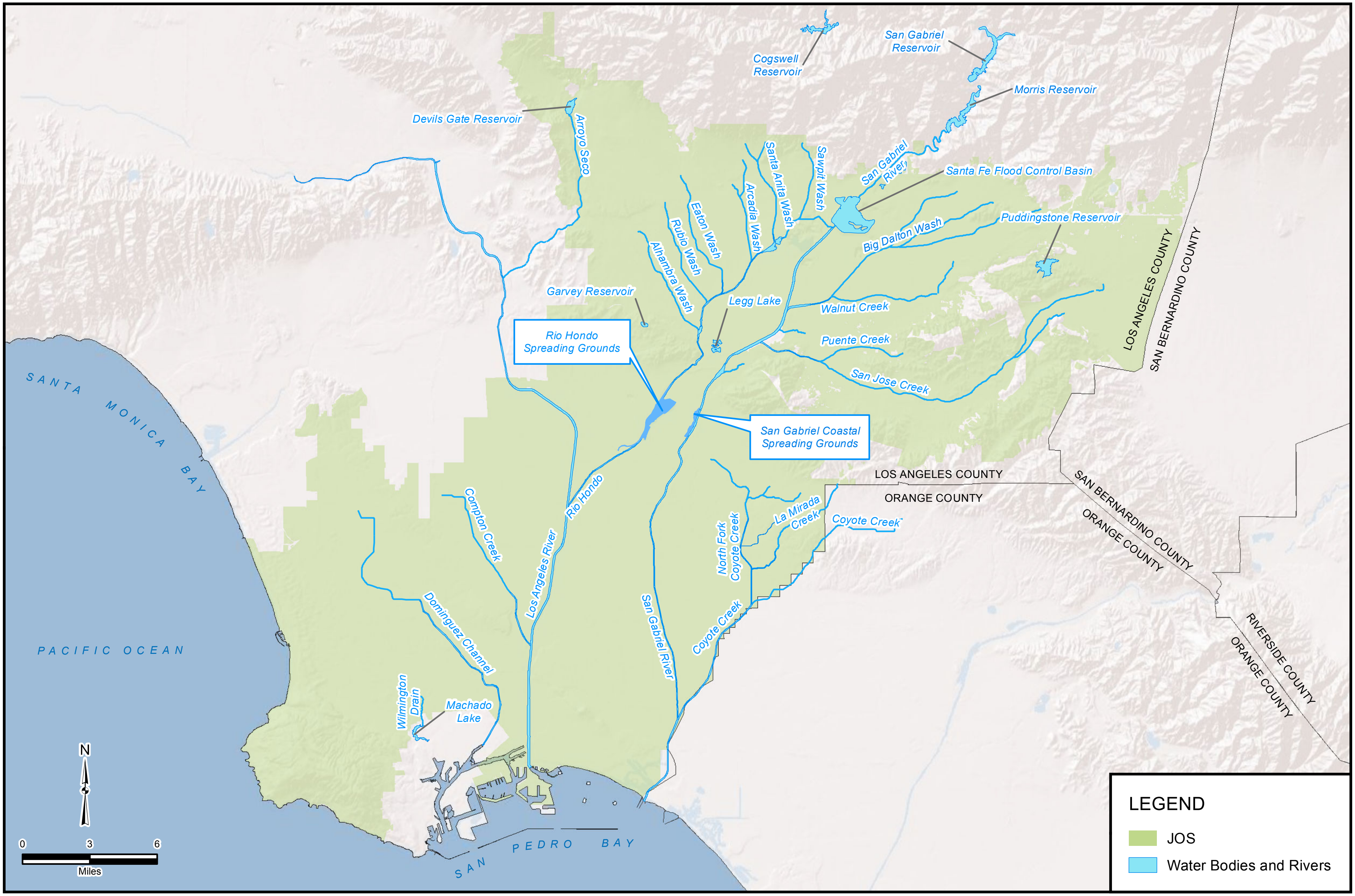


FIGURE 2-4

Water Bodies Within the JOS

Source: Sanitation Districts of Los Angeles County 2011, Thomas Bros 2011, ESRI 2011

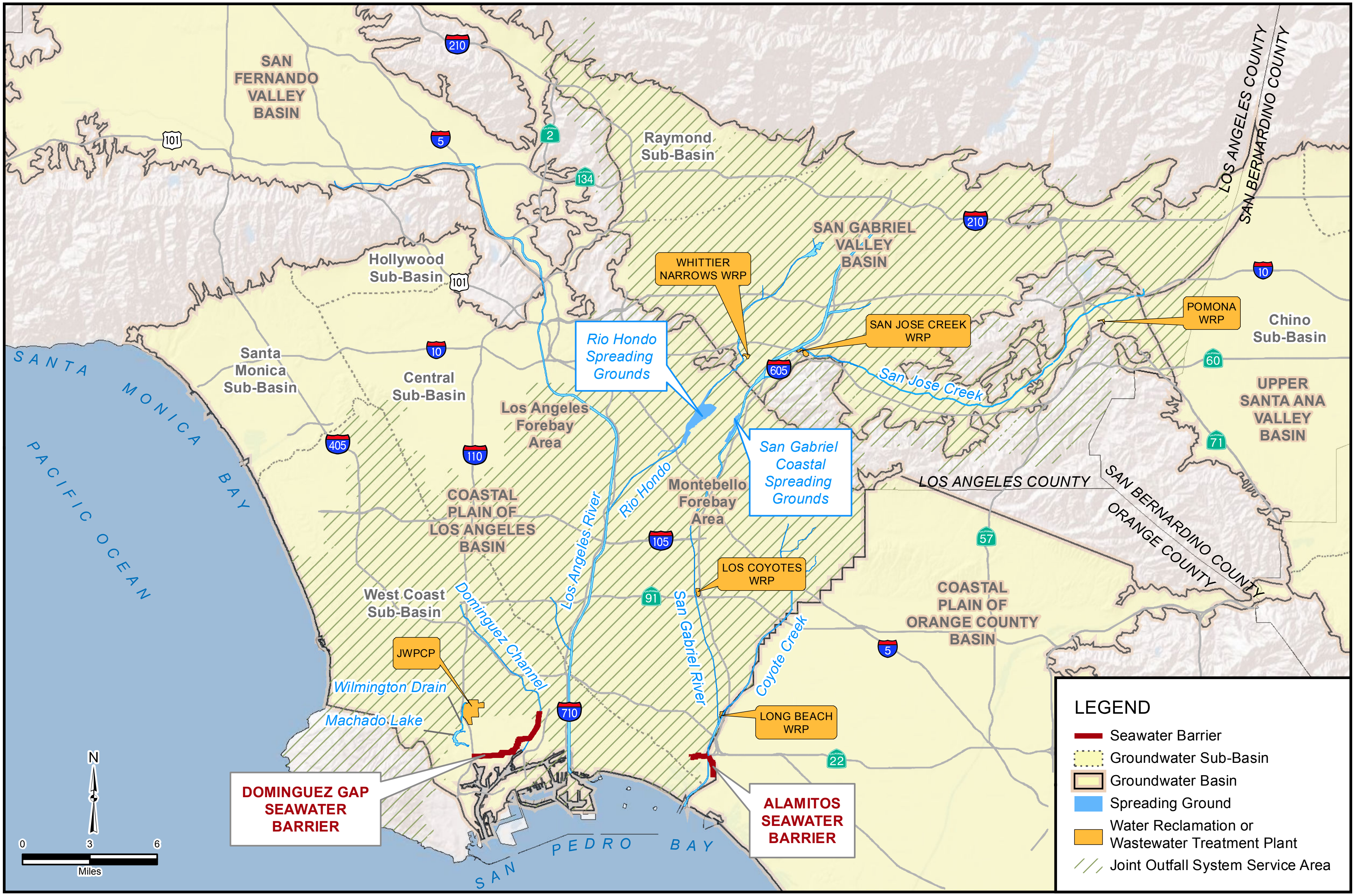


FIGURE 2-5

CLEARWATER Program

Regional Groundwater Basins

Source: Sanitation Districts of Los Angeles County 2011, Cal-Atlas 2011 (Teale Ground Water Basins 2007), LA County DPW 2011, ESRI 2011

FIGURE 2-6

CLEARWATER Program

South Coast Air Basin

Source: Sanitation Districts of Los Angeles County 2011, South Coast Air Quality Management Division 2011, Thomas Bros 2011, ESRI 2011

The Banning Pass area is excluded from the air basin. The western boundary is the entire shoreline of Los Angeles and Orange Counties.

The air quality in the SCAB has improved significantly over the last several decades. However, of the national ambient air quality standards (NAAQS) established for the six criteria pollutants (ozone, lead, sulfur dioxide, nitrogen dioxide, carbon monoxide, respirable particulate matter [PM_{10}], and fine particulate matter [$PM_{2.5}$]) and the additional four pollutants with state standards (sulfates, hydrogen sulfide, vinyl chloride, and visibility reducing particles), the SCAB is designated as a nonattainment area for federal and state standards for ozone and $PM_{2.5}$.

In addition to the NAAQS, greenhouse gas (GHG) regulations apply to the JOS service area. The California Global Warming Solutions Act of 2006 (also known as AB 32) established a comprehensive program of regulatory and market mechanisms to achieve reductions of GHGs. A scoping plan was adopted by the California Air Resources Board on December 12, 2008. The AB 32 scoping plan contains the main strategies that the state of California will use to reduce the GHGs that cause climate change. The scoping plan has a range of GHG reduction actions that include direct regulations, alternative compliance mechanisms, monetary and nonmonetary incentives, voluntary actions, market-based mechanisms such as a cap-and-trade system, and an AB 32 cost of implementation fee regulation to fund the program.

Further description of the regional air quality and GHGs is provided in Chapters 5 and 9, respectively, of the Clearwater Program EIR/EIS.

2.2 Demographics

A socioeconomic profile of the existing population, housing, income, and employment of the JOS service area and Los Angeles County is provided in this section. Projected growth for each JOS treatment plant drainage area is not addressed in this section, but will be discussed in Section 4.8. The analysis presented in this section is based on information provided by the U.S. Census, the Southern California Association of Governments (SCAG), and the California Department of Finance (DOF).

2.2.1 Population

In 1950, approximately 4.2 million people resided in Los Angeles County; by 2010, the population had more than doubled to approximately 9.8 million. This represents an increase of 5.6 million residents over 60 years, or an average growth rate of approximately 1 percent per year. In the last census decade (2000–2010), the population of the county grew by 300,000 (or 0.3 percent per year), which is approximately half the population increase of the previous decade. Approximately 50 to 52 percent of the county population resides within the JOS service area (based on a comparison of 1970 through 2010 population values). Population growth trends within the county and the JOS service area are shown in Table 2-3. Population growth trends within the JOS service area are also shown in Figure 2-7.

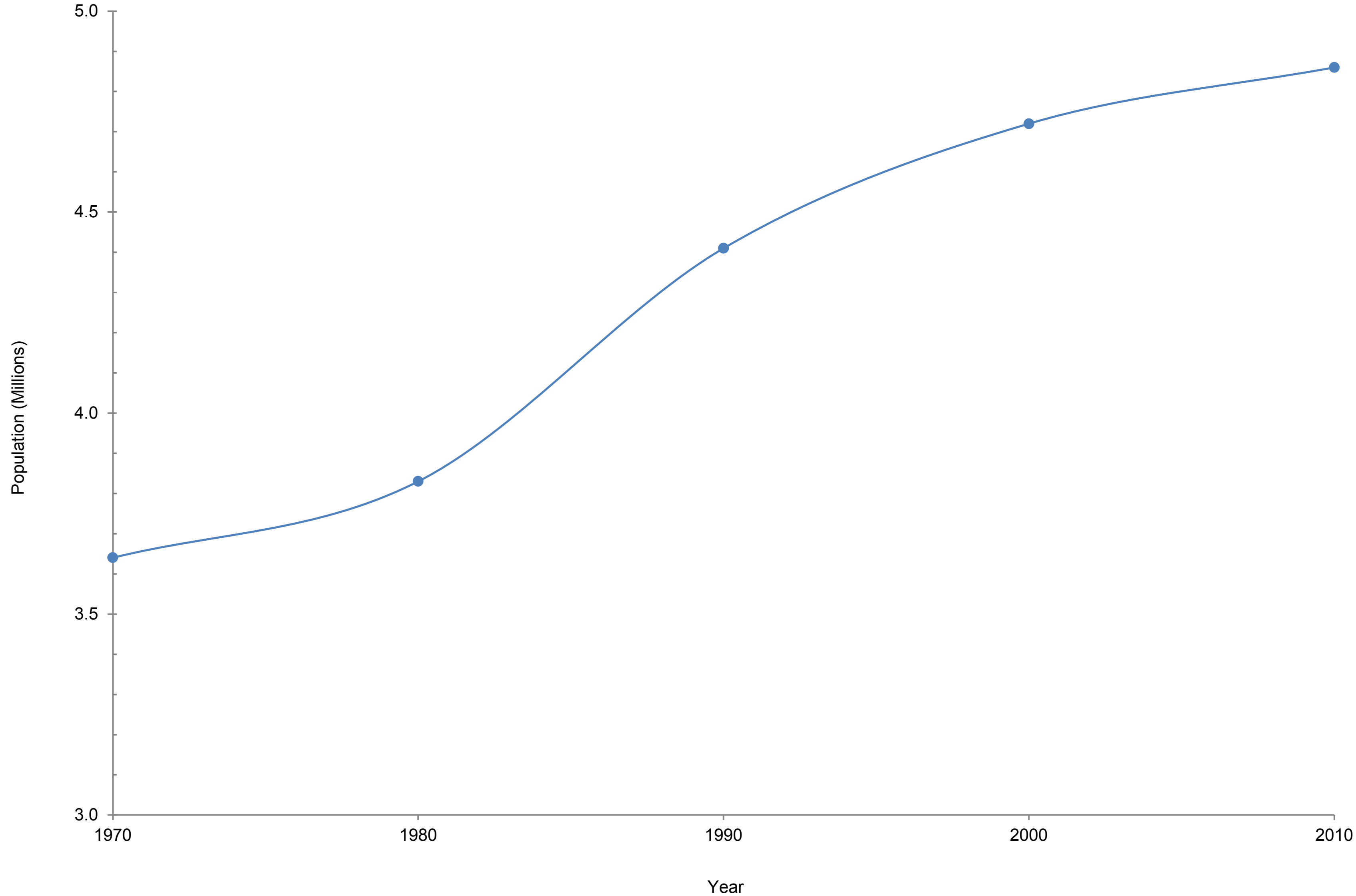


FIGURE 2-7

CLEARWATER Program

Population in the Joint Outfall System Service Area

Source: CA Department of Finance 2011

Table 2-3. Population in Los Angeles County and Joint Outfall System Service Area From 1970 to 2010

Year	Los Angeles County	JOS Service Area
1970	7,015,648	3,644,792[a]
1980	7,473,757	3,827,742[a]
1990	8,863,164	4,411,807[a]
2000	9,519,484	4,720,505[a]
2010	9,818,605[b]	4,840,048[b]

[a] Population figures have been normalized to the 1990 census tract boundaries for 1970 through 2000 by DOF, which enabled decade-to-decade population comparison within the JOS Service area. Source: California Department of Finance Tract-to-Tract Comparability File 2009

[b] Source: 2010 Census Summary File 1 prepared by the U.S. Census Bureau 2011

The racial and ethnic distributions within the JOS service area and Los Angeles County have changed significantly from 1970 through 2010. The distribution of population by race and ethnicity within Los Angeles County over this period is shown on Figure 2-8.

A significant shift in the predominant racial□ethnic group has occurred during the last 40 years. In 1970, 69 percent of the population in Los Angeles County was white and 19 percent was Hispanic. By 2010, the white percentage of the population had decreased to 19 percent, and the Hispanic percentage had increased to 53 percent. The numbers within the JOS service area are within a few percentage points of the county figures. The changes in both the JOS service area and Los Angeles County are summarized in Table 2-4.

Table 2-4. Ethnic and Racial Population Composition in Joint Outfall System Service Area and Los Angeles County From 1970 to 2010

	White		Black		Asian[c]		Hispanic		Other Non-Hispanic[c]	
Year	JOS	LA County	JOS	LA County	JOS	LA County	JOS	LA County	JOS	LA County
1970	69□ [a]	68□	9□ [a]	11□	NA	NA	19□ [a]	18□	2□ [a]	3□
1980	50□ [a]	53□	12□ [a]	12□	NA	NA	31□ [a]	28□	7□ [a]	7□
1990	35□ [a]	41□	11□ [a]	11□	NA	NA	41□ [a]	38□	12□ [a]	11□
2000	24□ [a]	31□	10□ [a]	9□	NA	NA	49□ [a]	45□	17□ [a]	15□
2010[b]	19□	28□	9□	8□	16□	13□	53□	48□	3□	3□

[a] Calculated by area-weighted GIS overlay analysis on 1990 census tracts. Source: California Department of Finance Tract-to-Tract Comparability File 2009

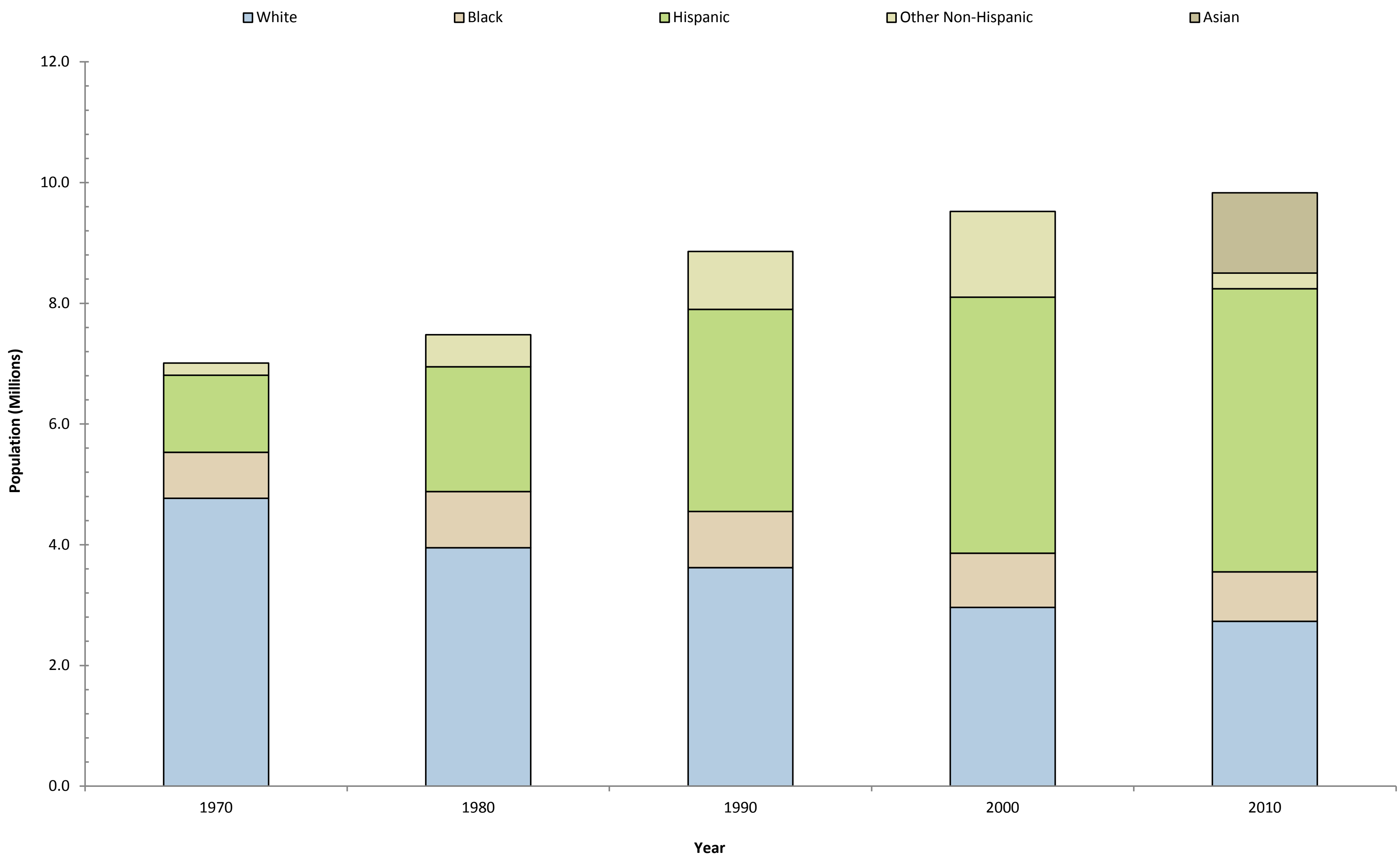
[b] Source: 2010 Census Summary File 1 prepared by the U.S. Census Bureau 2011

[c] Asian population composition is included in □Other Non-Hispanic□from 1970 to 2000.

NA □not available

2.2.2 Housing

Census data indicate that there were approximately 3.45 million dwelling units in Los Angeles County in 2010, and 1.56 million within the JOS service area. The total housing for the county and the JOS service area for 1970 through 2010 is presented in Table 2-5. In 2000, approximately 65.3 percent of housing within the JOS service area was single-family units. By comparison, countywide housing stock was approximately 56.1 percent single-family units.



Note: Asian population composition is included in "Other Non-Hispanic" from 1970 to 2000.

FIGURE 2-8

CLEARWATER Program

Distribution of Population by Race and Ethnicity in Los Angeles County

Source: 2010 Census Summary File 1, US Census Bureau 2011

Table 2-5. Dwelling Units in Joint Outfall System Service Area and Los Angeles County From 1970 to 2000

	Total Units		Single Family	
Year	**JOS Service Area**	**LA County**	**JOS Service Area**	**LA County**
1970	1,227,619	2,536,173	834,852	1,512,595
1980	1,361,217	2,852,770	876,727	1,604,290
1990	1,457,272	3,163,343	934,993	1,739,874
2000	1,487,929	3,270,963	971,037	1,835,134
2010[a]	1,556,810	3,445,076	NA	NA

[a] Source: 2010 Census Summary File 1 prepared by the U.S. Census Bureau 2011
NA □ not available
Source: California Department of Finance Tract-to-Tract Comparability File 2009

Vacancy rates are defined as the percentage of unoccupied units in the total available housing stock. Low vacancy rates indicate that the housing market is constrained. According to Census data, the Los Angeles County vacancy rate of 5.9 percent indicates a relatively small housing shortage.

An increase in persons-per-household can indicate a shortage in housing or decreased housing affordability. The county vacancy rate and persons-per-household trends are shown in Table 2-6. The vacancy rate declined from 5.5 percent in 1990 to 4.2 percent in 2000 and then increased to 5.9 percent in 2010.

Table 2-6. Vacancy Rate and Persons per Household in Los Angeles County From 1980 to 2010

Year	Percent Vacancy	Persons per Household
1980	4.31□	2.620
1990	5.49□	2.802
2000	4.19□	2.910
2010	5.92□	2.850

Source: U.S. Census Bureau 2011

2.2.3 Income

According to the Census□2005-2009 American Community Survey (ACS), the median household income was □54,828 in Los Angeles County in 2009 and □61,906 within the JOS service area. The median household income for the county and the JOS service area for 1970 through 2009 are presented in Table 2-7.

Table 2-7. Median Household Income in Joint Outfall System Service Area and Los Angeles County From 1970 to 2009

	Median Household Income	
Year	**JOS Service Area**	**Los Angeles County**
1970	□9,641	□9,740
1980	□19,511	□18,994
1990	□38,565	□37,980
2000	□47,834	□47,102
2009[a]	□61,906	□54,828

[a] Source: 2005-2009 American Community Survey prepared by the U.S. Census Bureau 2010
Source: California Department of Finance Tract-to-Tract Comparability File 2009

2.2.4 Employment

With an estimated Gross Regional Product (GRP) of approximately $865 billion in 2007, the Southern California region (six-county SCAG region that includes Imperial, Los Angeles, Orange, Riverside, San Bernardino, and Ventura Counties) is considered one of the major centers of economic production in the world. The GRP of the Southern California economy ranks sixteenth in the world.

Employment is one of the major indicators of a region's economic health. Total employment figures for 1970 through 2009 for the SCAG region, Los Angeles County, and the JOS service area are shown in Table 2-8. Between 1990 and 2009, employment growth in the SCAG region was 14.0 percent based on the ACS and DOF estimates normalized to 1990 census tracts. In 2009, there were approximately 8.1 million jobs in the SCAG region, approximately 56 percent of which were located in Los Angeles County, and 44 percent of which were located in the JOS service area.

Most significantly, the DOF data show a decrease of 250,305 civilian jobs between 1990 and 2000 in Los Angeles County, 51 percent (128,560) of which were in the JOS service area. The Los Angeles County unemployment rate has fluctuated generally between 6 percent and 10 percent since 1990, with only a brief drop below 5 percent in 2006–2007. By 2010, the unemployment rate had increased to 12.7 percent.

Table 2-8. Civilian Jobs in the Southern California Association of Governments Region, Los Angeles County, and the Joint Outfall System Service Area From 1970 to 2009

Year	SCAG Region	Los Angeles County	JOS Service Area
1970	3,903,722	2,824,789	1,418,923
1980	5,315,413	3,470,076	1,717,768
1990	6,949,076	4,203,792	2,018,271
2000	6,948,813	3,953,487	1,889,711
2009[a]	8,082,681	4,522,378	2,179,888

[a] Source: 2005-2009 American Community Survey prepared by the U.S. Census Bureau 2010
Source: California Department of Finance Tract-to-Tract Comparability File 2009

The 2000 and 2009 jobs-to-housing ratios for the JOS service area are 1.27 and 1.40, respectively, as compared to 1.21 and 1.31 for the entire county for the same respective years. There were more jobs per household in 2009 than in 2000 both in the JOS service area and in the county in general.

Chapter 3
LAWS AND REGULATIONS

3.1 Introduction

The collection and treatment of wastewater and the management of treated wastewater effluent is subject to federal, state, and local regulations. Furthermore, federal and state funding for capital projects is contingent upon the fulfillment of additional regulatory requirements. A broad summary of federal, state, and local laws, regulations, and plans that must be considered when planning for wastewater treatment and effluent management facilities is provided in this chapter.

3.2 Regulations for Federal and State Waters

This section discusses regulations pertaining to federal and state waters that typically impact publicly owned treatment works (POTWs). The Joint Outfall System (JOS) is subject to the federal regulations listed in Section 3.2.1 because it discharges to waters of the United States (U.S.).

3.2.1 Federal Regulations

3.2.1.1 Refuse Act

Federal regulation of discharges to bodies of water began in 1899 with the passage of the Refuse Act, which was primarily intended to protect navigation by preventing discharges that might interfere with the use of the nation's waterways as transportation corridors.

3.2.1.2 Water Pollution Control Act

The Water Pollution Control Act of 1948 was the first federal legislation to address water quality, which had been historically regulated on state and local levels. This act reaffirmed that water pollution control was primarily a state responsibility, but it also provided the federal government with the authority to conduct investigations, research, and surveys. In 1956, the Water Pollution Control Act was amended to include provisions for federal grants to support the construction of POTWs and direct federal regulation of waste discharges.

3.2.1.3 Water Quality Control Act

The Water Quality Control Act, enacted in 1965, required states to establish federally approved ambient water quality standards for interstate water courses and to develop federally approved implementation plans for controlling pollution sufficiently to meet these standards.

3.2.1.4 Clean Water Act

The 1972 amendments to the federal Water Pollution Control Act marked the beginning of the current system of federal water quality regulation and increased the level of federal grant funding for municipal wastewater treatment facilities. Goals of the 1972 amendments included the elimination of discharges of pollutants to navigable waters of the U.S. by 1985 and, wherever attainable, the protection of fishable and swimmable waters by 1983. The 1972 amendments initiated the National Pollutant Discharge Elimination System (NPDES) permit program, which required the issuance of discharge permits for all municipal and industrial point sources that discharge into waters of the U.S.

The 1972 amendments preserved the system of state-established water quality criteria promulgated under the 1965 Water Quality Act, but the states were additionally required to review and update these standards every 3 years and to submit revisions to the U.S. Environmental Protection Agency (EPA) for approval. These amendments required the establishment of water quality standards, consisting of the designated uses of the navigable waters and the water quality criteria for such waters. The standards and criteria must take into consideration the water source's use and value for public water supplies; propagation of fish and wildlife; and recreational, agricultural, industrial, navigation, and other purposes. Where compliance with identified technology-based standards was not sufficient to ensure attainment of approved water quality standards, the 1972 amendments directed the permitting agency to administer water quality-based effluent limitations in permits.

The federal Water Pollution Control Act was amended a third time in 1977, and the amended act was renamed the Clean Water Act (CWA). The 1977 amendments extended some of the deadlines identified in 1972 and more clearly delineated the manner in which conventional and toxic water pollutants were to be treated. The 1977 CWA required that toxic pollutants be managed, either through the effluent guidelines program for major industrial dischargers or through the pretreatment program for specified industries discharging to POTWs.

The 1987 amendments to the CWA (1) ended the construction grant program and replaced it with the State Revolving Fund (SRF) loan program for the construction of municipal sewerage facilities, (2) required the states to promulgate water quality standards for toxic water pollutants for which advisory water quality criteria had been developed pursuant to Section 304(a) of the CWA, and (3) established new requirements for the states to develop and implement programs to control non-point source pollution. To address non-point source pollution, the 1987 amendments also required the issuance of NPDES permits for storm water discharges associated with municipal, industrial, and construction activities.

3.2.1.5 National Pretreatment Program

The National Pretreatment Program, established through the CWA in 40 Code of Federal Regulations (CFR) Part 403, requires implementation of pretreatment programs for POTWs with capacities greater than 5 million gallons per day (MGD) that receive pollutants from industrial sources that may interfere with POTW operations. POTWs are required to prohibit or limit discharges of pollutants from industrial facilities that could pass through the treatment processes into receiving waters, interfere with treatment plant operations, or limit biosolids management options. Smaller POTWs with significant industrial influent, treatment process problems, or violations of effluent limitations are also required to implement pretreatment programs. In addition, federal standards have been established to regulate sewer discharges from specific types of industries.

POTWs are responsible for developing, implementing, and enforcing their own pretreatment programs. If POTWs fail to properly administer pretreatment programs, they are subject to oversight by state and federal regulatory agencies and may be subjected to enforcement actions, penalties, fines, or other remedies provided for by the CWA.

The Sanitation Districts of Los Angeles County (Sanitation Districts) developed and implemented an industrial wastewater pretreatment program in 1972 with the adoption of the Wastewater Ordinance. Local discharge limits for industrial wastewater dischargers were adopted in 1975, and the EPA approved the Sanitation Districts' program in March 1985. Local industrial wastewater discharge limits were established to ensure compliance with NPDES and waste discharge requirements (WDRs) permit limits for each treatment plant, as well as to protect treatment plant operations and biosolids quality. The pretreatment program has been very successful in reducing the discharge of contaminants.

The existing industrial wastewater discharge limits are presented in Table 3-1. The Sanitation Districts regularly review these limits to determine if modifications are needed. Modifications to the discharge limits may be made if determined necessary in order to maintain biosolids quality and/or meet NPDES and WDR permit limits.

Table 3-1. Industrial Wastewater Discharge Limits

Constituent	Instantaneous Maximum Limit (mg/L)
Arsenic	3
Zinc	25
Cadmium	15
Chromium (Total)	10
Copper	15
Cyanide (Total)	10
Lead	40
Mercury	2
Nickel	12
Silver	5
TICH[a]	Essentially None[b]

[a] Total Identifiable Chlorinated Hydrocarbons (TICH) consists of aldrin, dieldrin, chlordane (cis & trans), trans-nonachlor, oxychlordane, heptachlor, heptachlor epoxide, hexachlorocyclohexane (alpha-, beta-, delta-, and gamma- isomers), toxaphene, polychlorinated biphenyls, and pp' and op' isomers of dichlorodiphenyltrichloroethane (DDT), dichlorodiphenyldichloroethane (DDD), and dichlorodiphenyldichloroethylene (DDE).

[b] TICH must be maintained below detection limits.

mg/L = milligrams per liter

In addition, the following numerical requirements from the Sanitation Districts' Wastewater Ordinance apply:

- The pH of the wastewater discharged shall not be below 6.0 at any time
- The dissolved sulfide concentration of the wastewater shall not exceed 0.1 milligrams per liter (mg/L) at any time
- The temperature of the wastewater shall not exceed 140 degrees Fahrenheit (°F) at any time, and shall not cause the wastewater influent to a Sanitation Districts' treatment plant to exceed 104°F

3.2.1.6 National Toxics Rule and California Toxics Rule

The National Toxics Rule (NTR) and the California Toxics Rule (CTR) contain regulatory criteria adopted pursuant to Section 303(c) of the CWA that apply to inland surface waters and enclosed bays and estuaries in California that are waters of the U.S. In 1992, the EPA promulgated priority toxic pollutant water quality criteria for select constituents for California in the NTR. The EPA promulgated the CTR in response to litigation that overturned the Inland Surface Waters Plan (ISWP) (see Section 3.2.2.2) and the Enclosed Bays and Estuaries Plan (two statewide water quality control plans) in 1994. The CTR took effect in May 2000 and established numeric criteria for the remaining priority toxic pollutants required under Section 303(c)(2)(B) of the CWA. The NTR and CTR include criteria for the protection of aquatic life and human health. In translating these criteria to effluent limitations in permits, California Regional Water Quality Control Boards (RWQCBs) determine which designated beneficial uses apply to the receiving waters and base the permit limits on the most stringent applicable criteria.

3.2.1.7 Section 404 and Section 401 Permits

Section 404 of the CWA established a permit program for regulation of the discharge of dredged material or fill into waters of the U.S. The permit program is administered by the Secretary of the Army, acting through the U.S. Army Corps of Engineers (Corps). Section 404 authorizes the EPA to regulate the discharge of any dredged material or fill that can cause adverse effects on municipal water supplies, recreational areas, wildlife, fisheries, or shellfish beds.

Section 401 of the CWA provides the states with the authority to regulate hydrologic modification projects that require Section 404 permits. In California, the RWQCBs oversee the 401 Water Quality Certification process.

3.2.2 State Regulations

3.2.2.1 The Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act of 1969 (PCA) established the current legal framework for water quality regulation in California. The PCA requires the State Water Resources Control Board (SWRCB) to adopt water quality control plans and policies for the protection of water quality. The SWRCB is the primary agency responsible for formulating policies to protect surface waters and groundwater supplies within the state of California. The PCA also established nine RWQCBs to develop and implement water quality protection programs at the local level.

The SWRCB has delegated authority for the day-to-day administration and enforcement of the PCA to the regional level. Each RWQCB develops regional water quality control plans (basin plans) that identify important water resources within its region and specify the beneficial uses for each of these resources. A basin plan must:

- Identify the beneficial uses of the waters to be protected
- Establish water quality objectives for the reasonable protection of those beneficial uses
- Establish an implementation program for achieving water quality objectives

Each basin plan must be approved by the SWRCB, the Office of Administrative Law, and the EPA. Basin plans are scheduled for updates on a 3-year (triennial) cycle.

The Sanitation Districts' JOS facilities are under the jurisdiction of the Los Angeles Regional Water Quality Control Board (LARWQCB) and are regulated under the regional basin plan known as the Water Quality Control Plan, Los Angeles Region (Basin Plan). The LARWQCB is also responsible for administering and enforcing NPDES permits, WDRs, and pretreatment programs within the Los Angeles Region.

The PCA authorizes RWQCBs to regulate all discharges to water and/or land in order to protect water quality. RWQCBs issue WDRs to all dischargers in accordance with Section 13263 of the California Water Code (CWC) and are authorized to review WDRs periodically. Authority delegated to RWQCBs includes the issuance of WDRs, review of self-monitoring reports submitted by dischargers, performance of independent compliance checks, and execution of enforcement actions. Enforcement actions, which may be taken by RWQCBs under the authority provided by the PCA, range from orders requiring relatively simple corrective actions to monetary penalties levied for failure to comply with permit provisions.

The RWQCBs have also been delegated responsibilities associated with administering and enforcing the provisions of the CWA. When discharges are made to waters of the U.S., NPDES permits for point source discharges are issued. Under Chapter 5.5 of the PCA, WDRs are deemed equivalent to NPDES permits issued under the CWA. Thus, NPDES permits are generally issued as both federal and state permits in California and are generally assigned both a state order number and an NPDES permit number.

3.2.2.2 Statewide Implementation Policy

In 1991, the SWRCB adopted the ISWP in fulfillment of the requirements of Section 303 of the CWA. The ISWP contained narrative and numeric water quality objectives for toxic pollutants, as well as chronic and acute toxicity objectives and provisions for implementation. Pursuant to the CWA, the SWRCB submitted the ISWP to the EPA for review and approval. In November 1991, the EPA took action on the ISWP, which included disapproval of performance goals for categorical water bodies (e.g., effluent-dependent water bodies). Furthermore, in 1991, a lawsuit was filed against the SWRCB regarding the compliance of ISWP with three state laws. This litigation was resolved with the invalidation of the ISWP in March 1994 by the Sacramento County Superior Court and the subsequent rescission of the ISWP by the SWRCB.

In March 2000, the SWRCB adopted a policy establishing provisions to implement the priority toxic pollutant criteria in the CTR and NTR and priority pollutant objectives in the basin plans of each RWQCB. The Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (also known as the Statewide Implementation Policy) establishes provisions for translating CTR criteria, NTR criteria, and basin plan water quality objectives for toxic pollutants into:

- NPDES permit effluent limits
- Compliance determinations
- Monitoring for 2, 3, 7, 8-tetrachlorodibenzo-p-dioxin equivalents
- Chronic toxicity control
- Initiating site-specific objective development
- Granting exceptions

For the NTR and the priority pollutant water quality objectives in basin plans, the policy took effect on April 28, 2000. For the CTR, the policy took effect on May 18, 2000.

3.2.3 Local Regulations

3.2.3.1 Water Quality Control Plan for the Los Angeles Basin

The Basin Plan provides the basis for the regulatory program of the LARWQCB. It sets forth water quality objectives for all surface and groundwaters within the basin. The Basin Plan designates beneficial uses for all such waters and specifies narrative and numerical water quality objectives that must be maintained or attained to protect those uses. The Basin Plan also identifies general types of water quality problems that can threaten beneficial uses of water resources in the Los Angeles region and identifies required or recommended control measures for these problems, including any Total Maximum Daily Loads (TMDLs) that have been established to improve the quality of impaired water bodies. The Basin Plan also summarizes applicable provisions of SWRCB and RWQCB planning and policy documents, as well as water quality management plans adopted by other federal, state, and regional agencies. In addition, past and present water quality monitoring programs are summarized. LARWQCB orders are based on applicable water quality objectives and/or prohibitions specified in the Basin Plan.

3.3 Discharge Regulations for JOS Plants

Five of the six water reclamation plants (WRPs) in the JOS and the Joint Water Pollution Control Plant (JWPCP) hold NPDES permits that must be renewed every 5 years. The WRPs include the Pomona Water Reclamation Plant (POWRP), the San Jose Creek Water Reclamation Plant (SJCWRP), the Whittier Narrows Water Reclamation Plant (WNWRP), the Los Coyotes Water Reclamation Plant (LCWRP), and the Long Beach Water Reclamation Plant (LBWRP). The sixth WRP, the La Cañada Water Reclamation Plant (LACAWRP), does not have an NPDES permit because the entire plant effluent is reused at a golf course; no effluent is discharged to waters of the U.S.

The NPDES permits for the WRPs contain limits that are consistent with specific receiving water quality objectives (WQOs) of the Los Angeles Basin and the Statewide Implementation Policy. In addition to NPDES permits, all the WRPs have water reclamation requirements (WRRs), and the POWRP, SJCWRP, and WNWRP are regulated under the Montebello Forebay Groundwater Recharge Permit. The WRRs for the WRPs contain limits consistent with specific water quality objectives for hydrologic subareas in the Basin Plan.

The primary purpose of the limitations, prohibitions, and provisions in the JWPCP NPDES permit is to implement the objectives of the SWRCB's Water Quality Control Plan for Ocean Waters of California, which was designed to maintain the indigenous marine life and a healthy and diverse marine community.

The current permit and order numbers for the JOS wastewater treatment plants are summarized in Table 3-2.

Table 3-2. Permit and Order Numbers for JOS Plants

	Effluent Discharge			
Plant	NPDES Permit Number	LARWQCB Order Number	LARWQCB Order Number (Reuse)	LARWQCB Order Number (Recharge)
POWRP	CA0053619	R4-2009-0076	81-34, 97-072	91-100, R4-2009-0048
SJCWRP	CA0053911	R4-2009-0078	87-50, 97-072	91-100, R4-2009-0048
WNWRP	CA0053716	R4-2009-0077	88-107, 97-072	91-100, R4-2009-0048
LCWRP	CA0054011	R4-2007-0048	87-51, 97-072	N/A
LBWRP	CA0054119	R4-2007-0047	87-47, 97-072	N/A
LACAWRP	N/A	N/A	00-99	N/A
JWPCP	CA0053813	R4-2011-0151	N/A	N/A

N/A = not applicable

Adoption years for LARWQCB permits are reflected in the first two digits of the order numbers for the permits adopted before 2002 and in the middle four digits of newer permits. Requirements and numerical limits for the JWPCP and the WRPs are summarized in the following sections.

3.3.1 WRP Requirements

All of the JOS WRPs, except the LACAWRP, provide tertiary treatment to influent wastewater. Treatment at these WRPs currently consists of primary sedimentation, activated sludge treatment, coagulation, filtration, chlorination, and dechlorination. With the exception of the LACAWRP, all of the WRPs have been recently upgraded to include nitrification and denitrification.

3.3.1.1 NPDES Requirements

The NPDES permit final effluent limits for conventional and non-conventional constituents are listed in Table 3-3. The permits also contain limits for total coliform bacteria, turbidity, radioactivity, and toxicity. In addition to effluent limits, the WRP NPDES permits contain narrative and numeric receiving water limits for chemical, physical, and biological parameters that are designed to protect the quality of the receiving waters and beneficial uses, and state that pollutants must not be present in wastes discharged at concentrations that pose a threat to groundwater quality.

Total Coliform Limits

The NPDES permits for all WRPs require discharges to be adequately disinfected. To meet this requirement, the effluent must be sampled and tested for total coliform bacteria. The median number of total coliform bacteria for the last 7 days of samples cannot exceed a most probable number (MPN) or Coliform Forming Units (CFU) of 2.2 per 100 milliliters (mL). Additionally, the number of total coliform bacteria cannot exceed an MPN or CFU of 23 per 100 mL in more than one sample during a 30-day period. Additionally, at the POWRP, the number of total coliform bacteria must not exceed an MPN or CFU of 240 per 100 mL in any sample.

Turbidity

For the protection of the water contact recreation beneficial uses, turbidity, which measures the cloudiness or haziness of a fluid caused by suspended solids, must be monitored. WRP NPDES permits have limits of (1) a daily (or 24-hour) average of 2 nephelometric turbidity units (NTUs), (2) a limit of 5 NTUs that cannot be exceeded more than 5 percent of the time (72 minutes) during any 24-hour period, and (3) a maximum of 10 NTUs at any time.

Radioactivity

For the POWRP, SJCWRP, and WNWRP, the NPDES permits require that radioactivity must not exceed the limits specified in Title 22, Chapter 15, Article 5, Section 64443, of the California Code of Regulations (CCR). For the LBWRP and LCWRP, the NPDES permits require that radionuclides will not be present in concentrations that are deleterious to human, plant, animal, or aquatic life or that result in accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal, or aquatic life.

Toxicity

Toxicity requirements were developed for both acute and chronic toxicity. The requirements apply to all of the WRPs. The acute toxicity of the effluent must be such that (1) the average survival in the undiluted effluent for any three consecutive bioassay tests must be at least 90 percent and (2) no single test produces less than 70 percent survival. Noncompliance with these requirements triggers accelerated monitoring and, as necessary, implementation of a Toxicity Identification Evaluation and a Toxicity Reduction Evaluation Workplan.

Table 3-3. NPDES Permit Final Effluent Limits for Conventional and Non-Conventional Constituents for WRP Discharges

		POWRP[a]			SJCWRP[b]			WNWRP[c]			LCWRP[d]			LBWRP[e]		
Constituents	**Units**	**AM**	**AW**	**MD**	**AM**	**AW**	**MD**	**AM**	**AW**	**MD**	**AM**	**AW**	**MD**	**AM**	**AW**	**MD**
BOD (5-day 20°C)	mg/L	20[f]	30[f]	45[f]	20[f]	30[f]	45[f]	20[f]	30[f]	45[f]	20[f]	30[f]	45[f]	20[f]	30[f]	45[f]
TSS	mg/L	15[f]	40[f]	45[f]	15[f]	40[f]	45[f]	15[f]	40[f]	45[f]	15[f]	40[f]	45[f]	15[f]	40[f]	45[f]
pH	standard units	6.5[g]	-	8.5[g]	6.5[g]	-	8.5[g]	6.5[g]	-	8.5[g]	6.5[g]	-	8.5[g]	6.5[g]	-	8.5[g]
Oil and Grease	mg/L	10[f]	-	15[f]	10[f]	-	15[f]	10[f]	-	15[f]	10[f]	-	15[f]	10[f]	-	15[f]
Settleable Solids	mL/L	0.1	-	0.3	0.1	-	0.3	0.1	-	0.3	0.1	-	0.3	0.1	-	0.3
Total Residual Chlorine	mg/L	-	-	0.1	-	-	0.1[f]	-	-	0.1[f]	-	-	0.1	-	-	0.1[f]
TDS	mg/L	750[f]	-	-	750[f]	-	-	750[f]	-	-	-	-	-	-	-	-
Ammonia Nitrogen	mg/L	[f,h]	-	[f,h]	[f,i]	-	[f,i]	[f,i]	-	[f,i]	2.1[f]	-	4.9[f]	1.8[f]	-	4.2[f]
Chloride	mg/L	180[f]	-	-	180[f]	-	-	180[f]	-	-	-	-	-	-	-	-
Sulfate	mg/L	300[f]	-	-	300[f]	-	-	300[f]	-	-	-	-	-	-	-	-
Boron	mg/L	1[f]	-	-	1[f]	-	-	1[f]	-	-	-	-	-	-	-	-
Detergents (as MBAS)	mg/L	0.5[f]	-	-	0.5[f]	-	-	0.5[f]	-	-	-	-	-	-	-	-
Nitrate Nitrite (as N)	mg/L	8[f]	-	-	8[f]	-	-	8[f]	-	-	8[f]	-	-	8[f]	-	-
Nitrate (as N)	mg/L	-	-	-	-	-	-	8[f]	-	-	-	-	-	-	-	-
Nitrite-N (as N)	mg/L	1[f]	-	-	1[f]	-	-	1[f]	-	-	1[f]	-	-	1[f]	-	-
Temperature	F	-	-	86[j]	-	-	86[j]	-	-	86[j]	-	-	86[j]	-	-	86[j]
Removal of BOD and TSS		≥ 85	-	-	≥ 85	-	-	≥ 85	-	-	≥ 85	-	-	≥ 85	-	-

[a] Permit also contains effluent limits for bis(2-ethylhexyl)phthalate, lead, selenium, and total trihalomethanes.
[b] Permit also contains effluent limits for copper, lead, and selenium.
[c] Permit also contains effluent limits for cadmium, copper, lead, mercury, and zinc.
[d] Permit also contains effluent limits for copper and cyanide.
[e] Permit also contains effluent limits for 4,4-DDE, copper, lead, and zinc.
[f] Permit also contains a corresponding mass limit established using the WRP design flow.
[g] Limits are for instantaneous minimum and instantaneous maximum rather than average monthly and maximum daily.
[h] Seasonally adjusted limits apply.
[i] Different limits apply to each discharge point.
[j] Unless caused by external ambient temperature.

AM average monthly
AW average weekly
MD maximum daily
BOD biochemical (or biological) oxygen demand
mL/L milliliter per liter
mg/L milligram per liter
TSS total suspended solids
TDS total dissolved solids
MBAS methylene blue active substances
N nitrogen
pH hydrogen ion concentration

There must not be any chronic toxicity in the effluent discharge. A monthly median greater than 1 chronic toxicity unit (TUc) will trigger accelerated monitoring and, as necessary, implementation of a Toxicity Identification Evaluation and a Toxicity Reduction Evaluation Workplan.

3.3.1.2 Reuse Requirements

Reuse permit limits from the Montebello Forebay recharge permit and the limits for standard permissible uses of recycled water are listed in Table 3-4. The permits also contain limits for total coliform bacteria, turbidity, radioactivity, and constituents with drinking water standards, as well as a number of narrative restrictions. The recharge permit applies to effluent discharged from the POWRP, SJCWRP, and WNWRP to the Rio Hondo or San Gabriel Coastal Spreading Grounds.

Table 3-4. WRP Recharge and Reuse Permit Limits

Constituent	Units	Montebello Forebay Recharge Permit	LBWRP Reuse Permit	LCWRP Reuse Permit	POWRP Reuse Permit	SJCWRP Reuse Permit	WNWRP Reuse Permit	LACAWRP Reuse Permit
TDS	mg/L	700[a]	1,000[a]	1,000[a]	750[a]	800[a]	600[a]	1,150[b]
Suspended Solids	mg/L	15[c]	-	-	-	-	15[c]	30[b]
Settleable Solids	mL/L	0.1[d]	-	-	-	-	0.1[d]	-
Nitrate □ Nitrite Nitrogen	mg/L	10[b]	-	-	-	-	10[b]	-
Sulfate	mg/L	250[a]	250[a]	250[a]	300[a]	250[a]	150[a]	375[b]
Chloride	mg/L	250[a]	250[a]	250[a]	150[a]	250[a]	100[a]	250[b]
Fluoride	mg/L	1.6[a]	-	-	-	-	1.6[a]	-
Boron	mg/L	1[a]	1.5[a]	1.5[a]	1[a]	1.5[a]	0.5[a]	1[b]
Oil and Grease	mg/L	10[f]	-	-	-	-	10[f]	-
pH	standard units	6.0/9.0[g]	6.0/9.0[g]	6.0/9.0[g]	6.0/9.0[g]	6.0/9.0[g]	6.0/9.0[g]	6.0/9.0[g]
Temperature	□F	100	-	-	-	-	-	-
BOD (5-day □ 20°C)	mg/L	-	-	-	-	-	20[e]	30[b]

[a] Maximum daily limit.
[b] Average monthly limit.
[c] Limits for suspended solids are: 30-day average, 15 mg/L; 7-day average, 40 mg/L.
[d] Limits for settleable solids are: 30-day average, 0.1 mL/L; daily maximum, 0.3 mL/L.
[e] Limits for BOD_5 are: 30-day average, 20 mg/L; 7-day average, 30 mg/L.
[f] Oil and grease limits are: 30-day average, 10 mg/L; daily maximum, 15 mg/L.
[g] pH must be between 6.0 and 9.0 at all times.
mg/L □ milligram per liter
mL/L □ milliliters per liter
BOD □ biochemical (or biological) oxygen demand
pH □ hydrogen ion concentration
TDS □ total dissolved solids

Total Coliform Limits

The reuse permits require discharges to be adequately disinfected. To ensure that this requirement is met, the effluent must be sampled and tested for total coliform bacteria. The median number of total coliform bacteria for the last 7 days of samples cannot exceed a MPN or CFU of 2.2 per 100 mL. Additionally, the number of total coliform bacteria cannot exceed an MPN or CFU of 23 per 100 mL in more than one sample during a 30-day period.

Turbidity

To ensure that recycled water has been adequately filtered, turbidity, which measures the cloudiness or haziness of a fluid caused by suspended solids, must be monitored. WRP reuse permits have limits of (1) a daily (or 24-hour) average of 2 NTUs, and (2) a limit of 5 NTUs that cannot be exceeded more than 5 percent of the time (72 minutes) during any 24-hour period.

Radioactivity

For the LBWRP, LCWRP, POWRP, SJCWRP, WNWRP, and LACAWRP, the reuse permits require that radioactivity must not exceed the limits specified in Title 22, Chapter 15, Article 5, Sections 64441 and 64443, of the CCR.

Drinking Water Standards

The LBWRP, LCWRP, SJCWRP, and WNWRP reuse permits and the POWRP, SJCWRP, and WNWRP recharge permits require that recycled water must not contain trace constituents in concentrations exceeding limits contained in California drinking water standards. The Montebello Forebay recharge permit additionally requires that drinking water action levels (now called notification levels) be met as well. For the POWRP, the reuse permit requires that recycled water must not contain heavy metals, arsenic, or cyanide in concentrations exceeding California drinking water standards.

3.3.1.3 Discharge Points and Receiving Waters

Pomona WRP

Almost all of the recycled water from the POWRP is reused either directly via a distribution system or indirectly through groundwater recharge. The recycled water is supplied to the city of Pomona, California State Polytechnic University, Walnut Valley Water District, and the Sanitation Districts' Spadra Landfill site. Uses of recycled water from the POWRP include landscape and food crop irrigation, fire protection, dust control, cooling tower supply, and concrete mixing. Recycled water that is not directly reused is released into the South Fork of San Jose Creek (Discharge Point 001), which flows into the San Gabriel River and then can be diverted into the Rio Hondo or San Gabriel Coastal Spreading Grounds. Sections of San Jose Creek, and the section of the San Gabriel River into which San Jose Creek flows, are unlined, which allows percolation of recycled water into the groundwater during downstream travel.

San Jose Creek WRP

The SJCWRP consists of the East and West plants, two independently operated units with separate influent sources and effluent outfalls. Almost all of the recycled water from SJCWRP is reused. Groundwater recharge is the largest beneficial use of the plant's effluent. Recycled water from the SJCWRP is also used for landscape irrigation and at reuse sites through the city of Industry's distribution system. Recycled water that is not directly reused is released into the San Gabriel River or San Jose Creek at several discharge points. The discharge points are as follows:

- 001: The discharge point is located approximately 8 miles south of the plant. Recycled water from both the East and West plants is conveyed through an outfall to this location. Recycled water flows directly into a lined portion of the San Gabriel River. A portion of the recycled water from this line is used for irrigation at the Sanitation Districts' Puente Hills Landfill and the Rose Hills Memorial Park; it is delivered to the Central Basin Municipal Water District's Recycled

Water System and can be diverted into the San Gabriel River Coastal Spreading Grounds for recharge.

- 001A: A turnout midway down the outfall pipe to 001 is used to divert recycled water to an unlined portion of the San Gabriel River, which allows percolation of recycled water to the groundwater.
- 002: The East WRP discharges recycled water from this point to an unlined portion of San Jose Creek that flows into the San Gabriel River. The recycled water, which is conveyed via various channels and diversion structures to either the Rio Hondo Spreading Grounds or the San Gabriel Coastal Spreading Grounds, is primarily used to recharge groundwater. During wet weather periods the water may continue downstream to the lined portion of the San Gabriel River.
- 003: The West WRP discharges recycled water from this point to an unlined portion of the San Gabriel River. The recycled water, which is conveyed via various channels and diversion structures to either the Rio Hondo Spreading Grounds or the San Gabriel Coastal Spreading Grounds, is primarily used to recharge groundwater. During wet weather periods the water may continue downstream to the lined portion of the San Gabriel River.

Whittier Narrows WRP

Nearly all of the recycled water from the WNWRP is reused. A portion of the water is directly used for irrigation or bus washing, with the remainder recharged to groundwater at the Rio Hondo Spreading Grounds or the San Gabriel Coastal Spreading Grounds.

The WNWRP has four discharge points. The discharge points are as follows:

- 001: The discharge point is located in the San Gabriel River above the Whittier Narrows Dam. Recycled water released at this discharge point is primarily used to recharge groundwater at the San Gabriel Coastal Spreading Grounds, but during wet weather periods the water may continue downstream to the lined portion of the San Gabriel River.
- 002: The discharge point is located in the Zone 1 Ditch. Recycled water released at this discharge point is primarily used to recharge groundwater at the Rio Hondo Spreading Grounds, but during wet weather periods the water may continue downstream to the Los Angeles River.
- 003: Formerly used to provide water to a groundwater test basin that was last used in 1981.
- 004: The discharge point is located in the Rio Hondo. Recycled water released at this discharge point is primarily used to recharge groundwater at the Rio Hondo Spreading Grounds, but during wet weather periods the water may continue downstream to the Los Angeles River.

Los Coyotes WRP

Some of the recycled water from the LCWRP is reused. Uses of recycled water include landscape irrigation in the cities of Cerritos and Bellflower, and supply to the Central Basin Municipal Water District's distribution system for irrigation, manufacturing, and cooling tower supply. Recycled water that is not used is discharged into the portion of the San Gabriel River that is concrete-lined from the point of discharge to the estuary (Discharge Point 001).

Long Beach WRP

The LBWRP supplies recycled water to the city of Long Beach. The city of Long Beach distributes the recycled water for various uses, including irrigation of parks, golf courses, athletic fields, and other landscaped areas, as well as oil-zone repressurization.

A portion of the LBWRP's effluent is further treated using microfiltration and reverse osmosis (MF/RO) and then disinfected using ultraviolet oxidation at the Water Replenishment District of Southern California (WRD) Leo J. Vander Lans Water Treatment Facility. The effluent from this facility is blended with imported water and pumped into the Alamitos Seawater Barrier to protect the Central Basin groundwater basin against seawater intrusion.

Recycled water from LBWRP that is not reused is discharged into a lined portion of Coyote Creek, about 2,200 feet upstream from its confluence with the San Gabriel River (Discharge Point 001). The San Gabriel River is lined at the Coyote Creek confluence.

La Cañada WRP

All effluent from the LACAWRP is reused for irrigation and surface impoundments at the La Cañada Flintridge Country Club.

3.3.2 JWPCP Requirements

The JWPCP has been providing full secondary treatment since November 2002. The secondary-treated effluent, after traveling approximately 6 miles through two tunnels, is discharged to the Pacific Ocean through two outfalls, Discharge Points 001 and 002 (120- and 90-inch outfalls, respectively). Two additional outfalls, Discharge Points 003 and 004 (72 inches and 60 inches, respectively), are permitted and available on standby to provide hydraulic relief, as necessary. Discharge Points 001 and 002 are located approximately one and a half miles off the coast. The diffuser sections are distributed between depths of 195 and 210 feet, and provide an initial minimum dilution of 166:1. Discharge Points 003 and 004 provide initial minimum dilutions of 150:1 and 115:1, respectively.

The final effluent must meet the limits listed in Table 3-5 through Table 3-9, which are prescribed by the plant's NPDES permit.

Table 3-5. NPDES Permit Limits for Major Wastewater Constituents for JWPCP Ocean Discharge

		Effluent Limitations				
Constituent	**Units**	**Average Monthly**	**Average Weekly**	**Maximum Daily**	**Instantaneous Minimum**	**Instantaneous Maximum**
BOD	mg/L	30	45	-	-	-
(5-day @ 20°C)	lbs/day	96,300	144,500	-	-	-
TSS	mg/L	30	45	-	-	-
	lbs/day	96,300	144,500	-	-	-
pH	standard units	-	-	-	6.0	9.0
Oil and Grease	mg/L	15	22.5	45	-	75
	lbs/day	48,200	72,200	144,500	-	-
Settleable Solids	mL/L	0.5	0.75	1.5	-	3.0
Turbidity	NTU	75	100	-	-	225
Temperature	°F	-	-	-	-	100
Removal of BOD and TSS	%	≥ 85	-	-	-	-

BOD = biochemical (or biological) oxygen demand
lbs/day = pounds per day
mg/L = milligrams per liter
mL/L = milliliters per liter
NTU = nephelometric turbidity unit
TSS = total suspended solids
pH = hydrogen ion concentration

Table 3-6. NPDES Permit Limits for Marine Aquatic Life Toxicants for JWPCP Ocean Discharge Points 001 and 002

		Effluent Limitations		
Constituent	**Units**	**Average Monthly**	**Maximum Daily**	**Instantaneous Maximum**
Chlorine Residual	µg/L	330	1,300	10,000
	lbs/day	1,060	4,170	-
Acute Toxicity	TUa	-	5.3	-
Chronic Toxicity	TUc	-	167	-

µg/L = micrograms per liter
lbs/day = pounds per day
TUa = acute toxicity unit
TUc = chronic toxicity unit

Table 3-7. NPDES Permit Limits for Human Health Toxicants (Carcinogens) for JWPCP Ocean Discharge Points 001 and 002

	Average Monthly Effluent Limits	
Constituent	**µg/L**	**lbs/day**
Benzidine	0.012	0.039
Chlordane	0.0038	0.012
DDT	0.028	0.090
3,3′-Dichlorbenzidine	1.4	4.5
Hexachlorobenzene	0.035	0.11
PCBs	0.0032	0.010
TCDD Equivalents	0.65	2.1×10^{-6}
Toxaphene	0.035	0.11

µg/L = micrograms per liter
lbs/day = pounds per day
DDT = dichloro-diphenyl-trichloroethane
PCBs = polychlorinated biphenyls
TCDD = 2,3,7,8-tetrachlorodibenzo-p-dioxin

Table 3-8. NPDES Permit Limits for Marine Aquatic Life Toxicants for JWPCP Ocean Discharge Points 003 and 004

		Effluent Limitations, 003			Effluent Limitations, 004		
Constituent	**Units**	**AM**	**MD**	**IM**	**AM**	**MD**	**IM**
Chlorine Residual	µg/L	300	1,200	9,100	230	930	7,000
Acute Toxicity	TUa		4.8			3.8	
Chronic Toxicity	TUc	-	151	-	-	116	-

AM = average monthly
MD = maximum daily
IM = instantaneous maximum
µg/L = micrograms per liter
TUa = acute toxicity unit
TUc = chronic toxicity unit

Table 3-9. NPDES Permit Limits for Human Health Toxicants (Carcinogens) for JWPCP Ocean Discharge Points 003 and 004

Constituent	Units	Average Monthly Effluent Limits, 003	Average Monthly Effluent Limits, 004
Benzidine	μg/L	0.010	0.008
Chlordane	μg/L	0.0034	0.0027
DDT	μg/L	0.026	0.020
3,3'-Dichlorbenzidine	μg/L	1.2	0.93
Hexachlorobenzene	μg/L	0.032	0.024
PCBs	μg/L	0.0029	0.0022
TCDD Equivalents	pg/L	0.59	0.45
Toxaphene	μg/L	0.032	0.024

μg/L = micrograms per liter
pg/L = picograms per liter
DDT = dichloro-diphenyl-trichloroethane
PCBs = polychlorinated biphenyls
TCDD = 2,3,7,8-tetrachlorodibenzo-p-dioxin

Performance goals for Discharge Points 001 and 002 are also listed in Table 3-10. These performance goals are not enforceable effluent limitations or standards. However, the Sanitation Districts are required to maintain, if not improve, treatment efficiency to attain these goals. Any exceedance of the performance goals will trigger an investigation into the cause of the exceedance. If the exceedance is substantial or persists in successive monitoring periods, the Sanitation Districts are required to submit a written report to the LARWQCB on the nature of the exceedance, the results of the investigation as to the cause of the exceedance, and the corrective actions taken or proposed corrective measures with a timetable for implementation, if necessary. The JWPCP NPDES permit also includes narrative and numeric receiving water limitations for various constituents. These receiving water limits are summarized in Table 3-11 and Table 3-12.

Table 3-10. NPDES Permit Performance Goals for JWPCP Ocean Discharge Points 001 and 002

Constituent	Units	Average Monthly Performance Goal
Marine Aquatic Life Toxicants		
Arsenic	μg/L	2.5
Cadmium	μg/L	0.1
Chromium (VI)	μg/L	1.5
Copper	μg/L	4.9
Lead	μg/L	0.4
Mercury	μg/L	0.04
Nickel	μg/L	13
Selenium	μg/L	7.6
Silver	μg/L	0.2
Zinc	μg/L	37
Cyanide	μg/L	19
Chlorine Residual	μg/L	196
Ammonia as N	mg/L	40
Phenolic Compounds (Non-Chlorinated)	μg/L	3.6
Phenolic Compounds (Chlorinated)	μg/L	1.9
Endosulfan	μg/L	0.015
HCH	μg/L	0.015

Table 3-10 (Continued)

Constituent	Units	Average Monthly Performance Goal
Endrin	µg/L	0.01
Gross alpha radiation	pCi/L	6.3
Gross beta radiation	pCi/L	29
Human Health Toxicants – Non Carcinogens		
Acrolein	µg/L	5.2
Antimony	µg/L	9.8
Bis (2-Chloroethoxy) Methane	µg/L	1.3
Bis (2-Chloroisopropyl) Ether	µg/L	1.6
Chlorobenzene	µg/L	1.2
Chromium (III)	µg/L	3.3
Di-N-Butylphthalate	µg/L	4.4
Dichlorobenzene	µg/L	0.5
Diethyl Phthalate	µg/L	2.1
Dimethyl Phthalate	µg/L	1.9
2-Methyl-4,6-Dinitrophenol	µg/L	13
2,4-Dinitrophenol	µg/L	17
Ethylbenzene	µg/L	1.9
Flouranthene	µg/L	1.9
Hexachlorocyclopentadiene	µg/L	7.5
Nitrobenzene	µg/L	2.2
Thallium	µg/L	0.6
Toluene	µg/L	0.5
Tributyltin	µg/L	0.01
1,1,1-Trichloroethane	µg/L	1.8
Human Health Toxicants – Carcinogens		
Acrylonitrile	µg/L	2.7
Aldrin	µg/L	0.0037
Benzene	µg/L	0.75
Beryllium	µg/L	0.15
Bis (2-Chloroethyl) Ether	µg/L	0.95
Bis (2-Ethylhexyl) Phthalate	µg/L	17
Carbon Tetrachloride	µg/L	1
Chlorodibromomethane	µg/L	0.6
Chloroform	µg/L	30
1,4-Dichlorobenzene	µg/L	1
1,2-Dichloroethane	µg/L	0.6
1,1-Dichloroethylene	µg/L	1.1
Bromodichloromethane	µg/L	2
Dichloromethane	µg/L	3
1,3-Dichloropropene	µg/L	0.65
Dieldrin	µg/L	0.005
2,4-Dinitrotoluene	µg/L	1
1,2-Diphenylhydrazine	µg/L	0.65
Halomethanes	µg/L	1
Heptachlor	µg/L	0.005

Table 3-10 (Continued)

Constituent	Units	Average Monthly Performance Goal
Heptachlor epoxide	µg/L	0.0033
Hexachlorobutadiene	µg/L	0.7
Hexachloroethane	µg/L	0.7
Isophorone	µg/L	0.65
N-Nitrosodimethylamine	µg/L	0.7
N-Nitrosodi-N-Propylamine	µg/L	0.6
N-Nitrosodiphenylamine	µg/L	0.75
PAHs	µg/L	0.95
1,1,2,2-Tetrachloroethane	µg/L	0.4
Tetrachloroethylene	µg/L	20
Trichloroethylene	µg/L	0.85
1,1,2-Trichloroethane	µg/L	0.45
2,4,6-Trichlorophenol	µg/L	0.6
Vinyl Chloride	µg/L	1.3

µg/L = micrograms per liter
N = nitrogen
mg/L = milligrams per liter
HCH = hexachlorocyclohexane
pCi/L = picocuries per liter
PAHs = polycyclic aromatic hydrocarbons

Table 3-11. JWPCP Receiving Water Bacteria Limits

Marine Water Designated for Water Contact Recreation (Rec-1)		
5-Sample (or 30-Day) Geometric Mean	Total coliform density	1,000/100 mL
	Fecal coliform density	200/100 mL
	Enterococcus density	35/100 mL
Single Sample Maximum	Total coliform density	10,000/100 mL
	Fecal coliform density	400/100 mL
	Enterococcus density	104/100 mL
	Total coliform density, when fecal coliform/total coliform ratio exceeds 0.1	1,000/100 mL
	Total coliform density must not exceed 1,000/100 mL for more than 20 percent of the samples at any sampling station in any 30-day period	
Marine Waters Where Shellfish May Be Harvested for Human Consumption		
Median for 6-month period	Total coliform	70/100 mL
Not more than 10% of samples for a 6-month period	Total coliform	230/100 mL

mL = milliliter

Table 3-12. Additional Prohibitions on Effects on Receiving Water by JWPCP Discharge

Physical Characteristics	▪ Floating particulates ▪ Visible oil and grease ▪ Aesthetically undesirable discoloration of the ocean surface ▪ Significant reductions in the transmittal of natural light at any point outside the initial dilution zone ▪ Change in the rate of deposition of inert solids and the characteristics of inert solids in ocean sediments such that benthic communities are degraded
Chemical Characteristics	▪ Dissolved oxygen concentration at any time depressed more than 10 percent from that which occurs naturally ▪ Change in pH of the receiving water at any time more than 0.2 units from that which occurs naturally ▪ Significant increase in dissolved sulfide concentrations of water and sediments above those present under natural conditions ▪ Increase in the concentration of substances set forth in Chapter II, Table B, of the Ocean Plan in marine sediments to levels that would degrade indigenous biota ▪ Increase of concentrations of organic materials in marine sediments to levels that would degrade marine life ▪ Objectionable aquatic growths or degradations of indigenous biota due to levels of nutrients in waste discharged
Biological Characteristics	▪ Degradation of marine communities, including vertebrate, invertebrate, and plant species ▪ Alteration of the natural taste, odor, and color of fish, shellfish, or other marine resources used for human consumption ▪ Bioaccumulation of organic materials concentrations in fish, shellfish, or other marine resources used for human consumption to levels that are harmful to human health
Radioactivity	▪ Degradation of marine life due to radioactive waste

3.4 Regulations for Drinking Water

3.4.1 Federal Regulations

3.4.1.1 Safe Drinking Water Act

The Safe Drinking Water Act (SDWA), passed in 1974, established a national program for protecting the quality of drinking water provided by public water suppliers. Under the SDWA, the EPA issued primary and secondary drinking water standards that are the minimum water quality standards that must be established by all states. Primary drinking water standards are water quality limits for contaminants that may cause or transmit disease, chemical poisoning, or other impairments to humans. Secondary drinking water standards are water quality limits for assuring aesthetically adequate drinking water in terms of appearance, taste, and odor. Under the SDWA, states with approved drinking water protection programs, such as California, have implementation and enforcement authority.

The 1986 amendments to the SDWA required the EPA to promulgate new standards for certain contaminants and establish requirements for the protection of groundwater supplies. The 1996 amendments to the SDWA provided new approaches to prevent contamination of drinking water, better information for consumers, regulatory improvements, and new funding for states and communities through a Safe Drinking Water State Revolving Fund (SDWSRF).

3.4.2 State Regulations

3.4.2.1 California Drinking Water Standards

California drinking water standards (CDWS) are promulgated by the California Department of Public Health (CDPH) under the California Safe Drinking Water Act. Typically, the CDWS are the same as the federal standards. Recycled water that is used to recharge groundwater or that is discharged to a surface water body designated as a drinking water supply must generally meet CDWS for trace constituents.

3.5 Regulations for Water Reuse

The discharge and reuse of recycled water is regulated at the state and local level.

3.5.1 State Regulations

State requirements for production, discharge, distribution, and use of recycled water are contained in the following codes:

- CWC, Division 7 —Water Quality, Sections 13000 through 13999.19
- CCR, Title 22 Social Security, Division 4 —Environmental Health, Chapter 3, Recycling Criteria, Sections 60301 through 60475
- CCR, Title 17 Public Health, Division 1 —State Department of Health, Chapter 5, Sanitation (Environmental), Subchapter 1, Engineering (Sanitary), Group 4, Drinking Water Supplies, Sections 7583 through 7630

In addition, guidelines for production, distribution, and use of recycled water have been prepared or endorsed by state agencies administering recycled water regulations.

3.5.1.1 California Water Code

The CWC contains requirements for the production, discharge, and use of recycled water. Division 7, Chapter 7, of the CWC specifically addresses requirements for water recycling. This chapter requires CDPH to establish water recycling criteria and gives the RWQCBs responsibility for prescribing specific WRRs for water that is used or proposed to be used as recycled water. In addition, Division 7, Chapter 7, of the CWC regulates recycled water injected into the ground and requires that greenbelt areas and certain other applications must use recycled water rather than potable water where recycled water is available at a cost-effective price.

Sections 1210 and 1212 of the CWC, added in 1980, focus on the definition of property rights to recycled water. These sections require that the owner of a wastewater treatment plant obtain approval from the SWRCB prior to making any change to the point of discharge, place of use, and/or purpose of use of recycled water.

3.5.1.2 Title 22

In 1975, the CDPH prepared Title 22 of the CCR to fulfill the requirements of the CWC. Title 22 was subsequently revised in 1978 to conform with the 1977 amendments to the CWA and was revised again in December 2000. The requirements of Title 22 regulate production and use of recycled water in

California. Criteria for reuse of secondary and tertiary effluent in various reuse applications include limits on the maximum numbers of total coliform bacteria present within the water.

Title 22 establishes four categories of recycled water:

- Undisinfected Secondary Recycled Water: oxidized effluent
- Disinfected Secondary-23 Recycled Water: oxidized and disinfected effluent that does not exceed an MPN of 23 total coliform bacteria per 100 mL median concentration in a 7-day period
- Disinfected Secondary-2.2 Recycled Water: oxidized and disinfected effluent that does not exceed an MPN of 2.2 total coliform bacteria per 100 mL median concentration in a 7-day period
- Disinfected Tertiary Recycled Water: oxidized, coagulated, clarified, filtered, and disinfected effluent

Suitable uses of recycled water, as defined by the December 2000 revision of Title 22, are summarized in Table 3-13.

Table 3-13. Suitable Uses of Recycled Water

Use	Undisinfected Secondary Recycled Water	Disinfected Secondary-23 Recycled Water	Disinfected Secondary-2.2 Recycled Water	Disinfected Tertiary Recycled Water
Surface Irrigation				
Food crops where recycled water contacts the edible portion of the crop	Not Allowed	Not Allowed	Not Allowed	Allowed
Parks and playgrounds	Not Allowed	Not Allowed	Not Allowed	Allowed
School yards	Not Allowed	Not Allowed	Not Allowed	Allowed
Residential landscaping	Not Allowed	Not Allowed	Not Allowed	Allowed
Unrestricted access golf courses	Not Allowed	Not Allowed	Not Allowed	Allowed
Other irrigation uses not prohibited by other provisions of the CCR	Not Allowed	Not Allowed	Not Allowed	Allowed
Food crops where the edible portion is produced above ground and not contacted by recycled water, other than orchards and vineyards	Not Allowed	Not Allowed	Allowed	Allowed
Cemeteries	Not Allowed	Allowed	Allowed	Allowed
Freeway landscaping	Not Allowed	Allowed	Allowed	Allowed
Restricted access golf courses	Not Allowed	Allowed	Allowed	Allowed
Nonedible vegetation at other areas where access control prevents use as if land were a park	Not Allowed	Allowed	Allowed	Allowed
Ornamental nursery stock and sod farms where access by the general public is not restricted	Not Allowed	Allowed	Allowed	Allowed
Pasture for animals producing milk for human consumption	Not Allowed	Allowed	Allowed	Allowed
Orchards and vineyards where recycled water does not contact the edible portion of the crop (e.g., pistachios and chestnuts)	Allowed	Allowed	Allowed	Allowed
Non food-bearing trees	Allowed	Allowed	Allowed	Allowed
Pastures for animals not producing milk for human consumption	Allowed	Allowed	Allowed	Allowed
Seed crops not eaten by humans	Allowed	Allowed	Allowed	Allowed
Food crops that must undergo commercial pathogen-destroying processing before consumption (e.g., sugar beets)	Allowed	Allowed	Allowed	Allowed

Table 3-13 (Continued)

Use	Undisinfected Secondary Recycled Water	Disinfected Secondary-23 Recycled Water	Disinfected Secondary-2.2 Recycled Water	Disinfected Tertiary Recycled Water
Ornamental nursery stock and sod farms with no irrigation 14 days before harvest, retail sale, or public access	Allowed	Allowed	Allowed	Allowed
Fodder crops (e.g., alfalfa) and fiber crops (e.g., cotton)	Allowed	Allowed	Allowed	Allowed
Supply for Impoundments				
Non-restricted recreational impoundment	Not Allowed	Not Allowed	Not Allowed	Allowed[a]
Restricted recreational impoundment	Not Allowed	Not Allowed	Allowed	Allowed
Fish hatchery with public access	Not Allowed	Not Allowed	Allowed	Allowed
Landscape impoundment without decorative fountain	Not Allowed	Allowed	Allowed	Allowed
Supply for Cooling or Air Conditioning				
System with cooling tower, evaporative condenser, spray, or mechanism that can create mist, with high efficiency draft reducer and effective biocide level in circulated water	Not Allowed	Not Allowed	Not Allowed	Allowed
System without cooling tower, evaporative condenser spray, or mechanism that can create mist	Not Allowed	Allowed	Allowed	Allowed
Other Uses				
Flushing toilets and urinals	Not Allowed	Not Allowed	Not Allowed	Allowed
Priming drain traps	Not Allowed	Not Allowed	Not Allowed	Allowed
Industrial process water that may contact workers	Not Allowed	Not Allowed	Not Allowed	Allowed
Structural fire fighting	Not Allowed	Not Allowed	Not Allowed	Allowed
Decorative fountains	Not Allowed	Not Allowed	Not Allowed	Allowed
Commercial laundries	Not Allowed	Not Allowed	Not Allowed	Allowed
Consolidation of backfill material around potable water pipelines	Not Allowed	Not Allowed	Not Allowed	Allowed
Artificial snow making for commercial outdoor use	Not Allowed	Not Allowed	Not Allowed	Allowed
Commercial car washes, including hand washes if water is not heated, where public is excluded from washing process	Not Allowed	Not Allowed	Not Allowed	Allowed
Industrial boiler feed	Not Allowed	Allowed	Allowed	Allowed
Nonstructural fire fighting	Not Allowed	Allowed	Allowed	Allowed
Backfill consolidation around nonpotable water piping	Not Allowed	Allowed	Allowed	Allowed
Soil compaction	Not Allowed	Allowed	Allowed	Allowed
Mixing concrete	Not Allowed	Allowed	Allowed	Allowed
Dust control on roads and streets	Not Allowed	Allowed	Allowed	Allowed
Cleaning roads, sidewalks, and outdoor work areas	Not Allowed	Allowed	Allowed	Allowed
Industrial process water that will not contact workers	Not Allowed	Allowed	Allowed	Allowed
Flushing sanitary sewers	Allowed	Allowed	Allowed	Allowed

[a] With monitoring for enteric viruses and protozoan cysts.

In addition to defining permitted uses of recycled water and treatment requirements, Title 22 defines requirements for sampling and analysis of effluent at treatment plants, requires preparation of an engineering report prior to production or use of recycled water, specifies general design criteria for treatment facilities, establishes reliability requirements, and addresses alternative methods of treatment.

3.5.1.3 Water Reclamation Requirements

Use of recycled water is usually regulated by the RWQCB under WRRs. The LARWQCB has adopted WRRs for the JOS WRPs, including the POWRP, SJCWRP, WNWRP, LCWRP, LBWRP, and LACAWRP. The JOS WRR Order Numbers are summarized in Table 3-2. The WRR permit limits for specific constituents are summarized in Table 3-4.

When these WRR permits are renewed, they will likely become incorporated into master reclamation permits. A master reclamation permit is authorized under the CWC to replace WRRs and establishes six different types of procedural and substantive requirements intended to assure protection of the environment, including compliance with uniform statewide reclamation criteria. The issuance of a master reclamation permit is an approach taken in the past for oversight of municipal, nonpotable reuse projects that do not represent a significant impact to groundwater quality. This approach would allow recycled water users to operate under a master reclamation permit for each of the JOS WRPs, facilitating the permitting process for appropriate municipal reuse projects. Uses for disinfected tertiary recycled water that are widely accepted and implemented as appropriate with minimal or no impacts to receiving waters are listed in Table 3-13.

3.5.1.4 SWRCB Recycled Water Policy

On February 3, 2009, the SWRCB released a recycled water policy (Resolution No. 2009-0011). The purpose of this policy is to increase the use of recycled water in a manner that implements state and federal water quality laws and provide direction to RWQCBs, proponents of recycled water projects, and the public regarding appropriate criteria to be used by the SWRCB and RWQCBs in issuing permits for recycled water projects. The policy includes language that:

- Establishes goals to increase the use of recycled water in California and clarifies the roles of the SWRCB, RWQCBs, CDPH, and the California Department of Water Resources (DWR)
- Requires development of salt and nutrient management plans for each groundwater basin by 2014
- Establishes a "blue-ribbon" advisory panel to guide future actions relating to Emerging Constituents/Constituents of Emerging Concern (CEC)

3.5.1.5 SWRCB Recycled Water General Irrigation Permit

The California Legislature declared its intent to promote the use of recycled water as a valuable resource and a significant component of California's water supply. In response, the SWRCB issued the General Waste Discharge Requirements for Landscape Irrigation Uses of Municipal Recycled Water (General Permit) to streamline the regulatory process for reuse of disinfected tertiary recycled water for:

- Parks, greenbelts, and playgrounds
- School yards
- Athletic fields
- Golf courses
- Cemeteries
- Residential landscaping and common areas
- Commercial landscaping, except eating areas
- Industrial landscaping, except eating areas

- Freeway, highway, and street landscaping

The SWRCB adopted the General Permit on July 7, 2009.

3.5.1.6 CDPH Draft Groundwater Recharge Regulations

The CDPH issued new Draft Groundwater Recharge Reuse Regulations on August 5, 2008. The CDPH is currently revising these draft regulations and it is anticipated that elements of the 2008 draft may change in the new version. Key elements of the 2008 draft groundwater recharge regulations for groundwater reuse recharge projects (GRRPs) include:

- All recycled water recharged in a GRRP is to be retained underground for a minimum of 6 months prior to extraction for use as a drinking water.
- Control of nitrogen compounds and regulated chemicals and physical characteristics is required.
- For each spreading area or subsurface injection facility recharged by the GRRP, total organic carbon (TOC) must be monitored. The TOC analytical results for filtered wastewater samples are not to exceed 16 mg/L (for two consecutive samples and the average of the last four results). The TOC analytical results for recharge water are not to exceed 0.5 mg/L divided by the recycled water contribution (RWC) (based on a 20-week running average). Exceptions are made to this limit under certain conditions as outlined in Section 60320.045 of the regulation.
- The initial RWC shall not exceed 0.50 for direct injection projects, 0.50 for surface spreading projects with advanced treatment, and 0.20 for surface spreading projects without advanced treatment.

The CDPH groundwater reuse recharge draft regulations include requirements to increase the project RWC. The ability to increase the RWC indicates potential opportunities for increased groundwater recharge capacity within the JOS. The proposed requirements include the following:

- Reports to CDPH including operations, monitoring, and compliance data demonstrating that the maximum RWC and maximum contaminant levels (MCLs) are not exceeded. Engineering and scientific reports will be subject to peer review by an advisory panel including scientific experts within disciplines specified by CDPH.
- Reverse osmosis treatment of recycled water as well as subsequent advanced oxidation treatment such that, at a minimum, a 1.2 log N-nitrosodimethylamine (NDMA) reduction and a 0.5 log 1,4-dioxane reduction are achieved.
- Recycled water analysis and annual reports prepared for any new compounds identified by CDPH, in addition to any other required monitoring.

3.5.1.7 Title 17

The focus of Title 17 of the CCR is the protection of potable water supplies through control of cross connections with potential contaminants. Examples of potential contaminants include sewage; nonpotable water supplies such as recycled water, irrigation water, and auxiliary water supplies; fire protection systems; and hazardous substances.

Title 17, Group 4, Article 2 (Protection of Water System), Table 1, specifies the minimum backflow protection required on a potable water system when there is a potential for contamination of the potable water supply. Recycled water is addressed in two instances as follows:

- An air-gap separation is required on premises where the public water system is used to supplement the recycled water supply.
- An air-gap separation is required on premises where recycled water is used and there is no interconnection with the potable water system; however, a reduced pressure principle backflow prevention device may be provided in lieu of an air gap, if approved by the health agency and water supplier.

3.5.1.8 Recycled Water Guidelines

To assist in compliance with Title 22, CDPH has prepared a number of guidelines for the production, distribution, and use of recycled water. Additionally, CDPH recommends the use of guidelines for distribution of recycled water that have been prepared by the California-Nevada Section of the American Water Works Association (AWWA). These guidelines include:

- Guidelines for the Preparation of an Engineering Report on the Production, Distribution, and Use of Recycled Water
- Manual of Cross-Connection Control Procedures and Practices
- Guidelines for the Distribution of Nonpotable Water
- Guidelines for the Use of Recycled Water
- Guidelines for the Use of Recycled Water for Construction Purposes

3.5.1.9 Recycled Water Administration

In the state of California, recycling requirements are administered by the SWRCB, RWQCB, and CDPH. The direct involvement of each agency during a water recycling project is as follows:

- The SWRCB issues loans in accordance with the CWC and approves petitions for a change in place and/or purpose of use of recycled water in accordance with the CWC.
- The RWQCB prepares or revises WRRs in accordance with the CWC and Title 22, reviews and approves engineering reports required under Title 22, and reviews and approves recharge projects using recycled water in accordance with the CWC.
- The CDPH provides recommendations to the RWQCB on WRRs and reviews and approves engineering reports, final plans for cross-connection control and pipeline separations in accordance with Title 17, and final user system plans in conjunction with local health agencies for cross-connection control in accordance with Title 17. The CDPH also inspects distribution systems prior to operation.

3.5.1.10 Public Utilities Code

The 2010 California Public Utilities Code contains requirements for distribution and use of recycled water. Per Chapter 8.5 of the code, Service Duplication, a political subdivision is prohibited from extending similar or duplicating facilities into the service areas of a privately owned public utility.

3.5.1.11 Nonpotable Water Reuse Systems

Chapter 16A, Nonpotable Water Reuse systems, was added to the 2007 California Plumbing Code on August 4, 2009. These regulations were developed to encourage the use of graywater. Chapter 16A is intended to provide guidance to code users and the flexibility to make legal compliance easily achievable.

The use of graywater conserves water by facilitating greater reuse of laundry, shower, lavatory, and similar sources of discharge for irrigation. Graywater reuse also diverts discharge of these sources from the sewerage system.

3.5.2 Local Regulations

Local requirements focus on the distribution and use of recycled water and, primarily, on the user systems. Local requirements generally emphasize cross-connection control. The state regulations and guidelines discussed in Section 3.5.1 are the governing requirements. The Los Angeles County Department of Public Health (County DPH) generally establishes more specific requirements for separation and construction of potable and recycled water systems, specifies guidelines for user systems, and establishes criteria for identification of recycled water facilities.

3.5.2.1 Local Regulations Administration

Local requirements are administered by the County DPH or the applicable local health department. The direct involvement of the County DPH in a recycled water project generally includes, but is not necessarily limited to, review of as-built drawings of users' potable water systems, performance of onsite surveys of users' water systems, provision of guidance to users with respect to methods of identifying potable and recycled water systems, review and approval of design drawings of users' recycled water systems, and inspection of users' potable and recycled water systems and cross-connection controls following construction.

3.6 Regulations for Wet Weather Flow Management

While the 1972 Clean Water Act placed a great deal of emphasis on establishing treatment permit limits to protect receiving water quality, the importance of avoiding conveyance system overflows and plant bypasses during high flow events is also recognized. This section provides an overview of the federal and state requirements pertinent to the management of wet weather flows in the conveyance system.

3.6.1 Federal Regulations

The EPA proposed a draft Sanitary Sewer Overflow (SSO) Rule in 2001 that would require municipalities to establish the capacity of the wastewater conveyance system under a strict sanitary sewer overflow prohibition. The SSO Rule is also commonly referred to as CMOM, which stands for capacity, management, operations, and maintenance. Three provisions of the proposed SSO Rule emphasize the capacity relevance of managing SSOs and their impact on public health and the environment. These include:

- Provide adequate capacity to convey base and peak flows
- Take all feasible steps to stop and mitigate impacts of SSOs
- Undertake a system evaluation and capacity assurance program

These provisions are found in both the general standards and the CMOM program components. The state's WDRs have embraced the intent and purpose of EPA's proposed SSO rule and are expected to meet all related requirements if the rule is passed.

3.6.2 State Regulations

The primary regulations governing wet weather planning and design for sanitary sewer systems in California have been promulgated at the state level. On May 2, 2006, the SWRCB issued statewide WDRs for sanitary sewer systems with more than 1 mile of pipes or sewer lines that are also owned by public agencies. The SWRCB is currently exploring revisions to the WDRs, and released revised draft WDRs in March 2011.

3.6.2.1 Enforcement Discretion

Within the statewide WDRs, Provision 6 of Section D indicates that RWQCBs must consider whether "the sanitary sewer system design capacity is appropriate to reasonably prevent SSOs" in any enforcement action. This intent to prevent SSOs is based on the current interpretation of the CWA by the EPA that all SSOs to waters of the U.S. are illegal and, therefore, prohibited. The word "reasonably" was included in the language, however, as recognition that it is impossible to design a sewer system large enough to prevent every single capacity-related SSO.

3.6.2.2 Use of Professional Judgment

Because design storms are not specified by regulations applicable in California, agencies must use professional judgment to design the size of sewer systems to prevent SSOs. The term "reasonably" is not defined in a regulatory context. Several approaches are currently being used, which often include identification of alternative design storm sizes for various parts of the sewer system (depending on the potential impacts of SSOs on local receiving waters) and a comparison of the costs and benefits of these alternatives to arrive at a reasonable approach.

3.6.2.3 Sewer System Management Plan

The statewide WDRs also require the development of a sewer system management plan (SSMP) in which the approach to sewer system capacity is documented. A WDR implementation schedule was issued by the SWRCB on July 7, 2005, which requires completion of SSMP elements by August 31, 2008, with intermediate dates on some of the elements. The most recent version of the Sanitation Districts' SSMP was completed in May 2009.

3.7 Regulations for Air Quality

The federal Clean Air Act (CAA) and its subsequent amendments established air quality regulations and the National Ambient Air Quality Standards (NAAQS), and delegated enforcement of these standards to the states. In California, the California Air Resources Board (CARB) is responsible for enforcing air pollution regulations. CARB, in turn, has delegated the responsibility of regulating stationary emission sources to the local air agencies. In the South Coast Air Basin (SCAB), the local regulatory air agency is the South Coast Air Quality Air District (SCAQMD).

The following is a summary of the key federal, state, regional, and local air quality rules, policies, and agreements that apply to the JOS.

3.7.1 Federal Regulations

3.7.1.1 State Implementation Plans

The federal CAA requires each state to prepare a State Implementation Plan (SIP) that details how the federally designated nonattainment areas will achieve the NAAQS. In California, each air district prepares an air quality management plan (AQMP) to incorporate into the state's SIP. SCAQMD prepared the 2007 AQMP for inclusion into the California SIP.

The 2007 AQMP addresses several federal planning requirements and incorporates significant new scientific data, primarily in the form of updated emissions inventories, updated ambient measurements, new meteorological episodes, and new air quality modeling tools. The 2007 AQMP builds upon the approaches taken in the 2003 AQMP for the SCAB for the attainment of federal air quality standards. The AQMP highlights the necessary reductions and the need to identify additional strategies, especially in the area of mobile sources, to meet federal criteria pollutant standards within the timeframes allowed under the federal CAA (SCAQMD 2007).

3.7.1.2 Greenhouse Gases

Federal regulations requiring reporting or reduction of greenhouse gas (GHG) emissions are in various stages of development or implementation. In the 2007 U.S. Supreme Court case *Massachusetts v. EPA*, the court ruled that carbon dioxide (CO_2) and other GHGs are air pollutants that could be regulated by the EPA. Subsequent to the court case, the EPA Administrator signed a document making two significant findings with regard to GHG emissions, thereby allowing the EPA to proceed with rulemaking. The ultimate implementation of the federal GHG regulations may be preempted by congressional action.

The President's Council on Environmental Quality (CEQ) issued draft guidance on how GHG emissions should be handled under the National Environmental Policy Act (NEPA). Based on this guidance, federal agencies, such as the Corps, will not make an impact determination under NEPA for GHG emissions but, instead, use a reference point above which they are required to consider any additional environmental review.

3.7.1.3 Environmental Protection Agency Off-Road Diesel Engine Rule

To reduce emissions from off-road diesel equipment, the EPA established a series of increasingly strict emission standards for new engines. Locomotives and marine vessels are exempt from this rule. Manufacturers of off-road diesel engines would be required to produce engines with certain emission standards under the following compliance schedule:

- Tier 1 standards were phased in from 1996 to 2000 (year of manufacture), depending on the engine horsepower category
- Tier 2 standards were phased in from 2001 to 2006
- Tier 3 standards were phased in from 2006 to 2008
- Tier 4 standards, which likely will require add-on emissions control equipment to attain them, will be phased in from 2008 to 2015

3.7.1.4 Environmental Protection Agency On-Road Diesel Engine Rule

In 2007, the EPA promulgated the Heavy-Duty Highway Rule, which reduces emissions from on-road, heavy-duty diesel trucks by establishing a series of increasingly strict emission standards for new engines. Manufacturers are required to produce new diesel vehicles that meet particulate matter (PM) and mono-nitrogen oxide (NO_X) emission standards beginning with model year 2007.

3.7.1.5 Environmental Protection Agency Marine Diesel Engine Rule

For the purpose of emission regulations, marine engines are divided into three categories based on displacement per cylinder, as listed in Table 3-14. Each of the categories represents a different engine technology. Categories 1 and 2 are further divided into subcategories, depending on displacement and net power output.

Table 3-14. Environmental Protection Agency Marine Engine Categories

Category	Displacement per Cylinder (D)	Basic Engine Technology	Type of Vessels	Range in Engine Size
1	Subcategory 1□2: D □ 5 dm^3 and power □ 37 kW Subcategory 3□4: D □ 7 dm^3	Land-based non-road diesel	Tugboats, pushboats, fishing vessels, commercial vessels in and around ports, and supply vessels	500 to 8,000 kW (700 to 11,000 hp)
2	Subcategory 1□2: 5 dm^3 □ D □ 30 dm^3 Subcategory 3□4: 7 dm^3 □ D □ 30 dm^3	Locomotive diesel	Same as above	500 to 8,000 kW (700 to 11,000 hp)
3	D □ 30 dm^3	Unique marine engine design	Container ships, oil tankers, bulk carriers, and cruise ships	2,500 to 70,000 kW (3,000 to 100,000 hp)

dm^3 □ cubic decimeters
kW □ kilowatts
hp □ horsepower

On March 14, 2008, the EPA signed a regulation to introduce Tier 3 and Tier 4 emission standards to new or rebuilt Category 1 and Category 2 marine diesel engines. Tier 3 standards apply to new engines used in commercial, recreation, and auxiliary power applications beginning in 2009 for Category 1 engines and in 2013 for Category 2 engines. Tier 4 standards apply to new Category 1 and 2 engines above 600 kW on commercial vessels beginning in 2014. For remanufactured engines, standards apply only to commercial marine diesel engines above 600kW when the engines are remanufactured and as soon as certified systems are available.

3.7.1.6 Environmental Protection Agency Diesel Fuel Rule

This EPA rule limited the sulfur content in on-road diesel fuel to 15 ppm starting June 1, 2006 (EPA 2006).

3.7.1.7 Conformity Rule

Section 176(c) of the CAA states that a federal agency cannot issue a permit for or support an activity unless the agency determines it would conform to the most recent EPA-approved SIP. This means that projects using federal funds or requiring federal approval must not (1) cause or contribute to any new violation of a NAAQS, (2) increase the frequency or severity of any existing violation, or (3) delay the timely attainment of any standard, interim emission reduction, or other milestone (EPA 2010a).

Based on the present NAAQS attainment status of the SCAB, a federal action would conform to the SIP if its annual emissions remain below 100 tons of carbon monoxide (CO) and fine particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), 70 tons of respirable particulate matter less than 10 microns in diameter (PM_{10}), and 10 tons of NO_X or volatile organic compounds (VOCs) (EPA 2010b). These de minimis thresholds apply to the proposed construction and operation activities pertaining to the federal action. If the proposed action exceeds one or more of the de minimis thresholds, a more rigorous conformity determination is the next step in the conformity evaluation process. SCAQMD Rule 1901 adopts the guidelines of the General Conformity Rule.

3.7.2 State Regulations

3.7.2.1 California Clean Air Act

The California Clean Air Act of 1988, as amended in 1992, outlines a program to attain the California Ambient Air Quality Standards (CAAQS) by the earliest practical date. Because the CAAQS are more stringent than the NAAQS, attainment of the CAAQS will require more emissions reductions than what would be required to show attainment of the NAAQS. Consequently, the main focus of attainment planning in California has shifted from the federal to state requirements. Similar to the federal system, the state requirements and compliance dates are based on the severity of the ambient air quality standard violation within a region.

The JOS facilities are located within the jurisdiction of the SCAQMD, which is classified as a severe nonattainment area for ozone and a nonattainment area for PM_{10} and $PM_{2.5}$.

3.7.2.2 Heavy-Duty Diesel Truck Idling Regulation

CARB's heavy-duty diesel truck idling regulation affected heavy-duty diesel trucks in California beginning in 2008. The rule requires that heavy-duty trucks be equipped with a non-programmable engine system that shuts down the engine after 5 minutes to prevent long idling times or, as an alternative, meet a stringent NO_X idling emission standard.

3.7.2.3 California Diesel Fuel Regulation

CARB's diesel fuel regulation set sulfur limits of 15 ppm for diesel fuel sold in California for use in on-road and off-road motor vehicles. Harbor craft were originally excluded from the rule but were later included by a 2004 rule amendment.

3.7.2.4 Portable Equipment Registration Program

The Portable Equipment Registration Program (PERP) established a uniform, statewide program to regulate portable engines and portable engine-driven equipment units (CARB 2010). Once registered in this program, engines and equipment units may operate throughout California without the need to obtain individual permits from local air districts. The portable equipment, however, cannot reside at the same location for more than 12 months. Some construction-related equipment may be registered under PERP.

3.7.2.5 On-Road Heavy-Duty Diesel Vehicles (In Use) Regulation

On December 12, 2008, CARB approved the on-road heavy-duty diesel vehicle (in use) regulation to significantly reduce PM and NO_X emissions from existing diesel vehicles operating in California. The regulation applies to nearly all diesel-fueled trucks and buses with a gross vehicle weight rating (GVWR) greater than 14,000 pounds that are privately or federally owned and for privately and publicly owned school buses.

Starting January 1, 2012, the regulation would phase in requirements for heavier trucks to reduce PM emissions with exhaust retrofit filters that capture pollutants before they are emitted to the air or by replacing vehicles with newer vehicles that are originally equipped with PM filters. Starting on January 1, 2015, lighter trucks with a GVWR of 14,001 to 26,000 pounds with engines that are 20 years or older would need to be replaced with newer trucks. Starting January 1, 2020, all remaining trucks and buses would need to be replaced so that they would all have 2010 model year engines or equivalent emissions by 2023.

Heavier trucks and buses with a GVWR greater than 26,000 pounds would have two ways to comply. Fleets could comply with a compliance schedule by engine model year or use a phase-in option where engine replacement could be delayed by installing a PM filter on the existing engine.

3.7.2.6 Off-Road Diesel Fleet Regulation

On July 26, 2007, CARB adopted a regulation to reduce diesel PM and NO_X emissions from existing off-road heavy-duty vehicles in California. This regulation applies to off-road vehicles with a 25 horsepower engine or greater, such as loaders, crawler tractors, skid steers, backhoes, forklifts, and two-engine cranes. The regulation does not apply to stationary equipment or portable equipment, such as generators. The off-road performance requirements are applied to a fleet as a whole and not to individual vehicles, and are based on a fleet's average NO_X emissions. The goal of the regulation is to encourage fleet owners to replace a certain percentage of their diesel fleet over time with cleaner emitting vehicles in order to meet the lower annual NO_X limits. This CARB rule is applicable to the off-road diesel vehicles that would be used during the construction of the program and project elements.

The regulation was amended in December 2010 to provide a 4-year delay from the original compliance timeline for all fleets. By January of each year, starting in 2014, each fleet must meet the fleet average NO_X requirements or, as an alternative, a specified percentage of the fleet must be replaced with newer engines. The percent turnover is referred to by CARB as best available control technology (BACT).

3.7.2.7 Airborne Toxic Control Measure for Commercial Harbor Craft

In 2007, the CARB approved a regulation to reduce emissions from diesel engines on commercial harbor craft vessels. The regulation was intended to reduce diesel particulate matter (DPM) and NO_X emissions from harbor craft engines. The rule became effective in 2009 and was amended in 2010. The rule includes new engine and in-use engine requirements for many diesel engines on commercial harbor craft. The compliance schedule is phased in such that it brings the oldest and highest use engines into compliance first. This CARB rule is applicable to marine engines on tugboats that would be used during the construction of the project elements.

3.7.2.8 Airborne Toxic Control Measure for Diesel Particulate Matter From Portable Engines

Effective February 19, 2011, diesel-fueled portable engines with a rated brake horsepower of 50 or greater are subject to the CARB's Airborne Toxic Control Measure (ATCM). The ATCM imposes fuel and DPM emission requirements for in-use and new portable diesel engines. Diesel fleets are required to meet certain DPM standards by set compliance dates. By January 1, 2020, new emergency standby diesel engines will need to be certified to Tier 4 emission standards.

3.7.2.9 Greenhouse Gases

The U.S. Supreme Court's ruling in the 2007 case *Massachusetts v. EPA* held that the EPA has authority to regulate GHG emissions from new vehicles under the CAA. In 2007, the California State Attorney General decided that the federal ruling gave California the right to regulate GHGs. Consequently, GHG emissions can be regulated in the state of California and the associated emission reduction plans can be enforced through existing air quality laws.

Office of Planning and Research CEQA Guidelines on Greenhouse Gases

The California Governor's Office of Planning and Research (OPR) developed amendments to the State CEQA Guidelines for addressing GHG emissions. These amendments became effective on March 18, 2010, when the Office of Administrative Law approved them. OPR did not define or set a CEQA threshold at which GHG emissions would be considered significant. Instead the lead agency would assess the significance of impacts from GHG emissions on the environment by considering a threshold that applies to the project and evaluate feasible mitigation measures.

In the SCAB, the SCAQMD has set a significance threshold for purposes of CEQA. The SCAQMD threshold will be used for evaluating potential GHG impacts of the Clearwater Program.

May 2008 Attorney General Greenhouse Gas CEQA Guidance Memo

In 2008, the California State Attorney General's office released a CEQA guidance memo related to GHG analysis and mitigation measures. The memo provides examples of mitigation measures that could be used in a diverse range of projects.

AB 32 – California Global Warming Solutions Act of 2006

AB 32 sets a statewide goal to reduce GHG emissions to 1990 levels by 2020. This act instructs CARB to adopt regulations that reduce emissions from significant sources of GHGs, and to establish a mandatory GHG reporting and verification program by January 1, 2008.

Wastewater processes are not considered a significant GHG emissions source. Additionally wastewater-related CO_2 emissions are biogenic in nature, not man-made. Consequently, wastewater treatment operations with anthropogenic emissions below 25,000 metric tons per year (mty) of carbon dioxide equivalent are categorically excluded in the state's emerging GHG cap and trade regulation, and are not included in the AB 32 Scoping Plan's Early Reduction Measures. Additionally, biogenic CO_2 emissions from wastewater treatment operations are not reported as direct, anthropogenic emissions under the state's Mandatory Reporting Rule.

AB 1493 – Vehicular Emissions of Greenhouse Gases

AB 1493 (Pavley), enacted on July 22, 2002, required CARB to develop and adopt regulations that reduce GHGs emitted by passenger vehicles and light duty trucks. Regulations adopted by CARB apply to 2009 and later model year vehicles. CARB estimates that the regulation will reduce climate change emissions from light duty passenger vehicle fleet by 18 percent in 2020 and 27 percent in 2030 (CARB 2004).

Low Carbon Fuel Standard

In January 2007, by Executive Order, the Governor established a low carbon fuel standard (LCFS) for transportation fuels sold in the state of California, where the initial goal is to reduce the carbon intensity of California's passenger vehicle fuels by at least 10 percent by 2020. Landfill gas, which is similar in nature to digester gas, qualifies as a low carbon fuel because of its very small carbon footprint.

3.7.3 Local Regulations

3.7.3.1 South Coast Air Quality Management District Rules and Regulations

Through the attainment planning process, SCAQMD has developed and adopted rules and regulations to address stationary sources of air pollution in the SCAB. The SCAQMD rules for stationary sources that are most pertinent to the Clearwater Program are listed in Table 3-15.

Table 3-15. SCAQMD Rules for Stationary Sources

SCAQMD Rule	Purpose of Rule
402	Nuisance rule that prohibits the discharge of air contaminants that causes injury and annoyance, endangers public health and safety, or damages property
403	Fugitive dust rule that prohibits dust from any active operation, open storage pile, or disturbed surface area that remains visible beyond the emission source property line. Requires best available control measures to be applied to earth moving and grading activities
1113	Sets a limit on the VOC content in architectural paint
1146	Sets NO_X limits for exhaust from large external combustion equipment, such as commercial boilers, steam generators, and process heaters
1166	Requires a mitigation plan for soil contaminated with VOCs
1402	Sets action triggers based on facility-wide risks for public notification and mandatory risk reduction
1470	Sets fuel requirements and limits operating hours on diesel engines
1472	Reduces diesel particulate emissions from facilities with three or more stationary emergency stand-by diesel engines/generator

3.8 Regulations for Biosolids Management

All solids generated within the JOS are processed at the JWPCP. The disposal of solids and beneficial use of biosolids are subject to federal and state regulations. Depending upon the type and level of treatment provided, solids/biosolids are placed into different classifications, which determine allowable uses of these materials.

3.8.1 Federal Regulations

The EPA promulgated 40 CFR Part 503 in 1993 to establish general requirements, pollutant limits, management practices, and operational standards for the final use or disposal of biosolids. *Biosolids* are sewage sludges/solids that have been treated/stabilized to a degree suitable for beneficial use. Part 503 of 40 CFR contains regulations for biosolids management options, such as land application, surface disposal, and incineration. The regulations classify biosolids as Exceptional Quality, Class A, or Class B biosolids. Sludges that do not fulfill the requirements for any classification are termed *unclassified solids*. Unclassified solids generated at the JWPCP are typically managed via surface disposal (i.e., landfilled). Pathogen and vector attraction reduction requirements are also included in 40 CFR Part 503. POTWs with a design flow rate greater than or equal to 1.0 MGD and POTWs serving 10,000 people or more must comply with monitoring and reporting provisions outlined by the EPA in this regulation. The JWPCP produces Class B biosolids and is subject to the regulatory requirements of Class B biosolids, which are discussed in Section 3.8.1.1.

3.8.1.1 Class B Requirements

Class B biosolids can be applied to agricultural fields and other areas that are not accessible to the general public. The biosolids producer is responsible for monitoring how the biosolids are applied at the point of use and for compliance with all regulations at the point of use. The pollutant concentration limits that determine the reuse and disposal options for biosolids from 40 CFR Part 503 are listed in Table 3-16.

Table 3-16. Pollutant Concentration Standards for Biosolids

Constituent	Ceiling Concentration[a] (mg/kg)	Monthly Average Concentration[b] (mg/kg)	Cumulative Pollutant Loading Rate[b] (kg/ha)
Arsenic	75	41	41
Cadmium	85	39	39
Copper	4,300	1,500	1,500
Lead	840	300	300
Mercury	57	17	17
Molybdenum	75	-	-
Nickel	420	420	420
Selenium	100	100	100
Zinc	7,500	2,800	2,800

[a] The maximum concentration at which biosolids may be given away or sold for land application.
[b] Dry weight basis.
mg/kg = milligrams per kilogram
kg/ha = kilograms per hectare
Source: EPA, 40 CFR 503 – Standards for the Use or Disposal of Sewage Sludge 1997

3.8.2 State Regulations

The SWRCB enacted State Water Quality Order No. 2000-10-DWQ in August 2000, which was later replaced by State Water Quality Order No. 2004-0012-DWQ, to establish general WDRs for the reuse of biosolids. The land application requirements are more restrictive than those contained in 40 CFR Part 503 and are designed to account for conditions specific to California soils and local environments through the issuance and oversight of general order permits.

3.9 Regulations for Hazardous Materials

3.9.1 Federal Regulations

The EPA is the principal federal agency regulating hazardous materials. As such, the EPA broadly defines a hazardous waste as one that is specifically listed in EPA regulations, that has been tested and meets one of the characteristics (e.g., toxicity) established by the EPA, or that has been declared hazardous by the generator based on its knowledge of the waste. In general, federal regulations applicable to hazardous wastes are contained in Titles 29, 40, and 49 of the CFR. The main federal regulations pertaining to hazardous materials are discussed in the following sections.

3.9.1.1 Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA), including the Hazardous and Solid Waste Amendments of 1984 (HSWA), imposes regulations on hazardous waste generators, transporters, and operators of treatment, storage, and disposal facilities (TSDFs). The HSWA also requires the EPA to establish a comprehensive regulatory program for underground storage tanks.

3.9.1.2 Comprehensive Environmental Response, Compensation, and Liability Act

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), also known as Superfund, establishes a comprehensive national program to identify active and abandoned waste disposal sites that pose a threat to human health or the environment. CERCLA created a fund to pay for the cleanup of abandoned sites for which no responsible parties could be identified.

3.9.1.3 Superfund Amendment Reauthorization Act

The Superfund Amendment and Reauthorization Act Title III (community right-to-know laws) is the set of statutes that grants individuals information regarding chemicals located in their communities or workplace and that provides emergency preparedness for reaction to environmental accidents.

3.9.1.4 Hazardous Materials Transportation Act

The Hazardous Materials Transportation Act governs the transportation of hazardous materials. These regulations are promulgated by the United States Department of Transportation and enforced by the EPA. The California Environmental Protection Agency (Cal-EPA) has been granted primary responsibility by the EPA for administering and enforcing hazardous materials management plans. In particular, the state has acted to regulate the transfer and disposal of hazardous waste. Hazardous waste haulers are required to comply with regulations that establish numerous standards, including criteria for handling, documenting, and labeling the shipment of hazardous waste (26 CCR 25160 et seq.). Hazardous waste TSDFs are also highly regulated and must meet standard criteria for processing, containment, and disposal of hazardous materials (26 CCR 25220).

3.9.2 State Regulations

Cal-EPA defines a hazardous material more generally as a material that, because of its quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the environment if released (26 CCR 25501). Note that hazardous materials include raw materials and products, such as bulk chemicals stored for the operation of a typical POTW.

California state regulations governing hazardous materials are as stringent as, or in some cases, more stringent than, federal regulations. State regulations include requirements for detailed planning and management to ensure that hazardous materials are properly handled, stored, and disposed of in order to reduce human health risks.

3.9.2.1 Hazardous Materials Release Response Plans and Inventory Act

The Hazardous Materials Release Response Plans and Inventory Act (also known as the Business Plan Act) requires a business using hazardous materials to prepare a plan describing the facility, inventory, emergency response plans, and training programs. The Sanitation Districts prepare this plan biennially and submit it to the Los Angeles County Fire Department, Hazardous Materials Division.

3.9.2.2 Hazardous Waste Control Act

The state equivalent of RCRA is the Hazardous Waste Control Act (HWCA). The HWCA created the State Hazardous Waste Management Program, which is similar to the RCRA program but is generally more stringent. The HWCA establishes requirements for the proper management of hazardous substances and wastes with regard to criteria for (1) identification and classification of hazardous wastes; (2) generation and transportation of hazardous wastes; (3) design and permitting of facilities that recycle, treat, store, and dispose of hazardous wastes; (4) treatment standards; (5) operation of facilities; (6) staff training; (7) closure of facilities; and (8) liability requirements.

3.9.2.3 Emergency Services Act

Under the California Emergency Services Act, the state developed an emergency response plan to coordinate emergency services provided by all governmental agencies. The plan is administered by the California Office of Emergency Services (OES). OES coordinates the responses of other agencies, including the EPA, the Federal Emergency Management Agency, the California Highway Patrol, the RWQCBs, the air quality management districts, and the county disaster response offices. Local emergency response teams, including the fire, police, and sheriff's departments, provide most of the services to protect public health.

3.10 Regulations for Environmental Impacts

3.10.1 Federal Regulations

3.10.1.1 National Environmental Policy Act

NEPA, enacted in 1970, was developed in response to a national sentiment that federal agencies should take more direct responsibility in providing greater protection for the environment. NEPA is the nation's basic charter for the protection of the environment. It establishes environmental policy for the nation, provides an interdisciplinary framework for federal agencies to prevent environmental damage, and contains procedures to ensure that federal agency decision-makers take environmental factors into account (Bass and Herson 1996).

The four main purposes of NEPA include:

- Declare a national policy that will encourage productive and enjoyable harmony between people and the environment
- Promote efforts that will prevent or eliminate damage to the environment and biosphere and stimulate health and welfare
- Enrich the understanding of the ecological system and natural resources important to the nation
- Establish a Council on Environmental Quality

NEPA applies to all federal agencies and most of the activities they manage, regulate, or fund that affect the environment. Under NEPA, the lead agency is the federal agency with the primary responsibility for complying with NEPA for a proposed action. To construct the new or modified ocean discharge system being evaluated in the Clearwater Program Master Facilities Plan (MFP), the Sanitation Districts would need to secure permit(s) from the Corps under one or more of the following federal acts:

- Section 404 of the CWA, which regulates fill or discharge of materials into state and ocean waters
- Section 10 of the Rivers and Harbors Act, which regulates the diking, filling, and placement of structures in navigable waterways
- Section 103 of the Marine Protection, Research, and Sanctuaries Act, which regulates the transportation of dredged material for the purpose of dumping it into ocean waters

Therefore, the Corps is the federal lead agency for the federal action under NEPA.

3.10.2 State Regulations

3.10.2.1 California Environmental Quality Act

CEQA, enacted in 1970, was modeled after NEPA. CEQA applies to all proposed discretionary activities that will be carried out or approved by California public agencies, such as the Sanitation Districts, unless such activities are specifically exempted. Under CEQA, a lead agency has the principal discretionary responsibility to approve a project and, therefore, is the agency with the primary responsibility for preparing a CEQA document associated with a proposed discretionary action. For the MFP EIR, the Sanitation Districts will serve as the CEQA lead agency.

The purpose of CEQA is to minimize environmental damage. The primary objectives of CEQA are to (1) disclose to decision makers and the public the significant environmental effects of a proposed project to enable them to consider its environmental consequences and (2) to balance the benefits of a project with the environmental costs.

Major elements of CEQA include:

- Disclosing environmental impacts
- Identifying and preventing environmental damage
- Fostering intergovernmental coordination
- Enhancing public participation
- Disclosing agency decision making (Bass et al. 1996)

3.11 Regulations for Endangered Species

3.11.1 Federal Regulations

3.11.1.1 Federal Endangered Species Act

The Federal Endangered Species Act (FESA) regulates the take of species listed as threatened or endangered. *Take* is broadly defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Consultation with the United States Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) may be required under FESA for implementation of the Clearwater Program.

Section 7

Section 7 of FESA applies when a project involves a federal action such as issuing a federal permit or federal funding. Section 7 requires the federal agency to consult with the USFWS and/or NMFS regarding the potential effect of the agency's action on those species listed as threatened or endangered. Section 7 compliance also applies to agencies applying for SRF loans because some of the funding is from federal sources. This consultation typically results in preparation of a biological opinion that specifies whether the proposed action is likely to jeopardize the continued existence of the listed species or result in adverse modification of critical habitat. The biological opinion may include an incidental take statement if the proposed action would result in the take of a listed species incidental to the federal action.

Section 9

Section 9 of FESA prohibits all persons subject to the jurisdiction of the United States from taking, importing, exporting, transporting, or selling any fish or wildlife species listed as endangered or threatened.

Section 10

Although Section 9 prohibits the take of a federally listed species, Section 10 of FESA is the mechanism that may allow an incidental take of such species. The USFWS may issue a take permit for any taking that is incidental to, and not for the purpose of, carrying out an otherwise lawful activity. Along with the application for an incidental take permit, the applicant must submit a conservation plan that specifies likely impacts that would result from the take, mitigation measures to minimize those impacts, funding for the mitigation, and a project alternatives analysis.

3.11.2 State Regulations

3.11.2.1 California Endangered Species Act

Under the California Endangered Species Act (CESA), all state lead agencies (as defined by CEQA) preparing initial studies, negative declarations, or EIRs must consult with the California Department of Fish and Game (CDFG) to ensure that any action authorized, funded, or carried out by that lead agency is not likely to jeopardize the continued existence of any endangered or threatened species. This CESA consultation requirement does not apply to local lead agencies, such as the Sanitation Districts.

Section 2080 of CESA prohibits any party from importing into the state, exporting out of the state, or taking, possessing, purchasing, or selling within the state any part or product of any endangered or threatened species (except as provided in the Native Plant Protection Act or California Desert Native Plants Act). Through Section 2081 of CESA, CDFG may enter into a management agreement with the project applicant to allow for an incidental take, as the USFWS and NMFS may under Section 10 of FESA. Under CESA, *take* is defined as to hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill.

3.11.2.2 California Fish and Game Code

Sections 1601–1616 of the California Fish and Game Code apply to any state or local government agency or any public utility that proposes to

> substantially divert or obstruct the natural flow of, or substantially change or use any material from the bed, channel, or bank of, any river, stream, or lake, or deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake.

Sections 1601–1616 require application to the CDFG to obtain a Streambed Alteration Agreement (SAA). This agreement is negotiated between the CDFG and the applicant. The agreement may contain mitigation measures, such as erosion control, intended to reduce the effect of the activity on fish and wildlife resources. The agreement may also include monitoring to assess the effectiveness of the proposed mitigation measures.

3.11.3 Local Regulations

3.11.3.1 Significant Ecological Areas

Significant ecological areas (SEAs) were developed by the Los Angeles County Department of Regional Planning (DRP) as a way to protect biotic diversity, including habitat for endangered species. In 1972, the original SEA report was prepared and submitted to the DRP to be used as background information for the 1973 County of Los Angeles General Plan. A second SEA study, completed in 1976 and amended in the 1980 County of Los Angeles General Plan, identified 61 SEAs within the county. The most recent SEA study, completed in 2001 and amended in the 2035 County of Los Angeles General Plan, identifies 31 SEAs within the county, several of which are combinations of previous SEAs.

Although SEAs do not preclude development or construction, they promote open space conservation. SEAs require another level of scrutiny in the CEQA review process by the Significant Ecological Areas Technical Advisory Committee (SEATAC). SEATAC reviews proposed projects to ensure consistency with SEA-recommended management practices before a SEA conditional use permit (CUP) can be issued and the project can be approved.

The Sanitation Districts could be required to obtain a CUP for construction of new facilities within a proposed SEA if the SEA is currently in place or is adopted prior to the start of construction of any proposed JOS facilities.

3.12 Regulations for Cultural Resources

3.12.1 Federal Regulations

3.12.1.1 National Historic Preservation Act

A programmatic agreement between the SWRCB and the State Historic Preservation Officer (SHPO) requires that projects receiving federal funds administered by the SWRCB (such as SRF loan funding) comply with Section 106 of the National Historic Preservation Act (NHPA). Because the Sanitation Districts may seek to finance projects associated with the Clearwater Program MFP with SRF loan funds, compliance with Section 106 of the NHPA would be required. In addition, Section 106 compliance would be required because federal permits are required for the ocean work being proposed under the Clearwater Program.

The Section 106 review process is implemented by means of a five-step procedure including: (1) the identification and evaluation of historic properties, (2) an assessment of the effects of the undertaking on properties that are eligible for listing on the National Register of Historic Places, (3) a consultation with the SHPO and other agencies for the development of an agreement that addresses the treatment of historic properties, (4) the receipt of comments on the agreement or results of the consultation from the Advisory Council on Historic Preservation, and (5) project implementation subject to conditions imposed by the consultation and any agreements.

3.12.2 State Regulations

The state requirements for cultural resources are outlined in Sections 5020 through 5024.6, 21084, and 21084.1 of the California Public Resources Code (CPRC). In general, compliance with the requirements of Section 106 of the NHPA is sufficient to ensure compliance with CEQA.

Other state requirements are outlined in Section 7050.5 through 7055 of the CHSC and Sections 5097 through 5097.998 of the CPRC, which provide for the protection of Native American remains and identify special procedures to be followed when Native American burial sites are found. When remains are found, the Native American Heritage Commission (NAHC) and the County Coroner must be notified. The NAHC provides guidance concerning the most likely Native American descendants and the treatment of human remains and associated artifacts. Compliance with the provisions of these laws is separate from the requirements of the NHPA and CEQA.

3.13 Other Agencies Associated With Tunneling and Marine Construction

A new or modified ocean discharge system for JWPCP effluent is evaluated in this MFP. Associated regulatory agencies that have not been previously discussed in this chapter are identified in the following sections.

3.13.1 Federal Agencies

3.13.1.1 U.S. Coast Guard

Under 33 CFR Part 66, the U.S. Coast Guard issues private aids to navigation for temporary or permanent stationing of a fixed or floating object within navigable waters of the U.S.

3.13.2 State Agencies

3.13.2.1 California Coastal Commission

The California Coastal Commission (CCC) retains coastal permit jurisdiction over projects located on public trust lands, tidelands, and submerged lands, extending inland generally 1,000 yards from the mean high tide line (with additional considerations for areas with estuarine, habitat, or recreational significance) to 3 nautical miles offshore. A project that involves outfall construction within state of California waters (i.e., seaward from the mean high tide line to 3 nautical miles offshore, measured from the harbor breakwater) requires issuance of a permit from the CCC. The federal government administers the submerged lands, subsoil, and seabed lying between the seaward extent of the state's jurisdiction and the seaward extent of federal jurisdiction, which extends from 3 to 200 miles offshore.

Pursuant to Section 307(c)(3)(A) of the Coastal Zone Management Act (CZMA), any federally licensed or permitted activity affecting any land or water use or natural resource in the coastal zone must be consistent with state coastal management policies. The CCC, which is responsible for implementing the CZMA in California, issues concurrence in a certification to the permitting agency that the project would be conducted consistent with California's approved coastal management program. For the portion of the project that lies within state waters, the consistency certification is redundant as the coastal development permit serves as the consistency certification.

3.13.2.2 California State Lands Commission

The state of California acquired sovereign ownership of all its tidelands and submerged lands upon its admission to the U.S. in 1850. The California State Lands Commission (CSLC) was established in 1938 under Division 6 of the CPRC to provide stewardship of state's tidelands and submerged lands through economic development, protection, preservation, and restoration. The CSLC also retains residual and review authority for tidelands and submerged lands legislatively granted in trust to local jurisdictions. CSLC jurisdiction extends seaward from the mean high tide line to 3 nautical miles offshore.

3.13.2.3 California Department of Industrial Relations

Tunnel safety is overseen by the California Occupational Safety and Health Administration (Cal/OSHA), Mining and Tunneling Unit. Regulations are outlined in Title 8, CCR, Chapter 4, Subchapter 17, Article 4, and Subchapter 20, Article 3.

3.14 Other Applicable Laws and Regulations

3.14.1 Federal Regulations

3.14.1.1 State Revolving Fund

Other applicable laws and regulations that apply to the MFP include federal requirements in accordance with the SRF loan program beyond those of FESA and NHPA. These requirements are described in the sections that follow.

Executive Order 11988

This executive order relating to floodplain management was prepared in 1979 to avoid, to the extent possible, long- and short-term adverse impacts associated with the occupation and modification of floodplains and to avoid direct or indirect support of development in floodplains. This order requires that the agency reviewing the proposed action consider alternatives to avoid adverse effects and incompatible development in floodplains. If the only practicable alternative is to site a project in the floodplain, and the reviewing agency concurs, then the action must be designed or modified to minimize potential harm to the floodplain. Furthermore, a notice containing an explanation of why the proposed action is to be located in the floodplain must be prepared and circulated.

Executive Order 11990

This executive order was prepared to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative. The order requires early public review of any plans or proposals for new construction in wetlands, in addition to notification of the federal Office of Management and Budget regarding compliance with the order. The order establishes several factors that should be considered during evaluation of the effects of a project on the survival and quality of wetlands including public health and welfare, maintenance of natural systems, and other uses of wetlands in the public interest.

Executive Order 11593

This executive order provides for the protection and enhancement of the cultural environment. Compliance with Section 106 of NHPA and with CEQA fulfills the requirements of this order.

Executive Order 12898

This executive order effectively expands the scope of complaints that may be filed with EPA under Title VI of the Civil Rights Act of 1964 to include issues of environmental justice. Environmental justice complaints typically allege that facilities generating adverse impacts associated with pollution and/or potential pollution are systemically sited in and/or permitted to operate in minority communities. Disproportionate adverse impacts on minority communities associated with pollution generated by facilities may constitute discrimination. Executive Order 12898 directs the EPA to address environmental justice concerns through the permitting process and applies to the permitting decisions of all agencies that receive or act as a conduit for federal monies.

The EPA's Title VI regulations apply to all programs and activities carried out by departments or agencies that receive EPA funding either directly or indirectly. The SWRCB administers a number of funding programs, including SRF, which are partially funded by federal monies. The SWRCB has delegated permitting authority vested in it by state and federal laws to the local RWQCBs, including the LARWQCB. Accordingly, all of the permitting decisions of the LARWQCB, including the issuance, modification, or renewal of the WDRs for the JOS facilities, are subject to the mandates of Executive Order 12898 and the EPA guidelines implementing that order.

3.14.2 State Regulations

3.14.2.1 Worker Safety

Worker safety laws protect public health in the workplace. These laws are administered and enforced by Cal/OSHA. The laws apply to normal operational activities and include all provisions for standard injury and illness prevention, construction requirements, and requirements for the handling of chemicals and prevention of infection and disease. Worker safety programs directly benefit public health by reducing the number of accidents and injuries that occur. Worker safety laws also protect worker and public safety by requiring specific training, handling, transportation, and storage procedures for hazardous materials.

3.14.3 Local Regulations

3.14.3.1 Storm Water Pollution Prevention Plan

A storm water pollution prevention plan (SWPPP) is generally required as part of a construction permit for large projects or facilities that are within a drainage basin of a water of the U.S. The major objectives of a SWPPP are to help identify sources of sediment and other pollutants that affect the quality of storm water discharges and to describe and ensure implementation of best management practices (BMPs). The SWPPP emphasizes the use of appropriately installed and maintained storm water pollution reduction BMPs.

Required elements of a SWPPP include:

- A site description addressing the elements and characteristics specific to the site
- BMPs for erosion and sediment controls
- BMPs for construction waste handling and disposal
- Implementation of approved local plans
- Proposed post-construction controls, including a description of local post-construction erosion and sediment control requirements

- Non-stormwater management
- Routine visual inspections
- Development of a Construction Site Monitoring Plan

Chapter 4
WATER, WASTEWATER, AND PROJECTIONS

4.1 Introduction

This chapter provides a comprehensive overview of regional water supply and demand as well as Joint Outfall System (JOS) wastewater characteristics and flow projections, solids projections, and water reuse.

4.2 Water Use

Water use includes withdrawals from surface and groundwater supply sources, deliveries to meet water demands, releases from points of use, and returns to surface water and groundwater supply sources.

4.2.1 Historical Water Use

The availability of fresh water has proven critical for commercial and residential development in the Los Angeles metropolitan area, including the JOS service area. Throughout the history of the region, major efforts have been implemented to supply a growing population and industrial base with adequate amounts of water.

Early in the 20th century, when it became apparent that local water supplies were not sufficient to support continued development of the Los Angeles region, the city of Los Angeles began to import water from the Owens Valley in Northern California. Later, water was diverted from the Colorado River, and more recently, the state of California began delivering water from the Sacramento-San Joaquin Delta in Northern California.

Extensive water supply infrastructure, including aqueducts, pumping plants, storage reservoirs, and treatment plants, has been constructed to deliver water from these regions, and additional water supply infrastructure is planned to improve the reliability of Southern California's imported water supplies. Despite the efforts to date, the effects of the recent droughts and projections of growth in the region indicate that water supply will continue to be a critical issue in Southern California and the JOS planning area in the future.

4.2.2 Significance to Clearwater Program Facilities Planning

The Sanitation Districts of Los Angeles County (Sanitation Districts) have consistently pursued a program of wastewater reclamation and reuse since 1963. Recycled water generated at the JOS water reclamation plants (WRPs) supports a variety of beneficial uses including landscape and agricultural irrigation, industrial cooling and process water, and groundwater recharge operations. As water resources become scarcer in response to rising demands and declining supplies, demand for recycled water in Southern California will likely increase.

The reuse potential of recycled water is directly influenced by the quality of the water supply. Conventional wastewater treatment processes, such as those employed at the JOS WRPs, have a minimal effect on certain water quality parameters, including mineral content. The mineral content of the water supply, generally expressed in terms of the concentration of total dissolved solids (TDS), is a parameter of concern to the Sanitation Districts. High TDS levels in the water supply produce high TDS levels in recycled water, which tends to limit available reuse options.

Excessive TDS levels in recycled water can be detrimental to some plant species and, therefore, limit irrigation applications. In addition, the TDS limit for recycled water used for groundwater recharge at the Montebello Forebay, the Sanitation Districts' single largest user of recycled water, has been set at 700 milligrams per liter (mg/L). The quality of the water supply, especially its TDS level, is, therefore, relevant to the Sanitation Districts' facilities planning.

The viability of continued wastewater recycling and reuse depends on the delivery of a high quality water supply to the regions served by the WRPs. The Sanitation Districts are committed to working with the communities using the recycled water to achieve cost-effective treatment upgrades as required to support increased reuse of this important resource. This would be accomplished within a framework that maintains consistency with regional salinity management plans.

4.3 Existing Water Supply

This section discusses the various sources of water supply for the JOS service area, and the impacts of these sources on the Sanitation Districts' facilities planning. Water supplies for the JOS service area are composed of local and imported water resources. Local water resources consist primarily of groundwater, but may also include surface water and recycled water. Imported water resources, which constitute approximately three-quarters of the JOS water supply, are provided by the Metropolitan Water District of Southern California (MWD) via the Colorado River Aqueduct and the California Aqueduct.

4.3.1 Imported Water

The MWD is a consortium of 26 cities and water districts that provides drinking water to approximately 19 million people in parts of Los Angeles, Orange, San Diego, Ventura, Riverside, and San Bernardino Counties. Organized in 1928 following the adoption of the Metropolitan Water District Act by the California Legislature in 1927, the MWD currently delivers 1.7 billion gallons of water per day to its 5,200 square mile service area. The MWD imports water from two sources: the Colorado River via the Colorado River Aqueduct, and Northern California via the State Water Project's (SWP's) California Aqueduct.

The MWD was originally formed with the intent to build and operate an aqueduct to import water to Southern California from the Colorado River. Imported water from the Colorado River was designated to supplement local water supplies in the original 13 MWD member cities. The 242-mile Colorado River Aqueduct was completed in 1941 and began deliveries of Colorado River water to Southern California the same year.

In 1951, the California Legislature authorized construction of the Feather River Project, now known as the SWP, by the State Department of Water Resources. The purpose of the SWP is to transfer surplus water from Northern California to water-scarce regions in Central and Southern California. In 1972, the MWD began providing additional imported water via the SWP to meet increased demands in its service area.

4.3.1.1 Colorado River Water

Colorado River water supplies generally exhibit low levels of most water quality constituents. However, mineral concentrations of water delivered via the Colorado River Aqueduct have typically been high.

Mineralization of Colorado River waters occurs naturally as water tributary to the river flows over and through soils within the watershed and as soluble salts are released through natural geologic weathering processes. Farming activities along the Colorado River also contribute significant amounts of salts to river water. Water imported via the Colorado River Aqueduct has the highest level of salinity of all of the MWD's sources of supply, averaging 630 mg/L.

The MWD has employed a number of strategies to avoid potential problems associated with the higher mineral content of the Colorado River Aqueduct supply source and contamination-related issues. To lower TDS levels in water supplies derived from the Colorado River, the MWD typically blends Colorado River water with SWP water that is lower in TDS.

Another compound of concern found in water from the Colorado River Aqueduct is perchlorate. Perchlorate enters the Colorado River system at the Las Vegas wash near Henderson, Nevada. The MWD has adopted the Perchlorate Action Plan to proactively address this issue. As a result, the amount of perchlorate entering the Colorado River system from Henderson has been reduced from approximately 900 pounds per day (lbs/d) in 2000 to 77 lbs/d as of February 2008.

The MWD provides treated water to the JOS service area through three treatment facilities: the Jensen Filtration Plant, located in the northwestern end of the San Fernando Valley; the Weymouth Filtration Plant, located in the northeastern end of the San Gabriel Valley; and the Diemer Filtration Plant, located in the northwest corner of Orange County. These facilities have been interconnected into a distribution loop whereby any of the three facilities may potentially provide water to the JOS service area.

In general, however, the Jensen Plant serves the San Fernando Valley, the city of Los Angeles, and the South Bay area (e.g., Redondo Beach, Torrance); the Weymouth Filtration Plant serves the San Gabriel Valley and the southeastern and central portions of the Los Angeles Basin; and the Diemer Filtration Plant serves Orange County. Treated water from the Jensen Filtration Plant is derived solely from SWP water; treated water from the Weymouth and Diemer Filtration Plants is derived from a blend of SWP and Colorado River water.

4.3.1.2 State Water Project

Potable water provided by the SWP flows through the Sacramento-San Joaquin Delta (Delta). Measurements by the Department of Water Resources and municipal agencies that treat and deliver SWP water indicate that concentrations of water quality constituents are generally low with respect to drinking water standards. TDS levels in SWP water are also relatively low. Water supplies from the SWP have average TDS concentrations of 250 mg/L for water supplied through the East Branch and 325 mg/L from the West Branch. SWP water delivered by the California Aqueduct has an average TDS concentration of 310 mg/L.

Treated SWP water has occasionally exceeded existing state and federal drinking water standards for trihalomethanes (THMs). THMs are a by-product of disinfection processes that employ chlorine as a disinfectant. They are suspected human carcinogens and are, therefore, regulated by state and federal safe drinking water laws. THMs form when halogens, such as chlorine and bromine, react with dissolved organic matter present in water.

SWP water contains relatively high levels of naturally occurring organic matter, measured as total organic carbon (TOC), due to the influence of peat soils in the Delta. The presence of bromides in SWP water as a result of the ocean's influence on the Delta allows the formation of bromine-containing THM compounds during chlorine disinfection.

To protect and improve the water quality of SWP supplies and resolve environmental issues, the MWD is one of the agencies that have implemented the CALFED Bay-Delta Program. The CALFED Bay-Delta Program has set water quality goals for TOC and bromide using a cost-effective combination of alternative source waters, source control, and treatment technologies. Measures have included the use of ozonation to disinfect SWP waters and a blending of SWP water or Colorado River water to lower the concentration of THMs.

4.3.2 Local Surface Water

The JOS service area includes two major river systems, the Los Angeles and San Gabriel Rivers, and several large creek systems. Some precipitation in the areas tributary to these rivers and creeks compliments local water supply through groundwater recharge and incidental runoff into surface storage reservoirs further up in the watershed. However, flood control is the primary function of the mostly concrete lined river and stream systems. Because most of the local surface water drains directly to the ocean through concrete storm drains and channels, local surface water quality does not have a significant impact on the JOS service area.

4.3.3 Groundwater

The groundwater basins that provide water to the JOS service area include the Central, West Coast, Main San Gabriel, Raymond, Claremont Heights, Live Oak, Puente, Spadra, and Pomona Basins. With the exception of the Puente and Spadra Basins, the water quality in these basins is generally good. Where contamination does occur, it tends to be highly localized. The most common contaminants are industrial solvents and nitrates.

In contrast to the other water quality basins, contamination of the Main San Gabriel Basin is fairly widespread. The Main San Gabriel Basin has been classified as a Superfund site by the United States Environmental Protection Agency (EPA). Chlorinated solvents are the most common contaminants found in this basin; nitrate and metals concentrations are also high in some locations. Remediation is underway to improve the groundwater quality in the Main San Gabriel Basin.

Groundwater from all of the basins generally exhibits low concentrations of TDS with a few exceptions. In coastal groundwater basins, TDS levels are highly elevated in locations of historic overdrafting and subsequent saltwater intrusion. Freshwater injection barrier wells have been employed at many of these locations to prevent further degradation of the groundwater aquifers. TDS levels are also elevated in regions affected by irrigated agriculture, dairy or livestock activities, and septic tanks in unsewered areas. TDS levels are also elevated in portions of coastal basins where saltwater intrusion has occurred. One strategy to prevent further degradation of these aquifers is the installation of freshwater-injection barrier wells.

4.3.4 Recycled Water

Another source of water supply is recycled water. Approximately one-third of the wastewater in the JOS is treated at the WRPs and is available for reuse. The remaining two-thirds is treated at the Joint Water Pollution Control Plant (JWPCP) for ocean disposal, as the tributary wastewater flow to this plant is too high in TDS for reuse without advanced treatment. Recharge and reuse TDS permit limits for the water recycling plants in the JOS range from approximately 600 to 1,150 mg/L. Recycled water quality and water reclamation permits are discussed in Chapter 3.

Wastewater flows experience significantly higher salinity concentrations than the potable water supply. Typically, each cycle of urban water use adds 250 to 400 mg/L of TDS to the wastewater. Salinity increases tend to be higher where specific commercial, industrial, or agricultural processes add brine wastes to the discharge stream or where brackish groundwater infiltrates into the sewer system.

Where wastewater flows have high salinity concentrations, the use of recycled water may be limited or additional treatment may be required. Landscape irrigation and industrial reuse become problematic at TDS concentrations of over 1,000 mg/L. Some crops are particularly sensitive to high TDS concentrations, and the use of high-salinity recycled water may reduce yields of these crops. In addition, concern for the water quality in groundwater basins may lead to restrictions on the use of recycled water on lands overlying those basins.

These issues are exacerbated during times of drought, when the salinity of imported water supplies increases. As a result, there is an increase in the salinity of wastewater flows and, therefore, a similar increase in recycled water salinity. Basin management plans may restrict the use of recycled water by recycled water customers when its use would be most valuable. Therefore, to maintain the cost-effectiveness of recycled water, the salinity level of the region's potable water sources and wastewater flows must be properly managed.

4.4 Projected Water Demand

4.4.1 Municipal Water Demand

The MWD Regional Urban Water Management Plan (UWMP) includes demand projections for the MWD service area, which includes the JOS service area. According to the MWD's 2005 UWMP, historical retail water demands in the Los Angeles County portion of the MWD's service area increased from 1.5 million acre-feet (AF) in 1980 to approximately 1.8 million AF in 2005. Due to the recession, wet weather, conservation efforts, and lingering drought impacts, water use dropped for several years in the mid-1990s. Following the pattern of population projections, water demands are projected to increase in Los Angeles County 272,600 AF by the year 2030. The UWMP only contains projections through the year 2030.

Almost 100 percent of Los Angeles County water is used for municipal and industrial (M&I) purposes. Residential water use accounts for the majority of the MWD's M&I demands. Although single-family homes account for about 55 percent of the total occupied housing stock, they account for about 70 percent of total residential water demands. Also, single-family households tend to have more persons living in the household, are likely to have more water-using appliances and fixtures, and tend to have a greater amount of landscaping per home.

4.4.2 Other Water Demand

Commercial, industrial, and institutional (CII) water use represents about 25 percent of the total M&I demands in Los Angeles County. The CII (nonresidential) sector represents water that is used by businesses, services, government, institutions (such as hospitals and schools), and industrial (or manufacturing) establishments. Within the commercial/institutional category, the top water users include schools, hospitals, hotels, amusement parks, colleges, laundries, and restaurants. In Southern California, the major industrial users include electronics, aircraft, petroleum refining, beverages, and food processing.

4.4.3 Water Conservation

A number a federal and state regulations implemented within the JOS service area encourage water conservation. These regulations include plumbing efficiency standards, urban water management, agricultural water management, recycled water reuse, and graywater use. In addition to the state and federal programs, there are local water conservation programs, and some water agencies use a tiered rate structure to encourage water conservation.

The MWD water demand forecasts discussed in Section 4.4.1 account for water savings resulting from plumbing codes, price effects, and actual implementation of best management practices (BMPs). The MWD total M&I water demand projections achieved an 11 percent savings (measured from 1990 usage levels) from conservation and pricing policies in 2000. It is projected that this level will increase to a 19.3 percent savings in 2030, compared to demands without conservation for the entire MWD service area.

4.5 Future Water Demand and Supply Balance

In the 1990s, resource constraints resulting from drought and operational constraints resulting from regulatory requirements impacted the reliability of the MWD's water supplies while the region experienced accelerated growth. To address this challenge, the MWD and its member agencies collaborated on an Integrated Resource Planning (IRP) process to determine the appropriate level of supply reliability and to establish cost-effective approaches towards achieving that goal.

The reliability evaluation conducted as part of the 1996 IRP process revealed that without future investments in local and imported supplies, the region may experience a supply shortage of at least 0.79 million AF about 50 percent of the time (or once every other year) by 2020. Since 1996, the MWD, its member agencies, and other local agencies have strived to implement the goals identified in the IRP. Implementation and refinements to the IRP are conducted via annual reports to the MWD Board of Directors, as well as an IRP Report update every 5 years (in conjunction with the Regional UWMP update). The IRP updates have confirmed that these efforts have moved the region toward its goal of long-term regional water supply reliability.

The 2004 IRP Update emphasized conservation and local water supply development and included a "planning buffer" as redundancy to accommodate unforeseen circumstances. The 2010 IRP Update, which remained true to the original IRP goal of meeting "full service demands at the retail level under all foreseeable hydrologic conditions," managed recent dramatic changes such as reduced water supply from the Colorado River and more stringent regulations that reduce water supply from the SWP. One component of the 2010 IRP Update was to establish foundational actions that detail strategies for securing additional water sources if changed conditions turn dramatic or persistent. These foundational actions, which will span an estimated 8 years, include low-risk actions (i.e., feasibility studies, legislative efforts, public and stakeholder outreach, agency consultation for permitting, and research) undertaken to reduce the time necessary to make a project operational. The MWD will employ these foundational actions concurrent with the remaining components of the plan that focus on further development or study of four local resources including recycled water, seawater desalination, stormwater, and graywater (MWD 2010).

The major drivers for the improved supply reliability in the MWD service area have been:

- Conservation
- Water transfers and storage and groundwater management programs within the Southern California region
- Storage programs related to the SWP and the Colorado River
- Local resource planning including desalination, water recycling, and groundwater recovery
- Other water supply management programs outside of the region

4.6 Uncertainties and Possible Effects on Projections

Variables exist beyond the control of the Sanitation Districts that may influence the availability of future water supplies and their usage. These may, in turn, affect future wastewater characteristics and flows. Limitations exist relative to the accuracy of predicting population growth, future water usage, and the resulting wastewater-related projections. Some areas of uncertainty include:

- Future availability of imported water supplies and contingency planning related to potential reductions
- Potential effects associated with the increased use of graywater
- Impacts due to future increased recycled water use
- Impacts due to climate change

The approach to dealing with uncertainties within the planning process is discussed in Section 4.6.5.

4.6.1 Imported Water Supply Contingency Planning

A variety of federal, state, and local programs have been initiated to enhance the supply capabilities and reliability of imported sources to consistently meet projected future demands. In addition, contingency analyses and long-range planning efforts have been undertaken to further improve the supply dependability in coping with potential interruptions or reductions to these sources.

The MWD must meet the drought and water shortage planning requirements of the Urban Water Management Planning Act including:

- Water supply reliability analysis addressing normal, dry, and multiple dry years
- Planning for the stages of actions to implement in response to water supply shortages, accounting for up to a 50 percent reduction in its water supplies

The MWD accomplished this in its Water Surplus and Drought Management Plan (WSDM Plan), which guides planning and operations during both shortage and surplus conditions.

The WSDM Plan identifies the expected sequence of resource management actions that will be executed during surpluses and shortages to minimize the probability of severe shortages and eliminate the possibility of extreme shortages and shortage allocations. Unlike the MWD's previous shortage management plans, the WSDM Plan recognizes the link between surpluses and shortages, and integrates planned operational actions with respect to both conditions.

Through effective management of its water supply, the MWD fully expects to be completely reliable in meeting all non-discounted, non-interruptible demands up to the year 2030. The effectiveness of the MWD's contingency planning approach has been demonstrated by the region's success in dealing with recent operational constraints, including supply disruptions from the Colorado River in 2003 and the SWP in 2004.

The guiding principle of the WSDM plan is to manage the MWD's water resources and management programs to maximize management of wet year supplies and minimize adverse impacts of water shortages to retail customers. From this guiding principle, the MWD developed the following supporting principles:

- Encourage efficient water use and economical local resource programs
- Coordinate operations with member agencies to provide as much surplus water as possible in dry years
- Pursue innovative transfer and banking programs to secure more imported water for use in dry years
- Increase public awareness about water supply issues

The WSDM plan also declared that if mandatory import water allocations are necessary, they would be calculated on the basis of need, rather than historical purchases. The WSDM plan contains the following considerations that would be utilized for an equitable allocation of imported water:

- Impact on retail consumers and regional economy
- Investments in local resources, including recycling and conservation
- Population growth
- Changes and/or losses in local supplies
- Participation in the MWD's non-firm (interruptible) programs
- Investment in the MWD's facilities

4.6.2 Graywater Use

On March 18, 1997, the Building Standards Commission approved the revised California Graywater Standards, as presented in the California Administrative Code, Title 24, Part 5, Appendix G. Graywater is defined within these standards as

> … untreated wastewater that has not come into contact with toilet waste. Graywater includes wastewater from bathtubs, showers, bathroom wash basins, clothes washing machines, and laundry tubs, or an equivalent discharge as approved by the Administrative Authority. It does not include wastewater from kitchen sinks, photo lab sinks, dishwashers, or laundry water from soiled diapers.

The use of graywater is limited to subsurface irrigation, and no *surfacing* of graywater is permitted. Surfacing of graywater means the ponding, running off, or other releases of graywater from the land surface. Any connection to a potable system must include an air gap. A permit must be obtained before constructing a graywater system.

The use of graywater systems would result in the replacement of water currently allocated for residential irrigation, thereby reducing the overall demand on potable supplies. Graywater usage would also reduce the hydraulic and organic loading to the sewers generated by residences with these systems in place. Due to the low organic content of graywater, the flows to the sewers would likely be lower in volume but higher in concentration. However, the sewer system would still need to be sized to accept graywater flow because irrigation systems would not be used during periods of sustained precipitation.

4.6.3 Recycled Water Usage

Recycled water provides an important water resource in arid, drought-prone areas, such as Southern California. In 2010, the WRPs within the JOS produced approximately 130 million gallons per day (MGD) of recycled water, of which approximately 50 percent was reused. The major categories of reuse are:

- Groundwater recharge
- Landscape and agricultural irrigation
- Industrial/commercial process water
- Recreational/environmental impoundments

A detailed discussion of the Sanitation Districts' recycled water program is provided in Section 4.10. The use of recycled water can provide a number of societal benefits, including:

- A reduction in the demand of potable, freshwater sources, thereby lessening the need to import water and decrease diversions from sensitive watersheds and ecosystems
- The creation of local, reliable water supplies
- The creation or enhancement of wetlands and riparian habitats
- A potential reduction in energy associated with transporting equivalent volumes of potable supplies into the Los Angeles area and a decrease in the production of associated greenhouse gases
- The generation of economic benefits associated with business retention and attraction that results from a reliable water supply
- The lessening of the need for local water rationing during water emergencies
- The preservation of local quality of life through the maintenance of public greenbelt areas with recycled water, even during droughts and water shortages.

The greater the level of water recycling developed within the JOS, the greater the potential for realizing these benefits. The MWD is the major water purveyor within the area encompassed by the JOS. In recognition of the benefits derived from recycling projects, the MWD has a number of programs that provide financial assistance to its public agency members that promote conservation and recycling.

In addition to the benefits listed previously, some of the specific benefits to the Sanitation Districts associated with the beneficial use of recycled water are:

- Freeing up additional sewer capacity
- Creating a potential source of additional revenue
- Enhancing the public's perception of recycled water

The increased use of recycled water within the JOS would serve to offset the need for additional potable water. Therefore, it could be viewed as accommodating population growth within the system that might otherwise be restricted by limited water resources. It is not anticipated that recycled water use would have a substantive impact on the quantity or quality of wastewater tributary to the sewers.

However, the potential exists that in the future, treatment processes beyond the Sanitation Districts' current systems, such as reverse osmosis (RO), may be implemented to produce higher quality recycled water for specific water recycling projects. This could result in the production of a concentrated brine waste byproduct that would be discharged to the JOS sewers. As with the majority of industrial and high salinity waste streams within the JOS, these brines would likely be routed to sewers directly tributary to the JWPCP. This would result in wastewater flows with a higher concentration of TDS at the JWPCP. However, any brine production that resulted from advance treatment of JWPCP effluent would not likely be returned to the influent flow stream; rather, it would be discharged directly into the plant's ocean outfall system (as is done with brine discharge from the nearby West Basin Municipal Water District's RO plant in Carson).

4.6.4 Climate Change

Water resources are highly sensitive to variations in weather and climate. The accumulation of greenhouse gases in the atmosphere impacts global climate patterns, thereby affecting the availability and quality of freshwater supplies, and altering the frequency and intensity of droughts and floods.

While there is a high degree of certainty that there will be significant changes in the quantity and distribution of precipitation, there are considerable uncertainties associated with the rate at which these changes will take place and the specific nature of the impacts on local hydrologic conditions. In California, climate change may result in significant deviations from patterns observed in the last century, including higher temperatures, reduced Sierra snowpack, earlier snowmelt, less snow and greater rainfall at the higher elevations, and a rise in sea level. The timing and extent of these changes, however, remains uncertain.

In December 2007, the Association of Metropolitan Water Agencies published a report entitled Implication of Climate Change for Urban Water Utilities. Included in this report was a summary of the potential direct impacts of climate change on water utilities. A direct impact is defined as an impact resulting from climate change on a water utility's function and operation. An excerpt from this report that includes causes and effects of climate change pertinent to the southwest United States is presented in Table 4-1.

Table 4-1. Climate Change Impacts in the Southwest

Warmer and probably drier overall with more extreme droughts and heat waves
Likely reduced quantities of surface water available from local runoff
Likely reduced quantities of water available to recharge groundwater aquifers
Very likely increased evaporative losses in inter-basin transfers of surface waters
Changes in vegetation of watershed and aquifer recharge areas
▪ Altered recharge of groundwater aquifers
▪ Changes in quantity and quality (e.g., TOC, alkalinity) of runoff into surface waters
Increased water temperature
▪ Increased evaporation and eutrophication in surface sources
▪ Water treatment and distribution challenges (disinfection, byproducts, regrowth)
Increased water demand
▪ Increased irrigation demand
▪ Increased urban demand with more heat waves and dry spells
▪ Increased drawdown of local groundwater resources to meet the above
▪ Increased difficulty of maintaining minimum in-stream flows in surface waters
More intense rainfall events
Increased turbidity and sedimentation
▪ Loss of reservoir storage
▪▪ Shallower, warmer water; increased evaporation and eutrophication
▪▪ Potential conflicts with flood control objectives
▪ Water filtration or filtration avoidance treatment challenges
Increased risk of direct flood damage to water utility facilities

The challenge associated with adjusting to these changes is the development of a strategy and associated infrastructure to provide the volume of water necessary to meet potable water demands at the needed locations and at the time when they are requested. Reduced availability of water supplies could result in higher costs, increased water conservation within residences, and reduced per capita wastewater generation. It is likely water use reductions would also result in a more concentrated wastewater flow.

4.6.5 Responses to Uncertainties in Projections

The degree of uncertainty associated with the prediction of future conditions is a challenge for all planning efforts. The projection of the volumes and characteristics of future wastewater flows depends on a number of factors including:

- Availability and characteristics of future water supplies
- Population growth within the service area
- Wastewater generation rates
- Future commercial and industrial activities

A reasonable set of assumptions has been developed and used to predict future conditions, determine associated needs, develop alternatives to address these needs, and ultimately recommend a plan of action for future implementation.

The key to dealing with uncertainty in recommending future facilities is to incorporate sufficient flexibility that allows for mid-course adjustments to effectively manage unexpected conditions. Systematic monitoring of wastewater flows and characteristics facilitates the staging of improvements based upon imminent identified needs rather than establishing absolute dates for infrastructure improvements. This may result in accelerating the implementation of certain portions of the plan, while postponing others, such as facility construction. A phased approach would ensure that systems are available when needed while avoiding premature construction of facilities that would result in excess, under-utilized capacity.

4.7 Wastewater Characteristics

To determine the capabilities of the JOS, and to assess future facility needs, the composition of the influent wastewater flow must be quantified. This section examines the physical, chemical, and biological characteristics of recent (2007 to 2009) wastewater flows within the JOS. The properties of recent flows are also compared with historic records and used to project future conditions. Wastewater characteristics were assessed using:

- Recent Characteristics: A comprehensive listing, on a plant-by-plant basis, of influent constituents using a 3-year average to provide a representative sampling of recent conditions.
- Comparison of Recent and Historic Concentrations: The concentrations of major constituents typically used in the treatment plant assessment are compared using recent concentrations (3-year averages) and past concentrations (1992–93).
- Comparison of Recent and Historic Loadings: The mass loadings of major constituents typically used in the treatment plant assessment are compared using recent concentrations (3-year averages) and past concentrations (1992–93).
- Long-term Concentrations Review: Information spanning a 20-year timeframe is assessed to identify variations in concentrations over time for major influent constituents.

Information for the 1992–93 timeframe was included to provide a long-term perspective. These values were extracted from the last major facilities planning effort for the JOS, the 2010 Master Facilities Plan (2010 Plan). The La Cañada Water Reclamation Plant (LACAWRP) has been excluded from discussions in this section because it is very small, does not discharge to surface water, and has a fixed tributary area. Wastewater characteristics were determined using data from the Long Beach, Los Coyotes, Pomona, San Jose Creek, and Whittier Narrows WRPs and the JWPCP.

4.7.1 Recent Characteristics

Influent characteristics for the JWPCP and the WRPs of the JOS are presented in Table 4-2. The average values for the listed influent constituents represent a span of calendar years 2007 through 2009. Concentrations of the majority of wastewater constituents are highest at the JWPCP due to the following:

- The JWPCP receives all primary and secondary solids from the entire JOS
- A greater, higher strength industrial flow is generated in the area directly tributary to the JWPCP
- Poorer quality wastewater is generally routed around the WRPs and sent on to the JWPCP to promote production of the highest quality of recycled water at the WRPs

Table 4-2. JOS Recent Wastewater Characteristics by Treatment Plant (2007–2009 Averages)

		JOS Treatment Plants					
Influent Constituent	**Units**	**POWRP**	**SJCWRP**	**WNWRP**	**LCWRP**	**LBWRP**	**JWPCP**
Total Flow	MGD	9.3	79.1	6.5	30.3	16.8	295.0
SS	mg/L	356	340	267	315	303	496
Total Cyanide	mg/L	0.0050	0.0038	0.0057	0.0040	0.0050	0.006
Total BOD	mg/L	353	295	229	296	274	426
Total COD	mg/L	738	688	567	634	640	758
TDS	mg/L	576	570	564	837	613	NR
Arsenic	mg/L	0.0021	0.0017	0.0018	0.0025	0.0077	0.0045
Barium	mg/L	0.133	NR	NR	0.055	0.218	NR
Cadmium	mg/L	0.0006	0.0004	0.0003	0.0002	0.0003	0.0022
Total Chromium	mg/L	0.006	0.008	0.009	0.005	0.003	0.030
Copper	mg/L	0.105	0.047	0.064	0.062	0.057	0.144
Lead	mg/L	0.020	0.003	0.003	0.003	0.001	0.009
Mercury	mg/L	0.00028	0.00010	0.00016	0.00009	0.00023	0.00030
Nickel	mg/L	0.015	0.008	0.017	0.007	0.004	0.021
Selenium	mg/L	0.001	0.001	0.001	0.001	0.001	0.010
Silver	mg/L	0.003	0.001	0.001	0.001	0.002	0.003
Zinc	mg/L	0.31	0.08	0.16	0.11	0.14	0.36

Reported TDS concentrations are effluent values.
POWRP = Pomona WRP
SJCWRP = San Jose Creek WRP
WNWRP = Whittier Narrows WRP
LCWRP = Los Coyotes WRP
LBWRP = Long Beach WRP
NR = not recorded
SS = suspended solids
BOD = biochemical (or biological) oxygen demand
COD = chemical oxygen demand
TDS = total dissolved solids

The Sanitation Districts' industrial pretreatment program has effectively limited the presence of trace metals and priority pollutants in the JOS influent flows. Priority pollutants are pollutants for which the EPA must establish ambient water quality criteria and effluent limitations. This program helps ensure that the WRPs can produce recycled water suitable for reuse applications, and that the JWPCP meets stringent ocean discharge requirements.

4.7.2 Recent and Historic Concentrations

The major parameters typically used in the assessment of current plant capabilities and establishing future needs are flow, suspended solids (SS), biochemical (or biological) oxygen demand (BOD), and chemical oxygen demand (COD). These parameters are shown for each plant in Table 4-3. Recent conditions are represented using average data from 2007 through 2009. In addition, the same information from the 2010 Plan, representing fiscal year 1992–93, is presented for historical comparison.

Total flows throughout the JOS decreased slightly over the 15-year span. It should be noted that the influent flows to the Whittier Narrows Water Reclamation Plant (WNWRP) and Pomona Water Reclamation Plant (POWRP) were intentionally reduced by the Sanitation Districts to accommodate nitrogen removal. The wastewater concentration data also indicate that overall wastewater strength has

(1) increased at the POWRP, San Jose Creek Water Reclamation Plant (SJCWRP), WNWRP, and JWPCP, (2) decreased at the Los Coyotes Water Reclamation Plant (LCWRP), and (3) remained relatively unchanged at the Long Beach Water Reclamation Plant (LBWRP).

Table 4-3. Comparison of Recent (2007–2009) and Historical Wastewater Parameters

Influent Constituent	Units	Years	JOS Treatment Plants						
			POWRP	SJCWRP	WNWRP	LCWRP	LBWRP	JWPCP	JOS Total
Total Flow	MGD	1992–1993	12.6	79.0	12.1	31.3	17.6	328.0	480.6
	MGD	2007–2009	9.3	79.1	6.5	30.3	16.8	295.0	437.0
SS	mg/L	1992–1993	245	290	250	449	351	449	409
	mg/L	2007–2009	356	340	267	315	303	496	441
Total BOD	mg/L	1992–1993	229	257	216	325	252	360	330
	mg/L	2007–2009	353	295	229	296	274	426	383
Total COD	mg/L	1992–1993	483	536	458	762	642	794	727
	mg/L	2007–2009	738	688	567	634	640	758	729

SS = suspended solids
BOD = biochemical (or biological) oxygen demand
COD = chemical oxygen demand
MGD = million gallons per day
mg/L = milligrams per liter

4.7.3 Recent and Historic Loadings

Mass loadings were calculated using the constituent concentrations and multiplying these by the flow rates with appropriate conversion factors applied. These values are reflective of the total pollutant load reaching a facility. Flow, SS, BOD, and COD are evaluated. The results are shown for each plant in Table 4-4. Recent conditions are represented using data from 2007 through 2009. In addition, the same information from the 2010 Plan, representing fiscal year 1992–93, is presented for historical comparison. The mass loading data indicate that overall loads have (1) increased at the SJCWRP, (2) decreased at the WNWRP, LCWRP, and JWPCP, (3) remained relatively unchanged at the POWRP and LBWRP.

Table 4-4. Comparison of Recent (2007–2009) and Historical Wastewater Loads

Influent Constituent	Units	Years	JOS Treatment Plants						
			POWRP	SJCWRP	WNWRP	LCWRP	LBWRP	JWPCP	JOS Totals
SS	1,000 lbs/d	1992–1993	26	191	25	117	52	1,229	1,640
	1,000 lbs/d	2007–2009	27	225	15	80	43	1,222	1,611
Total BOD	1,000 lbs/d	1992–1993	24	169	22	85	37	985	1,323
	1,000 lbs/d	2007–2009	27	195	12	75	38	1,049	1,397
Total COD	1,000 lbs/d	1992–1993	51	353	46	199	94	2,173	2,917
	1,000 lbs/d	2007–2009	57	454	31	160	90	1,869	2,661

SS = suspended solids
BOD = biochemical (or biological) oxygen demand
COD = chemical oxygen demand
lbs/d = pounds per day

4.7.4 Constituent Concentrations Review

Influent data for SS, BOD, and COD, and effluent data for TDS for each of the WRPs were examined to see if any long-term trends were exhibited. These long-term trends may be representative of future concentrations.

The influent annual average SS, BOD, and COD concentrations for each of the WRPs over a 25-year timeframe are shown on Figures 4-1, 4-2, and 4-3, respectively. While variations over time are evident for each of the constituents, there are no apparent, substantive trends.

The effluent concentrations of TDS are shown on Figure 4-4. TDS concentration is an important characteristic of WRP effluent that can impact potential reuse applications. Although these data exhibit year-to-year variations, long-term trends of increasing TDS concentrations are not apparent.

Similar to the WRPs, influent data at the JWPCP was also analyzed. The historical influent SS, BOD, and COD for the JWPCP are presented on Figure 4-5. These data span 25 years and indicate increasing BOD concentrations, fluctuating SS concentrations, and decreasing COD concentrations. Increasing BOD concentrations are expected in the future due to increases in primary sludge and waste activated sludge solids that will be discharged to the JWPCP from the WRPs. The decreasing COD concentrations over the last three decades might be the result of the implementation of the Sanitation Districts industrial pretreatment program beginning in the 1970s.

4.7.5 Characteristics Summary

An assessment of historic and recent wastewater characteristics within the JOS forms the basis for projecting future conditions. Overall, the loadings and concentrations are expected to remain relatively consistent with the population served. On this basis, future key parameters of BOD, SS, and COD are assumed to correspond to the values derived from 3-year averages.

4.7.6 Effluent Quality

Effluent quality requirements for surface water discharges, recycled water usage, and groundwater recharge are established by the Los Angeles Regional Water Quality Control Board (LARWQCB). Specific constituent limits are contained within permits issued to each of the treatment plants and summarized in Chapter 3. Each of the JOS treatment plants is reviewed in terms of actual effluent quality and permit compliance for these parameters within this section.

4.7.6.1 Pomona Water Reclamation Plant

The discharge requirements for the POWRP include approximately 7,800 numeric limits that must be met each year based on quantitative results of final effluent and receiving water sampling and analyses. During 2010, the POWRP successfully met all numeric limits and qualified for a National Association of Clean Water Agencies (NACWA) Gold Award.

4.7.6.2 San Jose Creek Water Reclamation Plant

The discharge requirements for the SJCWRP include approximately 27,500 numeric limits that must be met each year based on quantitative results of final effluent and receiving water sampling and analyses. During 2010, the SJCWRP successfully met all numeric limits and qualified for an NACWA Gold Award.

4.7.6.3 Whittier Narrows Water Reclamation Plant

The discharge requirements for the WNWRP include approximately 9,200 numeric limits that must be met each year based on quantitative results of final effluent and receiving water sampling and analyses.

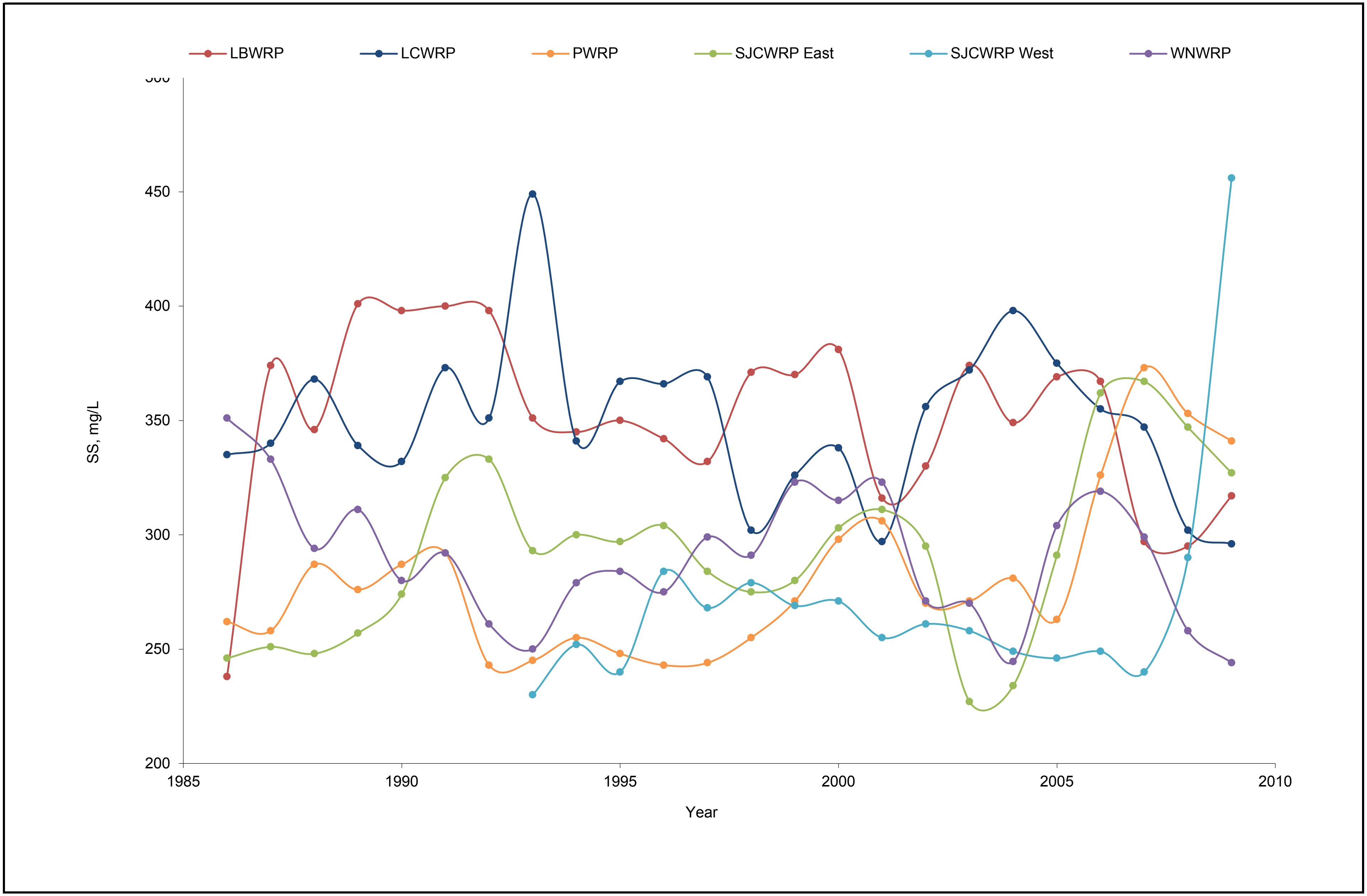


FIGURE 4-1

CLEARWATER Program

Historical WRP Influent Suspended Solids Concentrations

Source: Sanitation Districts of Los Angeles County 2011

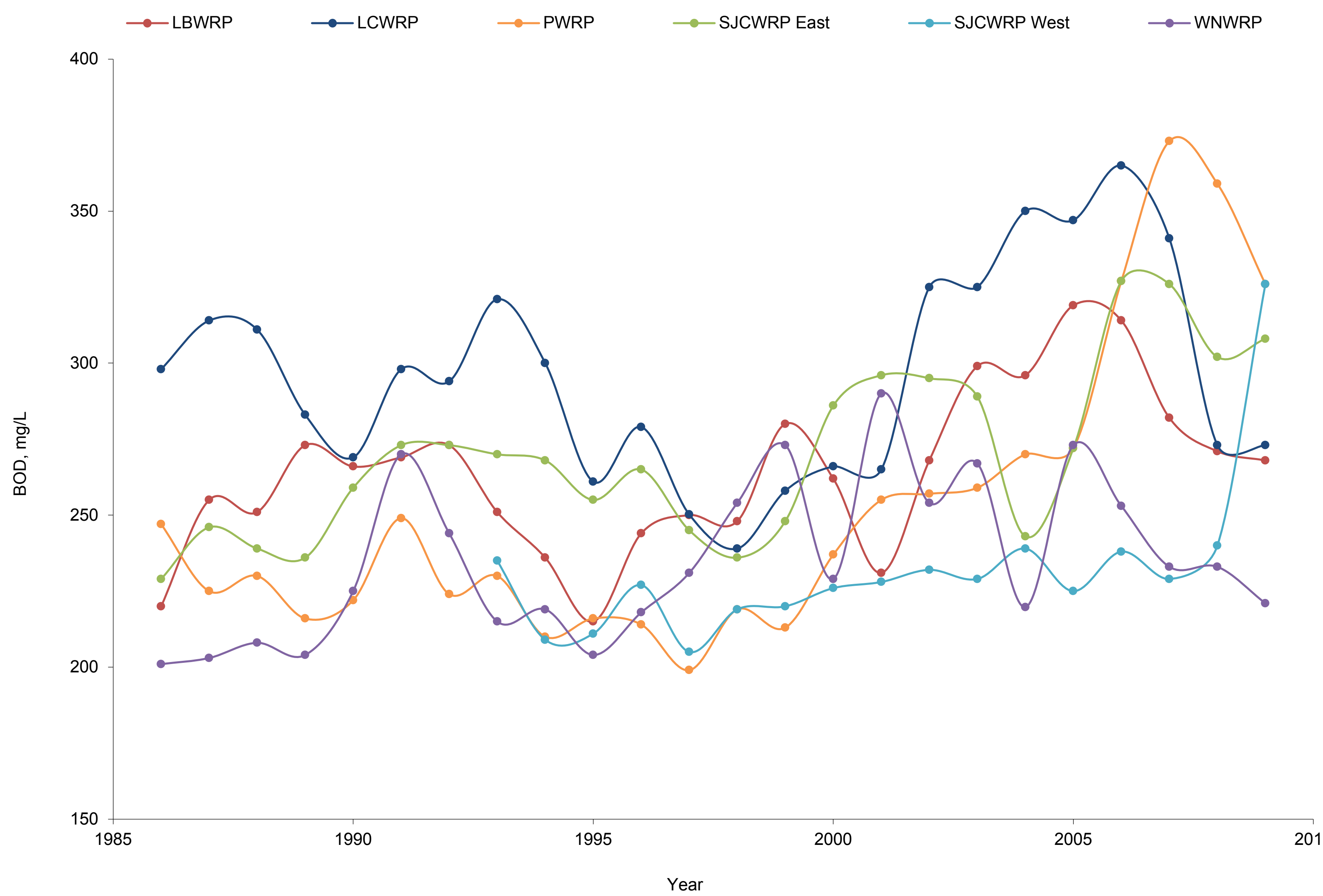


FIGURE 4-2

CLEARWATER Program

Historical WRP Influent BOD Concentrations

Source: Sanitation Districts of Los Angeles County 2011

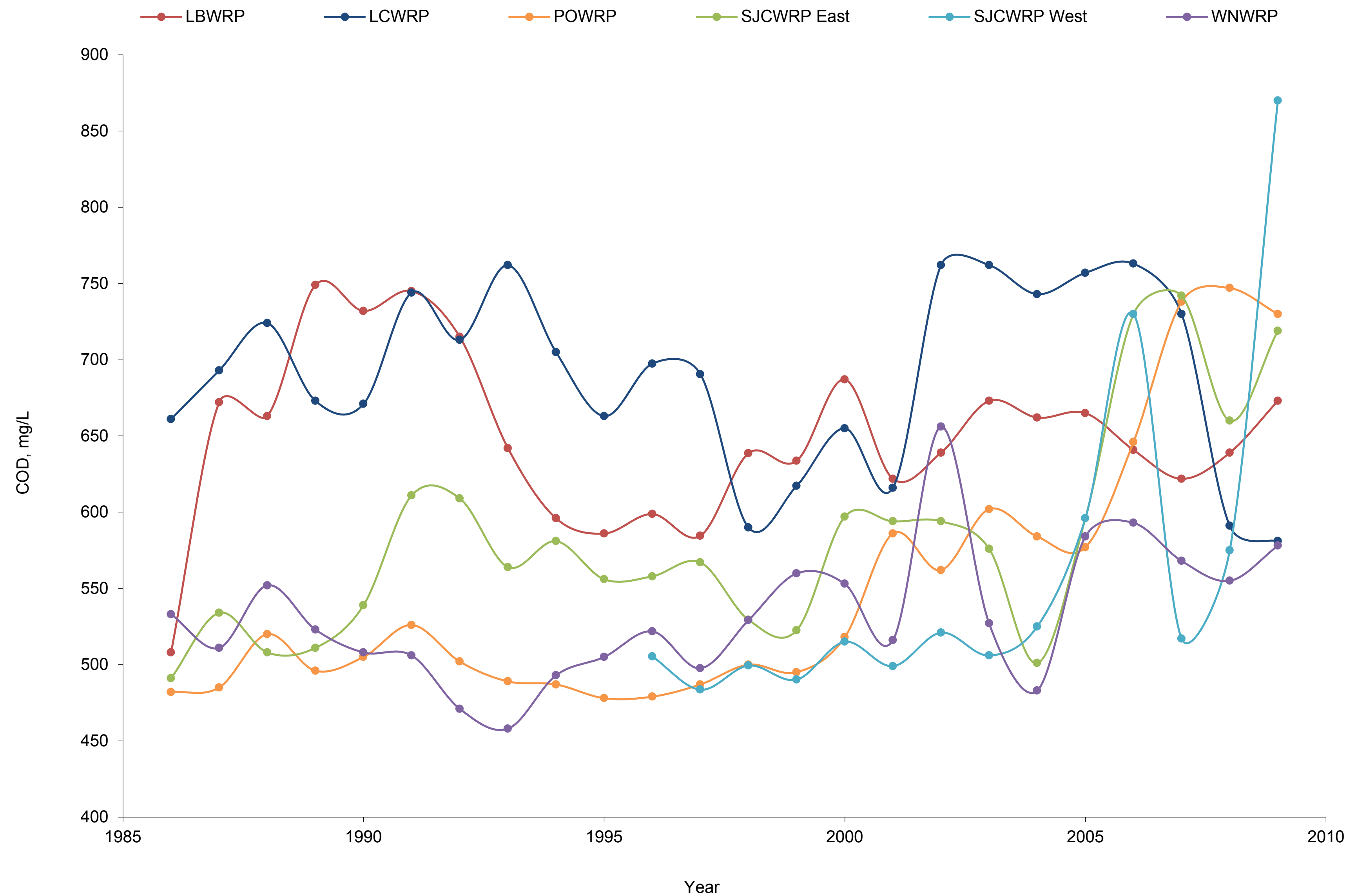


FIGURE 4-3

CLEARWATER Program

Historical WRP Influent COD Concentrations

Source: Sanitation Districts of Los Angeles County 2011

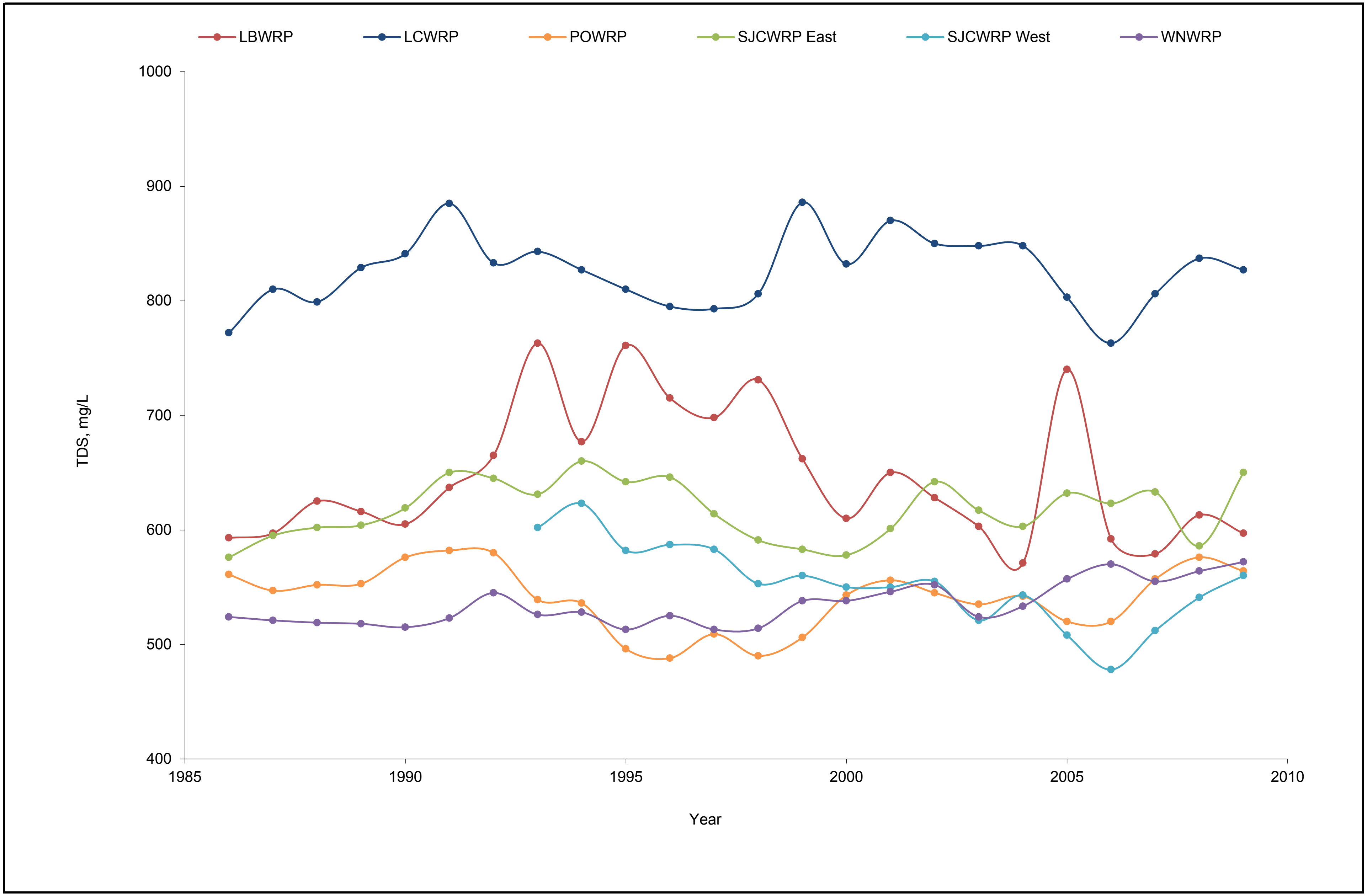


FIGURE 4-4

CLEARWATER Program

Historical WRP Effluent TDS Concentrations

Source: Sanitation Districts of Los Angeles County 2011

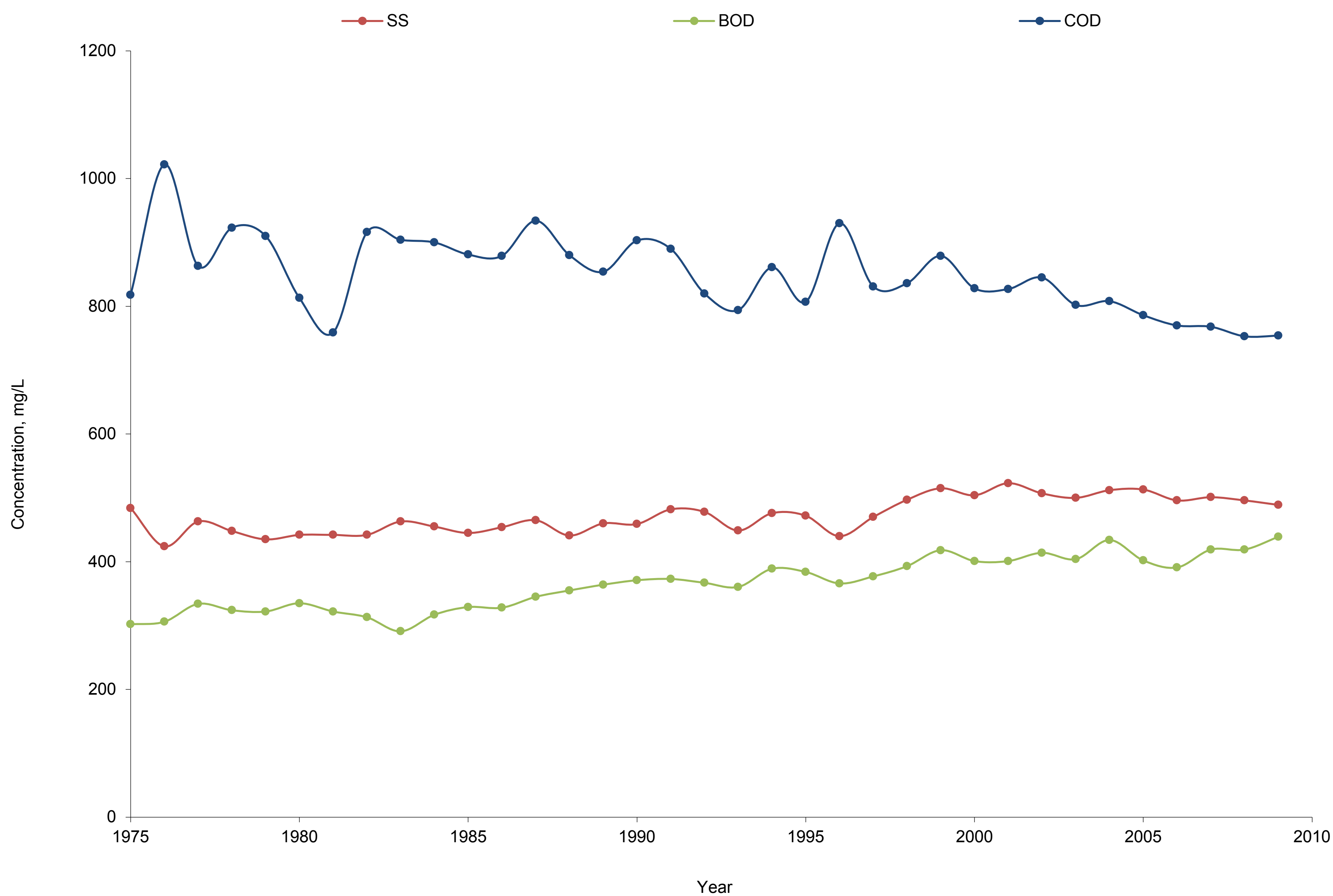


FIGURE 4-5

CLEARWATER Program

Historical JWPCP Influent Concentrations

Source: Sanitation Districts of Los Angeles County 2011

During 2010, the WNWRP successfully met all numeric limits and qualified for an NACWA Gold Award.

4.7.6.4 Los Coyotes Water Reclamation Plant

The discharge requirements for the LCWRP include approximately 7,800 numeric limitations that must be met each year based on quantitative results of final effluent and receiving water sampling and analyses. During 2010, the LCWRP had only one exceedance of the numeric limits and qualified for an NACWA Silver Award.

4.7.6.5 Long Beach Water Reclamation Plant

The discharge requirements for the LBWRP include approximately 5,700 numeric limits that must be met each year based on quantitative results of final effluent and receiving water sampling and analyses. During 2010, the LBWRP successfully met all numeric limits and qualified for an NACWA Platinum Award. The Platinum Award is given to facilities that have not had any NPDES effluent discharge violations in five years.

4.7.6.6 La Cañada Water Reclamation Plant

During 2010, the LACAWRP had only two exceedances of the non-NPDES permit containing waste discharge requirements and water reclamation requirements for irrigation. All effluent is stored and reused with no surface water discharge occurring.

4.7.6.7 Joint Water Pollution Control Plant

The discharge requirements for the JWPCP include approximately 27,000 numeric limits that must be met each year based on quantitative results of final effluent and receiving water sampling and analyses. During 2010, the JWPCP successfully met all numeric limits, qualifying for an NACWA Platinum Award. This plant has achieved 100 percent compliance with discharge limits since 2002.

4.8 Wastewater Flow Projections

Projections of average daily wastewater flow rates are used to determine the needed capacity of treatment and conveyance facilities. Over the 2050 planning horizon, the population in the JOS is projected to increase, which will in turn increase the amount of wastewater flows to be conveyed and treated. This section reviews the methodology used in projecting future flows and presents the results. Comparing the projected flows with existing capabilities serves as the foundation for assessing future facility needs.

4.8.1 Methodology

An estimation of the future wastewater flows and loading within the JOS is most dependent on two factors:

- Per-capita Generation Rate: The average amount of wastewater flow contributed to the system per person. It is based on current wastewater flows and the corresponding tributary population. Population data from the U.S. Census Bureau, the California State Department of Finance (DOF), and the Los Angeles County Assessor's Office were used to establish a per-capita generation rate.

- Population Projections: The amount of people served by the JOS. Future JOS population was projected using forecasts provided by the Southern California Association of Governments (SCAG).

Flow projections also take into account the discrete contribution from industrial and contract flows.

4.8.1.1 Per-Capita Generation Rate

A representative residential/commercial per-capita flow generation value was developed for the JOS using data from 2000–2007 by applying the following equation:

Total Flow = (Residential/Commercial Flow Rate x Population) + Industrial Waste Flow + Contract Flow

First, the residential/commercial portion of the flow for each year was determined. The residential/commercial contribution was calculated by subtracting the industrial waste (IW) and contract flow from the total flow. An adjustment was then made to account for those residents using onsite systems, commonly referred to as septic tanks. The determination of the population served by septic tanks was refined from previous planning efforts. In the past, the population served by septic tanks was assumed to be a single percentage that was applied to the entire JOS. For this analysis, the specific parcels connected to septic tanks were identified, as was the population associated with these parcels based on Los Angeles County Assessor's Office data. Next, the tributary population associated with residential/commercial flow was determined by subtracting the population served by septic tanks from the total population within the JOS. Finally, the residential/commercial flow was divided by the population to determine the per-capita generation rate.

Historic population data was derived from DOF information. Historic flow data were taken from the Sanitation Districts' records. The results of the analysis for each year are presented in Table 4-5. The average value of 83 gallons per capita per day (gpcd) was selected as the per-capita generation rate for future flow projections. This value is consistent with those used by other wastewater agencies and is within the range of values (54–130 gpcd) for residential contributions.

Table 4-5. Per-Capita Flow Generation Results for JOS Tributary Area

Year	Tributary Population[a]	Total Flow (MGD)	Contract Flow (MGD)	IW Flow (MGD)	Residential/ Commercial Flow (MGD)	Per Capita Generation Rate (gpcd)
2000	4,697,287	498	3.2	66.4	429	91
2001	4,765,762	486	3.7	64.0	419	88
2002	4,847,225	475	3.5	62.1	409	84
2003	4,919,916	473	3.9	61.0	408	83
2004	4,975,253	471	3.6	60.9	406	82
2005	5,013,939	480	3.2	60.0	417	83
2006	5,031,001	456	4.1	57.1	394	78
2007	5,053,455	430	4.1	57.7	369	73
Average	4,912,980	471	3.7	61.2	406	83

[a] Population figures exclude residents of parcels connected to septic tanks.

Residential water conservation can affect the per-capita wastewater generation rate. To determine if continuing water conservation efforts within the JOS tributary area could influence the long-term per-capita flow generation rate, a review of water use and supply data was performed. Published data for 51 Southern California retail water agencies serving over 5.8 million people (2005) were examined for trends in projected water demand through 2030. Trends were similar for single- and multi-family residential and for commercial land uses.

Approximately 47 percent of the water agencies did not publish sufficient data to calculate water demand per population served. Approximately 40 percent are expecting either declining (7 percent) or flat (33 percent) per-capita water demand through 2030. The remaining 13 percent are expecting an increase in demand through the same period. These results indicate that a constant per-capita flow generation rate is reasonable for future wastewater projections. The per-capita rate for future projections will, therefore, remain constant at 83 gpcd for the purposes of this plan.

4.8.1.2 Population Projections

Source Information

SCAG population projections, based on the 2000 Federal Census and contained in the 2008 Regional Transportation Plan (RTP), served as the basis for JOS population projections. However, the 2008 RTP only had projections through the year 2030. SCAG provided the 2050 projections at the Sanitation Districts' request.

Population Distribution

SCAG data is provided by census tract, and the Sanitation Districts use a parcel-based geographic information system (GIS) model to project wastewater flows. The SCAG population projections were distributed among parcels using parcel-based residential land use information obtained from the Los Angeles County Assessor's Roll. The county data provides five separate residential land use types corresponding to different residential densities. These land use types are presented in Table 4-6. The weighting factor relates different occupant densities for these residential uses to that of a single-family residence (SFR). Using the weighing factors, the census tract population was split proportionately among the parcels, providing a population for each parcel in the JOS.

Table 4-6. Residential Land Use Types and Corresponding SFR Equivalents

Land Use Type	Weighting Factor (Equivalent SFR)
SFR – Single-Family Residential	1
DUP – Duplex	2
TRIP – Triplex	3
QUAD – Fourplex	4
MULT – Multi-family Residential	20 (five or more units; unspecified number of floors)

Population and Parcel Adjustments

A number of adjustments were used to refine the values associated with tributary population projections and parcel-based population figures. Parcels on septic tanks do not contribute wastewater flow into the JOS. These parcels were identified and eliminated from consideration for calculations involving tributary populations. The separate identification of these parcels also permitted a phased approach in determining the impact of future septic tank connections to the JOS. It was assumed that all current septic tank systems would be connected to the JOS by 2050. For the 2050 projections, the Sanitation Districts' entire sphere of influence (SOI) was assumed to represent the service area. This results in a slight increase to the current service area.

Tributary Area Boundaries

Ten separate tributary areas for the treatment plants were identified and are depicted on Figure 4-6. The tributary areas are based on the settings within the conveyance system. Flow splits and diversions in the

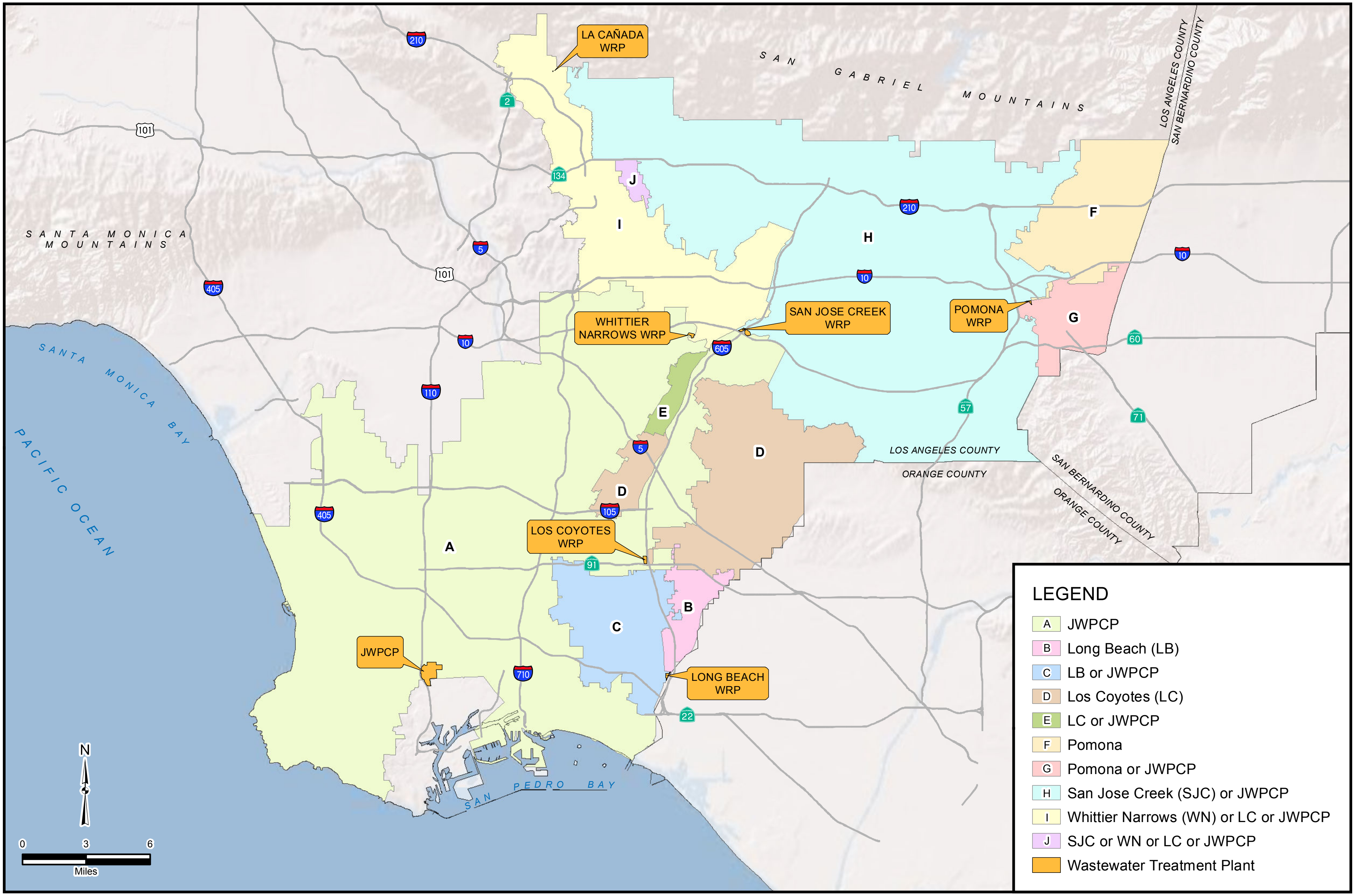


FIGURE 4-6

Treatment Plant Tributary Areas

Source: Sanitation Districts of Los Angeles County 2011, Thomas Bros 2011, ESRI 2011

conveyance system can be modified, which would shift the tributary populations. However, for planning purposes, it is assumed that modifications to the flow splits and diversions would be minimal and that the tributary areas depicted on Figure 4-6 are representative of future flows.

2050 Population Projections

Population projections were produced for the entire JOS and delineated in terms of designated tributary areas. The 2000 Census population figures and projections for 2050 are presented in Table 4-7. The total tributary residential population includes the service area's entire population, including those served by septic systems. The contributing residential population reflects only those residents connected to the JOS conveyance system and does not include the population served by septic systems. For the purposes of these projections, it is assumed that all septic systems would be completely phased out by the year 2050 so that the total tributary population and contributing population are the same value. In 2050, the projected JOS tributary population will increase to approximately 6.3 million people. Historic JOS populations and the projected 2050 JOS population are shown on Figure 4-7.

Table 4-7. Residential Population Projections

	Residential Population		
JOS Tributary Areas (by WRP)	**Total Tributary 2000**	**Contributing 2000**	**Tributary/Contributing 2050[a]**
JWPCP	2,530,097	2,521,663	3,131,658
LBWRP	68,514	68,487	76,974
LBWRP or JWPCP	181,700	181,496	216,668
LCWRP	320,379	320,013	400,221
LCWRP or JWPCP	38,032	37,934	46,223
POWRP	93,156	92,887	132,445
POWRP or JWPCP	95,265	95,071	147,571
SJCWRP or JWPCP	1,068,375	1,054,474	1,548,632
SJCWRP or WNWRP or LCWRP or JWPCP	10,683	10,673	13,641
WNWRP or LCWRP or JWPCP	422,885	415,311	543,581
Total for JOS	4,829,086	4,798,009	6,257,614

[a] In 2050, total tributary is equal to contributing because it is anticipated that all septic systems will have been phased out.

4.8.2 Projected Wastewater Flows

Future flows were projected in terms of three major source components: residential, industrial, and contract. The future residential flow contributions were calculated using the previously developed per-capita generation rate, and applying it to the projected JOS tributary populations. The industrial and contract flow components were separately projected based upon long-term trends. Projected wastewater flows for the JOS are presented in Table 4-8 for each major component source. The projected tributary flows for each of the treatment plants are shown in Table 4-9. The projected flow of 612 MGD exceeds the currently permitted capacity of the JOS. Alternatives for managing the flow in excess of the currently permitted capacity are evaluated in Chapter 6.

Table 4-8. 2050 Wastewater Flow Projections by Component Source for the JOS

Source	MGD
Residential Flows	520
IW Flows	82
Contract Flows	10
Total Average Wastewater Flow	612

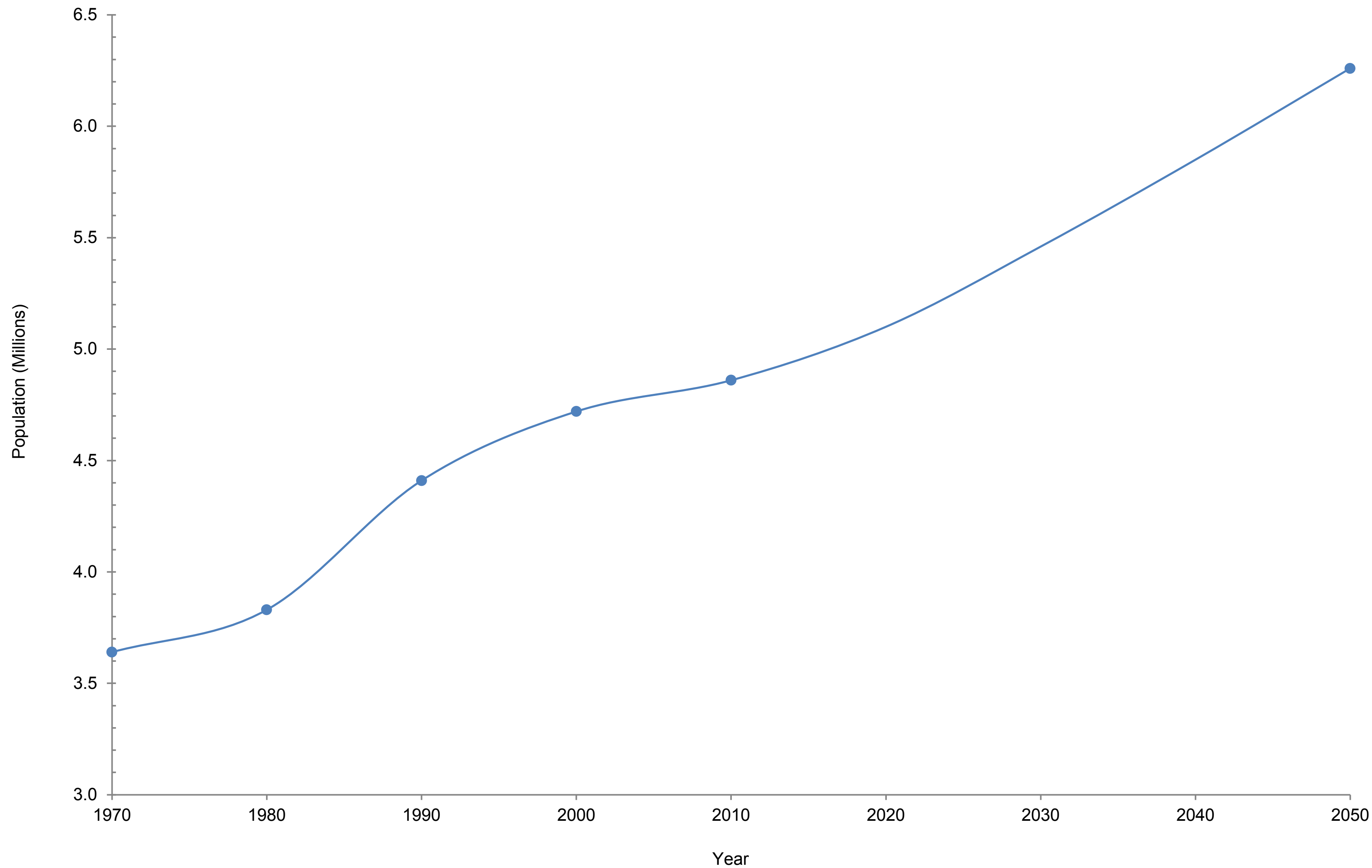


FIGURE 4-7

CLEARWATER Program

Historic and Projected Populations in the Joint Outfall System

Source: CA Department of Finance 2011

Table 4-9. 2050 Projected Tributary Flows for the JOS Treatment Plants

Treatment Plant	2050 Projected Tributary Flow[a]
POWRP	13
SJCWRP	135
WNWRP	44
LCWRP	38
LBWRP	23
JWPCP[b]	359
Total Average Wastewater Flow	612

[a] Based on a per capita generation rate of 83 gpcd and current conveyance system configuration and settings. Flows in excess of a WRP's capacity would be bypassed and treated at another WRP or the JWPCP.

[b] Tributary flow for the JWPCP does not include flows that bypass the WRPs.

4.8.3 Wastewater Flow Variations and Peaking

Wastewater does not flow into the treatment plants at a constant rate. The flow rate varies from hour to hour reflecting changes in the residential, commercial, and industrial activity taking place within the area served. The constituent loadings can vary as well depending on a number of different factors. The degree of flow variation can also be affected by the service area's configuration. Larger, more linear service areas possess the potential for greater attenuation of the flow rate variations.

In assessing the capabilities of existing systems and determining future facility needs, it is critical to incorporate the impacts of flow variations into the analysis. Though low flow periods may have some facility or operational impacts, the greatest concerns relative to conveyance and treatment capacity are the peak flows. For the JOS, three separate types of peak flows, and associated peaking factors, are evaluated: daily (diurnal), cyclical, and wet weather (seasonal).

Each of these is described in the subsections that follow, including a discussion of their impact on the planning process. With respect to peaking, the WRPs and the JWPCP are sufficiently different and, therefore, are discussed separately.

4.8.3.1 Daily (Diurnal) Flow Variations

The WRPs experience diurnal flow variations similar to other municipal treatment plants. The initial peak generally takes place in the morning hours, around 10:00 a.m. Flows are sustained for a period, followed by a slight reduction around 3:00 p.m. (15:00) and a significant reduction, starting around midnight. The lowest flows generally occur around 5:00 a.m., and the cycle starts over again. Weekends follow a similar pattern, but there is a second peak in the early evening hours, around 7:00 p.m. (19:00). The typical flow pattern found at the WRPs for dry weather flows is depicted on Figure 4-8.

The dry weather peaks are termed *peak sanitary flows*. For planning purposes, the peak sanitary flows were calculated using the following formula:

Peak Sanitary Flows = Average Annual Peak Daily Flow + 1 Standard Deviation

The results for each WRP are presented in Table 4-10 and reflect the period of July 2006 through July 2007. In this analysis, the SJCWRP was divided between the east and west plants since they are hydraulically separated. Because the average value plus one standard deviation represent the 67th percentile value, the resulting estimated peak daily sanitary flow is not overly conservative.

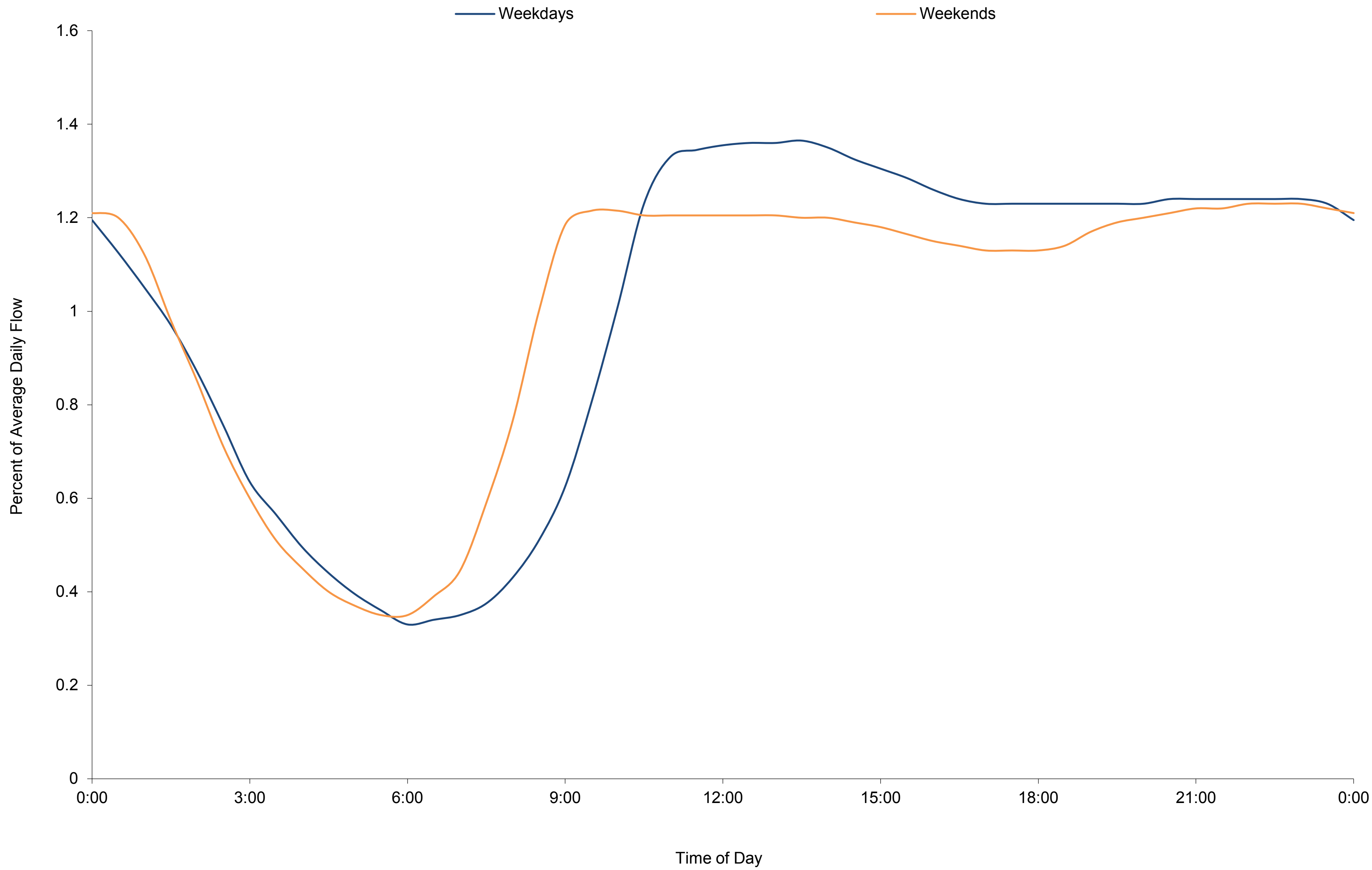


FIGURE 4-8

CLEARWATER Program

Typical WRP Diurnal Flow Variations

Source: Sanitation Districts of Los Angeles County 2011

Table 4-10. Water Reclamation Plant Sanitary Flow Peaking Factors

WRP	Sanitary Peaking Factor[a]
POWRP	1.81
SJCWRP East	1.48
SJCWRP West	1.77
WNWRP	1.28
LCWRP	1.48
LBWRP	1.77

[a] The sanitary peaking factor is based on the amount of flow treated by the WRPs; most of the WRPs bypass some of the tributary peak flow.

Due to the size and configuration of the conveyance system, the JWPCP routinely experiences a sanitary flow peaking factor lower than the WRPs. A typical day's dry weather flow variations at the JWPCP are depicted on Figure 4-9. The diurnal sanitary flow peaking factor for the JWPCP is approximately 1.24.

4.8.3.2 Cyclical Loading Variations

The WRPs do not see a significant variation in flows associated with any particular cycle. However, the WRPs experience higher organic loadings on the weekends. In particular, the ammonia loading is routinely higher on the weekends. The JWPCP does not experience any significant cyclical loading variations.

4.8.3.3 Wet Weather Peaking

Wet weather peak flows are sometimes referred to as seasonal peaks, indicating the predominance of occurrence when the heaviest rain occurs. The increase in system flows associated with wet weather events results from a combination of infiltration and inflow (I/I) into the conveyance system.

Infiltration is groundwater that enters sewer pipes (interceptors, collectors, manholes, or house laterals) through holes, breaks, joint failures, connection failures, and other openings. Infiltration quantities often exhibit seasonal variation in response to groundwater levels. Storm events can trigger a rise in groundwater levels and increase infiltration flows. The highest infiltration flows are observed following significant storm events or following prolonged periods of precipitation.

Inflow is surface water that enters the wastewater system from yard, roof, and footing drains; cross-connections with storm drains; downspouts; and through holes in manhole covers. Inflow occurs as a result of storm events (including rainfall and, in some areas, snowfall, springs, or snowmelt) that contribute to excessive conveyance system flows. Peak inflow can occur during heavy storm events when the stormdrain systems are surcharged, resulting in hydraulic backups and subsequent surface ponding.

Conveyance and treatment systems are primarily designed to manage wastewater flows without the addition of significant volumes from other sources. I/I adds a substantial hydraulic component to the loading of both systems. The inability of the conveyance system and treatment plants to accommodate these higher flows could potentially result in conveyance system overflows or the discharge from treatment plants of less than completely treated effluents.

The State Revolving Fund (SRF) guidelines require an evaluation of the non-existence or possible existence of excessive I/I in the existing sewer system. If the average daily flow during periods of sustained high groundwater is less than 120 gpcd, a Sewer System Evaluation Survey (SSES) is not required. If it is above 120 gpcd, the applicant must perform a SSES to determine whether it is cost-

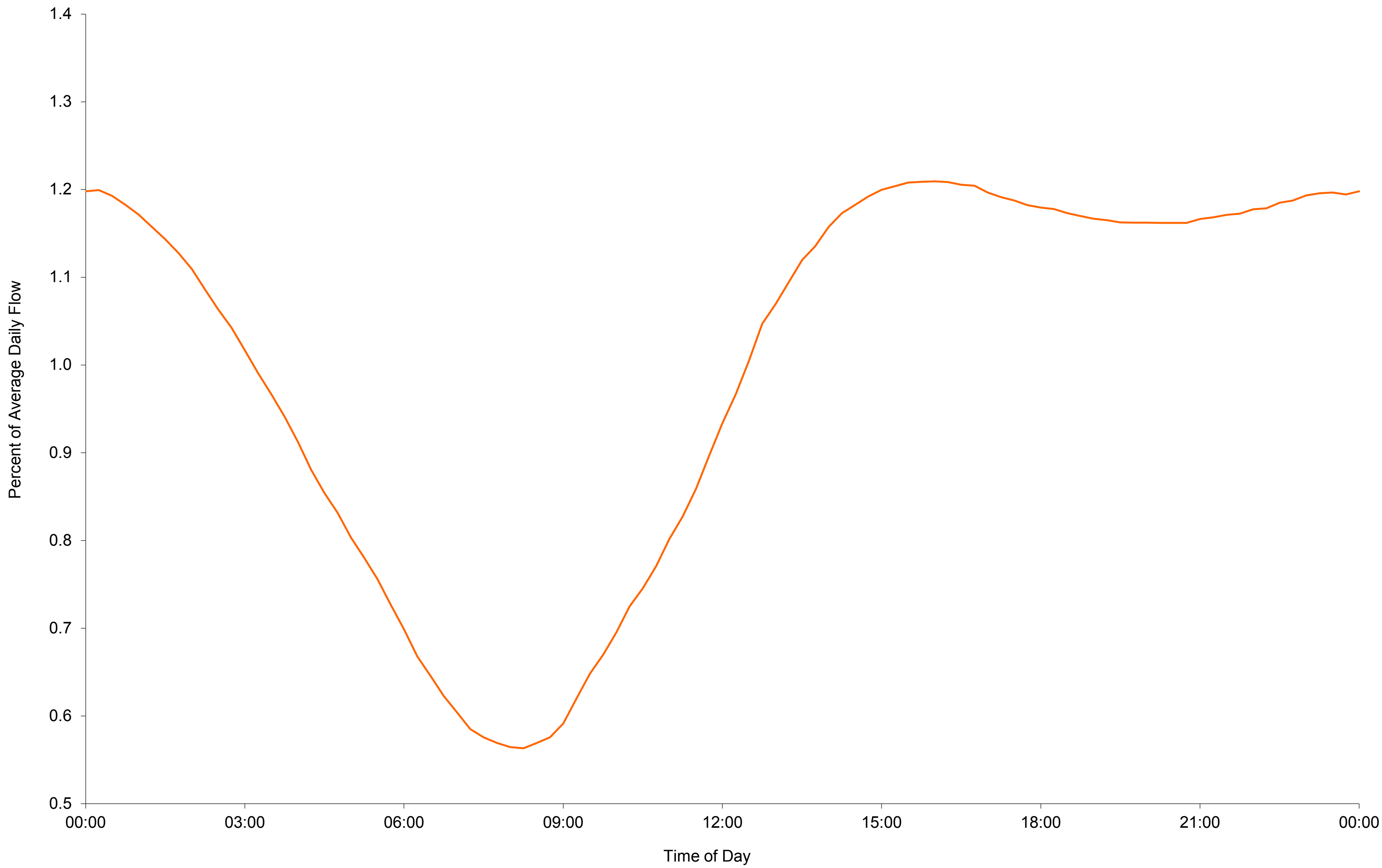


FIGURE 4-9

CLEARWATER Program

Typical JWPCP Diurnal Flow Variations

Source: Sanitation Districts of Los Angeles County 2011

effective to treat or correct the I/I. If the peak flow during a storm event (highest 3-hour average) exceeds 275 gpcd, a SSES must be completed.

According to the National Weather Service, the 2004–2005 rainfall season was the second wettest season in Los Angeles since recordkeeping began in 1877 (the wettest season being the 1883–1884 season). Therefore, plant flow data from 2004–2005 were used to evaluate I/I in the existing JOS sewer system.

The average residential/commercial flow rate in the JOS during the rainfall season (October 2004 through March 2005) was 435.3 MGD. This value does not include industrial waste or contract flows. The maximum overall flow rate in the JOS that season occurred during a storm lasting from January 7 through January 10, 2005. The maximum residential/commercial storm flow rate during this storm equaled 994.1 MGD. Dividing these flows by the JOS sewered population of 4,994,596 (average of 2004 and 2005 populations as shown in Table 4-5) results in a per capita generation rate of 87 gpcd during the rainfall season (infiltration) and 186 gpcd during the peak storm event (inflow). These rates fall well below the SRF threshold values of 120 gpcd for infiltration and 275 gpcd for inflow, respectively.

4.8.3.4 Water Reclamation Plant Wet Weather Peaking Factors

The potential wet weather peaking factors (peak storm) for the WRPs were assessed in terms of past events. For the POWRP, WNWRP, LCWRP, and LBWRP, the recent, highest wet weather plant flows took place in connection with a storm event on February 1, 1998. For the SJCWRP, the recent, highest wet weather plant flows took place in connection with a storm event on February 5, 2005. As with the diurnal peaking factors review, the SJCWRP was examined in terms of the east and west plants. Peaking factors for the WRPs are presented in Table 4-11.

Table 4-11. Water Reclamation Plant Wet Weather Flow Peaking Factors

WRP	Wet Weather Peaking Factor[a]
POWRP	2.6
SJCWRP East	3.1
SJCWRP West	2.1
WNWRP	2.6
LCWRP	3.0
LBWRP	2.8

[a] The wet weather peaking factor is based on the amount of flow treated by the WRPs; most of the WRPs bypass some of the tributary peak flow.

4.8.3.5 Joint Water Pollution Control Plant Peak Wet Weather Flows

Determining peak wet weather flow at the JWPCP is important because it dictates the size of the JWPCP effluent management system. The JWPCP has a more comprehensive set of influent flow data available than the WRPs; therefore, a more sophisticated approach than using historic peaking factors was possible to assess I/I contributions at the JWPCP.

With sufficient wet weather flow data and corresponding rainfall data, relationships can be derived between rainfall intensity and rainfall dependent infiltration and inflow (RDI/I). The approach applied at the JWPCP for this plan was the Inflow Coefficient Method (ICM). The ICM estimates peak RDI/I and total wet weather flow for any rainfall intensity.

The ICM establishes a statistical relationship between rainfall event severity (such as rainfall depth, duration, or intensity) and RDI/I in sanitary sewers based on the review of gauged historical rainfall and sewer flow events. In order to evaluate the peak flow, a modification of the rational formula for storm flow can be used as follows:

$$Q = K_P \, i \, A$$

Where:

Where:	Q	=	inflow rate, cubic feet per second (cfs)
	K_P	=	inflow coefficient for peak flow
	i	=	average rainfall rate for the time of concentration to the metering point, inches per hour (in/hr)
	A	=	sewered area, acres

For wet weather flows at the JWPCP:

Q	=	RDI/I
K_P	=	a constant developed from historical data relating RDI/I and i from historical events
i	=	intensity of a rainfall event (e.g., a 10-year or 25-year storm)
A	=	area over which the storm occurs

For application of the ICM, the peak RDI/I rate is assumed to be independent of the sanitary wastewater flow component. The peak flow at the JWPCP in 2050 becomes the sum of the projected dry weather flows, the infiltration extracted from the high-groundwater dry day, and the peak RDI/I. The 2050 projected average dry weather flow within the JOS tributary area was discussed in Section 4.8.2. Although the projected 2050 flow exceeds the current treatment capacity of the JOS, expansion at the JWPCP is not recommended as part of this facilities planning effort. With no expansion at the JWPCP, it can be assumed that the maximum average daily flow at the JWPCP would be 400 MGD.

However, peak RDI/I is partially a function of rainfall intensity and duration. Therefore, it is reasonable to state the expected RDI/I in terms of return period rainfall statistics for the local area. The RDI/I increases with more severe (higher return period) rainfall. The results of the ICM analysis for recent (2007) conditions and year 2050 are summarized in Table 4-12.

With respect to the values presented in Table 4-12, the projected 927 MGD peak wet weather flow represents a worst-case scenario. In the development of tributary average dry weather flows (ADWFs), it was assumed that the upstream WRPs are not expanded and that all system flows beyond the WRPs' current capacities are treated by the JWPCP. It was also assumed that the peak wet weather flows take place at the same time as the peak diurnal flow. It was also assumed that the peak wet weather event in question takes place shortly after another major storm event that has raised groundwater elevations within the system to a level that maximizes the quantity of groundwater infiltration entering the conveyance system. This level of conservatism is warranted for planning level assessments of critical effluent management facilities.

Table 4-12. Summary of Predicted Flows at the JWPCP

Year	Rainfall Event Return Period[a] (years)	ADWF[b]	Dry Peaking Factor[c]	PDWF	GWI	Daily Peak Flow	RDI□I[d]	Increased RDI□I from SOI[e]	PWWF	Wet Weather Peaking Factor
2007	25	308	1.24	382	30	412	368	-	780	2.5
2050	25	400	1.24	496	30	526	368	33	927	2.3

[a] Return period designations are based on climate norms for Coastal Southern California from NOAA Atlas 2: Precipitation Frequency Atlas of the Western United States, Volume III, by J.F. Miller, R.H. Frederick, and R.J. Tracey 1973. A 25-year return period is sufficiently conservative for an area the size of the JOS, because it assumes that the entire JOS would simultaneously experience a 25-year storm event.

[b] Average dry weather flow for 2007 is calculated from JWPCP flow data for 2005. Average dry weather flows are based on 83 gpcd and population projections contributing to JWPCP, plus bypass flows from upstream WRPs and include industrial waste and contract flows.

[c] Dry weather flow peaking factor is derived from one week of dry weather flow data in September 2005.

[d] RDI/I is derived from the ICM results, and is assumed to remain constant over time.

[e] RDI/I is assumed to increase with expanded service area only, and not with aging or deterioration of the collection system. All flows are MGD.

ADWF □ average dry weather flow
PDWF □ peak dry weather flow
GWI □ groundwater infiltration
RDI/I □ rainfall dependent infiltration and inflow
SOI □ sphere of influence
PWWF □ peak wet weather flow
PDWF □ ADWF x PF
Daily Peak Flow □ PDWF □ GWI
PWWF □ Daily Peak Flow □ RDI/I
Wet Weather Peaking Factor □ PWWF/ADWF

4.9 Wastewater Solids Projections

One of the primary byproducts of wastewater treatment and purification is residual solids. These solids or sludges are further processed prior to their ultimate disposal. The processes employed convert the residual sludges to biosolids, a product that can be put to a variety of beneficial uses. To assess the capabilities of the existing solids processing systems, and to determine future needs, the types and quantities of wastewater solids must be quantified. This section presents:

- Definition of solids sources and types
- Recent (2005 through 2009) solids production rates
- Basis for projecting future solids quantities
- Projections of future solids to be managed

Chapter 5 contains information on current solids processing systems and capabilities. This chapter presents an overview of potential future needs to be factored into subsequent alternatives assessments.

4.9.1 Solids Types and Sources

Within the JOS, the residual solids for each of the WRPs are returned to the sewers and conveyed to the JWPCP. Residual solids from the WRPs consist of primary solids, skimmings□scum, and waste activated sludge (WAS). The liquid treatment processes at the JWPCP remove most of the influent and process-generated solids at the JWPCP prior to effluent disposal. The following are the major sources of solids.

- Primary Solids: The source of primary solids is raw primary sludge (RPS), which is defined as the residuals removed from the primary sedimentation tanks.
- Secondary Solids: The source of secondary solids is WAS, which is generated by the activated sludge process and separated in the final sedimentation tanks.

While skimmings and scum removed at different stages of wastewater processing are also part of the solids processing systems, the quantities of these materials, relative to RPS and WAS, are very small. Other residual solids, such as grit or screenings, are removed at the headworks of the JWPCP.

4.9.2 Recent Solids Production

JWPCP monthly reports served as the primary source of information on solids at the facility. A 5-year timeframe (2005 through 2009) was evaluated to obtain a representative perspective on solids processing and solids generation rates. This data set provided recent information over a sufficient duration such that the results reflect the full spectrum of influent and operational scenarios impacting solids production.

A summary of the JOS solids generation data for 2005 through 2009, as well as the population served over that timeframe, is provided in Table 4-13. Solids production is expressed in dry tons per day (dtpd).

Table 4-13. Population and Solids Production Summary

Parameter	Year					5-Year Averages
	2005	2006	2007	2008	2009	
JOS Population	5,013,039	5,031,001	5,053,455	5,112,711	5,118,941	5,065,829
Raw Primary Sludge (dtpd)	497	480	478	462	450	474
Thickened WAS (dtpd)	280	276	257	256	234	261

dtpd dry tons per day
WAS waste activated sludge

Using the 5-year averages cited in Table 4-13, a per capita generation rate was calculated for each sludge type:

- RPS: 0.19 pounds per capita per day (ppcd)
- Thickened Waste Activated Sludge (TWAS): 0.10 ppcd

It was also assumed that these recent values are representative of future solids generation rates for the JOS, and were, therefore, used in the subsequent solids projections presented in Section 4.9.4.

4.9.3 Basis for Solids Projections

A variety of parameters influence the type and quantity of solids generated within treatment processes. There are a number of factors that can impact the accuracy of future quantity projections. Some of the limitations associated with the development of accurate and precise future quantity estimates include:

- Projecting quantities over an extended planning horizon. This project requires projections over a 40-year period.
- Predicting population growth over an extended planning horizon, because solids generation is dependent upon the size of the population served.

- Quantifying operational parameters (e.g., flow, SS, per capita contributions) for future conditions. Future values (concentrations, contributions, yields, etc.) may vary in either direction.
- Anticipating future operations affecting the transfer of solids from the upstream WRPs to the JWPCP. The JOS solids are the result of solids directly tributary to the JWPCP and the solids discharged into the JOS conveyance system by the upstream WRPs. The future division of flows between these sources may vary and may impact solids production and properties.
- Determining the processes to be employed and the manner by which these processes would be operated. Solids generation, process removal rates, and solids yield for soluble conversion are dependent upon the processes selected.

A simplified, empirical approach to projecting future solids generation at the JWPCP has been used. The steps include:

- Reviewing existing solids generation information for the JWPCP and selecting a representative data window to use. A 5-year timeframe of 2005 through 2009 was determined to be representative. Data were extracted from monthly summary operating reports for the selected time period.
- Determining the appropriate solids/sludge data sources to be used in the development of per capita contributions for primary and secondary solids. In this situation, the RPS and TWAS data sources provided the most appropriate basis for developing per capita contributions.
- Determining the JOS population served for the timeframe of 2005 through 2009 associated with solids generation data.
- Calculating a per capita contribution for RPS and TWAS, in ppcd.
- Applying the per capita contributions to the population projections.

This approach provides a rational basis for projecting future quantities of the two major solids types (primary and secondary) at the JWPCP.

4.9.4 Solids Projections

Using the calculated per capita solids generation rates, coupled with the projected 2050 JOS population, the following solids projections have been developed for the year 2050:

- RPS: 585 dtpd of solids at 3.32 percent and a flow of 4.23 MGD
- TWAS: 322 dtpd of solids at 5.52 percent and a flow of 1.40 MGD

These quantities were used in assessing the current systems' capacities, and in determining future facilities requirements. During the planning period, the JOS biosolids generation rate is projected to increase nearly 30 percent, from 1,470 wet tons per day (wtpd) (2005–2009) to 1,850 wtpd (2050).

4.10 Water Recycling and Reuse

4.10.1 Sanitation Districts' History of Water Recycling

The Sanitation Districts have actively promoted water recycling for nearly half a century. The Sanitation Districts' first report on water recycling was prepared in 1949, and described in detail the basic considerations of water recycling, including the opportunities that existed at that time. The report concluded that the configuration of the Sanitation Districts' trunk sewer system and the available knowledge of wastewater treatment processes would permit the safe and economic recycling of wastewaters for specific uses to alleviate an impending water shortage and supplement the natural and imported water supplies of the area.

A second report, prepared in 1958, reaffirmed the general findings of the first report and made a specific proposal: demonstrate to the general public the feasibility of full-scale water recycling through the construction and operation of a 10 MGD water reclamation plant at Whittier Narrows. Subsequently, A Plan for Water Reuse was prepared in 1963 to determine where, when, and how additional water recycling facilities could and should be constructed.

Between 1966 and 1974, four water reclamation plants (POWRP, LCWRP, SJCWRP, and LBWRP) were constructed, thereby increasing the water recycling capacity in the JOS from 10 MGD to 87.5 MGD. These four water reclamation plants were expanded between 1975 and the present to provide an additional 105.2 MGD of water recycling capacity to the JOS. These expansions bring the total permitted recycling capacity of the JOS to 192.7 MGD.

During the 2009–10 fiscal year, the average recycled water production within the JOS service area was 124.2 MGD (139,000 acre-feet per year [AFY]), and the average reuse was 54.2 percent (67.4 MGD or 75,000 AFY).

For the 2009–10 fiscal year, the Sanitation Districts had 24 contracts for the sale and/or delivery of recycled water from its facilities. Because the Sanitation Districts cannot sell recycled water directly to a user served by a private water company, recycled water was provided to 29 water wholesalers and purveyors. These 29 wholesalers and purveyors made the recycled water available to 640 individual sites in 30 cities for different applications such as irrigation, industrial use, agricultural use, and groundwater recharge.

4.10.2 Previous Studies

Over the past 30 years, a number of documents were created to evaluate the potential water reuse market in the Southern California region. Among the most significant are:

- 1982 Orange and Los Angeles County (OLAC) Water Reuse Study (OLAC 1982)
- 1995 JOS 2010 Master Facilities Plan (Sanitation Districts 1995a)
- 1995 Plan for Beneficial Reuse of Recycled Water (Sanitation Districts 1995b)
- 2002 Southern California Comprehensive Water Reclamation and Reuse Study (United States Bureau of Reclamation [USBR] 2002)
- City of Los Angeles Integrated Resources Plan 2005
- City of Los Angeles Recycled Water Master Plan 2006
- Urban Water Management Plans (all water wholesalers and purveyors)
- Sanitation Districts Annual Status Reports on Recycled Water

Each of these documents and their findings are briefly discussed in the following sections.

4.10.2.1 Orange and Los Angeles County Water Reuse Study (1982)

This study was prepared as a cooperative effort among the following agencies: the EPA, State Water Resources Control Board (SWRCB), MWD, Sanitation Districts, City of Los Angeles Bureau of Engineering, City of Los Angeles Department of Water and Power, Orange County Water District, Sanitation Districts of Orange County, State Department of Water Resources, LARWQCB, Santa Ana Regional Water Quality Control Board, and SCAG.

The OLAC study was the first comprehensive study on water reuse for the Orange County and Los Angeles County metropolitan areas. It evaluated technical, economic, and regulatory aspects of recycled water and defined a sequence of projects that could be developed to increase the use of recycled water over a 20- to 30-year time period. The study forecasted a recycled water demand of 290,000 AFY within Orange and Los Angeles counties to be realized between 2010 and 2015.

4.10.2.2 Joint Outfall System 2010 Master Facilities Plan (1995)

This Sanitation Districts planning document dedicated a section to the status of water recycling and water reuse. This section described the amount of recycled water available from the treatment plants and the customers of recycled water. It also projected the sizes and locations of future water reuse markets in the JOS service area.

4.10.2.3 Plan for Beneficial Reuse of Recycled Water (1995)

This Sanitation Districts plan was released in December 1995, with three stated goals:

- Identify and evaluate the potential for reuse of recycled water
- Delineate and examine technical, regulatory, and institutional impediments to using recycled water
- Propose a strategy for avoiding or overcoming the identified impediments

The last chapter of the document lists several recommended action items, including implementation of the JOS 2010 Master Facilities Plan; participation in legislative and public relations efforts to promote water recycling, management of recycled water production and distribution to optimize its availability to customers; and setting recycled water rates that encourage water reuse via savings over potable water supplies.

4.10.2.4 Southern California Comprehensive Water Reclamation and Reuse Study (2002)

This USBR study focused on the identification of regional water recycling opportunities. The study was divided into two phases. Phase I included data collection and analytical model development leading to an examination of the feasibility of regional water recycling projects across Southern California. Phase II focused on evaluating the feasibility of a number of basin-specific, multi-agency regional, and single-agency geographically localized, recycling projects. One of the study conclusions was that a total demand of 115,934 AFY and 188,520 AFY could be satisfied by the years 2010 and 2040, respectively, within the JOS service area.

4.10.2.5 City of Los Angeles Integrated Resources Plan (2005)

The Los Angeles Integrated Resources Plan was a stakeholder-driven process in which community members, agency representatives, and interested stakeholders participated in the development of alternatives to achieve the city of Los Angeles’ wastewater, urban runoff, and recycled water needs.

As part of the Integrated Resources Plan development, more than 20 preliminary alternatives were developed. Four were selected for further evaluation, and one was approved for implementation (contingent upon specific citywide policy changes with respect to groundwater recharge with recycled water). A second alternative was identified in the event that such policy changes are not adopted and treatment facility expansion is needed. The selected alternative includes expansion of the Tillman WRP and has a high potential for water resources projects. The backup alternative includes the expansion of the Hyperion Treatment Plant and has a moderate potential for water resources projects.

4.10.2.6 City of Los Angeles Recycled Water Master Plan (2006)

This master plan identified and evaluated new recycled water facilities based on factors such as water demands, economics, water quality regulations, and public acceptance. The master plan divided potential recycled water customers into four areas based on their proximity to existing wastewater treatment plants: San Fernando Valley (Tillman WRP), Central City (Los Angeles-Glendale WRP), Westside (West Basin Water Recycling Facility), and Harbor (Terminal Island WRP). The Harbor area expansion from the city of Los Angeles’ Terminal Island WRP included some potential industrial users that could also be served from the JWPCP; however, additional treatment of JWPCP effluent would most likely be required for these customers.

4.10.2.7 Urban Water Management Plans

The Urban Water Management Planning Act requires urban water suppliers of a specific size to prepare and adopt UWMPs. The UWMPs must be prepared in accordance with prescribed requirements established by the SWRCB including a description and evaluation of reasonable and practical efficient water uses, existing and projected uses of recycled water, and conservation activities. The most recent UWMPs were produced in 2010 by the wholesalers and purveyors located within the JOS service area. The recycled water numbers presented in the UWMPs are developed using different assumptions and serve different purposes than this document. Therefore, the direct use of such projections must be considered in context and, in some cases, revised for use in this facilities plan when evaluating the potential of future recycled water markets.

4.10.2.8 Annual Status Reports on Recycled Water

These reports are prepared for each fiscal year and include information about the Sanitation Districts’ WRPs. These annual reports provide information about recycled water use by plant and information about current and future projects.

4.10.3 Chronology of Water Reuse Approvals

Over the last 30 years, there have been a number of key regulatory approvals procured by the Sanitation Districts that have contributed to the continued and increased use of recycled water. A brief chronology of these regulatory approvals is presented in the following list.

- October 1978: Revised wastewater reclamation regulations are adopted by the State Department of Health Services (DHS, now California Department of Public Health, CDPH) as Title 22 of the California Code of Regulations. The effluent from the Sanitation Districts' tertiary treatment plants can be used for all of the approved applications contained in these regulations.
- June 1981: The LARWQCB adopts Board Order No. 81-34, which establishes water reclamation requirements (WRRs) for the POWRP.
- March 1987: The LARWQCB adopts Board Order No. 87-40, which permits the increase in the use of recycled water for groundwater recharge in the Montebello Forebay from 32,700 to 50,000 AFY.
- April 1987: The LARWQCB adopts Board Order Nos. 87-47, 87-50, and 87-51, which establishes revised WRRs for the LBWRP, SJCWRP, and LCWRP, respectively.
- September 1988: The LARWQCB adopts Board Order No. 88-107, which establishes WRRs for the WNWRP.
- September 1991: The LARWQCB adopts Board Order No. 91-100, which permits the increased use of recycled water for groundwater recharge in the Montebello Forebay to 60,000 AF in any 1 year, with a maximum of 150,000 AF in any 3-year period.
- May 1997: The LARWQCB readopts all of the Sanitation Districts' water reuse permits that had been previously issued in the 1980s in Board Order No. 97-072.
- December 2000: DHS adopts revised Title 22 Water Recycling Criteria that contains an expanded list of approved direct, non-potable uses of recycled water.
- June 2001: DHS issues draft Groundwater Recharge Regulations to Title 22 Water Recycling Criteria.
- September 2005: The LARWQCB adopts Board Order No. R4-2005-0061, which permits the use of advanced treated recycled water from the LBWRP for injection into the Alamitos Seawater Intrusion Barrier.
- August 2008: DHS issues revised draft Groundwater Recharge Regulations.
- April 2009: The LARWQCB adopts Board Order No. R4-2009-0048, which eliminates the annual and running 3-year volumetric limits on recycled water contribution to recharge contained in Board Order No. 91-100, replacing them with a dilution requirement of 35 percent recycled water in any 60-month period.

Currently, the CDPH, LARWQCB, and the Los Angeles County Department of Public Health (County DPH, formerly County DHS) or local health agencies, where applicable, have regulatory and/or oversight responsibilities for irrigation and industrial reuse applications. For groundwater recharge, beyond the general state regulations (Title 22 guidelines), permits from the LARWQCB would likely have specific requirements based on water quality and basin objectives. Detailed information on current water reuse regulations is contained in Chapter 3 of this document.

4.10.4 Current Reuse

The current status of water recycling and treatment plant conditions were presented in the most recent Annual Status Report on Recycled Water (Sanitation Districts 2011). The document presents a summary of the current projects for each of the Sanitation Districts' WRPs and lists start-up dates, acreages, type of users, and usage amounts. Data from this report are presented in Table 4-14 and on Figures 4-10 through 4-14.

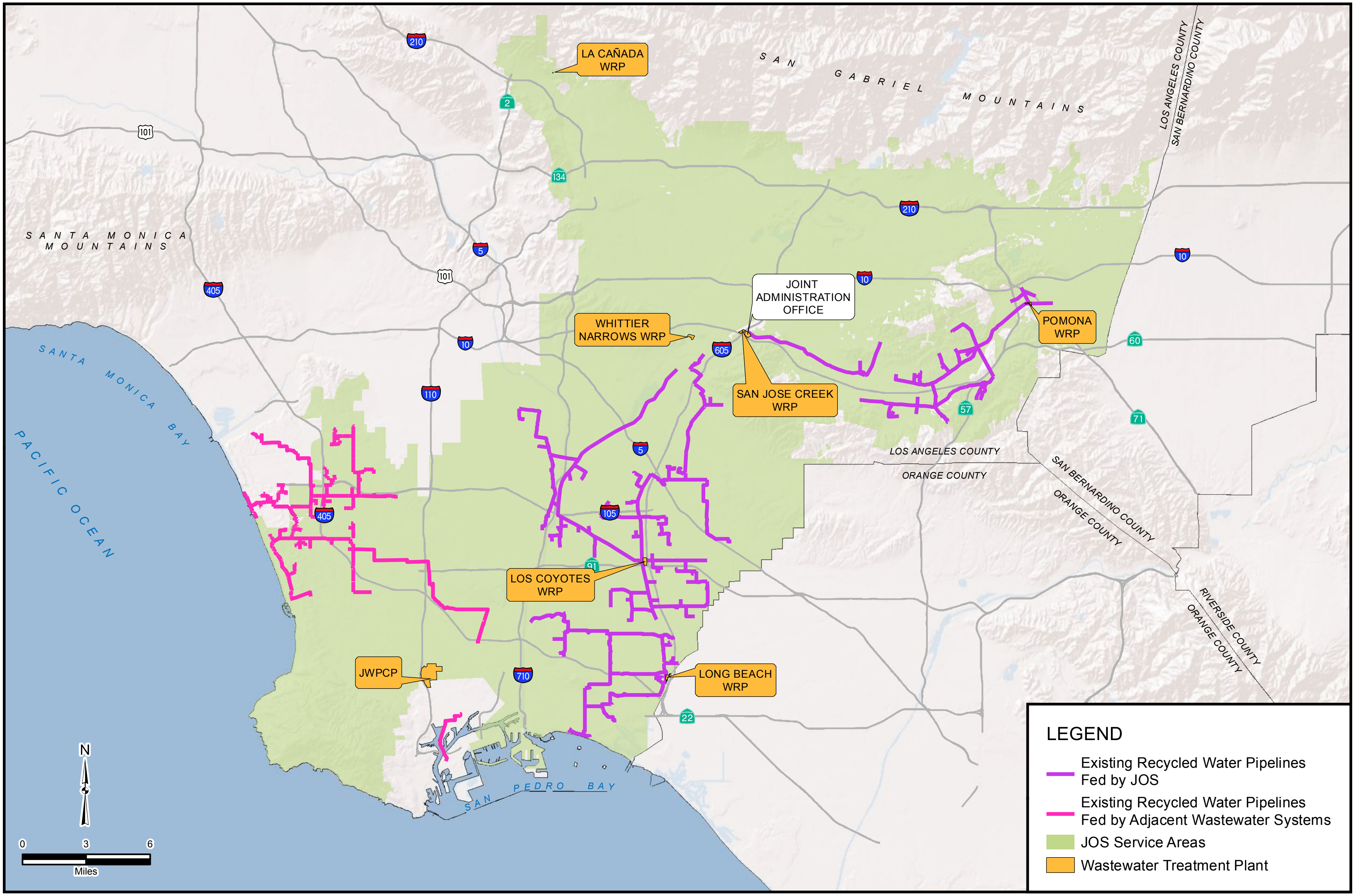


FIGURE 4-10

CLEARWATER Program

Recycled Water Distribution System

Source: Sanitation Districts of Los Angeles County 2011, Thomas Bros 2011, ESRI 2011

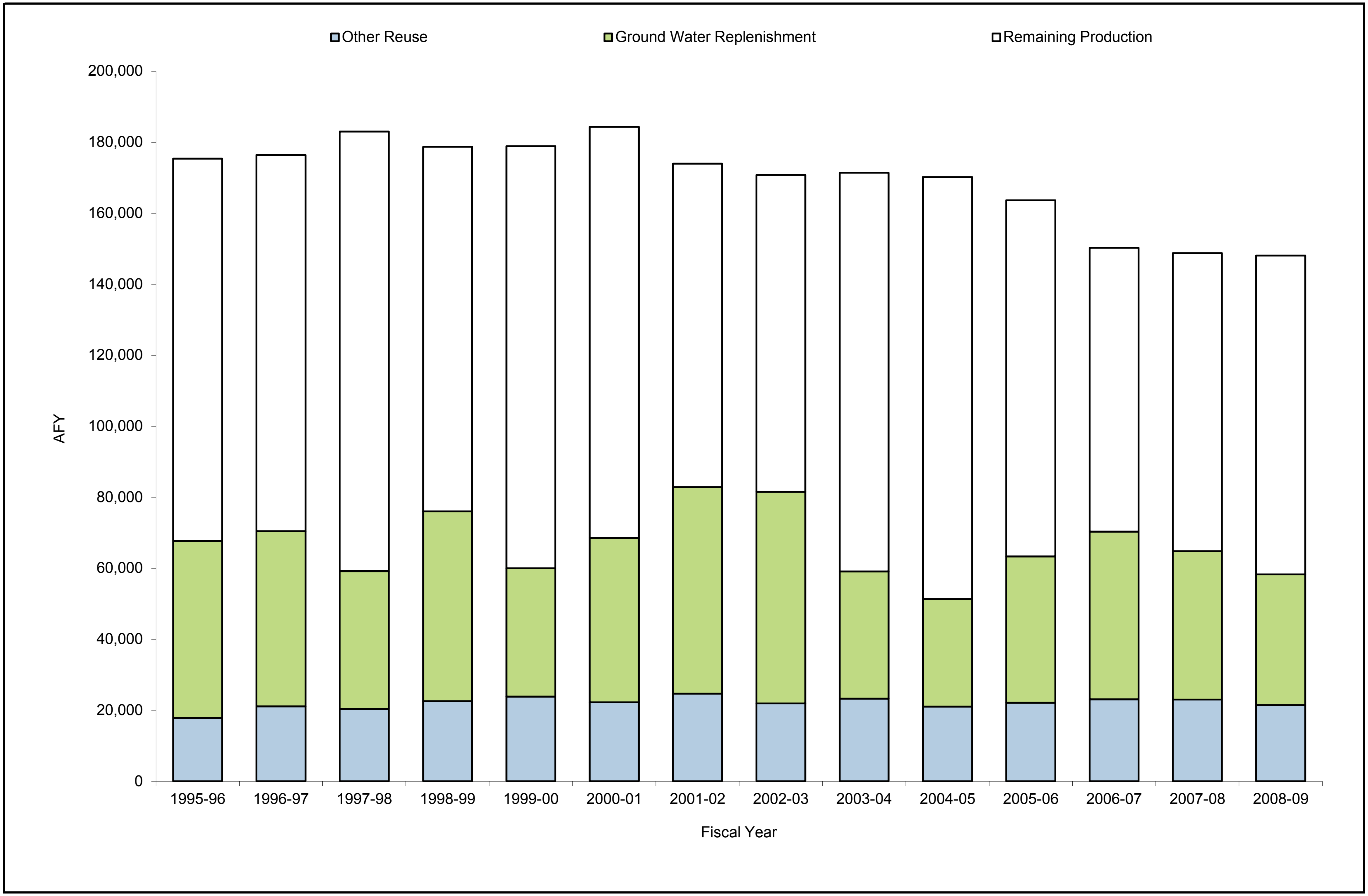


FIGURE 4-11

CLEARWATER Program

Historical Recycled Water Production and Total Usage

Source: Sanitation Districts of Los Angeles County 2011

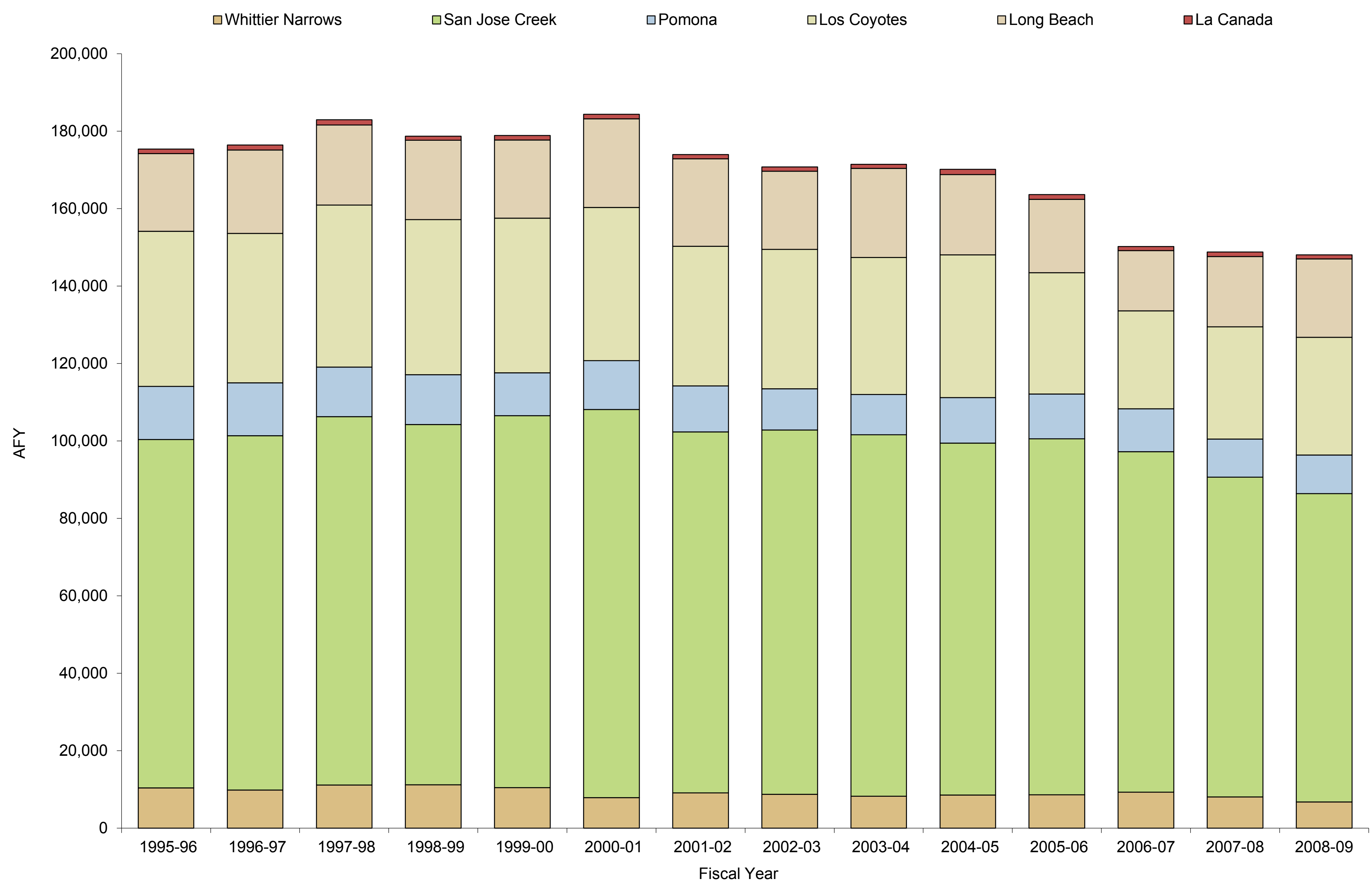


FIGURE 4-12

Clearwater Program

Historical WRP Recycled Water Production

Source: Sanitation Districts of Los Angeles County 2011

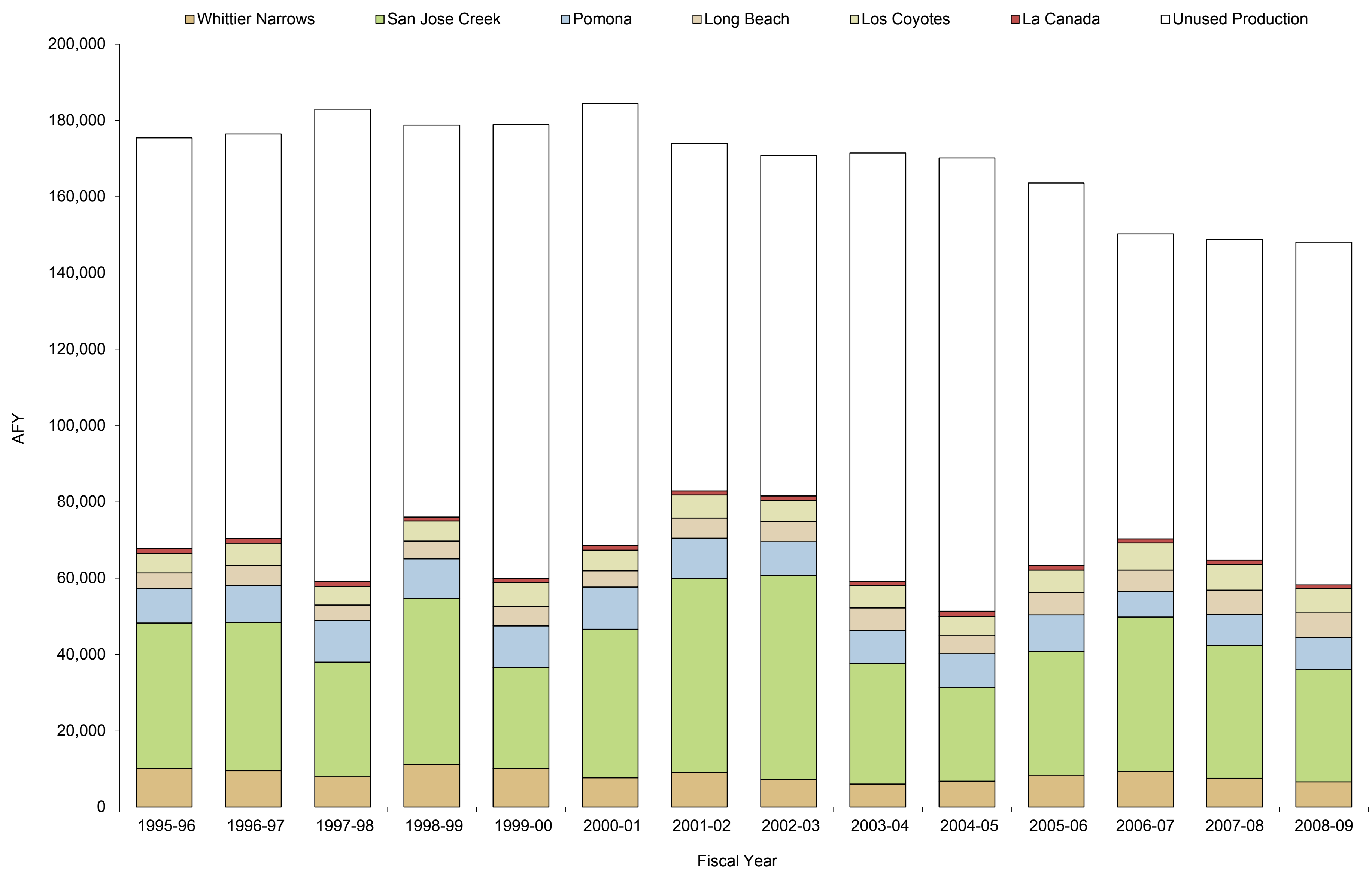


FIGURE 4-13

CLEARWATER Program

Historical Recycled Water Usage by WRP

Source: Sanitation Districts of Los Angeles County 2011

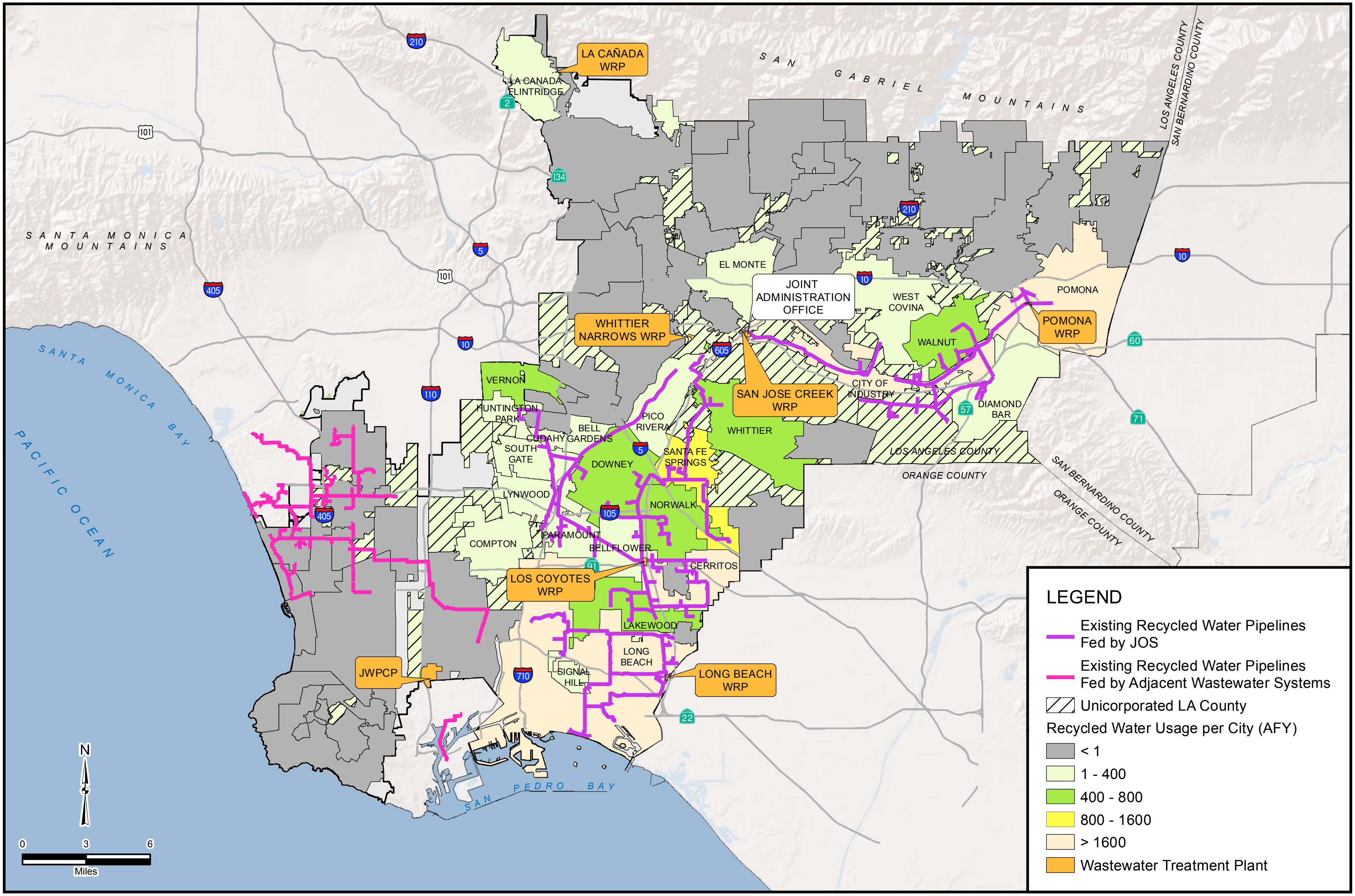


FIGURE 4-14

CLEARWATER Program

Recycled Water Usage by City Area

Source: Sanitation Districts of Los Angeles County 2011, Thomas Bros 2011, ESRI 2011

The location of the WRPs and the current recycled water pipelines within the JOS service area and in the immediate surrounding vicinity are shown on Figure 4-10.

The capacity, production, water reuse amount, and number of water reuse sites per WRP within the JOS drainage area for fiscal year 2009–10 are presented in Table 4-14. Processing at all the WRPs, with the exception of the LACAWRP, includes secondary treatment using activated sludge systems followed by tertiary filtration and disinfection. The percentage of recycled water that is reused by each plant is shown in Table 4-14.

Historical recycled water production and recycled water usage within the JOS are shown on Figure 4-11. The WRPs within the JOS have produced between 139,000 and 180,000 AFY of recycled water for most of the last 10 years. Recycled water usage has ranged between 50,000 and 80,000 AFY. Over the past 10 years, on average, approximately 40 percent of the recycled water produced has been reused in the JOS service area.

Table 4-14. Reuse by WRP for Fiscal Year 2009–10

		Water Produced		Water Reused			
Water Reclamation Plant	**Permitted Capacity (MGD)**	**Daily Avg. (MGD)**	**Annual (AFY)**	**Daily Avg. (MGD)**	**Annual (AFY)**	**Percent Reused**	**Number of Reuse Sites**
POWRP	15.0	8.4	9,400	7.4	8,200	88%	192
SJCWRP	100.0	68.6	76,800	44.0	49,300	64%	84
WNWRP	15.0	4.7	5,300	4.7	5,300	100%	3
LCWRP	37.5	24.2	27,100	5.2	5,900	22%	273
LBWRP	25.0	18.3	20,500	5.8	6,600	32%	56
LACAWRP	0.2	0.1	100	0.1	100	100%	1
Total	192.7	124.3	139,200	67.2	75,400	54%	609

MGD = million gallons per day
AFY = acre-feet per year
Source: Twenty-first Annual Status Report on Recycled Water, Fiscal Year 2009–10 (Sanitation Districts 2011)

Recycled water usage peaks between the 2001–02 and 2003–04 fiscal years are also shown on Figure 4-11. The peak usage in fiscal year 2001–02 was due to a combination of increased irrigation and groundwater replenishment. Dry weather and high temperatures in these years resulted in a significant increase of recycled water use for urban landscaping irrigation. The increase in groundwater recharge was due the conditions from previous years and the attempt to bring the 3-year total up to the permitted limit of 150,000 AF. The significant decrease in usage in fiscal year 2003–04 was due to reductions in groundwater recharge as compared to previous years, again to comply with the 3-year permitted limit of 150,000 AF.

Yearly recycled water production broken down by plant is presented on Figure 4-12. The SJCWRP has the highest production within the JOS service area. The maximum production since 1995 was 183,000 AF in fiscal year 2000–01. The maximum usage, 82,000 AF, occurred in fiscal year 2001–02.

The historical usage and the produced recycled water that was unused and discharged to surface waters by WRP are shown on Figure 4-13. A significant difference between the amount of water that is produced and the amount that is reused is shown on the figure. Much of that difference is explained by the seasonality of WRP inflows. The WRPs are more likely to receive and produce more flow during the winter due to rainfall runoff entering the sewer system while demands for recycled water are at a minimum. Flows not utilized to meet recycled water demands are ultimately released into the ocean via the San Gabriel River and its tributaries. However, a significant amount of the discharge from the SJCWRP, WNWRP, and POWRP is conserved via groundwater recharge, even during the rainy season.

Besides the seasonal variation on demands, there is also a diurnal flow variation that affects the degree to which recycled water flows can be used. The WRPs were mainly designed to treat residential and commercial wastewater, and, therefore, peaks of flow occur between 8:00 a.m. and 10:00 p.m. corresponding to human activity. However, a major use of recycled water is for landscaping irrigation where peaks of demand occur during the night when evaporation is lower and public greenbelt areas (e.g., parks, schools, golf courses) are unoccupied. Typically, the flows and capacities of the WRPs are adequate to meet the diurnal demands of recycled water customers. In the event of increased demand for recycled water, increased flow equalization and/or recycled water diurnal storage facilities at some WRPs or within the water wholesalers/purveyors distribution system could be required.

The current recycled water usage over city areas within the JOS is shown on Figure 4-14. Typically, where infrastructure is available, there is significant recycled water use, as shown on the figure.

Another major user of the Sanitation Districts' recycled water is the Water Replenishment District of Southern California (WRD). The WRD purchased 4,600 AFY from the WNWRP and 44,000 AFY from the SJCWRP in fiscal year 2009–10. It is noteworthy that the largest use (58 percent) of recycled water from the Sanitation Districts' WRPs is for groundwater replenishment.

Groundwater recharge takes place in the Montebello Forebay spreading grounds adjacent to the Rio Hondo and the San Gabriel River. According to the requirements established by the LARWQCB detailed in Board Order No. 91-100, adopted on September 9, 1991, the WRD had been permitted to spread up to 60,000 AFY of recycled water in any given year, not to exceed 50 percent of the total inflow to the Montebello Forebay in that year. However, as noted previously, this permit was revised by the LARWQCB in April 2009 to allow recycled water to make up to 35 percent of the total inflow into the forebay during any 60-month period (Sanitation Districts 2011). This new permit requirement, while allowing for increased amounts of recycled water use, still limits the amount of groundwater recharge that can be achieved using recycled water. In addition, the Sanitation Districts have had to make continuous adjustments to their operations and discharges to meet water quality requirements that continue to evolve.

4.10.5 Future Reuse

A number of potential projects that may be developed in the future have been identified that may expand reuse opportunities within the JOS. Most of the information on future projects was found in the following documents: the Annual Status Report on Recycled Water (Sanitation Districts 2010, 2011) and the Summary of Recycled Water Plans within the County Sanitation District of Los Angeles County's (CSDLAC's) Service Area (LWA 2007), a compilation of information on recycled water projects from the 2005 UWMPs, Integrated Regional Water Management Plans, Integrated Watershed Management Programs, and the city of Los Angeles' Recycled Water Master Plan.

The following subsections provide a brief description of some potential major future projects in the JOS service area, summarized by the WRP that would provide the recycled water.

4.10.5.1 Pomona Water Reclamation Plant

The Walnut Valley Water District (WVWD) has identified approximately 4,550 AFY of additional recycled water demand for the proposed expansion of its recycled water distribution system (Sanitation

Districts 2011). It is expected that approximately 3,000 AFY of these demand could be realized by 2050, primarily from customers in Walnut Village and the city of Diamond Bar.

The city of Pomona's major recycled water user was a paper company, with an average annual recycled water demand of approximately 3,700 AFY that had remained fairly constant since 1992. However, this facility ceased operations and stopped taking recycled water in April 2007. The city has identified 900 AFY of near-term demand and 700 AFY of longer-term demand that could use a portion of this available recycled water by 2050, if funding sources to extend recycled water pipelines to these customers can be obtained.

4.10.5.2 San Jose Creek Water Reclamation Plant

A total of 23,000 AFY of recycled water was proposed to be diverted for advanced treatment from SJCWRP West to supply Phase 1 of the Groundwater Reliability Improvement Program (GRIP). A total of 18,000 to 46,000 AFY of product water was planned to be split between the WRD and Upper San Gabriel Valley Municipal Water District (USGVMWD) for replenishment of the Central and Main San Gabriel groundwater basins, respectively (Sanitation Districts 2011). However, in February 2011, the USGVMWD Board of Directors voted to remove USGVMWD from the GRIP Joint Powers Agreement in order to explore other means of using recycled water for recharge of the Main San Gabriel Basin. GRIP Phase 1 is still under consideration, but its size and scope may be reduced.

The expansion of the city of Industry's recycled water pipeline by the USGVMWD and the Rowland Water District is expected to serve approximately 7,600 AFY from the SJCWRP East by 2020 to customers in the Rowland Water District, Suburban Water Systems, the WVWD, and the city of Industry.

The Central Basin Municipal Water District's (CBMWD's) Southeast Water Reliability Project would loop the Rio Hondo (Torres) and Century (Ibbetson) systems for flow reliability via a pipeline being built from the city of Pico Rivera through the cities of Montebello, Commerce, and East Los Angeles to the city of Vernon. This would allow recycled water to be supplied to these systems from both the LCWRP and SJCWRP. However, hydraulic limitations may exist that could control how much supply could be served from either plant at a given time. Also, water quality differences between the two sources could impact how much recycled water can be used from either plant based on user needs. This project is expected to deliver 4,000 AFY in the near-term and another 2,400 AFY by 2050.

Effluent from this plant that is not delivered through any direct distribution system is discharged into the San Jose Creek or San Gabriel River for groundwater recharge of the Central Basin by the WRD.

4.10.5.3 Whittier Narrows Water Reclamation Plant

One major project is expected to be supplied from the WNWRP. This project is part of the USGVMWD's San Gabriel Valley Water Recycling Project - Phase III to serve potential irrigation customers in the cities of South El Monte, El Monte, Irwindale, and Arcadia. This project would include connections to the Santa Anita Racetrack, the Los Angeles County Arboretum, Arcadia High School, Los Angeles County's Santa Anita Golf Course, and other greenbelt areas. Approximately 740 to 2,000 AFY of recycled water has been identified for this project (Sanitation Districts 2010, 2011). Preliminary design efforts have been completed within the city of Arcadia, and the USGVMWD is completing a master plan of the area to focus preliminary design efforts for the project.

Effluent from this plant that is not delivered through any direct distribution system is discharged into the Rio Hondo or San Gabriel River for groundwater recharge of the Central Basin by the WRD.

4.10.5.4 Los Coyotes Water Reclamation Plant

The LCWRP supplies both the city of Cerritos' recycled water distribution system and the CBMWD's Century (Ibbetson) System, the latter currently distributing recycled water to the cities of Bellflower, Bell Gardens, Compton, Downey, Lakewood, Lynwood, Norwalk, Paramount, Santa Fe Springs, South Gate, and Vernon. CBMWD has recently begun exploring the possibility of expanding its existing system by approximately 1,200 to 1,500 AFY (Sanitation Districts 2010, 2011).

The city of Cerritos is currently a major user of LCWRP recycled water. The city could expand their recycled water use by approximately 140 AFY by 2030 (LWA 2007).

The city of Lakewood is considering an expansion of approximately 100 to 160 AFY to its recycled water distribution system, which is supplied from the Cerritos system (Sanitation Districts 2010, 2011).

4.10.5.5 Long Beach Water Reclamation Plant

The LBWRP has a current water reuse level close to 7,000 AFY. The Long Beach Water Department (LBWD) has identified approximately 6,000 to 7,000 AFY of additional recycled water demand for irrigation and industrial uses (Sanitation Districts 2010, 2011), and may implement phased-in expansions of their recycled water distribution system to reach these sites, depending on funding and the availability of recycled water at the LBWRP. The LBWD is also working with the WRD to supply approximately 4,000 AFY of additional recycled water for expanded operation of the Alamitos Barrier Recycled Water Project (LWA 2007).

4.10.5.6 La Cañada Water Reclamation Plant

All of the recycled water produced at the LACAWRP is currently being reused, and there are no new projects planned for the recycled water produced at the LACAWRP.

4.10.5.7 Joint Water Pollution Control Plant

The Sanitation Districts and the MWD are conducting a joint feasibility study to evaluate the replenishment and storage capacities of area groundwater basins with the potential to recycle 100 MGD (112,000 AFY), or more, of JWPCP effluent. The JWPCP effluent would need to undergo advanced treatment, which is not currently in place, prior to recharging the groundwater. As part of the study, a pilot plant comprising ultrafiltration/reverse osmosis (UF/RO) and membrane bioreactor/reverse osmosis (MBR/RO), both followed by ultraviolet irradiation/oxidation, has been operating at the JWPCP since July 2010 for the UF/RO and November 2010 for the MBR/RO. The feasibility study will also evaluate how this project could complement other proposed projects, including GRIP and the city of Los Angeles' Recycled Water Master Plan.

4.10.5.8 Summary of Future Demands

Total future low and high projections of recycled water reuse demands within the JOS by WRP are shown in Table 4-15. Low reuse projections are based on projects with a higher likelihood of being completed within the 2050 planning horizon. High reuse projections are based on the low projections plus conceptual projects that are much more technically, institutionally, and financially complicated and may require significant capital improvements at the WRPs to implement.

Table 4-15. Summary of Total Projected Recycled Water Use Within the JOS by 2050

Water Reclamation Plant	Total Projected Annual Reuse (AFY)[a] Low Projection	High Projection
POWRP	16,000	17,000
SJCWRP	85,000	140,000
WNWRP	15,000	15,000
LCWRP	7,000	28,000
LBWRP	12,000	18,000
LACAWRP	100	100
Total	135,100	218,100

[a] Values rounded and based on projected future recycled water projects.

4.10.6 Reuse Challenges

A number of challenges exist relative to the expanded use of recycled water produced within the JOS service area in the following areas:

- Delivery Systems: Current uses are closely tied to the existing recycled water delivery infrastructure. Additional users could require expansion of current systems (i.e., piping, pumping stations, and storage facilities), which may represent a significant capital investment.
- Supply Availability: As the demand for recycled water increases, there may be insufficient supply available at specific locations. In some cases, the shortfall may be a result of the diurnal variations between supply (peak flow into the WRPs) and demand (peak irrigation requirements, particularly during the summer months).
- Quality: Future users may require higher levels of water quality than currently available at existing facilities. An example may be the need for recycled water with lower TDS levels for such industrial processes as boiler feed. These types of water quality requirements could result in higher levels of treatment in the future.

Chapter 5
EXISTING FACILITIES DESCRIPTION AND NEEDS ASSESSMENT

5.1 Joint Outfall System Overview

The Sanitation Districts of Los Angeles County's (Sanitation Districts') Joint Outfall System (JOS), shown on Figure 5-1, consists of seven wastewater treatment plants, over 1,230 miles of sewers, and 50 pumping plants. The largest JOS treatment facility is the Joint Water Pollution Control Plant (JWPCP). The other facilities are water reclamation plants (WRPs) that draw from the upstream reaches of the collection system and produce effluent suitable for reuse. The JOS WRPs include the Pomona Water Reclamation Plant (POWRP), San Jose Creek Water Reclamation Plant (SJCWRP), Whittier Narrows Water Reclamation Plant (WNWRP), Los Coyotes Water Reclamation Plant (LCWRP), Long Beach Water Reclamation Plant (LBWRP), and La Cañada Water Reclamation Plant (LACAWRP). In addition to producing effluent suitable for reuse, the WRPs can bypass all or a portion of their influent flows to the JWPCP for treatment. Solids produced at the WRPs are sent to the JWPCP for centralized processing.

5.2 Conveyance System

The conveyance system comprises four types of sewers. Ranging from the smallest to the largest, these are:

- Lateral lines
- Local sewers
- District trunk sewers
- Joint Outfall (JO) trunk sewers

In general, wastewater generated within the JOS flows from the smallest lines (laterals and local sewers), through the next largest lines (district trunk sewers), and finally into the largest lines (JO trunk sewers). The JO trunk sewers are tributary to one of the WRPs and/or to the JWPCP. The length of the sewer lines within the JOS boundaries (excluding lateral lines), broken down by sewer type and individual district, is provided in Table 5-1.

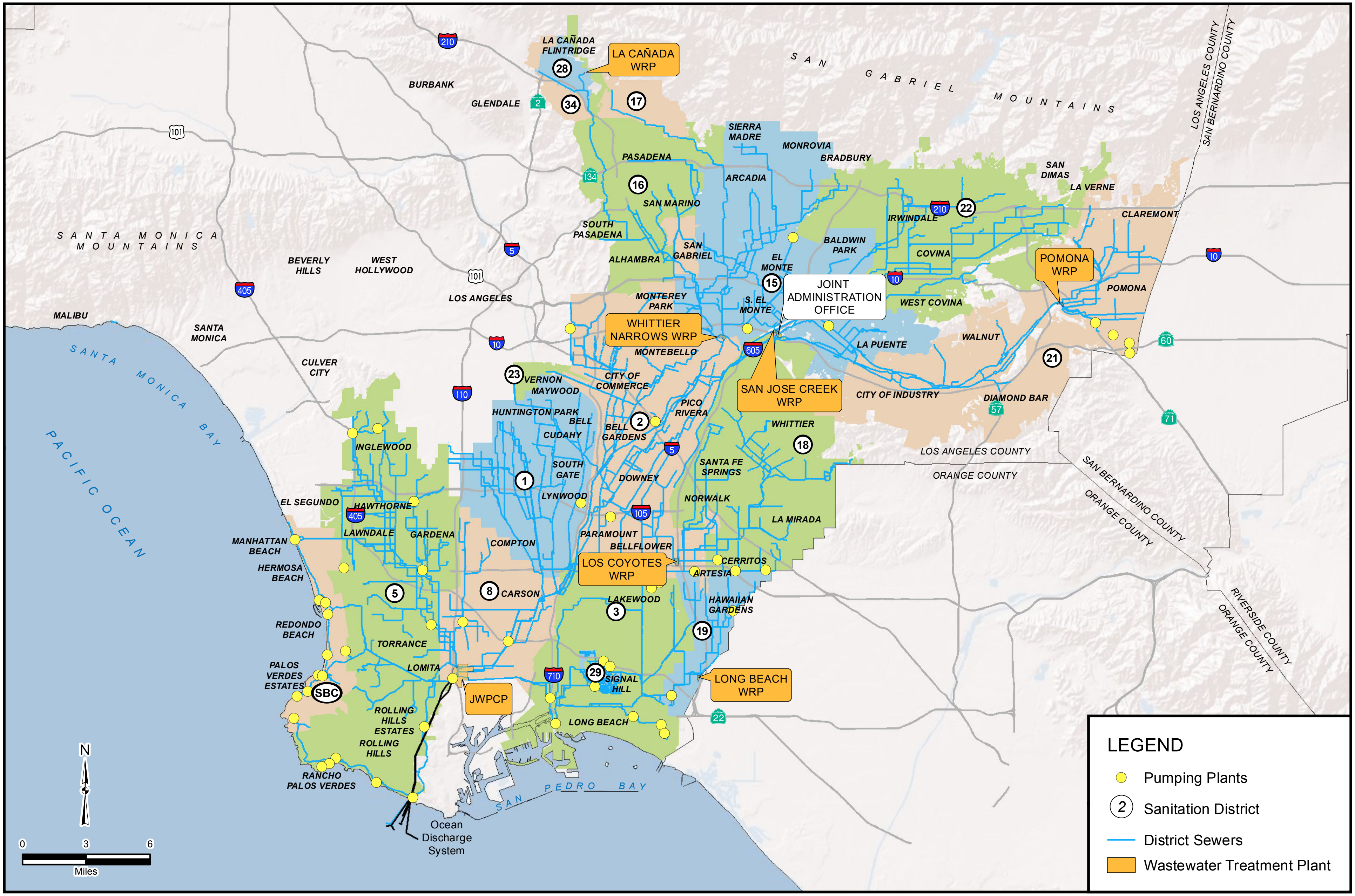


FIGURE 5-1

Joint Outfall System

Source: Sanitation Districts of Los Angeles County 2011, Thomas Bros 2011, ESRI 2011

Table 5-1. Lengths of Sewers Located in Each District

District No.	Local Sewers (miles)	District Trunk Sewers (miles)	JO Trunk Sewers (miles)[a]
1	697	69	31
2	976	125	90
3	788	27	45
5	1,098	128	61
8	292	38	47
15	1,028	62	80
16	539	30	17
17	108	5	0
18	726	69	17
19	199	15	19
21	961	51	34
22	732	75	26
23	21	0	2
28	35	2	2
29	1	38	2
34	1	0	0
SBC	277	19	6
Total	8,479	753	480

[a] Does not include 30 miles of outfalls (lines that convey treated effluent).

5.2.1 Laterals and Local Sewers

The majority of sewer lines located within the JOS service area are the responsibility of private property owners or local jurisdictions. The privately owned lateral lines connect residences and business to the local sewer, which are operated and maintained by either the cities in which the lines are located or Los Angeles County's Consolidated Sewer Maintenance District (within the Department of Public Works).

5.2.2 District Trunk Sewers

District trunk sewers are owned, operated, and maintained by the individual districts in which they are located. The purpose of most of these lines is to collect wastewater from the local sewers and/or laterals and convey it to the larger JO trunk sewers.

5.2.3 Joint Outfall Trunk Sewers

JO trunk sewers form the backbone of the JOS conveyance system. These sewers are owned, operated, and maintained by the Joint Outfall Districts, which are the 17 independent districts within the JOS. The JO trunk sewers collect wastewater from the district trunk sewers or local sewers and convey it to one of the WRPs or the JWPCP for treatment and disposal. There are nine JO trunk sewer lines designated Joint Outfall A to Joint Outfall J. (There is no Joint Outfall I.) The JO trunk sewers are shown on Figure 5-2 and listed by district in Table 5-1 and by JO sewer line in Table 5-2.

FIGURE 5-2

CLEARWATER Program

Joint Outfall Trunk Sewer System

Source: Sanitation Districts of Los Angeles County 2011, Thomas Bros 2011, ESRI 2011

Table 5-2. Lengths of District Trunk Sewers

Joint Outfall Trunk Sewers	Length (miles)[a]
Joint Outfall A	108
Joint Outfall B	102
Joint Outfall C	45
Joint Outfall D	23
Joint Outfall E	16
Joint Outfall F	24
Joint Outfall G	13
Joint Outfall H	114
Joint Outfall J	35
Total	480

[a] Does not include 30 miles of outfalls (lines that convey treated effluent).

5.2.4 Management Practices

5.2.4.1 Current System Operations

While the vast majority of the conveyance system is in continuously active service, there are several trunk sewers that are available but kept inactive for portions of the year. A few of these sewers are routinely returned to service, but most would require a significant amount of rehabilitation to keep in full time service. These are generally sewers that have been taken out of service when a new replacement sewer is constructed, but not permanently abandoned because their condition allows for their potential use. Some of these sewers are bulkheaded, or blocked off, and designated out of service but can be placed back into service; others are designated active in emergencies only and are available for use as needed (e.g., for wet weather flow management). During dry weather periods when extra capacity is not required, the Sanitation Districts minimize the use of inactive trunk sewers, thereby reducing maintenance costs.

Prior to each wet season, the JOS system configuration is slightly modified to take advantage of the additional capacity by adjusting stop logs, gates, and other flow control devices in the system. Once the projects that have been identified to provide the currently needed hydraulic relief are in place, wet season adjustments would be minimal because the capacity constraints that would trigger the adjustments will have been addressed.

Relief lines are typically designed to convey the ultimate design flows in conjunction with continued use of the existing sewer. Replacement lines are designed to provide the full ultimate design flow capacity; the existing lines can then be taken out of service, providing backup and flexibility for sewer system operations, such as wet weather flow management.

5.2.4.2 Condition Assessment and Improvements

The Sanitation Districts routinely monitor and evaluate individual sewer segments using closed-circuit television and physical inspections, as well as flow and level monitoring. Identified system deficiencies are addressed through sewer relief, repair, rehabilitation, and replacement projects. Therefore, the JOS conveyance system is in a continuous state of change as a balance is maintained between the aging of existing infrastructure and the implementation of sewer projects.

For decades, the Sanitation Districts have implemented a comprehensive program for identifying and relieving sewer capacity constraints. An element of this program includes the Sewer System Evaluation and Capacity Assurance Plan (SSECAP), which is now part of the Sewer System Management Plan (SSMP). The SSMP is required under the State Water Resources Control Board's (SWRCB's) Order No. 2006-0003 (Statewide General Waste Discharge Requirements for Sanitary Sewer Systems) (WDR Order No. 2006-0003).

As required by WDR Order No. 2006-0003, Subsection D.1(viii), the SSECAP results in a capital improvement plan (CIP) that "will provide hydraulic capacity of key sanitary sewer system elements for dry weather peak flow conditions, as well as the appropriate design storm or wet weather event." As part of the SSECAP, the sewer system is evaluated for hydraulic deficiencies, design criteria are established or enhanced as necessary, analysis is undertaken to establish short- and long-term CIP projects that address hydraulic deficiencies, and the identified CIP projects are scheduled.

The SSMP and SSECAP remain in draft status and are audited every 2 years and updated every 5 years. The following reports and procedures comprise the current Sanitation Districts' SSECAP:

- Capacity Conditions Assessment Report
- Description and Evaluation of Capacity Assessment Procedures
- Capacity Assurance Plan
- Report of Recommended Facility Improvements

Key findings found in each of these documents are incorporated into the most recent CIP.

5.2.4.3 Wet Weather Flow Management

Unlike many older parts of the United States that have combined sewer systems, most wastewater conveyance systems in Southern California, including that for the JOS, are separate from the storm drain system. Even so, the extent to which wet weather infiltration and inflow (I/I) affects the performance of the conveyance system is directly related to rainfall patterns. During normal or dry years, the volume of I/I is typically low; however, it increases in wet years. This increased I/I loading can lead to wet weather-related wastewater spills.

While the Sanitation Districts' design criteria for sewer sizing provide excess capacity to accommodate wet weather flow, approximately 87 percent of the total sewer system within the JOS service area is composed of local sewers outside the Sanitation Districts' purview. (Note that this percentage would be even higher if it were to include the privately owned laterals that connect residences and businesses to the local sewers.) As such, the Sanitation Districts can exert little direct control over the majority of sources of I/I. Therefore, I/I is a challenge that requires region wide collaboration. Nevertheless, the Sanitation Districts recognize that limiting the amount of I/I that enters into the sewerage system is a best practice to minimize sanitary sewer overflows and wastewater treatment costs.

The Sanitation Districts have instituted the following industry best management practices to reduce I/I:

- Conducting regular sewer system condition assessments
- Identifying, then rehabilitating and/or replacing deteriorated sewers
- Plugging manhole cover pick holes and sealing manhole cover frames subject to inflow
- Raising manhole covers in unimproved areas so that the cover is above the high water level

- Installing watertight caps on uncapped cleanouts
- Identifying and disconnecting illegal connections to the sewer system

Furthermore, the Sanitation Districts are actively engaged with the Los Angeles County Department of Public Works and the cities in the JOS service area to reduce I/I from entering local sewers. The Sanitation Districts have provided cork stoppers and silicone sealants for manholes to member cities free of charge. The Sanitation Districts are coordinating with local jurisdictions to educate public works employees that the practice of removing manhole covers as a means of flood control results in additional inflow into the sewer system and potential wastewater spills.

The wet-weather peaking factor (i.e., the increase in flows seen during and following major rain events) is approximately two times the average flows for the JOS.

The Sanitation Districts' current conveyance system management practices provide sufficient I/I control to compensate for sewerage infrastructure aging and deterioration. Therefore, additional I/I reductions that may be realized by these programs were not factored into the wet weather flow projections.

5.2.4.4 Storm Drain Diversion Management

Historically, sanitary agencies, including the Sanitation Districts, have not accepted urban runoff flows from the storm drains into their sanitary conveyance systems, which are separate systems. The reasons for this are to avoid (1) impacts from constituents in the runoff that could cause problems with the treatment processes and negatively impact the ability to meet effluent discharge requirements and (2) hydraulic capacity issues and the possibility of causing system overflows. More recently, consideration has been given to treating portions of the storm drain flows through publicly owned treatment works (POTWs) during periods of low flow within the sanitary systems. Low flow periods typically coincide with dry weather months and during non-peak hours of the day. This approach reduces the pollutant load from storm drain discharges to the ocean, providing benefits in terms of enhanced water quality.

Background

When areas become urbanized, much of the native ground surface is replaced by impervious paved surfaces. Water that was once absorbed into the ground then collects on these paved surfaces and flows into catch basins, storm sewers, and flood control channels, eventually makes its way out to the ocean. Wet weather urban runoff (WWUR) is generated when rainwater flows over urban surfaces such as rooftops, streets, and landscaping. Dry weather urban runoff (DWUR) is generated primarily through urban outdoor water use (e.g., landscape irrigation, car washing, and water pipe leaks). Both WWUR and DWUR can carry a number of pollutants including, but not limited to, oil and grease, sediments, nutrients, household chemicals, air pollutants captured in rainwater, pathogens, and pesticides. Urban runoff is a major source of pollution to the beaches and near-shore waters.

In 2007, the Sanitation Districts completed a report titled Supplemental Characterization of Los Angeles County Storm Drains. The study investigated the feasibility of diverting DWUR into the sewerage system or the use of alternative treatment for these flows. The report includes a listing of major storm drains with the potential for either diversion or treatment.

Sanitation Districts' Policy on Diversions

The Sanitation Districts do not accept WWUR into the sewerage system pursuant to the policy outlined in Guidelines for the Discharge of Rainwater, Stormwater, Groundwater, and Other Water Discharges (Sanitation Districts 2011). This policy was established under the provisions of Section 305 of the

Wastewater Ordinance, as amended in 1998. The Sanitation Districts require roofing and/or grading of open areas with possible connections to the sanitary sewer such that all WWUR is conveyed to the storm drain. If complete segregation is not feasible, the first 1/10 inch of rainwater may be discharged to the sanitary sewer by actively pumping from a pump well. Note that this initial 1/10 inch of rainfall on exposed industrial process areas is considered industrial wastewater and not WWUR. Rainfall above 1/10 inch must be diverted to the storm drain with an automatic rainwater diversion system that shuts down the pump and allows the rainwater to passively overflow from the pump well into the storm drain system. The Sanitation Districts currently permit approximately 400 of these rainwater diversion systems in their service area, which can equate to a total of approximately 5 MGD of flow into the conveyance system. Based on historical rainfall records, 36 rainfall events equal to or in excess of 1/10 inch are assumed to occur per year, resulting in a total of approximately 1,825 million gallons per year (MGY) of flow into the conveyance system.

The Industrial Waste Section of the Sanitation Districts has developed a policy for DWUR diversions titled Dry-Weather Urban Runoff Diversion Policy, dated July 2, 2007. The preamble provides a summary of the policy's intent:

> In the interest of promoting better health and safety protection for those who engage in water contact activities in coastal areas bordered by the Sanitation Districts' service area, the Sanitation Districts have consented, where justified, to accept the diversion of dry-weather urban runoff into the sewer system.

The policy includes a listing of general requirements that apply to all diversions. Some of the major provisions include:

- All diversions must obtain an Industrial Wastewater Discharge Permit, comply with the Sanitation Districts' Wastewater Ordinance, and identify all National Pollutant Discharge Elimination System (NPDES) permitted flows tributary to the diversion point.
- Discharges are typically limited to the dry season, defined as May 1 to September 30 (though some exceptions are possible). Dry season discharges may only take place during non-peak times of day.
- Discharges are required to be pumped into the system and must receive pretreatment for trash and sediment removal. Rain detectors must also be installed for automatic pump shutdown.
- Appropriate sampling and testing must take place to ensure there are no constituents present in the storm drain flow that would have detrimental impacts on the Sanitation Districts' ability to meet discharge requirements.
- Sanitation Districts' personnel must have unencumbered access to the power source or controls.

The provisions of this policy are designed to substantially reduce the risks to the Sanitation Districts of either the entry of undesirable constituents into the system and the associated effluent quality impacts, or the acceptance of excessive flow volumes that can result in capacity issues/overflows within the system. These limited risks are offset by the substantial, continuous benefits of water quality improvements resulting from DWUR diversions.

Permitted Urban Runoff/Storm Drain Diversions

The Sanitation Districts currently accept dry weather storm drain diversions from 10 permitted diversion structures within its service area along the coast: Herondo Street in Hermosa Beach; Avenue I in Redondo Beach; Los Alamitos, Claremont, and Appian Way in Long Beach; and 28th Street, Pollywog

Park, and the Pier in Manhattan Beach. The specifics of these diversions are presented in Table 5-3. Several additional coastal projects are currently under consideration. All of the existing and proposed diversion locations are tributary to the JWPCP.

Table 5-3. Permitted Dry Weather Storm Drain Diversions

Facility Name	Physical Location	Comments	Average Daily Flow Discharged (GPD)	Peak Flow Discharged (GPM)	Allowed Discharge
Los Angeles County DPW/ Flood Maintenance Division (Alamitos Bay)	5425 Ocean Long Beach, CA 90803	Connect to: 8-inch diameter local sewer line on Ocean Blvd	29,000	120	24 hrs per day year round
City of Manhattan Beach (Manhattan Beach)	1 The Strand Manhattan Beach, CA 90266	Connect to: South Bay Cities Main Trunk (MH 30-0025)	6,200	15	24 hrs per day year round
Los Angeles County DPW/ Flood Maintenance Division (Polliwog Park)	1611 Manhattan Beach Manhattan Beach, CA 90266	Connect to: 18-inch diameter local sewer line running east-west in Manhattan Beach Blvd, between Redondo St. and Peck Ave	30,000	50	24 hrs per day year round
Los Angeles County DPW/ Flood Maintenance Division (Esplanade/Avenue I)	1621 Esplanade Redondo Beach, CA 90277	Connect to: 12-inch diameter local sewer line flowing north in S. Esplanade Ave at intersection with Avenue I	8,900	60	Year round from 10:00 p.m. to 6:00 a.m.
Los Angeles County DPW/ Los Angeles County Flood Control District (Herondo)	446 1/2 Herondo Hermosa Beach, CA 90254	Connect to: local sewer line running east-west in the north side of Herondo St	43,200	60 from 6:00 a.m. to 10:00 p.m. and 120 from 10 p.m. to 6:00 a.m.	Year round
Los Angeles County DPW (28th Street & The Strand)	2621 The Strand Manhattan Beach, CA 90266	Connect to: South Bay Cities Main Pumping Plant at 27th St and The Strand	80,000	130	Year round from 8:00 p.m. to 6:00 a.m.
Los Angeles County DPW/ Flood Maintenance Division (Alamitos Bay)	222 Claremont Long Beach, CA 90803	Connect to: Anaheim Street Trunk Sewer (MH 03-0308)	20,000	60	Year round from 11:00 p.m. to 7:00 a.m.
Los Angeles County DPW/ Flood Maintenance Division (Apian Way Pump Station)	5871 Appian Long Beach, CA 90803	Connect to: Anaheim Street Trunk Sewer (MH 03-0308)	3,000	30	24 hrs per day year round
City of Long Beach DPW (Termino Avenue Drain)	Roswell Avenue (Between 7th Street and 8th Street) Long Beach, CA 90804	Connect to: Marina Relief Trunk, Section 1B (MH 03-0488)	23,000	100	Year round from 12:00 a.m. to 6:00 a.m.
City of Long Beach Parks, Recreation, and Marine Department (Colorado Lagoon)	W. 6th St and Park Ave Long Beach, CA 90814	Connect to: Marina Relief Trunk, Section 1B (MH 03-0369)	80,000	300	Year round from 12:00 a.m. to 6:00 a.m.

GPD gallons per day
GPM gallons per minute
DPW Department of Public Works
MH manhole
hrs hours

In addition, the Sanitation Districts' recently restored Bixby marshland, a 17-acre marsh area located on the JWPCP property, accepts DWUR and WWUR from the nearby Wilmington Drain. The marshland provides natural treatment to the water as it passes through. After flowing through the marshland, the DWUR and WWUR returns to the Wilmington Drain and eventually flows to the Los Angeles Harbor.

5.2.4.5 Planning Impacts

The impacts of the Sanitation Districts' policy for the acceptance of storm drain and urban runoff diversions are expected to be limited in terms of the future facilities' requirements and the present planning effort. Each of the main system components are reviewed as follows.

Conveyance System

The potential impacts to the conveyance system are minimal because the WWUR diversions are very limited (1/10 inch of rainwater), and the DWUR diversions are permitted only where sufficient hydraulic capacity exists within the system. DWUR diversions must be automatically suspended if rain occurs. With these provisions in place, there is no special consideration given in terms of current or future conveyance system sizing resulting from acceptance of these diversions.

Treatment Plants

Hydraulic considerations relative to treatment plants are addressed by the dry season, non-peak hour flows outlined for the conveyance system. The requirements for procurement of a permit and the provisions in place for pretreatment, testing, and monitoring of the diversion flow's composition control the amount of undesirable constituents entering the treatment plants. As such, there are no special considerations given to the sizing of, or processes provided for, the JOS treatment plants resulting from the inclusion of these diversions.

5.3 Water Reclamation Plants

The JOS WRPs are located upstream of the JWPCP and, with the exception of the LACAWRP, treat wastewater to a tertiary level. Recycled water produced at the WRPs may be beneficially reused or discharged to the San Gabriel and Rio Hondo tributaries that eventually flow to the Pacific Ocean. Five of the six WRPs (POWRP, SJCWRP, WNWRP, LCWRP, and LBWRP) discharge some or all of their treated effluent to the San Gabriel River watershed. The effluent from the LACAWRP is entirely reused at an adjacent country club.

The WRPs provide two principle benefits to the JOS. First, these plants make recycled water available to the locations where reuse demands are the greatest with minimal need for distribution systems and pumping. Second, the upstream locations of the WRPs provide hydraulic relief for the downstream wastewater conveyance system, which reduces the capital costs associated with constructing new relief sewers.

The WRPs have a number of unique operating features. The plants meet all water reclamation requirements (WRRs) and produce effluent that is suitable for beneficial reuse. Because they are part of the larger JOS, the WRPs have no solids handling capabilities; instead, all waste solids are discharged back to the JOS conveyance system for treatment at the JWPCP.

Production of effluent suitable for reuse requires multi-stage treatment. Except for the LACAWRP, the WRPs use primary sedimentation, nitrification-denitrification (NDN) reactors with secondary sedimentation, and effluent filtration. The main process differentiator between the individual WRPs is the use of either the Step-Feed Anoxic (SFA) or the Modified Ludzack-Ettinger (MLE) reactor configurations for NDN. The two process types achieve the same effluent quality but with differing tank configuration, feed points, and internal recycle use. With the exception of the WNWRP, the WRPs provide disinfection utilizing hypochlorite and dechlorination with sodium bisulfite. The WNWRP primarily utilizes ultraviolet (UV) irradiation for disinfection, with hypochlorite disinfection and sodium bisulfite dechlorination as a backup. Each WRP is discussed in the following subsections. Flows cited represent the treated average daily flow for the year 2010.

5.3.1 Pomona Water Reclamation Plant

The POWRP is located at 295 Humane Way on a 14-acre site within the limits of the city of Pomona. The POWRP is bound by a railroad right of way to the north, the Humane Society to the south, Humane Way to the east, and Elephant Hill to the west. The surrounding land use is composed of industrial and commercial zones. Residential areas may be found further to the north of the railroad and further south of the Humane Society. An aerial view of the POWRP is shown on Figure 5-3.

The POWRP, originally known as the Tri-City Plant, was owned by the cities of Pomona, Claremont, and La Verne and placed into operation in 1926. Effluent reuse began in 1927. The Sanitation Districts took over operation of the POWRP in 1966 and completed Stage I of the existing configuration. Conversion of the original activated sludge system to an MLE process to achieve NDN was completed in 2004.

The permitted capacity of the POWRP is 15.0 million gallons per day (MGD). In 2010, the plant treated an average daily flow of 9.1 MGD, and 7.6 MGD of the effluent was beneficially reused at 192 individual sites. Reuse applications include irrigation and dust control at the Spadra Landfill and industrial use. The remainder of the effluent is discharged into the south fork of the San Jose Creek channel where it makes its way to the unlined portion of the San Gabriel River, a designated water of the United States (U.S.). Effluent that percolates into the groundwater at this location is monitored by the Water Replenishment District (WRD).

Primary solids, scum, and waste activated sludge generated by the POWRP are returned to the District 21 Interceptor for conveyance to the JWPCP for processing.

5.3.2 San Jose Creek Water Reclamation Plant

The SJCWRP is located at 1965 Workman Mill Road on a 51-acre site within unincorporated Los Angeles County, next to the city of Whittier. The SJCWRP is split by Interstate (I-) 605 into two independent, but hydraulically interconnected, plants. The east plant (SJCWRP East) discharges to both the San Gabriel River and San Jose Creek (a tributary of the San Gabriel River), while the west plant (SJCWRP West) discharges only to the San Gabriel River. The overall site is bound by San Jose Creek to the north, State Route (SR-) 60 to the south, Workman Mill Road to the east, and the San Gabriel River to the west. Easements owned by the city of Los Angeles, the Los Angeles Department of Water and Power, and the state of California run along the northern side of the property. Land uses surrounding the plant consist mostly of low-density residential areas, intermixed with an industrial area to the west and open recreational space to the east. An aerial view of the SJCWRP is shown on Figure 5-4.

The SJCWRP started operation in 1971. The combined permitted capacity of the SJCWRP is 100.0 MGD (62.5 at SJCWRP East and 37.5 and SJCWRP West). The activated sludge process was converted from a conventional step-feed nitrification process to an SFA NDN process in 2004.

FIGURE 5-3

CLEARWATER Program

Pomona Water Reclamation Plant

Source: Sanitation Districts of Los Angeles County 2011, LARIAC 2007

FIGURE 5-4

CLEARWATER Program

San Jose Creek Water Reclamation Plant

Source: Sanitation Districts of Los Angeles County 2011, LARIAC 2007

In 2010, the plants treated a combined average daily flow of 77.0 MGD, and 41.6 MGD of tertiary effluent was reused at 84 individual sites. Groundwater recharge remains the largest beneficial use of the effluent. Approximately 37 MGD of effluent was used by the WRD for groundwater recharge. Groundwater recharge is accomplished by sending effluent to the San Gabriel Coastal Spreading Grounds, the Rio Hondo Spreading Grounds, San Jose Creek, or the San Gabriel River. The remaining effluent is discharged to the lined portion of the San Gabriel River approximately 8 miles south of the SJCWRP.

Primary solids, scum, and waste activated sludge generated by the SJCWRP are returned to the Joint Outfall H trunk sewer for conveyance to the JWPCP for processing.

5.3.3 Whittier Narrows Water Reclamation Plant

The WNWRP is located at 301 N. Rosemead Boulevard near the city of South El Monte on a 27-acre site that the Sanitation Districts lease from the U.S. Army Corps of Engineers. The WNWRP surroundings are dominated by the Whittier Narrows Recreation Area to the north, undeveloped industrial areas to the south, Legg Lake and nurseries to the east, and a largely unused utility area to the west. The Rio Hondo cuts through the northwest corner of the site. Compared to the other WRPs, the site is relatively undeveloped. An aerial view of the WNWRP is shown on Figure 5-5.

The WNWRP was the first reclamation plant built by the Sanitation Districts for the purpose of demonstrating the feasibility of large-scale water reclamation. The original plant was placed in operation 1962 and consisted of primary and secondary treatment with conventional activated sludge. The activated sludge process was converted to a MLE process to achieve NDN in 1998.

The permitted capacity of the WNWRP is 15.0 MGD. In 2010, the WNWRP treated an average daily flow of 7.1 MGD, and 7.0 MGD of the effluent produced at the plant was used for groundwater recharge and irrigation at three individual sites. Treated effluent is discharged to the Rio Hondo, the Zone 1 Ditch, or the San Gabriel River. Effluent discharged to the Rio Hondo and Zone 1 Ditch flows south to the Rio Hondo Spreading Grounds, and effluent discharged to the San Gabriel River flows south to the San Gabriel Coastal Spreading Grounds.

Primary solids, scum, and waste activated sludge generated by the WNWRP are returned to the Joint Outfall B trunk sewer for conveyance to the JWPCP for processing.

5.3.4 Los Coyotes Water Reclamation Plant

The LCWRP is located at 16515 Piuma Avenue on a 34-acre site within the city of Cerritos. The treatment facilities occupy the lower southwest corner of the site. The remaining 20 acres are leased to the city of Cerritos for use as the Iron-Wood Nine Golf Course. The LCWRP is bound by Southern California Edison property to the north, SR-91 to the south, I-605 to the east, and the San Gabriel River to the west. Land uses surrounding the LCWRP consist of light industrial areas to the north and south, and residential areas to the east and west. Caruthers Park is located immediately west of the LCWRP. An aerial view of the LCWRP is shown on Figure 5-6.

The LCWRP was commissioned in 1970 with an initial capacity of 12.5 MGD. The LCWRP originally consisted of primary and secondary treatment with conventional activated sludge. The activated sludge process was converted to an SFA NDN process in 2008.

FIGURE 5-5

CLEARWATER Program

Whittier Narrows Water Reclamation Plant

Source: Sanitation Districts of Los Angeles County 2011, LARIAC 2007

FIGURE 5-6

CLEARWATER Program

Los Coyotes Water Reclamation Plant

Source: Sanitation Districts of Los Angeles County 2011, LARIAC 2007

The current permitted capacity of the LCWRP is 37.5 MGD. In 2010, the plant treated an average daily flow of 26.8 MGD, and 5.1 MGD of the effluent produced at the plant was beneficially reused at 273 individual sites. Beneficial reuse applications include landscape irrigation of schools, golf courses, parks, nurseries, and greenbelts, and industrial applications at local companies for carpet dying and concrete mixing. The Central Basin Municipal Water District is the largest beneficial user, followed by the cities of Cerritos, Lakewood, and Bellflower. The majority of effluent is discharged to the lined portion of the San Gabriel River that flows directly to the Pacific Ocean.

Primary solids, scum, and waste activated sludge generated by the LCWRP are returned to the Joint Outfall F trunk sewer and conveyed to the JWPCP for processing.

5.3.5 Long Beach Water Reclamation Plant

The LBWRP is located at 7400 E. Willow Street on a 17-acre site within the city of Long Beach. Facilities are distributed evenly throughout the site with pockets of undeveloped areas. The LBWRP is bound by Willow Street to the north, Coyote Creek to the south and east, and the San Gabriel River to the west. El Dorado Park to the north and the El Dorado Municipal Golf Course to the west dominate the surrounding land. Residential areas may be found to the south and east of the LBWRP. An aerial view of the LBWRP is shown on Figure 5-7.

The LBWRP was commissioned in 1973. The activated sludge process was converted to an SFA NDN process in early 2008.

Immediately north of the LBWRP is the Leo J. Vander Lans Advanced Water Treatment Facility (AWTF), a state-of-the-art facility owned by WRD with a design capacity of 3 MGD (product water). The Leo J. Vander Lans AWTF supplies water to protect the Central Groundwater Basin from seawater intrusion. The high quality water is blended with imported water and pumped into the Alamitos Seawater Barrier, one of three seawater barrier systems within the WRD service area. The AWTF receives effluent from the LBWRP and provides further treatment via microfiltration, reverse osmosis, and ultraviolet disinfection.

The permitted capacity of the LBWRP is 25.0 MGD. In 2010, the plant treated an average daily flow of 18.4 MGD, and 5.7 MGD of the effluent produced at the plant was beneficially reused at 56 individual sites. The city of Long Beach used approximately 3.8 MGD of recycled water for landscape irrigation of schools, golf courses, parks, and greenbelts. The WRD used approximately 2.0 MGD of recycled water at the Leo J. Vander Lans AWTF. The majority of the effluent is discharged to the lined portion of Coyote Creek, which then joins the San Gabriel River and flows to the Pacific Ocean.

Primary solids, scum, and waste activated sludge generated by the plant and brine generated by Leo J. Vander Lans AWTF are returned to the Joint Outfall C trunk sewer and conveyed to the JWPCP for processing.

5.3.6 La Ca□ada Water Reclamation Plant

The LACAWRP is located at 533 Meadowview Drive on approximately 0.3 acre on the grounds of the La Ca□ada Flintridge Country Club golf course. An aerial view of the LACAWRP is shown on Figure 5-8.

The LACAWRP began operation in 1962 and provides extended aeration treatment. The plant has a permitted capacity of 0.2 MGD. In 2010, the LACAWRP treated an average daily flow of 0.1 MGD.

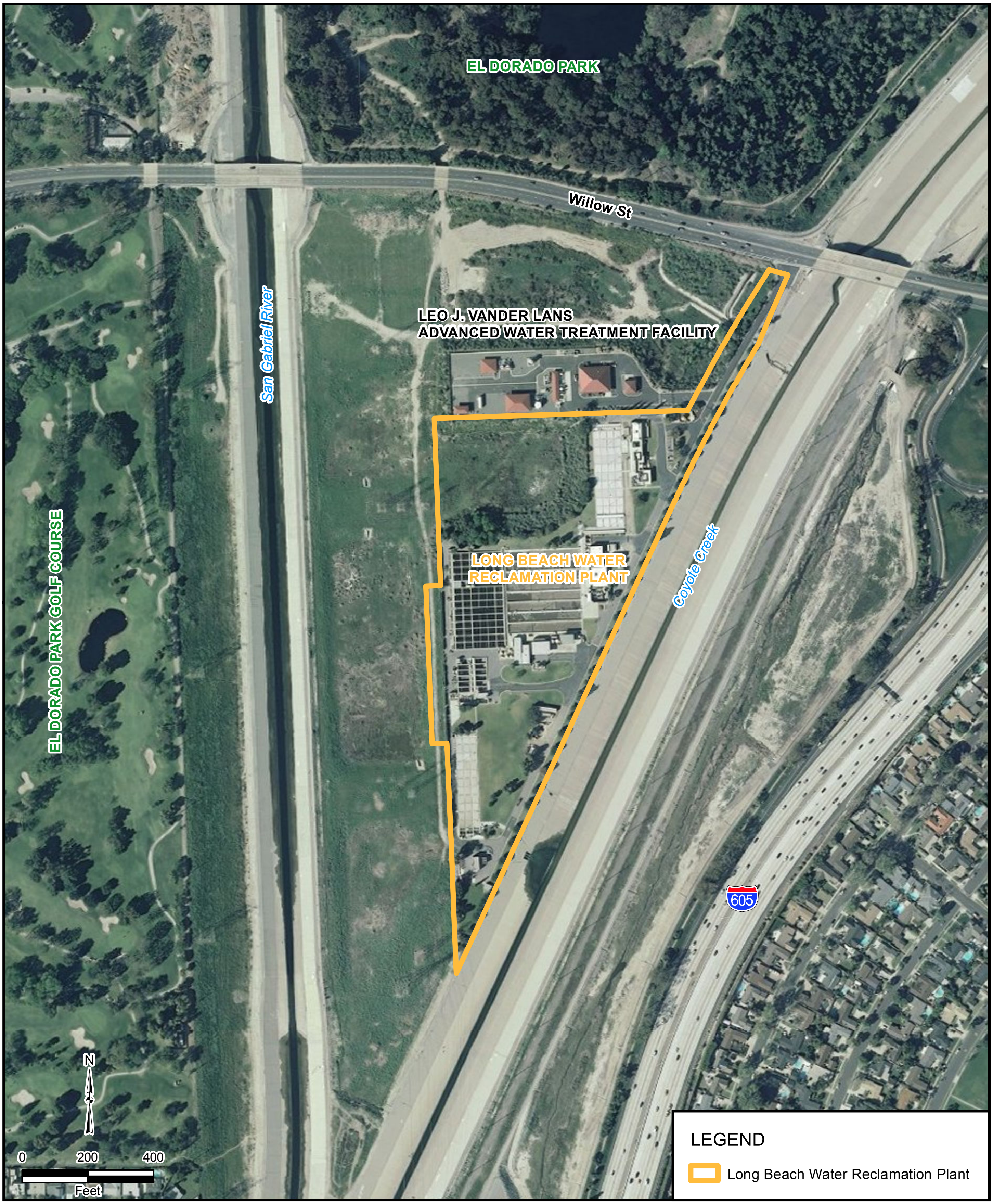


FIGURE 5-7

CLEARWATER Program

Long Beach Water Reclamation Plant

Source: Sanitation Districts of Los Angeles County 2011, ESRI 2011

FIGURE 5-8

CLEARWATER Program

La Cañada Water Reclamation Plant

Source: Sanitation Districts of Los Angeles County 2011, LARIAC 2007

The LACAWRP serves the golf course and 425 surrounding homes. All of the disinfected, secondary effluent flows into irrigation system storage impoundments on the 105-acre golf course.

5.3.7 Water Reclamation Plant Process Capabilities

This section reviews the process capabilities of the WRPs. Specific information is provided for each plant in terms of:

- Process schematics
- Design criteria
- WRP capacities
- Future planning considerations

The LACAWRP is not included within these discussions because as the facility's capacity is very small (0.1 MGD) relative to the other WRPs. In addition, it does not have discharge to surface waters and, therefore, has different treatment requirements.

5.3.7.1 Process Schematics

The Sanitation Districts' WRPs share a generalized process schematic, as depicted on Figure 5-9. Some minor features are specific to particular treatment plants. For example, the POWRP does not have influent pumps or process air compressors that draw foul air from the headspace of the covered primary sedimentation tanks. The two nitrogen removal processes employed at the WRPs are the MLE process (Figure 5-10) at the WNWRP and POWRP, and an SFA process (Figure 5-11) at the SJCWRP, LCWRP, and LBWRP.

5.3.7.2 Water Reclamation Plant Design Criteria

The design criteria for each of the plants are summarized in Table 5-4. These criteria reflect the nitrogen removal process modifications. Also, since the SJCWRP includes two physically separate facilities, design criteria are provided for each.

Table 5-4. Water Reclamation Plant Design Criteria

Design Element	Unit	POWRP	SJCWRP East	SJCWRP West	WNWRP	LCWRP	LBWRP
Plant Flows							
Average	MGD	15	62.5	37.5	15	37.5	25
Peak Sanitary	MGD	20	90	60	20	60	34
Peak Storm	MGD	30	125	75	25	75	60
Equalized Waste Filter Backwash	MGD	0.9	1.6	-	-	-	-
Primary Sedimentation Tanks							
Number	-	3	8	5	2	4	4
Dimensions (LxWxD)	feet	100x20x10	300x20x12	300x20x12	300x20x12	300x20x12	300x20x12
Avg Overflow Rate	gpd/ft^2	2,200	1,300	1,300	1,250	1,560	1,042
Avg Detention Time	hours	0.85	1.65	1.65	1.70	1.38	2.07
Avg SS Removal	□	66	65	62	61	60	67
Avg BOD_5 Removal	□	45	35	36	35	35	37

Table 5-4 (Continued)

Design Element	Unit	POWRP	SJCWRP East	SJCWRP West	WNWRP	LCWRP	LBWRP
Aeration Tanks							
Process Configuration	-	MLE	SFA	SFA	MLE	SFA	SFA
Number	-	3	20	12	3	12	8
Dimensions (LxWxD)	feet	260x30x15	225x30x15	225x30x15	300x30x15	225x30x15	225x30x15
Fraction Anoxic	□	22-33	25	25	22-33	25	25
Fraction Aerobic	□	67-78	75	75	67-78	75	75
Equipment Type	-	Fine Bubble	Fine Bubble	Fine Bubble	Fine Bubble	Fine Bubble	Fine Bubble
Make	-	Sanitaire	Sanitaire	Sanitaire	Sanitaire	Sanitaire	Sanitaire, Grey
HRT Total	hours	2.58	1.86	1.86	2.24	1.86	1.86
Process Air Compressors							
Number	-	3	5	3	3	5	4
Type	-	Centrifugal	Centrifugal	Centrifugal	Centrifugal	Centrifugal	Centrifugal
Capacity (per Unit)	cfm	13,300	3□ 44,000 2□ 20,000	44,000	1□ 5,500 2□ 11,100	3□ 20,000 2□ 60,000	2□ 20,000 2□ 10,000
Final Sedimentation Tanks							
Number, Total	-	6	30	18	6	18	13
Number Assigned to BWR	-	1	-	-	1	-	1
Dimensions (LxWxD)	feet	150x18x10	150x20x10	150x20x10	150x20x10	150x20x10	150x20x10
Avg Overflow Rate	gpd/ft^2	960	694	694	1,000	694	694
Avg Detention Time	hours	1.11	1.94	1.94	1.35	1.94	1.94
Filters							
Number	-	8	20	14	6	12	10
Type	-	Gravity □ Mono	Gravity □ Dual	Gravity □ Mono	Gravity □ Dual	Gravity □ Dual	Gravity □ Dual
Dimensions (LxWxD media)	feet	32x16x6	37x16x7.6	37x16x7.2	32x16x12	37x16x7.5	32x16x7.7
Avg SLR (All in Service)	gpd/ft^2	2.54	3.63	3.11	3.39	3.63	3.40
Filter Effluent Pumps							
Number	-	3	5	3	3	4	4
Type	-	Vertical Mixed Flow	Vertical Mixed Flow	Vertical Mixed Flow	Vertical Mixed Flow	Vertical Mixed Flow	Vertical Wet Pit
Capacity per Pump	gpm	7,000	2□ 22,800 1□ 22,000 1□ 12,200 1□ 13,800	23,000	2□ 6,000 1□ 5,500	2□ 13,800 2□ 22,800	2□ 7,500 2□ 8,650
Filter Backwash Pumps							
Number	-	2	2	2	2	2	2
Type	-	Centrifugal	Vertical Mixed Flow	Vertical Mixed Flow	Vertical Turbine	Vertical Mixed Flow	Vertical Wet Pit
Capacity per Pump	gpm	10,000	6,500	13,500	2,000	6,500	10,000
Filter Waste Backwash Recovery Tank							
Number	-	1	1	1	1	1	2
Volume (Effective)	gallons	200,000	136,925	135,000	224,000	137,000	224,000

Table 5-4 (Continued)

Design Element	Unit	POWRP	SJCWRP East	SJCWRP West	WNWRP	LCWRP	LBWRP
Chlorine Contact Tanks							
Number	-	3	4 (Series)	4	2[a]	2	3
Dimensions (LxWxD)	feet	185x20x16	386x13x16	300x27x15	655x8.2x15	800x22x13	287.5x20x20

[a] The existing chlorine contact tanks have been retrofitted for UV irradiation. The UV equipment is located within a portion of the tanks, which provides for use of the tanks as a backup disinfection process and for recycled water storage.

MGD □ million gallons per day
Avg □ average
gpd □ gallons per day
gpm □ gallons per minute
ft^2 □ square feet
cfm □ cubic feet per minute
MLE □ modified Ludzack-Ettinger
SFA □ step-feed anoxic
SS □ suspended solids
COD □ chemical oxygen demand
BOD_5 □ biochemical (or biological) oxygen demand
HRT □ hydraulic retention time
BWR □ backwash recovery
SLR □ surface loading rate

5.3.7.3 Water Reclamation Plant Capacities

Treatment plant capacity was assessed in terms of:

- Permitted capacities
- Ultimate site capacities

Each of these is briefly reviewed in the following sections.

Permitted Capacities

In addition to the discharge requirements provided in terms of concentrations for various constituents, each of the WRPs has a permitted maximum flow capacity. This capacity cannot be exceeded without a change to the facility□s NPDES permit. Treated flows for individual plants are monitored relative to the permitted capacity. As the flow approaches the permit capacity, the Sanitation Districts are required to submit reports to the regulatory authorities outlining their plans to accommodate additional flows. In the past, the most recent facilities plan documents have served this purpose.

Ultimate Site Capacities

Each WRP has a defined site property boundary. The site boundary limits the available area for future facilities and determines the ultimate capacity of the site. Ultimate site capacities for each WRP were determined by the Sanitation Districts as part of the JOS 2010 Master Facilities Plan (2010 Plan). These capacities were based on conventional activated sludge processes. None of the property boundaries have changed since that time and conventional activated sludge processes are still assumed, so the ultimate site capacities have not changed.

There may be other factors, not strictly related to land area, that could affect the ultimate site capacity of the WRPs. For instance, to achieve the ultimate 80 MGD site capacity at the WNWRP, extensive site improvements for flood protection and permitting would be required. The 125 MGD ultimate capacity of

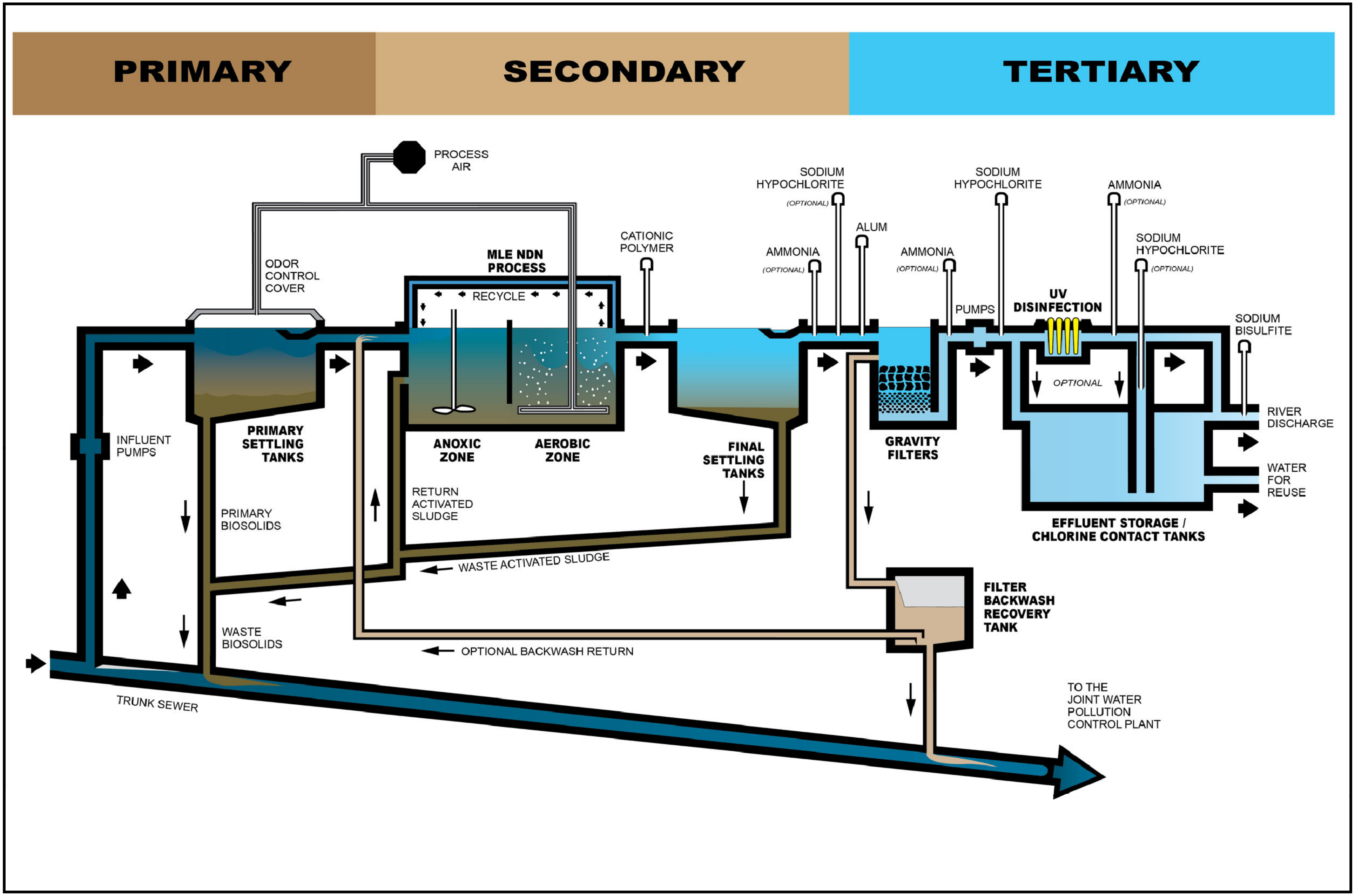


FIGURE 5-9

CLEARWATER Program

Generalized WRP Process Schematic

Source: Sanitation Districts of Los Angeles County 2011

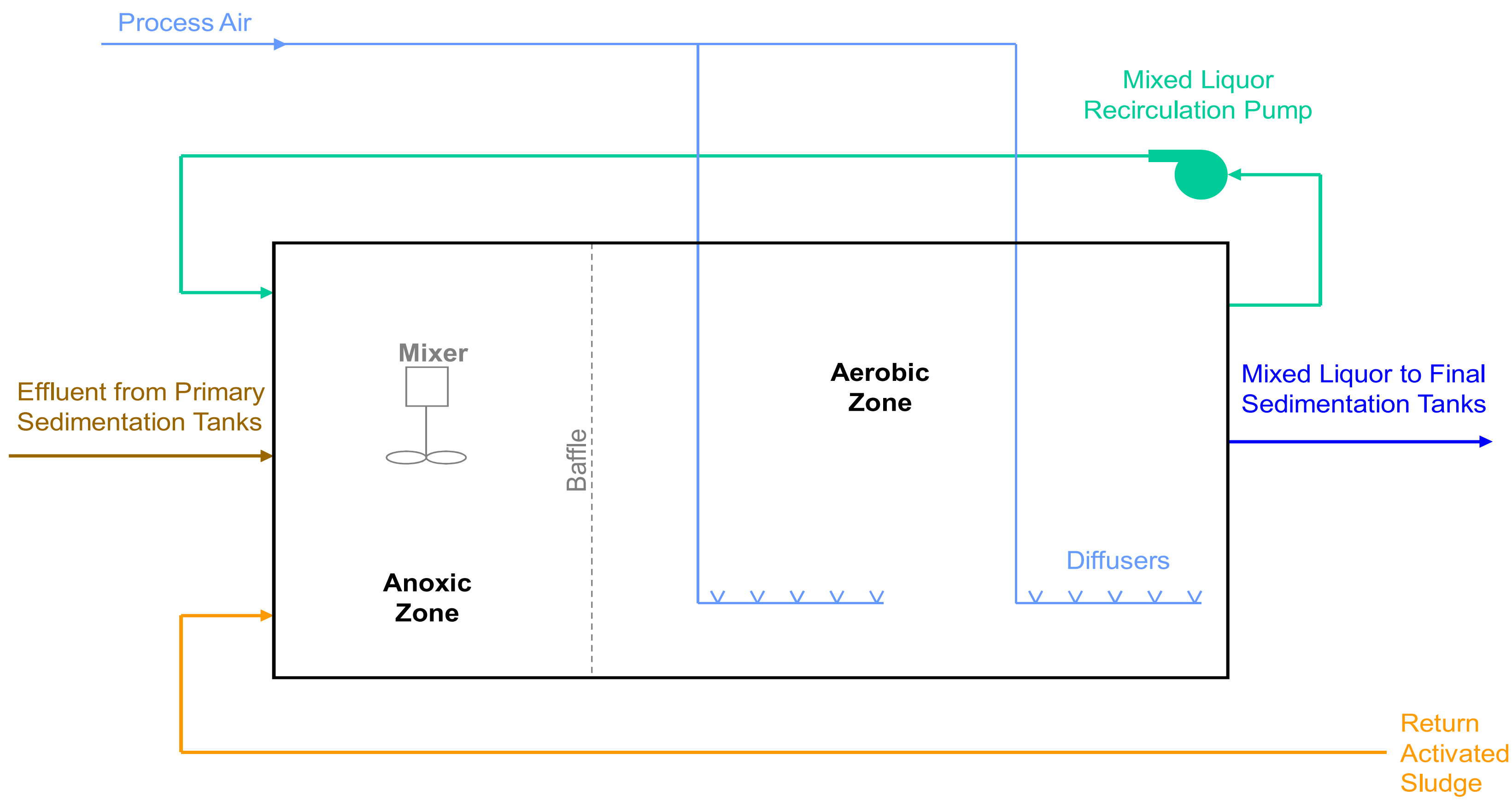


FIGURE 5-10

CLEARWATER Program

MLE Nitrogen Removal Process Schematic (WNWRP, POWRP)

Source: Sanitation Districts of Los Angeles County 2011

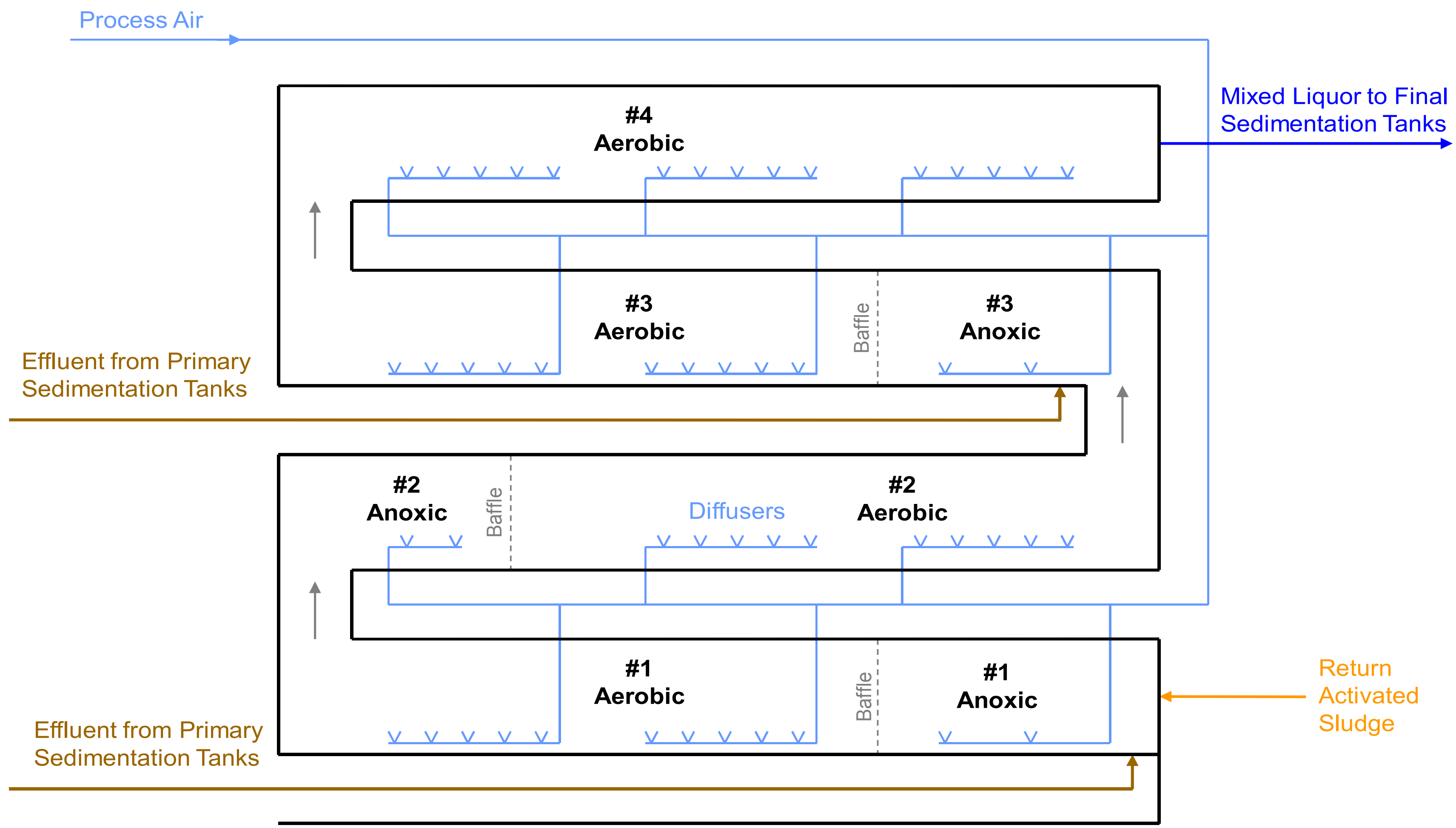


FIGURE 5-11

CLEARWATER Program

SFA Nitrogen Removal Process Schematic (SJCWRP, LCWRP, LBWRP)

Source: Sanitation Districts of Los Angeles County 2011

the LCWRP would require displacement of public recreational facilities that currently occupy the Sanitation Districts' property.

A summary of the permitted and ultimate site capacities for the WRPs is provided in Table 5-5.

Table 5-5. Water Reclamation Plant Permitted and Site Capacities

Water Reclamation Plant	Permitted Capacity (MGD)	Ultimate Site Capacity (MGD)
POWRP	15.0	30
SJCWRP	100.0	125
WNWRP	15.0	80
LCWRP	37.5	125
LBWRP	25.0	50

5.3.7.4 Planning Considerations

A plant's future treatment capabilities can be affected by a variety of factors such as current performance and future discharge requirements. Some of the considerations that affect current performance include nitrogen control improvements, ammonia removal and nitrogen limits, disinfection processes, and total dissolved solids (TDS). Each of these is briefly described in the following subsections.

Nitrogen Control Improvements

In response to more stringent discharge limits, the Sanitation Districts undertook a program to retrofit the existing JOS WRPs so that these facilities would consistently meet ammonia and total inorganic nitrogen objectives. The assessment of alternative approaches and the recommended plan was the subject of the Joint Outfall System Nitrification/Denitrification Facilities Plan, dated December 2001. The recommended plan involved the conversion of the plants' conventional activated sludge processes to multi-staged NDN systems. Five of the WRPs were converted to NDN between 1998 and 2008, and all currently operate in this mode.

Conversions to NDN systems have the potential to affect a WRP's treatment capacity in several ways. First, a portion of the reactor tankage is retrofitted from operating in an aerobic mode to an anoxic mode. This effectively decreases the detention time available for the aerobic reaction. In addition, the NDN process typically runs at a higher mixed liquor concentration. Higher mixed liquors result in higher solids loading to the secondary clarifiers, and can thereby affect the capacity of these systems. Systems operated with higher mixed liquor concentrations may also produce a sludge that does not compact or settle as readily when compared to solids produced in a process operating with a lower mixed liquor concentration. Overall, conversions to NDN systems can make WRPs more sensitive to peak hydraulic flows and nutrient loadings. Therefore, as flows approach the permitted capacities of the WRPs, it may be necessary to implement process optimization measures, such as the addition of flow equalization, to ensure that the Sanitation Districts continue to consistently meet permit conditions in anticipation of increasingly stringent regulatory requirements.

Ammonia Removal and Nitrogen Limits

Ammonia is a key parameter for assessing the WRPs' treatment capabilities. Reasons include:

- For nitrogen removal, nearly complete nitrification is necessary to allow for the anoxic denitrification processes to reduce the nitrates and nitrites to the required levels

- Ammonia levels are regulated in the effluents of each WRP and could be subject to more stringent limits in the future
- Ammonia concentrations within the treatment train impact the current disinfection process performance

As a result, influent ammonia concentrations and loading, coupled with effluent limitations for ammonia, total nitrogen, and disinfection byproducts can affect WRPs' treatment capacities.

Disinfection Processes

The disinfection process is a critical element for ensuring the public's health and safety relative to effluent discharges and beneficial reuse applications. Disinfection can affect a facility's treatment capabilities in terms of measures required to control byproduct formation, as well as achieving prescribed minimum requirements for disinfectant concentration and contact time.

Byproduct Formation. Chlorination using sodium hypochlorite or chlorine is used for disinfection at the WRPs. In the presence of ammonia, chloramines are formed and the resulting disinfection is referred to as chloramination. The Sanitation Districts have used chloramination at the WRPs to limit the production of trihalomethanes (THMs) to effluent concentrations of less than 20 micrograms per liter (μg/L), which is 4 times lower than the California drinking water standard (Tang, et al., CWEA Wastewater Professional, V 42, n 3, July 2006). To achieve this, ammonia has been added to the secondary effluent as necessary to provide 1 to 2 milligrams per liter (mg/L) ammonia at the point of hypochlorite addition, ahead of the tertiary filtration process. Reliable control of this process is best achieved with low secondary effluent ammonia concentrations.

While chloramination is effective in controlling the possible production of THMs, the process is also a potential source of N-nitrosodimethylamine (NDMA) formation. As NDMA is a constituent of concern, it is beneficial to reduce its potential formation by modifications to the disinfection process. As a result, the Sanitation Districts have evaluated the alternative disinfection strategies of UV irradiation and sequential chlorination. The latter is a modification of the chloramination process where low ammonia concentrations are maintained ahead of the initial hypochlorite addition point for free chlorination at the filters as a first step. The second step adds additional hypochlorite at the chlorine contact tank in the presence of a low, but controlled, ammonia concentration, with ammonia added as required, to complete the disinfection process by chloramination.

Low and consistent secondary effluent ammonia concentrations are important for process stability and reliable disinfection performance when employing either method of chlorination.

Application of UV. The Sanitation Districts have implemented UV irradiation at the WNWRP and are conducting full-scale evaluations of sequential chlorination. The UV system design concept developed for the WNWRP is based on the installation of the UV equipment within a portion of the existing chlorine contact tank (CCT). This approach requires no additional space at the site, provides for continued use of the remaining CCT as a backup disinfection process for peak flow or maintenance conditions, and provides for recycled water storage.

Chlorine Residual/Contact Time (CT) Requirements and Capacity. The California Title 22 regulations for reuse are specific regarding chlorination and require a minimum value for contact time multiplied by the residual chlorine concentration (CT value) of 450 mg-min/L with a minimum modal contact time of 90 minutes. Alternatively, and in accordance with the Title 22 regulations, a lower CT value can be used if it is demonstrated that the combined filtration and disinfection process provides equivalent treatment.

Total Dissolved Solids

The presence of TDS in WRP effluent can limit potential reuse applications. Recently, the Sanitation Districts have evaluated the potential impacts of future regulations on TDS and, in particular, chloride concentration. It was concluded that microfiltration followed by reverse osmosis (MF/RO) presents a viable and proven process to reduce TDS and chloride concentrations, but at considerable expense. The MF/RO process would produce a highly purified product water and a brine side stream that would be conveyed to the JWPCP for ocean disposal. The Sanitation Districts are committed to working with the community using the recycled water produced at the WRPs to achieve cost-effective upgrades to treatment, as required, and support expanded reuse of this important resource. This would be accomplished within a framework that maintains consistency with regional salinity management plans.

5.4 Water Reclamation Plant Effluent Management

All treated effluent generated at the upstream WRPs within the JOS is managed in one of two ways:

- Discharge to a surface water
- Beneficial reuse

5.4.1 Surface Water Discharge

All of the WRPs, with the exception of the LACAWRP, include some form of surface water discharge as part of their effluent management systems. Recycled water is discharged to the San Gabriel River or one of its tributaries. In cases where the discharge is to an unlined channel or reach of the river, some level of groundwater recharge can be expected to take place in connection with the surface water discharge. In a number of cases, the surface water discharge serves as a means to convey the effluent to a downstream reuse application, such as groundwater recharge or irrigation.

5.4.1.1 Pomona Water Reclamation Plant

The POWRP discharges into San Jose Creek, which ultimately flows into the San Gabriel River. Portions of San Jose Creek, where this discharge takes place, and the section of the San Gabriel River into which San Jose Creek flows, are unlined. Almost all of the surface discharge from the POWRP results in incidental groundwater recharge.

5.4.1.2 San Jose Creek Water Reclamation Plant

The SJCWRP consists of two completely separate, independently operated plants: SJCWRP East and SJCWRP West. Between the two plants there are four discharge points. They are:

- SJC 001: This outfall can convey effluent from both the SJCWRP East and the SJCWRP West. Flow from this outfall discharges into a lined portion of the San Gabriel River approximately 8 miles south of the plant. Along the 8-mile stretch, the outfall line is tapped at a number of locations to provide recycled water for different reuse applications.
- SJC 001A: Approximately 3 miles downstream of the plant, along the outfall to SJC 001, there is a turnout that allows effluent to be conveyed to an unlined portion of the San Gabriel River. This allows for incidental percolation of recycled water to the groundwater.

- SJC 002: The SJCWRP East discharges effluent at this point to a portion of San Jose Creek that is unlined and then flows into the San Gabriel River. Effluent is allowed to recharge groundwater and is conveyed via various channels and diversion structures to either the Rio Hondo Spreading Grounds or the San Gabriel Coastal Spreading Grounds.
- SJC 003: The SJCWRP West discharges effluent from this point to the unlined San Gabriel River. Effluent is used to recharge groundwater and is conveyed via various channels and diversion structures to either the Rio Hondo Spreading Grounds or the San Gabriel Coastal Spreading Grounds.

5.4.1.3 Whittier Narrows Water Reclamation Plant

The WNWRP has four permitted discharge points, but only three are currently in use. The fourth discharge point is a groundwater test basin that was last used for research in 1981. The four discharge points are:

- WN 001: Discharges to the San Gabriel River and flows to San Gabriel Coastal Spreading Grounds
- WN 002: Discharges to the Zone 1 Ditch, which flows to the Rio Hondo and the Rio Hondo Spreading Grounds
- WN 003: Test Basin (not in use)
- WN 004: Discharges to the Rio Hondo and flows to the Rio Hondo Spreading Grounds

5.4.1.4 Los Coyotes Water Reclamation Plant

The LCWRP discharges tertiary-treated effluent into the concrete-lined portion San Gabriel River, which flows to the Pacific Ocean.

5.4.1.5 Long Beach Water Reclamation Plant

The LBWRP discharges tertiary-treated effluent into the concrete-lined portion of Coyote Creek, about 2,200 feet upstream from the confluence with the San Gabriel River. The San Gabriel River is also lined from the Coyote Creek confluence to the Pacific Ocean.

5.4.2 Reclamation and Reuse

Reuse is an integral component of the WRPs effluent management systems. In 2010, the Sanitation Districts provided recycled water to 29 water wholesalers and purveyors for distribution and use. These wholesalers and purveyors make the recycled water available to over 600 individual sites in 30 cities for multiple applications that include irrigation, industrial use, agriculture, and groundwater recharge. Over 50 percent of the WRP effluent is beneficially reused. A discussion of beneficial reuse is presented in Chapter 4.

5.5 Joint Water Pollution Control Plant

The JWPCP has been in service longer than any other of the Sanitation Districts wastewater treatment plants and is its largest facility. It is also one of the largest such plants in the world. The JWPCP is located downstream of the WRPs and receives all JOS flows not treated by the WRPs. In addition to these flows, all solids generated by wastewater treatment within the JOS are processed at the JWPCP.

5.5.1 Plant Description

The JWPCP is located at 24501 South Figueroa Street in the city of Carson. The JWPCP occupies approximately 420 acres, of which approximately 200 acres are used as a buffer area between the operational process areas and the surrounding residential neighbors. The buffer areas, some of which extend into the city of Los Angeles, include the Wilmington Boys and Girls Club, the Wilmington Athletic Complex, the Bixby Marshland, the Carson Depot Commercial Center, and landscaping and nursery areas. Most of the JWPCP's facilities are in an area bound by I-110 to the west, Main Street to the east, Sepulveda Boulevard to the north, and Lomita Boulevard to the south. The plant provides a secondary level of treatment and disinfection. All of the JWPCP effluent is discharged to the Pacific Ocean. An aerial view of the JWPCP is shown on Figure 5-12.

The JWPCP has a permitted capacity of 400 MGD. Influent flows to the JWPCP are initially screened to remove large debris and protect downstream equipment. After screening, the flow passes through grit chambers for the removal of heavy, inorganic materials to avoid accumulation in process tankage. Flows are then directed to primary sedimentation tanks where readily settleable solids are removed and floating materials are skimmed from the surface. The activated sludge process, which receives the primary treatment effluent, is used for secondary treatment to remove a large portion of the organic materials and much of the remaining solids. The JWPCP uses high purity oxygen in the aeration basins (biological reactors). Following these reactors, final sedimentation tanks separate the activated sludge solids from the mixed liquor. These solids are either recycled back to the activated sludge process or diverted for further treatment and processing. The effluent from the secondary treatment process is disinfected using sodium hypochlorite prior to ocean discharge.

The systems for effluent management, solids processing, and solids management at the JWPCP are discussed separately in Sections 5.6, 5.7, and 5.8, respectively.

5.5.2 Process Capabilities

This section reviews the JWPCP's process capabilities and provides:

- Process schematics
- Design criteria
- Site capacity
- Planning considerations

The plant's liquid process flow was described in Section 5.5.1. A process flow schematic for the entire plant is shown on Figure 5-13. Design criteria for the liquid process stream are provided in Table 5-6. Representative influent characteristics are also provided in this table.

FIGURE 5-12

CLEARWATER Program

Joint Water Pollution Control Plant

Source: Sanitation Districts of Los Angeles County 2011, LARIAC 2007

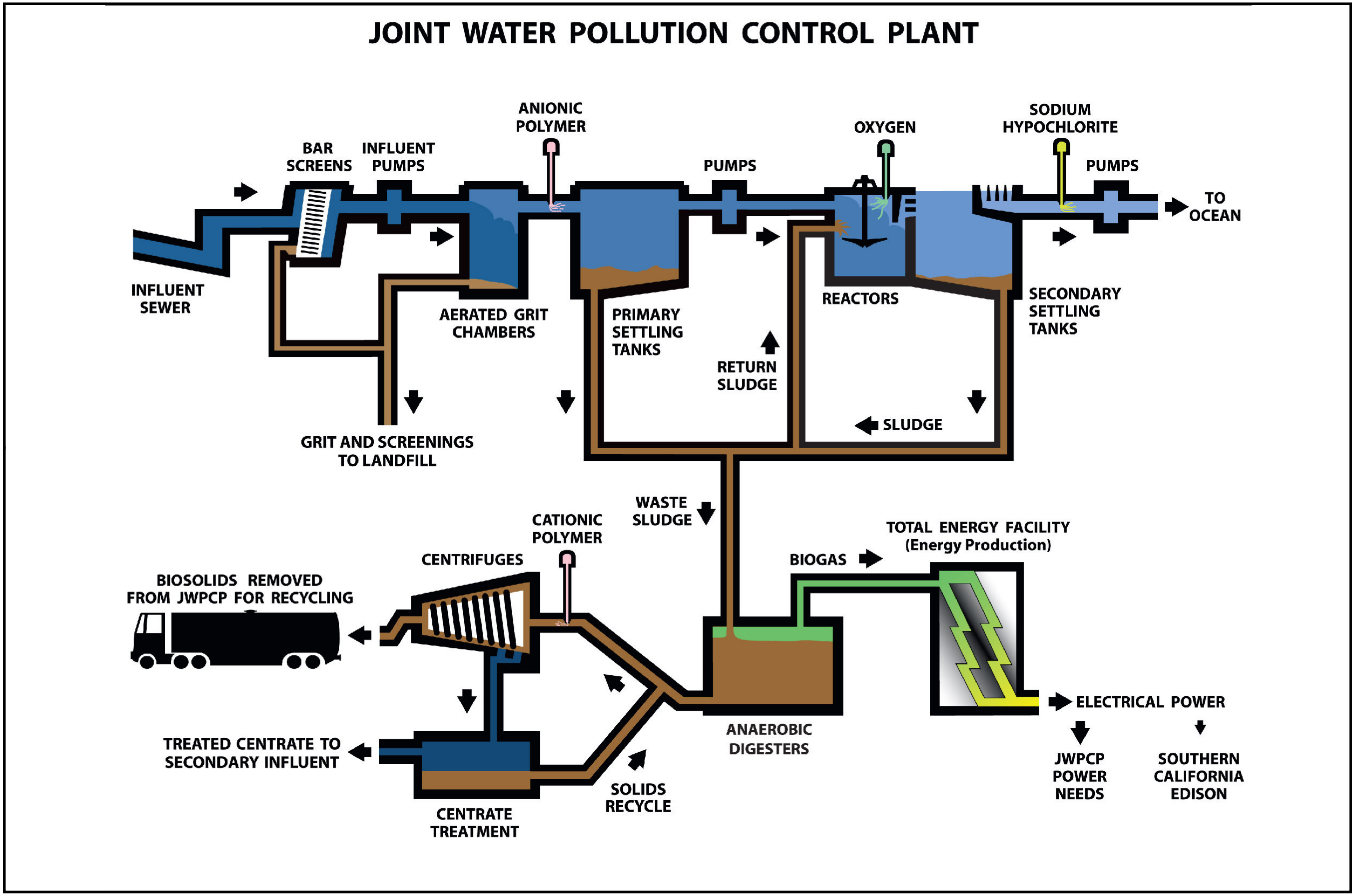


FIGURE 5-13

CLEARWATER Program

JWPCP Process Flow Schmatic

Source: Sanitation Districts of Los Angeles County 2011

Table 5-6. Joint Water Pollution Control Plant Process Design Criteria Summary

Area	Criteria	Unit	Value
Influent Characteristics			
	Plant Flows		
	Design Average Daily Flow	MGD	400
	Design Peak Sanitary	MGD	540
	Design Peak Storm	MGD	625
	Influent Characteristics		
	Design		
	Suspended Solids	mg/L	530
	Suspended Solids	ppd	1,769,140
	Biochemical Oxygen Demand	mg/L	425
	Biochemical Oxygen Demand	ppd	1,418,650
	Actual (Annual Average)		
	Suspended Solids	mg/L	510
	Suspended Solids	ppd	1,383,184
	Biochemical Oxygen Demand	mg/L	410
	Biochemical Oxygen Demand	ppd	1,111,971
Influent Hydraulics			
	Number of Pumps		
	Capacity □ JO A (5 Pumps)	MGD	180
	Capacity □ JO D (4 Pumps)	MGD	200
	Total Pumped Capacity	MGD	380
	Total Gravity Sewer Capacity □ JO B	MGD	265
Headworks			
	Barscreens		
	Type	-	Vertical
	Bar Spacing	inch	1
	Number	-	9
	Grit Chamber		
	Number	-	6
	Type	-	Rectangular
	Average Detention Time	minutes	5
Primary Treatment			
	Primary Sedimentation Tanks (PST)		
	Number of Tanks	-	52
	Dimensions, Range (W x L x D)	feet	18-21 x 240-300 x 8.5-12
	Average Detention Time	hours	1.4
	Average Overflow Rate	gpd/ft^2	1,400
	Estimated Solids Removal	□	75
Secondary Treatment			
	Secondary Influent Pump Station (SIPS)		
	Number of Pump	-	5
	Capacity of Pumps □ Each	MGD	170
	Total Pumping Capacity	MGD	850
	Total Pumping Capacity (w/Standby)	MGD	680

Table 5-6 (Continued)

Area	Criteria	Unit	Value
	Aeration Reactors		
	Number of Modules	-	4
	Capacity per Module	MGD	100
	Total Capacity	MGD	400
	Aeration Type	-	Surface Aerators
	Number of Aerator per Module	-	18
	Average Detention Time	hours	2.5
	Average Detention Time (w/Recycle)	hours	1.9
	Total Oxygen Required	lbs O_2/day	720,000
	Oxygen Generation System		
	Number of Cryogenic Plants	-	3
	Oxygen Generation Capacity, Peak	tpd	625
	Final Sedimentation Tanks (FST)		
	FSTs per Module	-	52
	Total FSTs	-	208
	Dimensions (W x L x D)	feet	21 x 167 x 14
	Average Detention Time (w/Recycle)	hours	3.5
	Average Overflow Rate	gpd/ft^2	550
	Return Activated Sludge (RAS) Pumps		
	Number of Pumps	-	24
	Pump Capacity – Each	MGD	18.75
	Total RAS Capacity (Excluding Standbys)	MGD	300
	Secondary Effluent Pump Station		
	Number of Pumps	-	5
	Pump Capacity – Each	MGD	170
	Total Capacity	MGD	850
	Total Pumping Capacity(w/Standby)	MGD	680
Disinfection System			
	Chlorination System		
	Type	-	Sodium Hypochlorite
	Average Condition (Flow/Dosage)		
	Dosage	mg/L	10
	Usage	ppd	33,380
	Maximum Conditions		
	Dosage	mg/L	17
	Usage	ppd	99,306

MGD = million gallons per day
mg/L = milligrams per liter
lbs = pounds
O_2 = oxygen
ppd = pounds per day
gpd = gallons per day
ft^2 = square feet
tpd = tons per day

Investigations have been undertaken to assess the ultimate site capacity of the JWPCP. Several assumptions were factored into these evaluations, including:

- Future processes and associated design criteria are similar to existing systems
- Consideration has not been given to existing technologies for compact treatment systems (e.g., double-deck clarifiers, ballasted flocculation reactors) to enhance site capacity
- New, more compact treatment technologies that may be developed in the future are not considered
- Areas identified for non-process facilities generally remain as such
- Areas identified for process facilities are not reduced
- There are no new, space-significant processes needed at the site as might be required by more stringent regulations or effluent disposal requirements

Based on these assumptions, the ultimate site capacity of the JWPCP is estimated at 700 MGD.

Considerations that could affect the JWPCP's operations, as well as any future system expansion or upgrades, are:

- Odor control
- Effluent reclamation and reuse

The Sanitation Districts are committed to making every effort to eliminate the migration of fugitive odors from the treatment plant to the surrounding community. To that end, the Sanitation Districts have invested in substantial facilities to reduce air emissions and resulting odors from the JWPCP. It is anticipated that additional control measures would be continuously evaluated and those providing effective emissions reduction would be implemented.

Currently none of the effluent from the JWPCP is beneficially reused, as the tributary flow to this plant is too high in TDS. In the future, with potential reductions in existing water supplies, coupled with increasing population, demand for recycled water in the vicinity of the JWPCP may be identified. There are a number of options for producing suitable recycled water. One is to treat the secondary effluent to a higher degree. A second approach is to hydraulically isolate the influent wastewater flow from specific trunk sewers with the lowest industrial contribution and lowest salinity content and treat that flow in a separate treatment train. These approaches would be evaluated in the future if recycled water demand is identified.

5.6 JWPCP Effluent Management

All disinfected, secondary treated effluent generated at the JWPCP is discharged to the Pacific Ocean through a system of tunnels and ocean outfalls. The existing ocean discharge system is shown on Figure 5-14. Two parallel tunnels extend from the JWPCP approximately 6 miles to a manifold structure located on the shoreline at Royal Palms Beach on the Palos Verdes Peninsula near White Point. There are four ocean outfalls that can be fed from the manifold by adjusting valve settings. Under normal operating conditions, the two largest outfalls are used; the other two smaller outfalls provide emergency backup capacity. The ocean outfalls extend up to one and a half miles offshore at a depth of approximately 200 feet below sea level.

FIGURE 5-14

CLEARWATER Program

Joint Water Pollution Control Plant Existing Ocean Discharge System

Source: Sanitation Districts of Los Angeles County 2011, Thomas Bros 2011, ESRI 2011

The tunnel and ocean outfall system were constructed as a series of projects between 1934 and 1967. Neither of the tunnels has been inspected in nearly 50 years. Inspection of the tunnels is not possible due to their overall length, limited access, lack of hydraulic separation between the two, and continuous effluent flows. Repair and rehabilitation of these tunnels, should it be warranted, is not currently possible for the same reasons.

The ocean outfalls are more accessible for inspection, repair, and rehabilitation because they are located on the seafloor. Visual inspections are routinely performed using divers and remote operated vehicles. It has been determined that the smallest and oldest of the four outfalls has nearly reached the end of its useful life, so it cannot be relied upon to manage future flows. As part of this study, a total of 27 cast iron and 9 concrete core samples were taken from various locations on each of the three remaining outfalls. The samples underwent laboratory analysis and it was determined that these three outfalls are in good condition and, with minor re-ballasting and possible joint repairs, have a remaining useful life that will extend well beyond the 2050 planning horizon.

The primary components of the JWPCP ocean discharge system are described in Table 5-7.

Table 5-7. JWPCP Ocean Discharge System

Segment	Year Placed in Operation	Operational Status	Total Length (feet)	Material	Diffuser Length (feet)	Discharge Depth (feet)
8-foot Tunnel	1937	Operational	32,340	Reinforced Concrete	NA	NA
12-foot Tunnel	1958	Operational	32,340	Reinforced Concrete	NA	NA
60-inch Outfall	1937	Standby, only used during peak storm flows	4,900	RCP w/ CI Joints	400	110
72-inch Outfall	1947	Standby, only used during peak storm flows	7,150	RCP w/ CI Joints	666	160
90-inch Outfall	1957	Operational	10,394	RCP w/ CI Joints	2,416	196-210
120-inch Outfall	1966	Operational	11,880	RCP	4,440	167-190

RCP = reinforced concrete pipe
CI = cast iron
NA = not applicable
Source: Parsons 2011

5.6.1 Initial Tunnel and Ocean Outfalls

The Sanitation Districts' first tunnel and ocean outfall were placed in service in 1937. The 6-mile tunnel was horseshoe-shaped with a nominal diameter of 8 feet. It was lined with reinforced concrete, and to avoid the potential for sulfide corrosion, it was designed to flow full under all conditions. The accompanying outfall system was double-barreled past the surf zone. It consisted of two 60-inch diameter reinforced concrete pipelines with a wall thickness of 7 inches. These pipes were placed in a trench that was blasted through the subsurface rock formation. Both pipes were then embedded in concrete. Past the surf zone, one pipe was bulk-headed and reserved for a future expansion. The other line was extended about one mile offshore, becoming the 60-inch outfall. The hydraulic capacity of the original ocean discharge system was approximately 52 MGD. All initial operations used gravity flow. In 1942, the first pumps were installed to increase the system's capacity.

As influent flows continued to increase, the need to expand the ocean discharge system was identified. Although the second barrel was originally planned to be extended with a 60-inch diameter pipeline, the determination was made to upsize the diameter to 72 inches. The 72-inch outfall was placed in service in 1947, discharging at a depth of approximately 100 feet. In 1953, this outfall was extended about one and a quarter miles from shore, reaching a depth of approximately 160 feet.

5.6.2 Subsequent Tunnel and Ocean Outfalls

As tributary flows to the JWPCP continued to increase, it became apparent that expansion of the ocean discharge system was required for JWPCP effluent management. The approach consisted of a second 6-mile tunnel and a new outfall. This second tunnel was constructed and commissioned in four separate segments. Work commenced on the 12-foot diameter tunnel in 1948. The four segments were phased into operation in April 1949, December 1950, March 1954, and April 1958.

Concurrently with the construction of the 12-foot tunnel, the Sanitation Districts built a third ocean outfall off White Point. It was a 90-inch diameter reinforced concrete pipeline that extended approximately one and a half miles offshore to a depth of 210 feet. The 90-inch outfall was placed in service in 1957.

The fourth and final ocean outfall was constructed and placed in service in 1966. This was a 120-inch diameter reinforced concrete pipeline extending approximately one and a half miles offshore to a depth of 190 feet.

With the 90-inch and 120-inch outfalls in service, the gravity flow capacity of the ocean discharge system at zero tide is approximately 415 MGD. The gravity flow capacity when all four outfalls are in service is 475 MGD at zero tide. The maximum hydraulic capacity of the tunnel and ocean outfall system with pumping is approximately 675 MGD.

5.6.3 Emergency Diversion

The JWPCP has an emergency discharge location upstream of the tunnels. The Wilmington Drain is owned and operated by the Los Angeles County Department of Public Works (LACDPW). It parallels the JWPCP boundary to the west. A diversion structure at the JWPCP allows for emergency discharge of secondary effluent to Wilmington Drain just north of Lomita Boulevard. However, during major wet weather events, there is very limited capacity in the drain for any additional flows. If sufficient capacity were not available in the Wilmington Drain, the sewers tributary to the JWPCP could overflow and untreated wastewater could enter various water courses, such as the Dominguez Channel and the Los Angeles River.

5.7 Solids Processing

5.7.1 Background

One byproduct of wastewater treatment and purification is residual solids. These solids, typically referred to as *sludge*, are further processed to convert organic matter into an energy-rich biogas and to produce a stabilized material, called *biosolids*, that is safe for various beneficial uses or disposal options.

This section discusses the primary systems employed for solids processing including:

- Sludge thickening
- Sludge stabilization
- Sludge dewatering
- Digester gas handling and power generation

Solids generation sources and solids processing systems are described in the sections that follow. A 5-year timeframe (2005 through 2009) was evaluated to obtain a representative perspective on solids processing and solids generation rates, which tend to vary with changes in population and economic conditions (i.e., industrial flow rates are generally lower during poor economic times). This 5-year data set provided recent information over a sufficient duration such that the results reflect the full spectrum of influent and operational scenarios impacting solids production.

5.7.2 Solids Sources

Within the JOS, the residual solids from each of the WRPs are returned to the JO trunk sewers and conveyed to the JWPCP along with tributary raw wastewater. Residuals from the WRPs consist of primary solids, skimmings, scum, and waste activated sludge (WAS). The wastewater treatment processes at the JWPCP remove nearly all of the influent- and process-generated solids prior to effluent disposal. The following are the major sources of solids.

- Primary Solids: Residuals removed from the primary sedimentation tanks consisting of solids settled out of the raw primary sludge (RPS) during primary treatment.
- Secondary Solids: WAS generated within the activated sludge process and separated from the secondary effluent in the final sedimentation tanks.

Skimmings and scum removed at different stages of wastewater processing are also included within the solids processing systems. The quantities of these materials, relative to RPS and WAS, are small and, therefore, are not evaluated in detail within this document. Other small quantities of solids, such as grit or screenings removed at the headworks, are managed separately from the primary and secondary solids.

5.7.3 Sludge Thickening

The thickening strategy for RPS and WAS differ. RPS is not thickened, while WAS is thickened using dissolved air flotation units. Polymer is added as a flotation aid to the units to enhance performance by increasing the solids concentration and percent capture.

There are a total of six dissolved air flotation units with a total surface area of 5,394 square feet (sf). The original four units make up 4,484 sf of area, with the two new units accounting for the remaining 910 sf. The design overflow rate is 1.84 gallons per minute (gpm)/sf; the design solids loading rate is 19.4 pounds per day (ppd)/sf. These units currently process close to 500,000 ppd of WAS. The WAS flow rate prior to thickening is approximately 6.3 MGD. The solids concentration of the WAS is increased from 1.0 percent to 5.5 percent by the dissolved air flotation thickeners. The product of this process is termed thickened waste activated sludge (TWAS) and represents a flow of approximately 1.1 MGD.

This thickening step is important in terms of reducing the volume of WAS to be handled in subsequent processes. The thickening systems have been recently upgraded and expanded.

5.7.4 Sludge Stabilization

Anaerobic digestion is used to stabilize RPS, TWAS, skimmings, and scum, collectively referred to as combined raw sludge (CRS), generated within the liquid treatment train. The digesters are operated as single-stage, high-rate units that use steam injection for heating and gas recirculation for continuous mixing. There are 24 conventional circular digesters, each with a volume of 500,000 cubic feet. This results in a combined volume of nearly 90 million gallons (MG). All of the JWPCP's original rectangular digesters have been removed from service and permanently decommissioned.

The average detention time is on the order of 15 to 18 days with two units out of service. Typically, at any time, there is one digester out of service for cleaning and another out of service on standby. The standby unit can be placed into service on short notice should there be a need to take any active digester off-line. Digesters are heated and mixed to optimize performance. The operating temperature is 96°Fahrenheit, providing a mesophilic environment. Biosolids produced meet Class B requirements for pathogen and vector attraction reduction.

The RPS flow to the digesters is approximately 3.4 MGD (474 dry tons per day [dtpd] at 3.32 percent solids); the TWAS flow to the digester is approximately 1.1 MGD (261 dtpd at 5.52 percent solids.) The CRS to the digesters has a volatile solids concentration of approximately 75 percent. Based on past performance, the volatile solids destruction in the digesters is about 53 percent (with the volatile solids being converted into biogas). The end product of digestion is stabilized sludge suspended in a liquid slurry.

5.7.5 Sludge Dewatering

Sludge dewatering reduces the volume of the material and changes its form from a liquid to a cake. This volume-reduction/form-change allows for the subsequent transport of biosolids by truck.

All digested sludge is mechanically screened prior to dewatering. Materials screened out are dewatered using a ram press. These screened materials, termed *unclassified solids*, are typically managed via landfilling. The majority of the digested sludge is dewatered using centrifuges with a polymer addition that improves solids recovery and increases the cake dryness. Of the 35 centrifuges now in use at the JWPCP, 27 are older units and eight are newer high-speed units that have a higher capacity and produce higher cake solids. (Note that four more new high-speed centrifuges are scheduled for installation in 2012.) The stabilized sludge from the digesters is approximately 2.2 percent solids. The solids cake produced from the centrifuges is approximately 26 to 28 percent solids. This represents a materials volume reduction of about 90 percent. The older low-speed, low-capacity centrifuges are being phased out of operation and replaced with newer technology systems, thereby increasing cake solids and reducing the overall volume of wet cake to be managed.

Dilution water is added to the centrate (the water removed during the dewatering process) to reduce the potential for scaling and deposition formation. Centrate flows are treated in dissolved air flotation units dedicated to this function. The underflow (liquid) can be returned to either the head of the plant, or upstream of the secondary treatment process. The float or skimmings (solids) are conveyed to the digested sludge wet well upstream of the dewatering centrifuges.

The cake produced by the centrifuges is transported by belt conveyors, stored in silos, and then loaded into trucks for offsite management. There are a total of 18 biosolids cake silos with a storage capacity of 500 wet tons per silo, resulting in a total storage capacity of 9,000 wet tons. At the recent (2005–2009) biosolids generation rate of approximately 1,470 wet tons per day (wtpd), about 6 days of storage is provided. There are three separate truck loading stations serving the JWPCP with loading rates of approximately 175 tons per hour.

Recently, facilities were placed into operation to control odors from the biosolids storage silo building, biosolids conveyors, and Truck Loading Station No. 3. The new systems include facilities for odor containment, foul air transport, and air treatment, using two independent biofilter treatment systems.

5.7.6 Gas Handling and Power Generation

A significant portion of the organic solids in the CRS is converted to gas through the anaerobic digestion process. This digester gas is approximately 63 percent methane and 37 percent carbon dioxide, capable of providing the Sanitation Districts with a significant fuel source. Approximately 6,900 cubic feet per minute (cfm) of gas is generated by the digesters. The digester gas is treated to reduce moisture and sulfur content prior to use. The purified gas is used to generate electricity by a combined cycle power plant.

First stage power generation uses gas turbines driving generators. This produces approximately 18 to 20 megawatts (MW) of electricity. Heat is recovered from the combustion turbines and used to generate steam. This steam is directed into a second stage steam turbine that drives a generator capable of producing 4 to 6 MW of electricity. The low grade residual steam and hot water from the outlet of this turbine, as well as low quality steam from boilers, are used for digester heating. The gas turbine generators were replaced and upsized in 2001. The steam turbine generator is being replaced with completion expected in late 2011. There are also flare stations at the JWPCP to assist in the management of the digester gas.

5.8 Biosolids Management

5.8.1 Biosolids Management History

After startup of the JWPCP in 1928, solids generated by the treatment processes were dewatered in open-air drying beds located on site. Recycling of these solids began in the same year when H.C. Kellogg entered into a contract with the Sanitation Districts to remove the dry material from the beds for use in a biosolids-based soil amendment product. In the 1930s, the Sanitation Districts constructed their first anaerobic digesters for solids stabilization, reducing the amount of solids needing to be managed and improving solids characteristics for both air-drying and reuse.

The first solids dewatering centrifuges were installed at the JWPCP in 1961. In 1972, the Sanitation Districts began windrow composting of biosolids at the JWPCP on a trial basis. Composting was found to accelerate the air-drying process, as well as producing a high-quality, stabilized soil amendment suitable for a wide range of agricultural and landscaping uses. The JWPCP composting operation continued until 1991, when it was moved offsite to a privately operated composting facility. Compost products were bagged for consumer use, and a portion was marketed in bulk quantities to plant growers. In addition to enabling windrow composting at the JWPCP, the installation of centrifuges also allowed for efficient transport of biosolids via truck. In the 1970s, the Sanitation Districts began co-disposal of biosolids with refuse at the Puente Hills Landfill, which has continued to be a safe, reliable, and cost effective management option.

The 1972 Clean Water Act required secondary treatment for all effluent and included a prohibition of wastewater sludge discharge into navigable waters. At this time, the JWPCP was providing primary treatment, and the requirement for secondary treatment would result in greater quantities of wastewater sludge to be treated and managed. In 1974, the Sanitation Districts, the city of Los Angeles, and the Orange County Sanitation District, in association with EPA Region IX and the SWRCB, jointly developed a Regional Wastewater Solids Management Program for the Los Angeles/Orange County Metropolitan Area (also known as the LA/OMA Project).

The objective of the effort was to develop a long-term plan for the reuse and disposal of wastewater treatment residual solids. One key finding of this program for the Sanitation Districts was that future biosolids management strategies must include sufficient flexibility, through the incorporation of a diverse range of management options, to accommodate uncertainties inherent in biosolids management. This principle continues to serve as a guide for the Sanitation Districts' current and future plans. In addition, the Sanitation Districts co-dispose biosolids at the Puente Hills Landfill.

5.8.2 Biosolids Strategy

The Sanitation Districts' preferred approach to biosolids management is to implement a diverse and cost-effective program that includes beneficial use. Diversity is achieved in terms of multiple contractors, locations of use and application, additional offsite processing, a variety of products created, and different types of biosolids applications. To maintain this diversity, the Sanitation Districts' current philosophy of biosolids management is to have no more than 50 percent of their biosolids sent to any one vendor, or to any one location, including Sanitation Districts-operated facilities. The Sanitation Districts will continue to focus on the beneficial use of biosolids in the agricultural sector, develop uses in renewable energy as technology becomes readily available, and continue to utilize landfill co-disposal as a reliable, cost-effective solution for biosolids management.

5.8.3 Recent Management Practices

The Sanitation Districts' solids processing and biosolids management programs meet all regulatory requirements including those specified in 40 Code of Federal Regulations (CFR) Part 503. Biosolids generated at the JWPCP meet EPA Class B pathogen reduction requirements by Alternative 2, Use of Processes to Significantly Reduce Pathogens, through time and temperature requirements for anaerobic digestion. Vector Attraction Reduction requirements are met by Option 1, Reducing the Mass of Volatile Solids During Anaerobic Digestion. JWPCP biosolids are sampled monthly and analyzed for total metals concentrations. Since the 1993 promulgation of the 40 CFR Part 503 regulations governing biosolids management, the JWPCP biosolids have consistently complied with the most stringent requirements related to metals concentrations.

The majority of biosolids are beneficially reused in connection with agriculture as follows:

- Composting and production of soil amendment products marketed for bulk and bagged sale
- Composting and land application
- Lime stabilization and land application
- Land application of dewatered Class B biosolids

Biosolids produced at the JWPCP are further processed and beneficially reused at several regional locations as shown on Figure 5-15. Composting facilities utilized include the Inland Empire Regional Composting Facility in Rancho Cucamonga, California; South Kern Composting Facility in Kern County; and San Joaquin Composting in Kern County. Various composting technologies are employed at these facilities, such as windrow composting and aerated static pile composting. The Inland Empire Regional Composting Facility is an entirely enclosed composting facility.

JWPCP biosolids are also directly land applied to farmland for use as a soil amendment at several locations. Biosolids are applied at Honey Bucket Farms in Kern County, where the material is lime stabilized prior to land application. Direct land application of Class B biosolids operations are managed by EnerTech Environmental, LLC, on agricultural land in Arizona.

The Sanitation Districts have also entered into a long-term management agreement with EnerTech Environmental, LLC, to process biosolids into a renewable fuel product called eFuel. The facility, located in Rialto, California, utilizes EnerTech's patented SlurryCarb process, which is designed to efficiently create a renewable alternative to coal for power plant and cement kiln operations. This facility began operations in late 2008.

Until the recent economic downturn reduced the demand for cement, a small portion of the biosolids was used by the Mitsubishi Cement Corp. The biosolids were injected into a cement kiln to reduce emissions such as nitrous oxide. As economic conditions warrant, this management option may again be implemented in the future.

A summary of JOS biosolids management practices for the year 2010 is provided in Table 5-8.

Table 5-8. Biosolids Management Practices Summary

Contractor	Management Practice	Site	Percent of Total
McCarthy Family Farms, Inc.	Bulk Land Application Class A Compost Product	San Joaquin Composting Kern County, CA	16.8
Synagro-WWT, Inc.	Bulk Land Application Class A Compost Product	South Kern Industrial Center Composting Facility Kern County, CA	11.0
Inland Empire Regional Composting Authority	Bulk Land Application Class A Compost Product	Inland Empire Regional Composting Facility Rancho Cucamonga, CA	15.9
Honey Bucket Farms	Bulk Land Application Class A Lime Stabilized Material	Honey Bucket Farms Kern County, CA	11.0
EnerTech Environmental, LLC	Biosolids Conversion to Pelletized Fuel	Rialto SlurryCarb Facility San Bernardino County, CA	5.6
	Direct Land Application Class B Biosolids	Desert Ridge Farms Yuma County, AZ	9.2
Sanitation Districts of Los Angeles County	Landfill Co-disposal	Puente Hills Landfill Los Angeles County, CA	30.5

5.8.4 Landfill Co-Disposal

Co-disposal of biosolids with municipal solid waste at landfills continues to be a viable option for biosolids management. Landfills utilized are appropriately permitted for biosolids co-disposal. The focus of biosolids management will continue to be on beneficial reuse, while maintaining the ability to use landfilling. In 2010, approximately 31 percent of the total biosolids produced at the JWPCP were co-

FIGURE 5-15

CLEARWATER Program

Biosolids Management Facilities

Source: Sanitation Districts of Los Angeles County 2011, Thomas Bros 2011, ESRI 2011

disposed with municipal solid waste at the Puente Hills Landfill, where landfill gas (LFG) containing methane is extracted from decomposing refuse and utilized for electrical power generation. Although co-disposal is not considered a direct beneficial reuse, the inclusion of biosolids within a landfill can lead to increased methane production, and thereby lead to enhanced energy recovery.

5.8.5 Future Solids Management

During the planning period, the JOS biosolids generation rate is projected to increase nearly 30 percent, from 1,470 wtpd (2005–2009) to 1,850 wtpd (2050). This increase is attributable to several factors, including, but not limited to, the population increase within the Sanitation Districts' service area; increased JOS flows; changes in wastewater influent quality; and upgrades, optimization, and new technology at the JWPCP.

The Puente Hills Landfill, where nearly a third of the biosolids generated in the JOS are currently being managed, is scheduled to close in 2013, so the Sanitation Districts will need to rely more heavily on other management practices.

In addition to the recent biosolids management practices previously described, the Sanitation Districts' long-range plans for biosolids management include the ownership and operation of a new state-of-the-art composting facility in Kings County, California, called the Westlake Farms Composting Facility, shown on Figure 5-15. In 2001, the Sanitation Districts purchased 14,500 acres of land and entitlements to construct the composting facility. Using a covered aerated static pile composting technology, the Westlake Farms Composting Facility will compost Sanitation Districts' biosolids, green waste from Central Valley and Southern California communities, and agricultural wastes from the Central Valley. The compost product will be used on adjacent agricultural land. Agricultural wastes have specifically been included as feedstocks to improve air quality by providing an outlet for material that otherwise may have been open burned in the field. Biofilter technology will be used to control odors and air emissions from the facility, along with state-of-the-art covers designed specifically for odor and air emission control from aerated static piles.

The Westlake Farms Composting Facility is permitted to ultimately receive up to 500,000 wet tons per year (wtpy) of biosolids. Phase 1, which will be able to accommodate up to 100,000 wtpy of biosolids, is currently under construction and scheduled to begin operations in 2013. Future phases will be constructed in increments of 100,000 wtpy. The Westlake Farms Composting Facility will further diversify the Sanitation Districts' portfolio for biosolids beneficial uses, advancing the agency's long-term commitment to resource recovery.

The Sanitation Districts will continue to receive and analyze proposals from contractors to manage biosolids, and may enter into agreements for use of sites and technologies that will maintain a diversified portfolio of options. The Sanitation Districts may also continue to develop additional facilities to serve these same purposes, either individually or in partnership with the public and/or private sector. The Sanitation Districts may either own or jointly own any such facilities, and also may directly operate or contract for the operation of any such facilities.

Siting of these facilities would be located regionally, as determined by the participation of any private and public sector partners, the location of any materials needed for processing of biosolids, and the location for the reuse of any end products. These areas may include:

- All counties in the state of California

- The state of Arizona
- Other U.S. states and territories, if applicable
- Foreign countries that desire biosolids, or biosolids derived products, for reuse and/or processing

Transportation of biosolids to management facilities is currently handled by truck, but may be transported by rail or other modes of transportation in the future. The current locations of landfill and composting facilities within a 100-mile radius of the JWPCP that accept wastewater biosolids for beneficial use and disposal are listed in Table 5-9.

Table 5-9. Landfill and Composting Facilities Within a 100-Mile Radius of the JWPCP[a]

Location	Estimated Distance	Types of Waste Accepted
Griffith Park Composting Facility 5400 Griffith Park Dr., Los Angeles, CA 90027	26.1	Sludge (Biosolids), Manure, Green Materials
Puente Hills Landfill 13130 Crossroads Pkwy South, Industry, CA 91746	27.7	Agricultural, Ash, Construction/Demolition, Industrial, Mixed Municipal, Sludge (Biosolids), Tires
Rancho Las Virgenes Composting Facility 3700 Las Virgenes Road, Calabasas, CA 91302	46.1	Sludge (Biosolids), Green Materials, Wood Waste
Simi Valley Landfill and Recycling Center 2801 Madera Road, Simi Valley, CA 93065	57.3	Construction/Demolition, Industrial, Mixed Municipal, Sludge (Biosolids)
Inland Empire Regional Composting Facility 12645 Sixth Street, Rancho Cucamonga, CA 91730	59.4	Green Materials, Sludge (Biosolids)
San Onofre Landfill 2.7 Miles East of Basilone Gate, Camp Pendleton (Mil Res), CA 92672	61.5	Industrial, Mixed Municipal, Construction/Demolition, Sludge (Biosolids)
Las Pulgas Landfill 1 Mile North of Camp Pulgas, Off Basilone Rd, Camp Pendleton (Mil Res), CA 92055	74.4	Construction/Demolition, Industrial, Mixed Municipal, Sludge (Biosolids)
California Street Landfill 2151 Nevada Street, Redlands, CA 92373	75.0	Mixed Municipal, Construction/Demolition, Sludge (Biosolids)
One Stop Landscape Supply Center 13024 San Timoteo Canyon Road, Redlands, CA 92373	77.9	Sludge (Biosolids), Agricultural, Wood Waste
Toland Road Landfill 3500 North Toland Road, Santa Paula, CA 93060	78.6	Mixed Municipal, Construction/Demolition, Agricultural, Industrial, Sludge (Biosolids)
San Timoteo Sanitary Landfill San Timoteo Canyon Road, Redlands, CA 92373	80.3	Agricultural, Construction/Demolition, Dead Animals, Industrial, Inert, Mixed Municipal, Sludge (Biosolids)
Lancaster Landfill and Recycling Center 600 East Avenue F, Lancaster, CA 93535	93.4	Agricultural, Construction/Demolition, Industrial, Mixed Municipal, Tires, Inert, Green Materials, Asbestos, Sludge (Biosolids), Contaminated Soil
Ojai Valley Waste Water Treatment Plant 1072 Tico Road, Ojai, CA 93023	94.0	Sludge (Biosolids)

[a] Per the California Integrated Waste Management Board's website (as of November 1, 2008).

5.9 Joint Outfall System Needs Assessment

System needs can be determined by comparing existing capabilities against future projected requirements. The existing system capabilities are outlined within this chapter; projected requirements are summarized in Chapter 4. This assessment of needs forms the basis for options and alternatives formulation contained within Chapter 6. With respect to projections, the future conditions of specific interest relate to anticipated growth within the JOS, as well as any potential new regulatory requirements that may affect the capabilities and adequacy of existing facilities.

This needs assessment is divided into five major facilities categories, as follows:

- Wastewater conveyance and treatment
- Solids processing
- Biosolids management
- WRP effluent management
- JWPCP effluent management

The needs identified and discussed are limited to those that may be associated with the construction of substantive, new improvements over the duration of the planning period. Needs associated with minor improvements or operational enhancements are not discussed.

5.9.1 Conveyance System

The conveyance system needs were developed by comparing the hydraulic carrying capacity of the JOS sewers to projected future flows. The conveyance system is distributed across the entire JOS service area such that individual pipeline segments must be compared to specific tributary flows. The assessment of flows versus capacity is complicated by the system's inherent flexibility that allows for flow diversions and thereby the ability to change tributary flows. In addition, the volumes extracted and treated by the WRPs also impact the flows seen by downstream conveyance facilities.

The Sanitation Districts have developed a static GIS conveyance system model that serves as a tool for analyzing the JOS conveyance system as well as providing a graphical display of the results. The model currently contains the JO trunk sewers and District trunk sewers but was calibrated with an emphasis on the JO trunk sewers. Calibration was conducted by comparing modeled flows against non-peak recorded flows (i.e., observed peak flows adjusted to reflect average daily flows), or estimated peak flows indicated on the sewer clearance diagrams. The modeled flows were based on average dry weather flows. The conveyance system configuration in the model (calibration configuration) reflects the current sewer system configuration.

The assessment of future needs was based on a comparison of projected tributary flows versus conveyance system capacity. The conveyance capacity was determined using the static GIS conveyance system model's baseline configuration. The baseline configuration consists of the calibrated configuration plus those projects previously identified and expected to be implemented within the near future (baseline projects). The addition of these projects also introduces a number of conveyance system configuration adjustments in terms of flow splits and diversion structure settings. A capacity need was identified as those pipeline segments for which the static GIS conveyance system model determined that the depth of peak dry weather flow (d) within the pipe was equal to, or greater than, 90 percent of the pipeline's diameter (D) (i.e., $d/D \geq 0.9$).

A detailed tabulation by pipeline segments and a graphical presentation were then developed from the static GIS model data. Using the static GIS conveyance system model and the criteria as discussed, potential areas where the conveyance system capacity may be exceeded have been identified. Overall, it is estimated that 43.7 miles of JO trunk sewers would need to be hydraulically relieved by the year 2050.

(Note that this estimate would be reduced if the increased wastewater flows were accommodated through expansion of one or more upstream WRPs rather than an expansion of the JWPCP.) The extent of capacity needs predicted for the JO trunk sewers is provided in Table 5-10 and graphically depicted on Figure 5-16.

Table 5-10. Projected Conveyance System Capacity Needs

JO Trunk Sewers	Total Length (miles)
Joint Outfall A	11.1
Joint Outfall B	15.5
Joint Outfall C	0.5
Joint Outfall D	1.0
Joint Outfall E	1.3
Joint Outfall F	3.5
Joint Outfall G	0.9
Joint Outfall H	9.7
Joint Outfall J	0.1
Total	43.7

Based on the duration of the planning period and the projected increase in system flows over that period, the extent of potential conveyance system capacity deficiencies identified by the static GIS conveyance system model appears to be a reasonable approximation. The projected conveyance system needs are comparable with the current rate of sewer improvement projects implemented annually. Actual future needs will vary depending upon a variety of factors such as future growth patterns and WRP expansions. As a result, the conveyance system improvements implemented will be based on continued monitoring of actual conveyance system performance and will represent the optimal combination of relief, rehabilitation, and replacement projects for the entire system.

5.9.2 Treatment Plants

The potential deficit in treatment plant processing capabilities was determined by calculating the difference between projected future tributary flows and the current JOS treatment capacity on a plant-by-plant basis. The results of this analysis are summarized in Table 5-11.

Table 5-11. Projected Joint Outfall System Treatment Plant Capacity Needs

Treatment Plant	Tributary Population	Current Permitted Capacity (MGD)	2050 Tributary Flow (MGD)	Treated Flow (MGD)	Bypassed/Exceeded Flow (MGD)
POWRP	129,919	15.0	13	13	0
SJCWRP	1,396,684	100.0	135	100	35
WNWRP	481,926	15.0	44	15	29
LCWRP	398,819	37.5	41[a]	38	3
LBWRP	264,773	25.0	23	23	0
JWPCP	3,180,740	400.0	423[b]	400	23
JOS Treated Flow				589	
JOS Exceed Flow				23	
JOS Total	6,257,614	592.5		612	

[a] LCWRP inflow includes 10 percent of WRNP bypass flow, with the remainder of the WRP bypass flow contributing to JWPCP inflow.
[b] JWPCP flow is the sum of the projected flow for the JWPCP tributary area plus upstream WRP bypassed flows.

FIGURE 5-16

CLEARWATER Program

Conveyance System Needs

Source: Sanitation Districts of Los Angeles County 2011, Thomas Bros 2011, ESRI 2011

Overall, the current combined permitted capacity of the JOS treatment plants is 592.5 MGD. Taking into account the total system's existing capacity versus the 612 MGD JOS flow projection for 2050 (derived in Chapter 4), it is estimated that a minimum of approximately 20 MGD of additional treatment capacity is required during the planning period. Depending on the flows tributary to specific treatment plants and the capacities associated with modular plant expansions, the future combined system capacity in some cases may need to exceed this minimum value. As shown on Figure 5-17, it is anticipated that the permitted treatment capacity of the JOS plants will not be exceeded until between 2040 and 2050.

In addition, the recent addition of NDN at the WRPs has made the plants more sensitive to peak hydraulic flows and nutrient loadings. Therefore, as flows approach the permitted capacities of the WRPs, it may be necessary to implement process optimization measures, such as the addition of flow equalization, to ensure that the Sanitation Districts continue to consistently meet permit conditions in anticipation of increasingly stringent regulatory requirements.

5.9.3 Solids Processing

The solids processing systems of principal concern are:

- Sludge thickening
- Sludge stabilization
- Sludge dewatering
- Gas handling and power generation

Each of these is discussed separately in terms of projected future capacity needs, potential facilities, and the timing for implementation.

5.9.3.1 Sludge Thickening

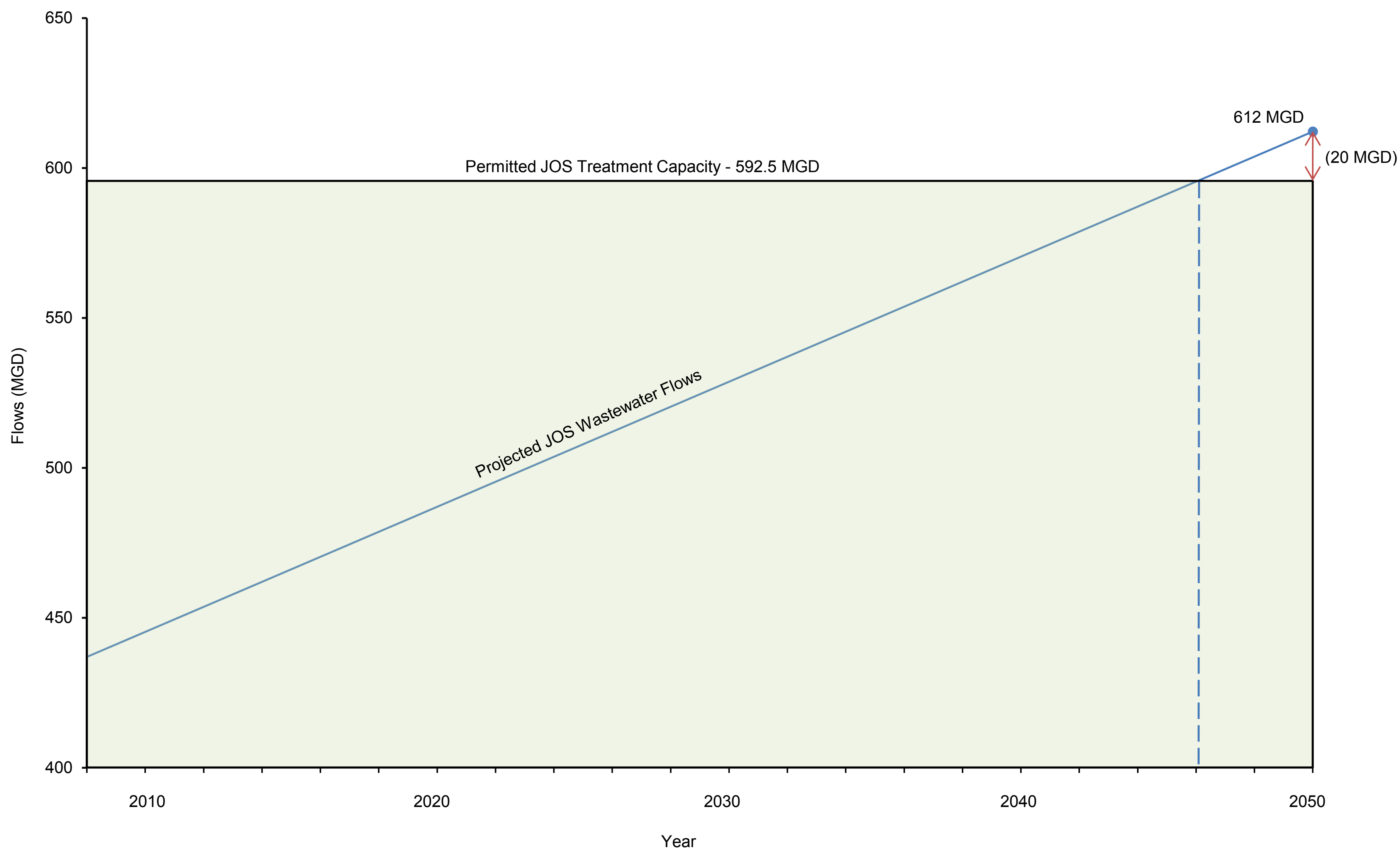
The capacity of the existing dissolved air flotation thickener system is estimated to be 11.32 MGD. The projected future WAS flow for 2050 is 7.80 MGD, resulting in a surplus thickening processing capacity of 3.52 MGD. Therefore, it is concluded that no additional thickening systems will be required over the duration of the planning period.

5.9.3.2 Sludge Stabilization

The capacity of the existing anaerobic digestion system is estimated to be 4.58 MGD. This means that the existing system is close to or at capacity. The projected future CRS flow for 2050 is 5.62 MGD, resulting in a processing deficit of 1.04 MGD. To accommodate this processing deficit, six additional anaerobic digesters will be required. It is anticipated that additional capacity would be in the form of units of similar design to those existing. The timing for construction of these faculties is dependent upon the future trending of sludge production at the JWPCP.

5.9.3.3 Sludge Dewatering

The projected future digested sludge flow for 2050 is 5.62 MGD. Sludge dewatering is currently being handled by a mix of centrifuges of various ages. The total capacity of the JWPCP sludge dewatering system can handle the projected flow. The Sanitation Districts should continue the existing program of replacing aging centrifuges as needed throughout the duration of the planning period.



Note: Projected Joint Outfall System wastewater flows are based on population projection forecasts provided by the Southern California Association of Governments for the year 2050.

FIGURE 5-17

CLEARWATER Program

Projected 2050 JOS Flows Versus Total Existing Permitted Capacity

Source: Sanitation Districts of Los Angeles County 2011

5.9.3.4 Gas Handling and Power Generation

The power plant at the JWPCP currently utilizes two turbines that run on digester gas, a third turbine that is used for standby, four boilers that create steam from digester gas for process heating, and twelve flares that burn excess digester gas. Additional gas resulting from an increased number of digesters could be managed by these facilities. The turbines are currently supplemented with natural gas. As digester gas increases, it could be used in lieu of natural gas.

5.9.4 Biosolids Management

During the planning period, it is projected that the JOS biosolids generation rate will increase nearly 30 percent, from 1,470 wtpd (2005–2009) to 1,850 wtpd (2050), as shown on Figure 5-18. The Sanitation Districts currently have a robust and diverse system in place to address the projected increase. This includes a collection of different private contractors who provide for beneficial use of the biosolids product. These contractors employ a variety of post-dewatering treatments, with biosolids being applied at a range of locations, using a number of different application methods. The Sanitation Districts also have the ability to co-dispose biosolids in landfills, but this option will become more restrictive with the scheduled closure of the Puente Hills Landfill in 2013. However, the planned 500,000-wtpy Westlake Farms Composting Facility should be operating at 20 percent of permitted capacity by the same year, and can be expanded in phases if and when future needs arise. Therefore, it is anticipated that there is no additional physical infrastructure required to accommodate future biosolids management. The Sanitation Districts should continue to explore options that provide for additional biosolids management diversity and further optimize the beneficial use of these materials.

5.9.5 Water Reclamation Plant Effluent Management

The existing system of WRP effluent management is effective and provides the Sanitation Districts flexibility with respect to providing recycled water for reuse and discharging any excess flows to surface waterways. All indications are that the demand for recycled water will continue to increase over time. This increase could also result in the potential need for storage and possibly higher levels of treatment. While there are no capacity limitations associated with surface water discharges, if more restrictive effluent requirements are implemented in the future by state and federal regulatory agencies, the current plant capacities and/or treatment process trains could be affected.

5.9.6 Joint Water Pollution Control Plant Effluent Management

JWPCP effluent management relies entirely on ocean discharge. With pumping and both tunnels and all four ocean outfalls in operation, the maximum hydraulic capacity of the JWPCP ocean discharge system is 675 MGD, which was nearly exceeded during a series of storms in January 1995. JOS flows are projected to increase by the year 2050. If the JWPCP reaches it permitted treatment capacity of 400 MGD, the associated peak wet weather flows are projected to reach 927 MGD. If the increased wastewater flows were accommodated through expansion of the JWPCP rather than one or more upstream WRPs, the associated peak wet weather flows are projected to be even higher.

Furthermore, the 60-inch diameter ocean outfall has nearly reached the end of its useful life, so it cannot be relied upon to manage future flows. Also, it is currently not possible to remove either of the tunnels from service to inspect their condition and make any necessary repairs. Neither of the tunnels has been inspected in over 50 years, and one of the tunnels has been in service for over 70 years. The Sanitation

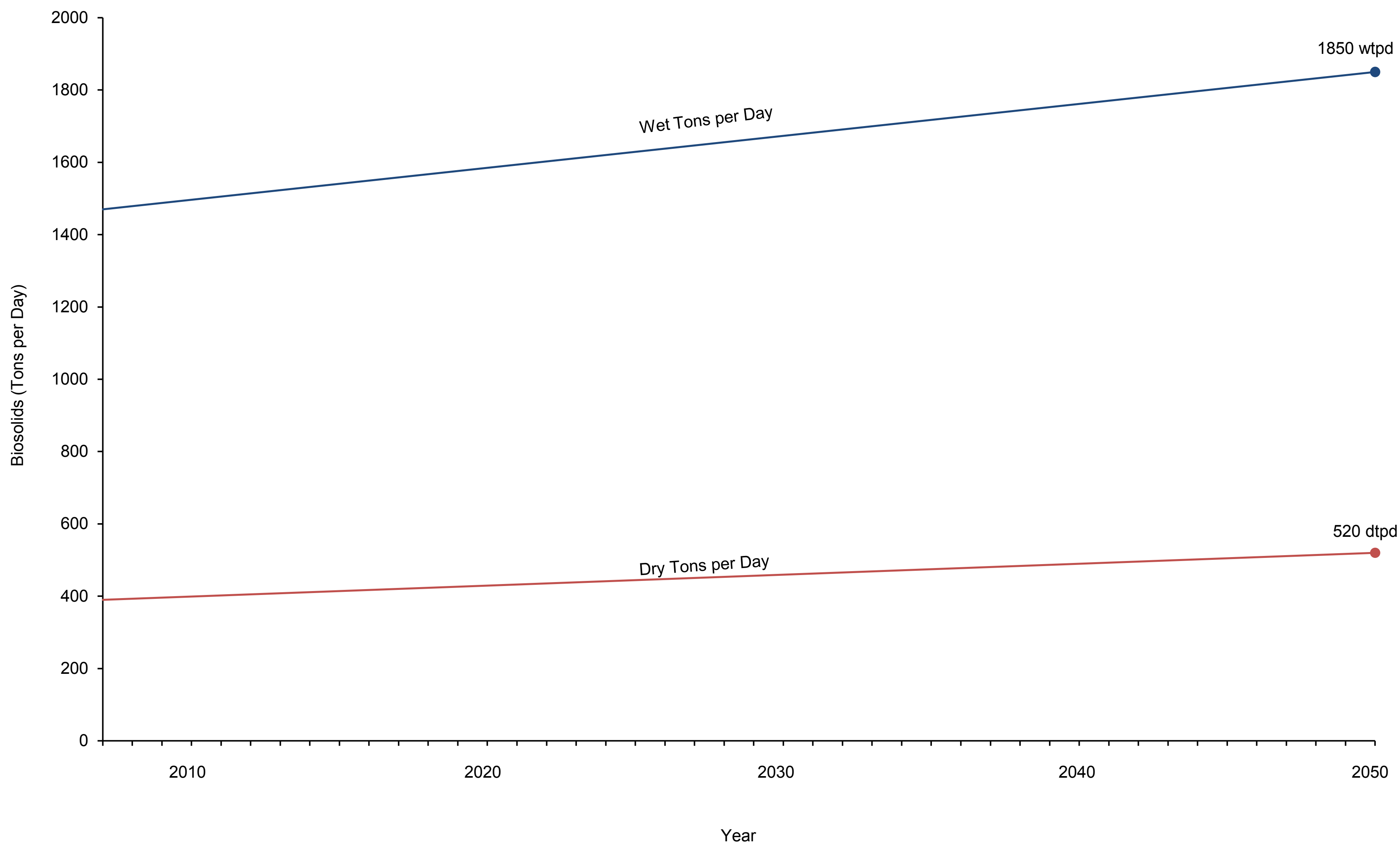


FIGURE 5-18

CLEARWATER Program

Projected 2050 JOS Biosolids Generation Rates

Source: Sanitation Districts of Los Angeles County 2011

Districts believe it is prudent to address this aging infrastructure concern in order to reduce the potential for the catastrophic failure of a key system component and provide redundancy for critical infrastructure.

Chapter 6
ALTERNATIVES ANALYSIS

6.1 Introduction

The overall goal of the Clearwater Program Master Facilities Plan (MFP) is *to identify a recommended plan that is protective of public health and will best meet the needs of the Joint Outfall System (JOS) through the year 2050 in a cost-effective and environmentally sound manner*. Recommendations consist of system improvements, upgrades, and expansions to accommodate projected future conditions within the service area. The future conditions of specific concern include anticipated growth within the system, an aging infrastructure, emerging demands for recycled water, and potential new regulatory requirements. This chapter presents the development, analysis, and screening of program-wide and project-specific alternatives within the framework of the regulatory requirements, existing conditions, and projected future conditions that have been established in the preceding chapters.

6.1.1 Chapter Organization

In this chapter, both program-wide and project-specific options and alternatives are analyzed. First, the program-wide options□alternatives are developed for the entire JOS. Second, project-specific options□alternatives are developed in connection with a single component area□Joint Water Pollution Control Plant (JWPCP) effluent management. Finally, the two sets of alternatives are grouped into plan alternatives and ranked, with a *recommended plan* being identified at the conclusion of the chapter.

6.1.2 Planning Objectives

The MFP is necessary to ensure adequate JOS wastewater system capacity, reliability, sustainability, and compliance through the year 2050. Specifically, the recommended plan in the MFP would need to meet the following objectives:

- *Provide adequate system capacity to meet the needs of the growing population*
- *Provide for overall system reliability by allowing for the inspection, maintenance, repair, and replacement of aging infrastructure*
- *Provide support for emerging recycled water reuse and biosolids beneficial use opportunities*
- *Provide a long-term solution for meeting water quality requirements set forth by regulatory agencies*

6.1.3 Managing Uncertainty

Planning efforts must always deal with some degree of uncertainty relating to projected future conditions versus the range of possibilities of what may actually occur. While projections are based on current available information and sound judgment, the limitations of these projections must be recognized, and flexibility should be incorporated into recommendations. Examples of the types of uncertainty and future changes that impact facilities planning include:

- Regulatory: Chapter 3 reviews current regulatory requirements. The potential exists for future additional constituents to be identified and regulated. Future requirements may also be more restrictive than current standards for existing regulated constituents.
- Wastewater and Reuse: Chapter 4 summarizes current and projected wastewater flows and characteristics, as well as recycled water reuse. Future projections are based on predictions of residential, commercial, and industrial growth; wastewater generation rates; and water reuse plans and studies. All these are subject to change over time.
- Treatment and Technology: Chapter 5 provides an overview of existing systems and projected needs. These needs may be affected by not only regulations and flows but also the treatment technologies that may be developed and available in the future.

The keys to managing these types of uncertainties relative to future conditions is to avoid narrowly tailored solutions that have limited capabilities to cope with change and to ensure that recommended systems have sufficient flexibility to accommodate a reasonable range of future conditions. This approach would permit the monitoring of actual future conditions against projected conditions and would allow appropriate adjustments as needed.

6.1.4 Public Input

Public input was an integral part of the overall alternatives development and analysis process. An extensive public outreach effort was conducted in conjunction with the Clearwater Program MFP and environmental impact report/environmental impact statement (EIR/EIS). Prior to conducting the alternatives analysis that follows in this chapter, the Sanitation Districts of Los Angeles County (Sanitation Districts) conducted a series of public workshops to solicit input on the plan objectives, screening criteria, and various program and project elements. Project engineers also met with over 500 community leaders, civic groups, public officials, regulatory agencies, environmental groups, and businesses. In addition, thousands of project newsletters were circulated, and a telephone information line and a website (www.ClearwaterProgram.org) were established to allow public input throughout the planning process.

6.1.5 Terminology

A set of nomenclature was developed to describe different elements of the alternatives analysis process. The basic terminology is outlined in the following sections.

6.1.5.1 Program Versus Project

The term *program* is used in reference to options or alternatives that are broad in nature and do not have a high level of detail. A program would be implemented in the long term. The term *project* is used to describe a specific component of the comprehensive plan. A project would be implemented in the short term, and a greater level of detail is required for its analysis in the MFP and the associated EIR/EIS. An example of a program would be the continuation of the Sanitation Districts' current biosolids management practices throughout the duration of the 2050 planning horizon. An example of a project would be the construction of a new or modified ocean discharge system within the next 10 years to address the effluent management needs of the JWPCP.

6.1.5.2 Program Component Areas

For the purposes of both needs assessment and options formulation, the JOS was divided into five program *component areas* based on primary functionality. These are:

- Wastewater conveyance and treatment
- Solids processing
- Biosolids management
- Water reclamation plant (WRP) effluent management
- JWPCP effluent management

These program component areas will be described in greater detail in subsequent sections. A similar breakdown was used for the project elements.

6.1.5.3 Options Versus Alternatives

Based on specific needs identified within the different program component areas, individual *option*s were formulated and subjected to multiple levels of screening. The remaining options from each of the five program component areas were combined into logical, system-wide *alternatives*, which were subjected to additional screening.

6.2 Program Analysis by Program Component Area

The process for alternatives formulation and screening is described in Section 6.2.1. The rules and regulations with which all planned wastewater facilities must comply are outlined in Chapter 3. The projected future wastewater flows and characteristics are summarized in Chapter 4. The capabilities of existing systems, as well as potential needs based on projected future conditions, are provided in Chapter 5. The subsections that follow outline alternative approaches to meet the Clearwater Program objectives based on regulatory requirements, projected future conditions, and identified system needs.

6.2.1 Alternatives Development and Analysis Process

A large number of approaches were considered to meet the identified future needs of the JOS. Determination of the optimal approach in the form of a recommended plan required the systematic assessment, ranking, and screening of options and alternatives. This process is graphically depicted on Figure 6-1. Starting with a large number of potential approaches grouped into one of five program component areas, the total number of options/alternatives was reduced by a formal evaluation, screening, and ranking process resulting in a recommended plan.

6.2.1.1 Conceptual Options

The identification of specific needs by the program component areas of the JOS is provided in Chapter 5. On the basis of the identified needs, *conceptual options* were developed for each program component area. In the development of these options, approaches were formulated with respect to alignment with the Sanitation Districts' organizational values embodied within:

- The Sanitation Districts' mission statement
- The Clearwater Program's overall goal and objectives

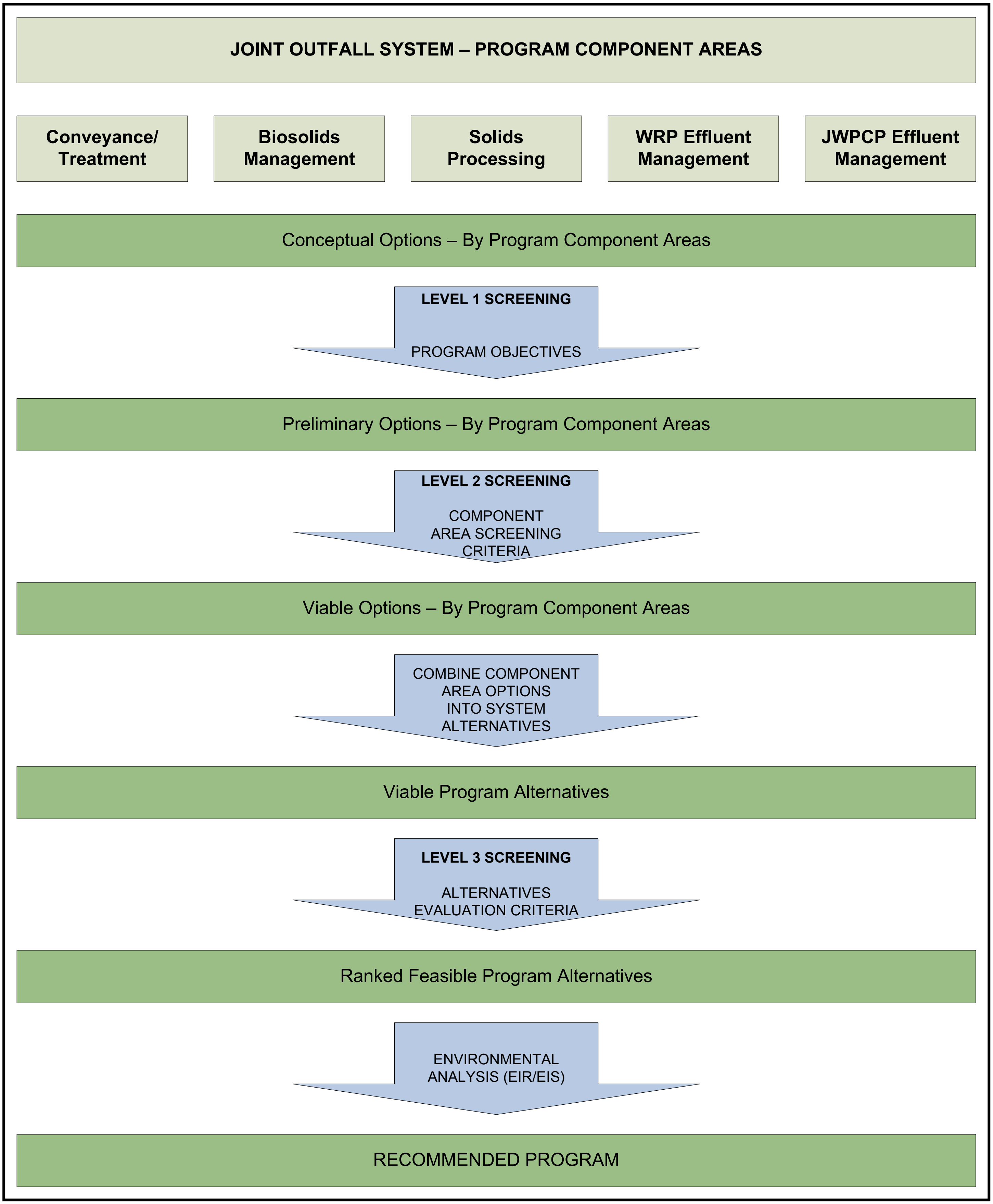


FIGURE 6-1

Master Facilities Plan
Program-Level Alternatives Screening Process

Source: Sanitation Districts of Los Angeles County 2011

The Sanitation Districts' mission statement is *to protect public health and the environment through innovative and cost-effective wastewater and solid waste management, and in doing so convert waste into resources such as recycled water, energy, and recycled materials.* The Clearwater Program's overall goal and objectives are provided in Section 6.1 and 6.1.2, respectively. The conceptual options represent a reasonable range of options available to the Sanitation Districts in providing comprehensive wastewater management within the JOS.

6.2.1.2 Level 1 Screening

The conceptual options by program component areas were evaluated with respect to compliance with Level 1 screening parameters.

Level 1 Screening Parameters

The Level 1 screening parameters were used to assess the conceptual options. Each of these parameters is briefly discussed in the paragraphs that follow.

Protection of Public Health

The Sanitation Districts are committed to the protection of public health. The evolution of proper sanitary practices, including wastewater management, has virtually eliminated waterborne disease in the United States and contributed to a longer life expectancy. The tertiary-treated recycled water produced by the Sanitation Districts essentially meets or exceeds state and federal drinking water standards and is safe for indirect potable reuse and unrestricted direct human contact. Because the continued protection of public health is an underlying goal of the MFP, a conceptual option must meet this screening parameter to be carried forward into the alternatives analysis.

Environmentally Sound and Cost-Effective Wastewater Management

An environmentally sound approach to wastewater management includes avoiding and/or minimizing potentially adverse impacts on the environment. During the initial stages of the planning process, the Sanitation Districts retained ICF International to begin preparing the associated EIR/EIS. ICF International also performed preliminary environmental impact assessments in support of alternatives analysis for the MFP.

A cost-effective approach to wastewater management entails taking into account total life-cycle costs of future infrastructure improvements and operations and maintenance (O&M) changes being considered for the JOS. External funding opportunities must also be identified and pursued. By planning in a fiscally responsible manner, the Sanitation Districts are able to ensure the continuation of affordable user rates.

In order to be further considered in the alternatives analysis process, a conceptual option must be both environmentally sound and cost effective.

System Capacity to Meet JOS Population Growth

The recommended plan must provide wastewater management facilities capable of handling flows generated within the JOS through the year 2050. In general, wastewater flows are expected to increase in proportion to population growth within the JOS service area. Population forecasts are derived from projections by the Southern California Association of Governments (SCAG). These projections are then converted to flows using a per capita generation rate. Contract and industrial flows are separately projected and added into the projected flow totals. Recent (2007–2009) average JOS flows were approximately 437 million gallons per day (MGD). Projected average JOS flows for the year 2050 are estimated at 612 MGD, representing a 40-percent increase. Peak wet weather JOS flows are also projected to increase during the planning period. The conceptual options for wastewater conveyance, treatment, effluent management, and solids management must be capable of effectively handling the projected flows and loadings for the planning period to be carried forward into the analysis.

Maintaining Aging Infrastructure to Ensure System Reliability

Proper operation and maintenance of JOS assets is critical to protecting public health and safeguarding the environment. Ensuring reliable levels of service requires the means to routinely inspect and maintain infrastructure components and to repair, rehabilitate, or replace assets as determined necessary. System components and associated maintenance varies considerably. Structural elements, such as pipelines, buildings, and tanks, typically have longer useful life expectancies than other components. Mechanical systems, including pumps and blowers, can experience significant wear and tear, requiring system redundancy and routine rehabilitation or replacement. Electrical and control components, such as switchgear and distributed control systems, can similarly experience deterioration, or become technically dated, requiring upgrading or replacement. As a result, some level of asset redundancy is needed for all types of components to provide reliable operation in case of an unplanned outage as well as the ability to routinely inspect and maintain systems to prevent any interruption of service. Critical elements of the systems must, therefore, be capable of being removed from service for inspection and maintenance without negatively affecting the system's overall functional integrity. Seismic considerations, such as retrofits and redundancy, should also be provided for vital system components. If a conceptual option did not allow for inspections and necessary replacement, repair, or rehabilitation of vital system elements, it was eliminated from further consideration.

Accommodating Emerging Water and Biosolids Recycling Opportunities

Recognizing water supply limitations in a semi-arid, drought-prone area such as Southern California, the Sanitation Districts have actively engaged in water recycling and reuse for over half a century. Water reuse applications include landscape and agricultural irrigation, industrial uses/processes, recreational impoundments, wetland creation and river habitat, groundwater recharge, and seawater barrier creation. The Sanitation Districts do not directly distribute recycled water to individual customers. Agreements are negotiated with local water purveyors who, in turn, provide recycled water to their customer base.

The processing of solids and conversion of these materials into recyclable biosolids also provides environmental benefits. These benefits include the creation of soil amendment products and alternative fuels. These aspects of solids processing and biosolids management contribute to enriching the land, reducing irrigation demands, and improving air quality.

A conceptual option must not impede emerging recycling opportunities to reach the next stage of the alternatives analysis process.

Compliance With Applicable Regulations

The management of JOS wastewater treatment and effluent discharges is subject to an array of federal, state, and local regulations. The regulations of principal concern are outlined in the National Pollutant Discharge Elimination System (NPDES) permits and/or Waste Discharge Requirements (WDRs) for each plant and discharge location. These requirements and permits are consistent with federal and statewide regulations and are promulgated by the Los Angeles Regional Water Quality Control Board (LARWQCB). A conceptual option would need to allow for continued compliance with applicable regulations to be carried forward into the alternatives analysis process.

Application of Screening Parameters

Conceptual options were qualitatively assessed for consistency with the Level 1 screening parameters by applying professional judgment based on experience and readily available information. The conceptual options that were determined to be impractical and/or unreasonable were eliminated from further consideration.

6.2.1.3 Preliminary Options

The smaller, more specific set of *preliminary options* for each program component area that were determined to be consistent with the Level 1 screening parameters were carried forward into the alternatives analysis.

6.2.1.4 Level 2 Screening

The preliminary options by program component areas were then evaluated for compliance with Level 2 screening parameters.

Level 2 Screening Parameters

For this stage of the assessment, program component area screening criteria were utilized. While a number of these criteria are common to all program component areas, some criteria are associated with specific program component areas. The application of a specific criterion was based on both its relevance to the program component area as well as its significance with respect to differentiating between the options under consideration. As an example, the conveyance systems impacts criterion is relevant to the wastewater conveyance and treatment (CT) program component area, and serves to differentiate between the options within that grouping. However, while the available land or right-of-way is relevant to the CT program component area, all of the CT options under consideration have facilities either located in public right-of-way or on Sanitation Districts' land. Therefore, this criterion provides no differentiation between options and, therefore, was not incorporated into the CT options analysis.

Each of Level 2 screening parameters is briefly discussed in the paragraphs that follow.

Conveyance System Impacts

The population projections for growth result in additional flows generated within different portions of the JOS. In some instances, depending on the JOS conveyance system configuration, these flows may be tributary to one or more WRPs, or could be bypassed to the JWPCP. In analyzing conveyance system impacts of the options put forward, the differential sewer relief requirements of these options were evaluated. The evaluation identified the tradeoffs between upstream WRP expansion and necessary sewer relief projects. A static geographic information systems (GIS) conveyance system model was an integral part of this evaluation process. When feasible, the Sanitation Districts generally give preference to options that provide for expansion to the WRPs in lieu of relief of the downstream sewer system. Large sewer relief projects increase project costs and can generate adverse environmental impacts during construction. Conversely, the WRP expansions provide substantial benefits in the form of increased availability of recycled water supplies for application to reuse opportunities. Options were compared relative to the magnitude of conveyance projects associated with implementation.

Treatment Plant Impacts

The primary impacts from treatment plants are associated with either capacity expansion to accommodate increased flow quantities or upgrades that provide for process optimization. The JOS plants have different capabilities to accept additional flows. Differences include:

- Currently available, unused capacity at a plant
- Differences in unit costs for expansion
- Non-cost considerations related to construction and plant expansion

The options assessment and scoring reflect the Sanitation Districts' preferences of providing capacity expansion/plant upgrades at the facilities with the lowest unit cost for improvements, minimizing the number of plants affected, and mitigating the non-cost impacts of expansions/upgrades to the extent required. One non-cost consideration evaluated in the assessment was impacts related to plant capacity expansions for facilities where competing uses exist for land space (e.g., recreational uses or flood control).

Resource Reuse

The primary resources generated within the JOS that are available for reuse are:

- Recycled water
- Digester gas
- Biosolids

Maximizing recycled water generally favored options that expand capacity at the WRPs rather than at the JWPCP. Some WRP expansion options were differentiated with respect to the location of a given WRP versus the location of the projected future recycled water demand. For reuse of digester gas, a byproduct of solids processing, all options are equal. Biosolids management options that provide a reliable, diversified program have the greatest potential for full reuse (e.g., composting and land application).

Sustainability

The term sustainability was applied in a relatively inclusive manner. Within the context of options analysis, the primary focus was the comparative evaluation of options related to the following considerations:

- Does the option in question increase or decrease the consumption of fixed resources relative to other options?
- Are products generated (e.g., recycled water) that can be used to avoid new resource consumption?
- Are there significant energy usage impacts and accompanying carbon footprint implications of an option?
- Are there substantial environmental and/or ecosystem impacts (i.e., beneficial or detrimental)?
- Are there significant socio-economic development impacts?

Options that create reusable products (e.g., recycled water) and are energy-efficient were preferred.

Available Land/Right-of-Way

While the land requirements and rights-of-way are important to any public works project, this parameter was only applied to the JWPCP effluent management options because of the implications associated with tunnel and ocean outfall options. The ability to procure land, easements, rights-of-way, permits, and approvals for both construction and operation were factored into the analysis. The areas with greatest potential for impacts are the shaft site locations. In general, options that minimize overall land requirements and the number of right-of-way procurements were ranked as preferred options under this criterion.

Institutional Feasibility

Institutional feasibility refers to the Sanitation Districts' ability to independently effect the implementation of the project, and the difficulty or feasibility of developing a project that is not wholly within the Sanitation Districts' control. The implementation of any of the options under consideration necessitates the involvement and cooperation of a number of entities. Many of the requirements for reviews, approvals, and permits needed to implement specific options are outside the immediate purview of the Sanitation Districts. The fewer reviews, approvals, and permits required, the greater the institutional feasibility of an option. The anticipated level of cooperation of these external entities in providing reviews, approvals, and permits was factored into the relative options assessment. The need for inter-agency agreements was also included within this evaluation.

Regulatory Compliance

Much of regulatory compliance revolves around the procurement of discharge and/or reuse permits and the ability to maintain compliance with permit standards. Compliance was assessed with respect to the following criteria:

- The ability to meet all of the current requirements
- The ability to meet potential future requirements
- The need to negotiate permit limits or perform extensive research to justify alternative standards

While there is limited certainty associated with predicting future regulatory requirements, it is highly likely that the Sanitation Districts will face more stringent standards than those currently in place. Constituents identified as having the greatest potential for current and future impacts were N-nitrosodimethylamine (NDMA), total dissolved solids (TDS), ammonia, nutrients, emerging contaminants, and pesticides. These constituents were factored into consideration under this criterion. Those options with the least potential to require any type of exception to existing requirements and are most likely to meet new requirements were provided the most favorable assessment.

Public Acceptability

Public acceptability was used to compare options relative to their perceived level of support or opposition from different groups representing public opinion. Groupings included:

- Public officials
- Civic groups and individuals
- Business community
- Public agencies
- Environmental groups

It should be noted that the assessments represent a composite evaluation because different groups may have differing perspectives on the same option. Input was received from the public during the planning effort using public workshops, group and individual meetings, and the responses received from different informational media.

Operational Flexibility, Reliability, and Familiarity

Options were reviewed in terms of a number of operations-related criteria. Flexibility is an essential component of operations, allowing personnel to react to, and adjust for, changing conditions such as flow increases or influent quality variations. Within the wastewater collection system, this could consist of the ability to route flows to optimize the system's overall capacity. Such flexibility could become important in the case of a localized, high intensity storm event within one portion of the conveyance system. The ability to balance flows through diversions and bypasses could be critical to overflow prevention. In the case of treatment plants, flexibility relates to the ability to adjust process operational parameters to accommodate varying conditions. This could be as straightforward as having the ability to accommodate higher constituent loading during a specific peak period. In general, the Sanitation Districts' preference is to implement systems with good operational flexibility, while avoiding a cost premium for such.

In general, all options developed for wastewater conveyance and treatment incorporate similar levels of reliability in terms of standby mechanical systems, redundancy of critical facilities, power supply backup, and instrumentation and control flexibility. As a result, there was not much differentiation with respect to reliability for conveyance/treatment options. However, in the evaluation of effluent and solids management options, reliability assessment was a more prominent consideration. The ability to reliably manage effluent and biosolids under a variety of different scenarios was assessed for these options.

The cost, reliability, and overall effectiveness of facilities/operations are significantly affected by the operational staff's familiarity with the systems involved. New facilities that are consistent with existing systems and processes were judged more favorably. Options that incorporated systems that were significantly different, or considerably more complex, than existing systems were evaluated less favorably.

Cost Effectiveness

The comparison between options relative to cost effectiveness included consideration of both initial capital costs and ongoing operation and maintenance costs.

These cost elements were combined and the different options compared in terms of their relative total present worth, or total life-cycle costs. (Detailed cost estimates were not developed for each option at this stage of the alternatives analysis process.) The ability to obtain potential external funding to defray cost impacts on ratepayers was also factored into this assessment. Options with comparatively lower life-cycle costs received more favorable assessments.

Application of Level 2 Screening Parameters

The options were scored against the previously discussed parameters and rated on a scale of plus, zero, and minus:

+ Rated superior with respect to other program component area options for a specific parameter

0 Rated neutral with respect to other program component area options for a specific parameter

\- Rated inferior with respect to other program component area options for a specific parameter

The screening parameters are used as measures of an individual program component area option's relative merits in comparison to other options in that area, and scored accordingly. The scores were summed to develop a total score for each option.

6.2.1.5 Viable Options

Preliminary options that had the lowest total score or had a total score that was negative were eliminated from further consideration. Those with a higher total score were moved forward in the process and are termed *viable options*.

6.2.1.6 Level 3 Screening

Two of the program component areas produced more than one viable option: wastewater conveyance and treatment and JWPCP effluent management. For these program component areas, a third level of screening was performed. In the case of the CT program component area, the viable options were ranked against a set of criteria as described in Section 6.2.2.7. For the JWPCP effluent management program component area, a separate project-level alternatives analysis was conducted as described in Section 6.3. The results from the Level 3 screening were a set of ranked feasible options for each program component area.

6.2.1.7 Plan Alternatives

Program component area options represent the building blocks for comprehensive, system-wide alternatives. In this step of the process, individually ranked feasible options were combined into plan alternatives. These plan alternatives were ranked based on the results of the program-level and project-level alternatives analyses. The recommended plan represents the top-ranked alternative as identified in Section 6.4 and detailed in Chapter 7.

6.2.2 Wastewater Conveyance and Treatment (CT)

6.2.2.1 Conceptual Options

The primary function of the conveyance and treatment system is to collect, convey, and treat all existing and future wastewater flows within the JOS to a level consistent with discharge and water reuse requirements. Options were separately formulated for the conveyance and treatment program elements. The conveyance options were formulated in support of specific treatment strategies. For the purposes of the MFP, options related to conveyance were limited to major new interceptors and relief sewers that impact the JOS overall capabilities and operations. Therefore, tradeoffs between WRP expansion and increases to downstream interceptor capacity can be evaluated. Additional interceptor capacity would be provided where hydraulic constraints are identified under peak dry weather flow conditions within the Joint Outfall (JO) trunk lines. The addition of conveyance capacity could result from:

- Identified capacity deficits within the existing conveyance system related to current or future projected flows
- Needing to change the flow distribution among the various WRPs and the JWPCP
- Maintaining the routing of low quality flow around the WRPs so as to maximize the reclamation potential of the WRPs

The treatment variables that may affect requirements for new sewer capacity include the site capacity of a WRP, the anticipated future reuse demands near the site, and the expansion costs relative to other WRPs. Because of this dependency on selected treatment approaches to establish conveyance options, no independent conceptual options were formulated for the conveyance program element.

Chapter 4 provides the basis for projecting future flows and characteristics, and Chapter 5 provides an assessment of current capabilities relative to future needs. Taking into account the system s total capacity relative to projected flows, it is estimated that approximately 20 MGD of additional treatment plant capacity is required for the 2050 planning horizon. Four conceptual options for conveyance and treatment have been formulated to manage these additional flows. These are:

- **CT 1 JWPCP Expansion:** All flows beyond the combined current treatment capacity of the existing WRPs would be directed to and treated at the JWPCP. This would require expansion of the JWPCP to accommodate system flow increases.
- **CT 2 WRP Expansion Existing:** All flows beyond the current treatment capacity of the JWPCP would be intercepted by and treated at existing WRPs. This would require expansion to some of the WRPs to accommodate system flow increases.

- **CT 3 WRP Expansion – New:** All flows beyond the existing facilities' (WRPs and the JWPCP) combined current treatment capacity would be directed to and treated at a new WRP. System flow increases would be accommodated by the new WRP.
- **CT 4 WRP Expansion – Existing and New:** All flows beyond current capacity of the JWPCP would be intercepted by and treated at a combination of expanded existing WRPs and a new WRP.

Each of these conceptual options is described in the following subsections. For options that involve the expansion of existing facilities, consideration is given to increasing capacity by way of either conventional expansions or incorporating some degree of process optimization to existing process trains. For a new WRP, consideration is given to the potential application of new processes and technologies that differ from existing systems (process modifications).

CT 1 JWPCP Expansion

This option would utilize all of the WRPs up to their existing capacities for treatment of tributary flows, with all flows in excess of these combined capacities directed to and treated at the JWPCP. The JWPCP would be expanded as required, with no expansions of the existing WRPs undertaken. The JWPCP is a 400-MGD pure oxygen activated sludge wastewater treatment plant. No significant changes to current discharge requirements are anticipated. Taking into account the facility's current operational effectiveness and efficiency of treatment, consideration of either a new process or significant changes for process optimization are not warranted nor included in this option. As such, any future expansion at the JWPCP would be consistent with current processes and configurations.

This option would minimize the number of plants (i.e., limited to just one) affected by construction activities associated with treatment capacity expansion. It also may represent one of the lower unit cost approaches due to plant scale and level of treatment. However, this option would require the greatest level of conveyance system improvements to accommodate the transportation of flows to the JWPCP.

CT 2 WRP Expansion – Existing

This option would use the JWPCP up to its current treatment capabilities. Flow beyond this would be treated at the WRPs. The accommodation of these future flows would require capacity expansion of the WRPs. As stated in the Sanitation Districts' previous planning documents, including A Plan for Water Reuse (1963), the JOS Facilities Plan (1977), and the JOS 2010 Master Facilities Plan (1995), it is the general preference of the Sanitation Districts to expand upstream WRPs in lieu of major relief projects for the downstream conveyance system where practical. Large conveyance system projects can be very expensive and generate adverse environmental and community impacts during construction. The WRPs, on the other hand, provide substantial benefits in the form of increased water supplies by providing water recycling and reuse opportunities.

With six WRPs under consideration, a large number of potential WRP capacity expansion combinations that could be evaluated in connection with this option exist. The design of the WRPs is modular and, as such, any facilities expansion contemplated would follow the planned framework for plant expansion. For the Pomona Water Reclamation Plant (POWRP) and the Whittier Narrows Water Reclamation Plant (WNWRP), the modules are 5 MGD. For the San Jose Creek Water Reclamation Plant (SJCWRP), Los Coyotes Water Reclamation Plant (LCWRP), and Long Beach Water Reclamation Plant (LBWRP), the modules are 12.5 MGD. No additional flows are tributary to the La Cañada Water Reclamation Plant (LACAWRP) are projected, so no further evaluation of this plant is provided within this chapter.

Processes employed at the WRPs are primary sedimentation followed by fine-bubble, air activated sludge secondary treatment that includes nitrification and denitrification. Secondary treatment is followed by tertiary filtration and disinfection. All solids and residuals are returned to the conveyance system for treatment at the downstream JWPCP. With this approach, the economies of scale associated with using the WRP facilities for expansion as originally planned would apply. Consistency with existing systems and the resulting familiarity with plant operations would also be provided.

For options that include expansion of the existing WRPs, consideration of process optimization is warranted. Process optimization consists of modifications within the existing plant to ensure that the Sanitation Districts continue to consistently meet permit conditions in anticipation of increasing regulatory requirements. While there are a variety of potential approaches to optimizing current treatment at the WRPs, such as treatment system modifications and other in-plant upgrades, the inclusion of flow equalization, or partial flow equalization, could provide the greatest number of potential benefits. With this approach, storage capacity is provided to attenuate peak plant flows and/or loadings. Flow equalization:

- Promotes conditions for consistent ammonia removal
- Accommodates influent ammonia concentration variations and spikes
- Balances diurnal flow variations and thereby maximizes reuse potential
- Reduces peak flows to the tertiary processes (filtration and disinfection)
- Potentially increases the amount of recycled water that can be produced and used during low influent flow conditions (i.e., which are typically at night, when landscape demands for recycled water are highest)

Flow equalization can be implemented at a variety of locations within the treatment process train. For this conceptual option, consideration is provided for the equalization of effluent from the primary sedimentation tanks. The Sanitation Districts have a positive track record with primary effluent equalization at other facilities outside the JOS (i.e., the Valencia and Saugus WRPs). This approach can improve the reliability and stability of downstream processes while retaining a reasonable level of system maintenance.

The volume of equalization storage provided varies depending on plant-specific requirements. In some cases, partial attenuation of the peak loading would be sufficient to provide stable and reliable process operation for systems such as secondary treatment. The other extreme is providing complete equalization of the entire influent flow to eliminate hydraulic peaking and thereby reduce both the hydraulic and organic peak loading to all downstream processes. For the JOS WRPs evaluated as part of this conceptual option, process optimization through flow equalization of the primary effluent for peak loading attenuation will be evaluated.

Facilities expansion would use the existing process train, with the addition of primary effluent flow equalization facilities, and follow the planned expansion module capacity (5 MGD at the POWRP and WNWRP, and 12.5 MGD at the SJCWRP, LCWRP, and LBWRP).

CT 3 WRP Expansion – New

This option would utilize the JWPCP and the existing WRPs up to their current capacities for treatment of tributary flows, with all flows in excess of this total combined capacity directed to and treated at a new WRP. Such an approach would provide the opportunity to:

- Accommodate flow increases resulting from population growth
- Relieve hydraulic constraints within the conveyance system

- Provide additional opportunities for reuse
- Reduce peak wet weather hydraulic loads to the JWPCP

Property considered as a site for a new WRP must comply with the following requirements:

- Availability: The land must be available for purchase, and there should not be any conflicting current uses of the property
- Area: There must be sufficient area available and the land configured in a geometry that would accommodate the needs of a WRP
- Zoning: The current zoning must be compatible with the intended use or zoning changes must be reasonably available
- Access: The property must have sufficient vehicular access to initially allow for construction activities and subsequently allow for plant operation access (e.g., employees, equipment, consumable deliveries)
- Acceptability: The location selected must be such that its use would not create significant public opposition from individuals or groups
- Wastewater Source: The site must have both the quality of wastewater and the quantity needed for the intended use
- Effluent Management: The site must have access to a suitable location for effluent disposal, typically a surface water discharge point
- Reuse Potential: The site must be located as close as reasonably possible to reuse opportunities

The treatment train employed by a new WRP could be similar to that used at the existing WRPs, or new processes and technologies that differ from existing systems could be considered. Application of a different process would be warranted if there are more stringent discharge/reuse regulations or site limitations associated with the new WRP. Any number of process modifications could be considered for a new WRP ranging from fixed film reactors to the use of pure oxygen secondary reactors. For the purposes of this MFP, membrane bioreactors (MBRs) were evaluated as a potential system for a new WRP.

The MBR process employs the suspended growth activated sludge treatment process with membrane filtration equipment. The membranes provide the critical solids/liquids separation normally accomplished with secondary clarifiers. The activated sludge system is operated with mixed liquor concentrations of approximately 5,000 to 10,000 milligrams per liter (mg/L). The membrane type can be either microfiltration or ultrafiltration. These membranes are usually configured as submerged units with suction applied to draw in liquid with solids remaining in the source tank. Coarse bubble air is used around the membranes for both mixing and scouring. The resultant effluent quality is typically superior to that from a conventional activated sludge system followed by tertiary filters. This approach would:

- Provide a more compact facility
- Produce very high quality effluent, with no need for tertiary filtration
- Generate an effluent that is suitable for direct feed to reverse osmosis systems if required by future reuse demands
- Lessen impacts from poor settling sludges and maintain higher mixed liquor suspended solids (MLSS) concentrations

At this stage in the planning process, no decision relative to the specific process train employed at a new WRP is required. The ultimate decision, should this be a component of the recommended plan, would be driven by a wide variety of factors such as effluent discharge limitations, reuse opportunities, site constraints, economics, operational considerations, and public acceptability.

CT 4 WRP Expansion – Existing and New

This option would utilize the JWPCP up to its current capacity. Flows beyond this would be treated by a combination of an expansion of the existing WRPs and a new WRP.

The actual division of flows between the existing WRPs and a new WRP would be influenced by a number of factors that would ultimately be incorporated into the development of specific options. The types of factors that would be considered may include maximizing the usage of existing facilities’ capacities, minimizing conveyance system modifications and associated construction disruption, optimizing the availability of recycled water based on projected demands, lessening the potential for impacts on public use facilities, and impacting the fewest number of treatment plant sites with construction activities.

For this option, increasing the capacities of the WRPs would consider the incorporation of process optimization. Also, for this option, a new WRP would include consideration of new processes and technologies that differ from those at the existing WRPs (i.e., process modification).

6.2.2.2 Options Eliminated Through Level 1 Screening

Within the CT program component area, all of the options examined revolved around the expansion of WRP capacity. Of the four conceptual approaches to WRP expansion reviewed, three were eliminated on the basis of the considerations described in the following.

CT 1 JWPCP Expansion: This option provides a straightforward approach to increasing treatment capacity by the expansion of only one plant, the JWPCP. Implementation of this option, however, would result in the greatest requirement for additional conveyance system improvements along with the associated costs and related adverse community and environmental impacts during construction. This conceptual option is also in direct conflict with the Clearwater Program objective of accommodating emerging markets for recycled water reuse.

CT 3 WRP Expansion – New: This option would site a new facility to accommodate all system flow increases. The ability to locate an available site, obtain the support of the surrounding community, and procure the necessary permits to proceed with implementation remains questionable. In addition, the cost of a new facility and all associated development would be considerably higher than expansion of the existing WRPs. Potentially, there is land available at the JWPCP on which to construct a new WRP. However, the influent flows to the JWPCP are not reclaimable without utilizing a costly advanced level of treatment to reduce the high TDS levels.

CT 4 WRP Expansion – Existing and New: This option would result in the expansion of at least one of the existing WRPs to accommodate a portion of the system flow increases and the construction of a new WRP to accommodate the remaining flow increases. Although the new WRP would not need to accommodate the entire 20 MGD of increased flows, a smaller WRP would still be subject to the same concerns raised with respect to the CT 3 WRP Expansion – New option.

6.2.2.3 Preliminary Options

Of the four conceptual options evaluated, one remains. The preliminary option for conveyance and treatment is:

- **CT 2 WRP Expansion – Existing**

In the formulation of options involving the expansion of the existing WRPs, two potential constraints must be factored into the analysis. First, based on current property boundaries, each existing WRP has an associated site capacity that cannot be exceeded. There are no plans to extend any of the current sites through property acquisition. Second, the WRPs are limited to accepting only those flows tributary to that plant. In some cases, however, tributary flows can be adjusted by changing settings in upstream flow diversion structures such as stop logs or other conveyance system modifications. For the purposes of this analysis, tributary flows were estimated based on the current conveyance system configuration and settings. The site capacities and projected 2050 tributary flows for each JOS treatment plant are presented in Table 6-1.

Table 6-1. Projected 2050 Tributary Flows and Site Capacities (MGD)

	POWRP	SJCWRP	WNWRP	LCWRP	LBWRP	JWPCP	Total
Projected Tributary Flows	13	135	44	38	23	359	612
Estimated Plant Site Capacities	30	125	80	125	50	700	1110

Conveyance and treatment options were formulated and defined in terms of capacity expansions to meet projected future flows at different treatment plants within the JOS. Flows intercepted and treated at the WRPs upstream of the JWPCP can decrease the hydraulic loading to the trunk sewers downstream of these WRPs, and thereby reduce the requirements for conveyance system hydraulic improvement projects. The first step in developing a comparative assessment of CT options with respect to conveyance system impacts was to establish the definition of when a sewer pipe segment has reached or exceeded its capacity and requires some type of hydraulic relief. For the purposes of this analysis, a capacity limitation, or project need, was identified as those pipeline segments for which the depth of peak dry weather flow (d) within the pipe was projected to be equal to or greater than 90 percent of the pipeline's diameter (D) (i.e., $d/D \geq 0.9$) when conveying future flows.

The next step in conducting the conveyance system assessment was to create a baseline configuration. This baseline can then be used to develop quantifiable, comparative impacts for each of the CT options relative to the baseline. The baseline configuration represents the existing conveyance system plus those projects currently identified and expected to be implemented within the MFP planning horizon (i.e., by the year 2050). In the baseline configuration, the flows intercepted and treated at the different WRPs were limited to the existing plant capacities; all flows in excess of current WRP capacities would be diverted around the WRPs and ultimately be tributary and conveyed to the JWPCP. With respect to identifying conveyance system constraints, this represents a worst-case scenario. CT options that expand capacity at any existing WRP would provide some downstream conveyance system hydraulic relief compared to this baseline configuration.

The assessment of conveyance system capabilities and determination of capacity limitations, as defined by the d/D criterion for both the baseline configuration and CT options, was accomplished using the Sanitation Districts' static GIS conveyance system model. The application of this modeling tool permits the assessment of conveyance system capacity constraints based on a variety of flows and plant treatment capacities within the system. Using the previously defined baseline configuration and applying projected 2050 JOS flows, conveyance system potential capacity limitations are summarized in Table 6-2. The table lists the total lengths of these capacity constraints by each of the JO trunk sewer lines. The JO trunk sewers were previously depicted on Figure 5-16, with those having identified capacity limitations highlighted in red based on the criterion and methodology described above.

Table 6-2. Baseline Model Versus 2050 Flow □Identified Potential Joint Outfall Trunk Sewer Capacity Limitations

Joint Outfall (JO) Trunk Sewers	Length (miles)						
	Dia ≤ 24"	Dia □24" to 36"	Dia □36" to 48"	Dia □48" to 56"	Dia □56" to 72"	Dia □72"	Total
JO A[a]	0.4	1.5	2.4	1.6	5.1	0.1	11.1
JO B	2.4	1.1	0.3	4.6	7.1	□0.1	15.5
JO C	0.3	0.1	0.0	0.0	0.1	0.0	0.5
JO D	0.0	□0.1	□0.1	1.0	□0.1	0.0	1.0
JO E	0.5	0.6	0.1	0.1	0.0	0.0	1.3
JO F	□0.1	0.1	0.9	0.1	2.5	0.0	3.6
JO G	0.0	0.3	0.6	□0.1	0.0	0.0	0.9
JO H	0.2	2.4	1.6	2.0	3.3	0.2	9.7
JO J	0.1	0.0	0.0	0.0	□0.1	0.0	0.1
Total	3.9	6.1	5.9	9.4	18.1	0.3	43.7

[a] Joint Outfall A includes JOA-1A sewers.

Dia □diameter

A similar conveyance system capacity assessment was conducted for each CT preliminary option. For the purposes of this analysis, the conveyance system needs identified for each option were compared to the conveyance system needs identified for the baseline configuration.

In the initial formulation of CT preliminary option CT 2, all feasible combinations of JOS treatment plant expansions capable of providing at least 612 MGD of total system treatment capacity were systematically identified. The development of these potential treatment scenarios was based on the following:

- The treatment capacity per expansion module is 12.5 MGD for the SJCWRP, LCWRP, and LBWRP, and 5 MGD for the POWRP and WNWRP
- The POWRP tributary flow can be increased up to 24 MGD by upstream sewer diversions; therefore, the expansion capacity at the POWRP is limited to 25 MGD
- The LBWRP tributary flow can be increased to match its 50-MGD site capacity by some combination of upstream sewer diversions, new interceptors, and pumping station modifications

The results of this analysis are a total of 18 potential treatment scenarios, as depicted in Table 6-3.

Table 6-3. Potential Treatment Scenarios

	Treatment Plant Expansion (MGD)				
Scenario	POWRP	WNWRP	SJCWRP	LCWRP	LBWRP
1	-	20	-	-	-
2	5	15	-	-	-
3	10	10	-	-	-
4	-	10	12.5	-	-
5	5	5	12.5	-	-
6	10	-	12.5	-	-
7	-	10	-	12.5	-
8	5	5	-	12.5	-
9	10	-	-	12.5	-
10	-	10	-	-	12.5
11	5	5	-	-	12.5
12	10	-	-	-	12.5
13	-	-	25	-	-
14	-	-	12.5	12.5	-
15	-	-	12.5	-	12.5
16	-	-	-	25	-
17	-	-	-	12.5	12.5
18	-	-	-	-	25

A number of the depicted scenarios may not be practical in terms of identified constraints for existing treatment plants and the current conveyance system capabilities. In addition, some of the scenarios may not be consistent with the basic planning objectives outlined for the Clearwater Program. The planning objective of greatest relevance in the comparative assessment of treatment scenarios is to provide a wastewater treatment and effluent management program that accommodates and promotes emerging recycled water reuse and biosolids beneficial use opportunities.

With respect to reuse, the greatest projected demands for recycled water are associated with the SJCWRP. It is estimated that long-term demands for recycled water at the SJCWRP will exceed the plant's ultimate site capacity. Therefore, to achieve the maximum levels of water reuse consistent with the planning objectives, CT preliminary options examined were limited to those scenarios that included expansion at the SJCWRP. The seven practical and consistent CT preliminary options evaluated that provide a minimum of 20 MGD throughout the JOS are presented in Table 6-4. CT 2A-F represent the six sub-options for CT 2. Each of the CT preliminary options outlined in this table is discussed in the subsections that follow.

Table 6-4. CT Preliminary Options

Option Number	Number of WRPs Constructed/Expanded	Option Designation	Scenario From Table 6-3
CT 2A	1	SJC	13
CT 2B	3	SJC/PO/WN	5
CT 2C	2	SJC/PO	6
CT 2D	2	SJC/WN	4
CT 2E	2	SJC/LC	14
CT 2F	2	SJC/LB	15

Option CT 2A – SJC

In this option, the SJCWRP would be expanded by 25 MGD. This expansion would consist of the addition of two treatment modules. The plant capacities and associated expansions for this option are presented in Table 6-5.

Table 6-5. Option CT 2A – SJC: Modules and Flows

	POWRP	SJCWRP	WNWRP	LCWRP	LBWRP	JWPCP	Total
Existing Number of Modules	3	8	3	3	2	8	-
Number of New Modules Required	0	2	0	0	0	0	-
Total Number of Modules	3	10	3	3	2	8	-
Projected Plant Flows (MGD)	15	125	15	37.5	25	394.5	612

As shown in Table 6-5, the expansion would provide a total system capacity consistent with that required for the JOS in 2050. This approach would also provide additional high quality recycled water in areas of identified potential future demands. Option CT 2A would require the addition of multiple modules. It is likely that these would be staged over time based on flow increases experienced.

The conveyance system impacts have been analyzed using the static GIS conveyance system model and applying the previously described d/D criterion and evaluation methodology. The potential capacity limitations identified by this approach are listed in Table 6-6 by JO trunk sewers. For the purposes of comparison, the totals for the baseline configuration are also shown in Table 6-6.

Table 6-6. Option CT 2A – SJC: Identified Potential Joint Outfall Trunk Sewer Capacity Limitations

Joint Outfall (JO) Trunk Sewers	Length (miles)						
	Dia ≤ 24"	Dia > 24" to 36"	Dia > 36" to 48"	Dia > 48" to 56"	Dia > 56" to 72"	Dia > 72"	Total
JO A[a]	0.4	1.5	1.9	1.6	4.8	0.1	10.3
JO B	2.4	1.1	0.1	3.9	4.1	0.0	11.6
JO C	0.3	0.1	0.0	0.0	<0.1	0.0	0.4
JO D	0.0	<0.1	<0.1	1.0	<0.1	0.0	1.0
JO E	0.5	0.6	0.1	0.1	0.0	0.0	1.3
JO F	<0.1	0.1	0.9	0.1	1.5	0.0	2.6
JO G	0.0	0.3	0.6	<0.1	0.0	0.0	0.9
JO H	0.2	2.4	1.5	<0.1	0.2	<0.1	4.3
JO J	0.1	0.0	0.0	0.0	<0.1	0.0	0.1
Total	3.9	6.1	5.1	6.7	10.6	0.1	32.5
Baseline Total	3.9	6.1	5.9	9.4	18.1	0.3	43.7
Difference	0.0	0.0	0.8	2.7	7.5	0.2	11.2

[a] Joint Outfall A includes JOA-1A sewers.
Dia = diameter

Option CT 2B – SJC–PO–WN

In this option, the SJCWRP would be expanded by 12.5 MGD. This expansion would consist of the addition of one treatment module. The remaining required treatment capacity would be obtained by expanding both the POWRP and the WNWRP by 5 MGD. The POWRP would be expanded by one treatment module; the WNWRP would also be expanded by one treatment module. The plant capacities and associated expansions for this option are presented in Table 6-7.

Table 6-7. Option CT 2B □SJC□PO□WN: Modules and Flows

	POWRP	SJCWRP	WNWRP	LCWRP	LBWRP	JWPCP	Total
Existing Number of Modules	3	8	3	3	2	8	-
Number of New Modules Required	1	1	1	0	0	0	-
Total Number of Modules	4	9	4	3	2	8	-
Projected Plant Flows (MGD)	20	112.5	20	37.5	25	397	612

As shown in Table 6-7, the expansions would provide a total system capacity consistent with that required for the JOS in 2050. This approach would also provide additional high quality recycled water in areas of identified potential future demands. Option CT 2B would require the addition of multiple modules. It is likely these would be staged over time based on flow increases experienced.

The conveyance system impacts have been analyzed using the static GIS conveyance system model and applying the previously described criterion and methodology. The system potential capacity limitations identified by this approach are listed in Table 6-8 by JO trunk sewers. For the purposes of comparison, the totals for the baseline configuration are also shown in Table 6-8.

Table 6-8. Option CT 2B □SJC□PO□WN: Identified Potential Joint Outfall Trunk Sewer Capacity Limitations

Joint Outfall (JO) Trunk Sewers	Length (miles)						
	Dia ≤ 24"	Dia □24" to 36"	Dia □36" to 48"	Dia □48" to 56"	Dia □56" to 72"	Dia □72"	Total
JO A[a]	0.4	1.0	1.9	1.6	4.8	0.1	9.8
JO B	2.4	1.1	0.1	4.0	4.6	0.0	12.2
JO C	0.3	0.1	0.0	0.0	0.1	0.0	0.5
JO D	0.0	□0.1	□0.1	1.0	□0.1	0.0	1.0
JO E	0.5	0.6	0.1	0.1	0.0	0.0	1.3
JO F	□0.1	0.1	0.9	0.1	1.5	0.0	2.6
JO G	0.0	0.3	0.6	□0.1	0.0	0.0	0.9
JO H	0.2	2.4	1.5	0.4	0.7	□0.1	5.2
JO J	0.1	0.0	0.0	0.0	□0.1	0.0	0.1
Total	3.9	5.6	5.1	7.2	11.7	0.1	33.6
Baseline Total	3.9	6.1	5.9	9.4	18.1	0.3	43.7
Difference	0.0	0.5	0.8	2.2	6.4	0.2	10.1

[a] Joint Outfall A includes JOA-1A sewers.
Dia □diameter

Option CT 2C □SJC□PO

In this option, the SJCWRP would be expanded by 12.5 MGD. This expansion would consist of the addition of one treatment module. The remaining required capacity would be obtained by a 10 MGD expansion of the POWRP. The POWRP would be expanded by the addition of two treatment modules. The plant capacities and associated expansions for this option are presented in Table 6-9.

Table 6-9. Option CT 2C – SJC–PO: Modules and Flows

	POWRP	SJCWRP	WNWRP	LCWRP	LBWRP	JWPCP	Total
Existing Number of Modules	3	8	3	3	2	8	-
Number of New Modules Required	2	1	0	0	0	0	-
Total Number of Modules	5	9	3	3	2	8	-
Projected Plant Flows (MGD)	25	112.5	15	37.5	25	397	612

As shown in Table 6-9, the expansions would provide a total system capacity consistent with that required for the JOS in 2050. This approach would also provide additional high quality recycled water in areas of identified potential future demands. Option CT 2C would require the addition of multiple modules. It is likely these would be staged over time based on flow increases experienced.

The conveyance system impacts have been analyzed using the static GIS conveyance system model and applying the previously described criterion and methodology. The system potential capacity limitations identified by this approach are listed in Table 6-10 by JO trunk sewers. For the purposes of comparison, the totals for the baseline configuration are also shown in Table 6-10.

Table 6-10. Option CT 2C – SJC–PO: Identified Potential Joint Outfall Trunk Sewer Capacity Limitations

Joint Outfall (JO) Trunk Sewers	Length (miles)						
	Dia ≤ 24"	Dia > 24" to 36"	Dia > 36" to 48"	Dia > 48" to 56"	Dia > 56" to 72"	Dia > 72"	Total
JO A[a]	0.4	0.9	1.9	1.6	4.8	0.1	9.7
JO B	2.4	1.1	0.1	4.3	4.6	0.0	12.5
JO C	0.3	0.1	0.0	0.0	0.1	0.0	0.5
JO D	0.0	< 0.1	< 0.1	1.0	< 0.1	0.0	1.0
JO E	0.5	0.6	0.1	0.1	0.0	0.0	1.3
JO F	< 0.1	0.1	0.9	0.1	1.5	0.0	2.6
JO G	0.0	0.3	0.6	< 0.1	0.0	0.0	0.9
JO H	0.2	2.4	1.5	0.3	0.4	< 0.1	4.8
JO J	0.1	0.0	0.0	0.0	< 0.1	0.0	0.1
Total	3.9	5.5	5.1	7.4	11.4	0.1	33.4
Baseline Total	3.9	6.1	5.9	9.4	18.1	0.3	43.7
Difference	0.0	0.6	0.8	2.0	6.7	0.2	10.3

[a] Joint Outfall A includes JOA-1A sewers.
Dia = diameter

Option CT 2D – SJC–WN

In this option, the SJCWRP would be expanded by 12.5 MGD. This expansion would consist of the addition of one treatment module. The remaining required capacity would be obtained by a 10 MGD expansion of the WNWRP. The WNWRP would be expanded by the addition of two treatment modules. The plant capacities and associated expansions for this option are presented in Table 6-11.

Table 6-11. Option CT 2D – SJC/WN: Modules and Flows

	POWRP	SJCWRP	WNWRP	LCWRP	LBWRP	JWPCP	Total
Existing Number of Modules	3	8	3	3	2	8	-
Number of New Modules Required	0	1	2	0	0	0	-
Total Number of Modules	3	9	5	3	2	8	-
Projected Plant Flows (MGD)	15	112.5	25	37.5	25	397	612

As shown in Table 6-11, the expansions would provide a total system capacity consistent with that required for the JOS in 2050. This approach would also provide additional high quality recycled water in areas of identified potential future demands. Option CT 2D would require the addition of multiple modules. It is likely that these would be staged over time based on flow increases experienced.

The conveyance system impacts have been analyzed using the static GIS conveyance system model and applying the previously described criterion and methodology. The system potential capacity limitations identified by this approach are listed in Table 6-12 by JO trunk sewers. For the purposes of comparison, the totals for the baseline configuration are also shown in Table 6-12.

Table 6-12. Option CT 2D – SJC/WN: Identified Potential Joint Outfall Trunk Sewer Capacity Limitations

Joint Outfall (JO) Trunk Sewers	Length (miles)						
	Dia ≤ 24"	Dia > 24" to 36"	Dia > 36" to 48"	Dia > 48" to 56"	Dia > 56" to 72"	Dia > 72"	Total
JO A[a]	0.4	1.5	1.9	1.6	4.8	0.1	10.3
JO B	2.4	1.1	0.1	4.0	4.6	0.0	12.2
JO C	0.3	0.1	0.0	0.0	0.1	0.0	0.5
JO D	0.0	<0.1	<0.1	1.0	<0.1	0.0	1.0
JO E	0.5	0.6	0.1	0.1	0.0	0.0	1.3
JO F	<0.1	0.1	0.9	0.1	1.5	0.0	2.6
JO G	0.0	0.3	0.6	<0.1	0.0	0.0	0.9
JO H	0.2	2.4	1.5	1.8	0.9	<0.1	6.8
JO J	0.1	0.0	0.0	0.0	<0.1	0.0	0.1
Total	3.9	6.1	5.1	8.6	11.9	0.1	35.7
Baseline Total	3.9	6.1	5.9	9.4	18.1	0.3	43.7
Difference	0.0	0.0	0.8	0.8	6.2	0.2	8.0

[a] Joint Outfall A includes JOA-1A sewers.
Dia = diameter

Option CT 2E – SJC/LC

In this option, the SJCWRP would be expanded by 12.5 MGD. This expansion would consist of the addition of one treatment module. The remaining required capacity would be obtained by a 12.5 MGD expansion of the LCWRP. The LCWRP would be expanded by the addition of one treatment module. The plant capacities and associated expansions for this option are presented in Table 6-13.

Table 6-13. Option CT 2E – SJC–LC: Modules and Flows

	POWRP	SJCWRP	WNWRP	LCWRP	LBWRP	JWPCP	Total
Existing Number of Modules	3	8	3	3	2	8	-
Number of New Modules Required	0	1	0	1	0	0	-
Total Number of Modules	3	9	3	4	2	8	-
Projected Plant Flows (MGD)	15	112.5	15	50	25	394.5	612

As shown in Table 6-13, the expansions would provide a total system capacity consistent with that required for the JOS in 2050. This approach would also provide additional high quality recycled water in areas of identified potential future demands. Option CT 2E would require the addition of multiple modules. It is likely these would be staged over time based on flow increases experienced and the optimal approach in terms of overall construction costs and facilities disruption.

The conveyance system impacts have been analyzed using the static GIS conveyance system model and applying the previously described criterion and methodology. The system potential capacity limitations identified by this approach are listed in Table 6-14 by JO trunk sewers. For the purposes of comparison, the totals for the baseline configuration are also shown in Table 6-14.

Table 6-14. Option CT 2E – SJC–LC: Identified Potential Joint Outfall Trunk Sewer Capacity Limitations

Joint Outfall (JO) Trunk Sewers	Length (miles)						
	Dia ≤ 24"	Dia > 24" to 36"	Dia > 36" to 48"	Dia > 48" to 56"	Dia > 56" to 72"	Dia > 72"	Total
JO A[a]	0.4	1.5	1.9	1.6	4.8	0.3	10.5
JO B	2.4	1.1	0.2	4.6	5.0	0.0	13.3
JO C	0.3	0.1	0.0	0.0	0.1	0.0	0.5
JO D	0.0	< 0.1	< 0.1	1.0	< 0.1	0.0	1.0
JO E	0.5	0.6	0.1	0.1	0.0	0.0	1.3
JO F	< 0.1	0.1	0.9	0.1	0.3	0.0	1.4
JO G	0.0	0.3	0.6	< 0.1	0.0	0.0	0.9
JO H	0.2	2.3	1.5	2.0	1.0	< 0.1	7.0
JO J	0.1	0.0	0.0	0.0	< 0.1	0.0	0.1
Total	3.9	6.0	5.2	9.4	11.2	0.3	36.0
Baseline Total	3.9	6.1	5.9	9.4	18.1	0.3	43.7
Difference	0.0	0.1	0.7	0.0	6.9	0.0	7.7

[a] Joint Outfall A includes JOA-1A sewers.
Dia = diameter

Option CT 2F – SJC–LB

In this option, the SJCWRP would be expanded by 12.5 MGD. This expansion would consist of the addition of one treatment module. The remaining required capacity would be obtained by a 12.5 MGD expansion of the LBWRP. The LBWRP would be expanded by the addition of one treatment module. The plant capacities and associated expansions for this option are presented in Table 6-15.

Table 6-15. Option CT 2F – SJC–LB: Modules and Flows

	POWRP	SJCWRP	WNWRP	LCWRP	LBWRP	JWPCP	Total
Existing Number of Modules	3	8	3	3	2	8	-
Number of New Modules Required	0	1	0	0	1	0	-
Total Number of Modules	3	9	3	3	3	8	-
Projected Plant Flows (MGD)	15	112.5	15	37.5	37.5	394.5	612

As shown in Table 6-15, the expansions would provide a total system capacity consistent with that required for the JOS in 2050. This approach would also provide additional high quality recycled water in areas of identified potential future demands. Option CT 2F would require the addition of multiple modules. It is likely these would be staged over time based on flow increases experienced.

The conveyance system impacts have been analyzed using the static GIS conveyance system model and applying the previously described criterion and methodology. The system potential capacity limitations identified by this approach are listed in Table 6-16 by JO trunk sewers. For the purposes of comparison, the totals for the baseline configuration are also shown in Table 6-16.

Table 6-16. Option CT 2F – SJC–LB: Identified Potential Joint Outfall Trunk Sewer Capacity Limitations

Joint Outfall (JO) Trunk Sewers	Length (miles)						
	Dia ≤ 24”	Dia > 24" to 36"	Dia > 36" to 48"	Dia > 48" to 56"	Dia > 56" to 72"	Dia > 72"	Total
JO A[a]	0.5	1.5	1.9	1.6	4.8	0.1	10.4
JO B	2.4	1.1	0.2	4.6	5.0	0.0	13.3
JO C	0.3	0.1	2.7	0.0	0.1	0.0	3.2
JO D	0.0	<0.1	<0.1	1.0	<0.1	0.0	1.0
JO E	0.5	0.6	0.1	0.1	0.0	0.0	1.3
JO F	<0.1	0.1	0.4	0.0	0.8	0.0	1.3
JO G	0.0	0.3	0.6	<0.1	0.0	0.0	0.9
JO H	0.2	2.4	1.5	2.0	1.0	<0.1	7.1
JO J	0.1	0.0	0.0	0.0	<0.1	0.0	0.1
Total	4.0	6.1	7.4	9.3	11.7	0.1	38.6
Baseline Total	3.9	6.1	5.9	9.4	18.1	0.3	43.7
Difference	-0.1	0.0	-1.5	0.1	6.4	0.2	5.1

[a] Joint Outfall A includes JOA-1A sewers.
Dia = diameter

In addition to the capacity limitation within existing trunk sewers presented in Table 6-16, in order to obtain sufficient influent flows as the LBWRP consistent with the option, an additional interceptor would be required. This interceptor would be approximately 5 miles in length and 42 inches in diameter. Flows would be diverted from the area currently tributary to the LCWRP to the tributary area for the LBWRP.

CT Options Summary

A total of six CT preliminary options have been formulated and presented. These options represent a wide range of alternatives relative to distribution of flows to the different treatment plants and the associated facilities expansion resulting from increased tributary plant flows. A summary of treatment plants and projected flows in 2050 for each of the options identified is presented in Table 6-17. In addition to the expansions identified, all of the options include process optimization at the SJCWRP, POWRP, LCWRP, and LBWRP.

Table 6-17. Preliminary CT Options Summary

	Projected Treatment Plant Flows (MGD)						
Preliminary Options	**POWRP**	**SJCWRP**	**WNWRP**	**LCWRP**	**LBWRP**	**JWPCP**	**Total**
CT 2A SJC	15	125	15	37.5	25	394.5	612
CT 2B SJC/PO/WN	20	112.5	20	37.5	25	397	612
CT 2C SJC/PO	25	112.5	15	37.5	25	397	612
CT 2D SJC/WN	15	112.5	25	37.5	25	397	612
CT 2E SJC/LC	15	112.5	15	50	25	394.5	612
CT 2F SJC/LB	15	112.5	15	37.5	37.5	394.5	612

6.2.2.4 Level 2 Screening

The Level 2 screening parameters for the CT program component area are:

- Conveyance system impacts
- Treatment plant impacts
- Regulatory compliance
- Public acceptability
- Operational flexibility, reliability, and familiarity
- Cost effectiveness

The application of the Level 2 screening parameters is shown in Table 6-18.

Table 6-18. Comparison of Preliminary CT Options to Level 2 Screening Parameters

	Conveyance System Impacts	Treatment Plant Impacts	Regulatory Compliance	Public Acceptability	Operational Flexibility, Reliability, and Familiarity	Cost Effectiveness	Score	Ranking
CT 2A SJC	□	□	0	0	0	□	□3	1
CT 2B SJC/PO/ WN	□	-	0	0	0	0	0	3
CT 2C SJC/PO	□	0	0	0	0	0	□1	2
CT 2D SJC/WN	□	0	0	0	0	0	□1	2
CT 2E SJC/LC	0	0	0	0	0	□	□1	2
CT 2F SJC/LB	-	0	0	-	0	-	-3	4

6.2.2.5 Options Eliminated Through Level 2 Screening

All of the options examined revolved around increasing total WRP capacity by expansion of existing plants. Of the six preliminary options put forth for consideration to expand the WRPs, the one option with a negative score was eliminated from further consideration:

CT 2F SJC□LB: The considerations that contributed to this scoring□ranking were:

- Conveyance System Impacts: This option would require the construction of approximately 5 miles of new major interceptor line. This would be in addition to the baseline conveyance system improvements that would be common to all options.
- Public Acceptability: The construction of this interceptor would create significant disruption in public rights-of-way and would be unfavorably viewed by those parties directly affected during construction.
- Cost Effectiveness: While all of the options under consideration would involve the construction of additional treatment capacity, the eliminated option is the only one that would require a significant additional investment in conveyance system infrastructure.

6.2.2.6 Viable Options

Of the six preliminary options evaluated, five remain. The viable options for conveyance and treatment are:

- **CT 2A SJC**
- **CT 2B SJC-PO-WN**
- **CT 2C SJC-PO**
- **CT 2D SJC-WN**
- **CT 2E SJC-LC**

6.2.2.7 Level 3 Screening

The viable options were evaluated in terms of compliance with Level 3 screening parameters to develop a set of ranked feasible options.

Level 3 Screening Parameters

Screening parameters were selected and defined to provide measurable, comprehensive, and independent results. Each option was scored on a system from zero (worst) to ten (best). Each of these parameters is briefly discussed in the paragraphs that follow.

Environmental Impacts

Environmental impacts consider both the short-term (construction) and long-term (operational) impacts related to the subject alternative. This parameter takes into account both the extent of construction as well as the sensitivity of areas affected. Long-term impacts also include any potential benefits related to water quality or resource use derived from facilities operation. The scores for this parameter range from zero, for a high degree of impacts and a high level of mitigation required, to ten, for limited impacts and no mitigation required.

Public Acceptability/Institutional Feasibility

The public acceptability/institutional feasibility parameter considers the relative degree of public acceptance anticipated for each of the alternatives. This includes views of individuals as well as community groups. Inasmuch as public institutions represent the interests and views expressed by elected officials, the support of these institutions is factored into the analysis. The need for, and the ability to, procure permits and approvals from other agencies are also incorporated into this parameter. The scores for this parameter range from zero, for a high degree of public opposition and extensive permits and approvals, to ten, for positive public perceptions and support and no outside permits or approvals needed.

Operational Considerations

Operational considerations assess the impact of new facilities on current plant O&M. The assessment includes examination of impacts on operational flexibility, plant reliability, and the operations staffs' current familiarity with treatment systems under consideration. The ability to consistently meet all discharge requirements is also included within this parameter. The scores for this parameter range from zero, for limited experience with systems under consideration, to ten, for a high degree of flexibility, reliability, and familiarity.

Promote Reclamation/Reuse

Promote reclamation/reuse considers the potential for increased recycling and reuse of plant effluent over the planning period. This is affected by the location of effluent generation (which WRPs are expanded) as well as the projected future reuse demands that may exist in a particular area within a reasonable proximity of the plant. The scores for this parameter range from zero, for least reuse potential, to ten, for greatest reuse potential.

Cost Effectiveness

Cost effectiveness considers the capital costs associated with the implementation of each alternative. The capital costs are divided into three major component costs: conveyance improvements, process optimization, and treatment plant expansions. The scores for this parameter range were based on the ratio of that option's cost against the lowest cost alternative, with the lowest cost alternative receiving a ten.

The scores for the parameters were then weighted according to the values in Table 6-19 and combined to determine a weighted score for each option. The evaluation and screening process employed a multi-criteria decision support software tool to facilitate the overall assessment effort. The software provided the flexibility to investigate a wide range of evaluation approaches and allowed for a sensitivity analysis of outcomes.

Table 6-19. Level 3 Screening Parameters and Weighting

Parameter	Weight (Percent)
Environmental Impacts	25
Public Acceptability/Institutional Feasibility	20
Operational Considerations	15
Promote Reclamation/Reuse	20
Cost Effectiveness	20

The scoring summary of the viable options, including the relative rankings, is presented in Table 6-20.

Table 6-20. Viable Options Scoring Summary

Option	Weighted Score	Relative Ranking
CT 2A SJC	9.25	1
CT 2B SJC/PO/WN	6.45	4
CT 2C SJC/PO	8.40	2
CT 2D SJC/WN	6.25	5
CT 2E SJC/LC	7.95	3

6.2.2.8 Viable Options Eliminated

On the basis of the assessment of viable options and the application of Level 3 screening parameters, four of the five viable options were eliminated from further consideration. Option CT 2A SJC scored the highest in all five of the screening parameters and had the highest weighted score. Therefore, it will be carried forward as the only feasible option. The factors contributing to the elimination of the other options are discussed in the following paragraphs.

CT 2B SJC-PO-WN: This option has a significant potential for environmental impacts. These impacts are related to the construction at the WNWRP within a flood plain area and adjacent to a possible wetland habitat composed of riparian scrub. Expansion of the WNWRP would also likely require a fairly extensive effort with respect to permitting and obtaining approval from the U.S. Army Corps of Engineers (Corps) for modification of the flood plain site. The complexity of construction in a flood plain also results in relatively high capital costs. This option also requires construction and would result in impacts at three separate treatment plant sites.

CT 2C SJC-PO: This option has additional environmental impacts related to a slightly longer length of conveyance improvements than the recommended option and construction and resulting impacts at two separate treatment plant sites. This option results in higher capital costs.

CT 2D SJC-WN: This option has a significant potential for environmental impacts. These impacts are related to the construction at the WNWRP within a flood plain area and adjacent to a possible wetland habitat composed of riparian scrub. Expansion of the WNWRP would also likely require a fairly extensive effort with respect to permitting and obtaining approval from the Corps for modification of the flood plain site. The complexity of construction in a flood plain also results in relatively high capital costs. This option also requires construction and would result in impacts at two separate treatment plant sites.

CT 2E SJC-LC: This option has additional environmental impacts related to a longer length of conveyance improvements than the recommended option, impacts on recreational areas, and construction and resulting impacts at two separate treatment plant sites. There is greater reuse potential with the recommended option. This option also results in higher capital costs.

6.2.2.9 Ranked Feasible Options

Of the five viable options evaluated, one remains. The only feasible, thus top-ranked, option for conveyance and treatment is:

- **CT 2A SJC**

6.2.3 Solids Processing (SP)

6.2.3.1 Conceptual Options

The primary objective of the solids processing systems is to convert the treatment process residuals from a liquid sludge to a more stable, substantial material that is termed *biosolids*. Processes employed in connection with this conversion include thickening, stabilization, and dewatering. All solids from the WRPs and the JWPCP are currently treated at the JWPCP.

SP 1 Centralized Processing at the JWPCP

This option would continue the existing practice of treating all solids at the JWPCP. Solids generated at the upstream WRPs would continue to be returned to the conveyance system and removed and treated at the JWPCP. Any new facilities for solids processing required in terms of level of treatment or expansion of capacity would be implemented at the JWPCP. Such an approach provides continuity with existing practice and avoidance of major investments in new systems and/or property acquisition.

SP 2 Processing at Source Plants

In this option, the solids processing would take place at the plants where the materials are generated. This would result in solids processing systems at each of the WRPs; the systems at the JWPCP would remain in place but would operate at a lower capacity reflecting the reduced loading. This approach would increase conveyance capacity for raw wastewater by removing the solids currently returned to the system and eliminate the double removal (first at the WRPs and then at the JWPCP) of these materials within the treatment systems. The land used for solids processing facilities at the WRPs would not be available for additional wastewater treatment facilities.

SP 3 Centralized Processing □New Sites

In this option, all solids from the WRPs would be returned to the JOS conveyance system and ultimately removed at the JWPCP. The subsequent processing of these materials, however, would take place at a new site, remote from the existing facility. All solids generated would be collected, pumped, and conveyed to the new site via a dedicated sludge pipeline. Systems employed for processing would be the same as currently used. This option would reduce potential impacts associated with solids processing to the community immediately surrounding the JWPCP. These community impacts, however, would essentially be transferred to the area surrounding the new solids processing site. The removal of this function from the existing plant would also free these areas for alternative uses.

6.2.3.2 Options Eliminated Through Level 1 Screening

Three solids processing conceptual options were examined. Of these, the following two options were eliminated from further consideration:

SP 2 Processing at Source Plants: A number of significant limitations exist relative to consideration of processing solids at the WRPs. Many of these sites are space-limited and could not accommodate the areas required for solids processing within their current footprint. If the Sanitation Districts sought to acquire additional adjacent land for plant expansion, significant opposition to such an arrangement could be anticipated from nearby property owners. As a result, the ability to procure required permits, as well as obtain environmental clearances for implementation, is likely to be significantly challenged. If the solids processing facilities were implemented within the WRPs□current footprints, it would significantly reduce the availability of property for water recycling facilities. This would, in turn, effectively reduce plant capacity and, thereby, not accommodate future recycled water reuse opportunities. The costs of duplicating existing systems would be considerable, limiting the relative cost effectiveness of such an arrangement.

SP 3 Centralized Processing □New Site: The primary limitations associated with this option are similar to those cited for Option SP 2. Finding a suitable location where there would not be significant community opposition is unlikely. As a result, the ability to procure the required permits, as well as obtain environmental clearances for implementation, is questionable. The costs of duplicating existing systems would be considerable, and, therefore, this approach does not provide a cost-effective means of solids management.

6.2.3.3 Preliminary Options

Of the three conceptual options evaluated, one remains. The only preliminary option for solids processing is:

- **SP 1 Centralized Processing at the JWPCP**

This option represents continuation of existing practices. Within the context of this preliminary option, the existing processes for thickening, stabilization, and dewatering will be examined to determine if they represent the most appropriate technologies for the future, or if changes are warranted. Sub-options representing further elaboration of this concept are discussed in the subsections that follow. While both options involve processing solids at the JWPCP, the systems employed would be different.

SP 1A Continue Existing Solids Processing Systems

The existing systems at the JWPCP for solids processing are:

- Waste Activated Sludge (WAS) Thickening: Dissolved air flotation (DAF) thickeners
- Stabilization: Conventional anaerobic digesters
- Dewatering: Centrifuges

These systems would continue to be employed and, as flows and loads to the JWPCP increase, these processes would be expanded to keep pace with capacity needs. Such an approach provides continuity with existing practices and avoids major investment in new systems.

SP 1B New Solids Processing Systems

In this option, the existing solids processing systems would be replaced with new systems.

There are a large number of WAS thickening systems available that are different from the existing DAFs. The two most likely to be found in plants of this type are gravity belt thickeners (GBTs) and centrifuge thickeners. The GBTs represent possibly the simplest and lowest energy type of approach, but have high polymer consumption, and a higher potential for odor generation. Centrifuge thickeners are more common at larger plants like the JWPCP and would be consistent with equipment used in the dewatering process. Centrifuge thickeners permit a more positive approach to air emission containment and odor control, but typically have the highest power consumption among thickening processes.

While there are a large number of possible approaches to sludge stabilization, anaerobic digestion is used at most large facilities for this purpose. One variation on the process is to modify the reactor type from a conventional cylindrical digester to an egg-shaped digester. Egg-shaped digesters are more efficient in terms of space requirements and typically have less frequent requirements for routine removal from service for cleaning. These units are typically more expensive to construct.

Other than centrifuge dewatering, two other systems used at larger plants are belt presses and filter presses. Belt presses, while used at some large plants, are typically not employed for plants of the size of the JWPCP due to the large number of individual units that would be required. Filter presses can provide a high solids sludge cake product typically using lime and metallic salts for conditioning in lieu of polymer.

6.2.3.4 Level 2 Screening

The screening parameters for the SP program component area are:

- Treatment plant impacts
- Institutional feasibility
- Regulatory compliance
- Public acceptability

- Operational flexibility, reliability, and familiarity
- Cost effectiveness

The application of the Level 2 Screening Parameters is shown in Table 6-21.

Table 6-21. Comparison of Preliminary Options to Level 2 Screening Parameters

	Treatment Plant Impacts	Institutional Feasibility	Regulatory Compliance	Public Acceptability	Operational Flexibility, Reliability, and Familiarity	Cost Effectiveness	Score	Ranking
SP 1A JWPCP: Existing Systems	0	0	0	0	□	□	□2	1
SP 1B JWPCP: New Systems	-	0	0	0	-	-	-3	2

6.2.3.5 Options Eliminated Through Level 2 Screening

One sub-option was eliminated from consideration through Level 2 screening:

SP 1B New Solids Processing Systems: This option was eliminated on the basis of:

- Treatment Plant Impacts: The implementation of significant new facilities at the JWPCP would result in significant construction-related disruption to the plant□s operations for a significant duration.
- Operational Flexibility, Reliability, and Familiarity: The new systems under consideration represent a significant departure from the technology currently employed without commensurate improvement in efficiency or effectiveness.
- Cost Effectiveness: The replacement of existing systems with alternate technologies represents a significant expenditure. This investment would not yield a commensurate improvement in efficiency or effectiveness.

In summary, the systems and processes currently in place represent appropriate and sound technologies for the applications in question. Any significant changes would detrimentally impact operations based on the current level of system familiarity. Finally, the costs and complexity of process changes would be prohibitive without providing any resulting substantive, offsetting benefits.

6.2.3.6 Viable Options

Of the two sub-options examined under the preliminary option SP 1 Centralized Processing at the JWPCP, one remains. The only viable option for solids processing is:

- **SP 1A Continue Use of Existing Solids Processing Systems**

This option represents a continuation of the current systems and practices for solids processing.

6.2.3.7 Level 3 Screening

Only one viable option remains, so it is not subject to any further screening.

6.2.3.8 Viable Options Eliminated

No viable options were eliminated.

6.2.3.9 Ranked Feasible Options

The only feasible, thus top-ranked, option for solids processing is:

- **SP 1A Continue Use of Existing Solids Processing Systems**

6.2.4 Biosolids Management (BM)

6.2.4.1 Conceptual Options

The primary objective of biosolids management is to effectively and efficiently dispose of, or beneficially use, all the biosolids generated by wastewater treatment within the JOS. The current practice relies on a diversified program of beneficial biosolids use and landfill disposal. The conceptual options identify alternatives including, and in addition to, the current practice.

BM 1 Current Practice – Beneficial Use/Landfill

The current practice is to maximize the beneficial use of biosolids, while maintaining the ability to use landfilling. Under this option, the current practice would continue into the future.

BM 2 Landfill Disposal – All Biosolids

In this option, all biosolids would be disposed of in landfills. This approach could potentially simplify the administration and management of the biosolids use/disposal program. As the owner and operator of the landfill, the Sanitation Districts would have complete oversight and responsibility for biosolids disposal independent of any third parties.

BM 3 Beneficial Use – All Biosolids

In this option, all biosolids would be beneficially used. There would be no provisions for use of a landfill for biosolids disposal. As a result, the number and diversity of beneficial uses would have to be such that there is sufficient beneficial use capacity under a variety of future scenarios without any potential for interruption of service. This would result in a high degree of dependency on third parties to assure adequate beneficial use options.

6.2.4.2 Options Eliminated Through Level 1 Screening

Of the three conceptual options considered, one option was eliminated.

BM 2 Landfill Disposal – All Biosolids: This option would preclude any beneficial use of biosolids. It is inconsistent with the objective of accommodating current and emerging biosolids recycling and beneficial use opportunities. It is also likely that such an arrangement would be unfavorably received by the public. It may also be inconsistent with regulations aimed at reducing the volume of materials going into sanitary landfills. Finally, it does not take into consideration that the Puente Hill Landfill is scheduled to close in 2013. Consequently, it was eliminated from further consideration.

6.2.4.3 Preliminary Options

Of the three conceptual options reviewed, two options remain. The preliminary options for biosolids management are:

- **BM 1 Current Practice – Beneficial Use – Landfill**
- **BM 3 Beneficial Use – All Biosolids**

Each of these is briefly described in the sections that follow.

BM 1 Current Practice – Beneficial Use – Landfill

This option entails the continuation of a diversified program of biosolids management practices, including beneficial uses, that enhances the environment, provides a reliable means of ultimate disposition of the biosolids, is cost-effective, and complies with all regulatory requirements.

The majority of current beneficial biosolids uses involve agriculture. These include:

- Land application of Class B biosolids cake
- Lime stabilization and land application
- Composting and land application
- Composting and production of soil amendment products

The Sanitation Districts are currently in the process of implementing the first phase of a state-of-the-art composting facility called Westlake Farms, which is scheduled to begin operations in 2013. This will provide an additional degree of reliability relative to biosolids beneficial use beyond what currently exists.

Landfill co-disposal with municipal solid waste would likely be curtailed given that the Puente Hills Landfill is scheduled for closure in 2013.

BM 3 Beneficial Use – All Biosolids

In this option, all biosolids would be beneficially used. There would be no provisions for use of a landfill for biosolids co-disposal. As a result, the number and diversity of beneficial uses would have to be such that there is sufficient beneficial use capacity under a variety of future scenarios without any potential for interruption of service.

A number of challenges exist in regard to service reliability. Third parties operate many of the current beneficial use sites. While the Sanitation Districts have contractual agreements with these parties, the potential exists that one or more of these parties could default on their obligations to accept and beneficially use biosolids. The locations of these beneficial use operations tend to be in remote areas located at a significant distance from the site of biosolids generation, the JWPCP. Weather or other circumstances that interfere with biosolids transport could disrupt planned beneficial use options.

6.2.4.4 Level 2 Screening

The screening parameters for the BM program component area are:

- Resource reuse
- Sustainability

- Regulatory compliance
- Public acceptability
- Operational flexibility and reliability
- Cost effectiveness

The application of the Level 2 Screening Parameters is shown in Table 6-22.

Table 6-22. Comparison of Preliminary Options to Level 2 Screening Parameters

	Resource Reuse	Sustainability	Regulatory Compliance	Public Acceptability	Operational Flexibility and Reliability	Cost Effectiveness	Score	Ranking
BM 1 Current Practice □ Beneficial Use/ Landfill	□	□	0	□	□	0	□4	1
BM 3 Beneficial Use □ All Solids	□	□	0	□	-	0	□2	2

6.2.4.5 Options Eliminated Through Level 2 Screening

Of the two Preliminary Options developed for biosolids management, one is eliminated from further consideration:

BM 3 Beneficial Use □All Solids: This alternative is virtually identical to the other remaining option, BM 1 Current Practice □Beneficial Use□Landfill, except that BM 3 lacks the ability to utilize a landfill. This lack of diversity substantively impacts the screening criterion of operational reliability. On this basis, this option was eliminated.

6.2.4.6 Viable Options

Of the two preliminary options evaluated, one remains. The only viable option for biosolids management is:

- **BM 1 Current Practice □Beneficial Use□Landfill**

This option represents the continuation of current practices, which emphasize the beneficial uses of biosolids, while maintaining the ability to use landfilling.

6.2.4.7 Level 3 Screening

Only one viable option remains, so it is not subject to any further screening.

6.2.4.8 Viable Options Eliminated

No viable options were eliminated.

6.2.4.9 Ranked Feasible Options

The only feasible, thus top-ranked, option for biosolids management is:

- **BM 1 Current Practice – Beneficial Use/Landfill**

6.2.5 WRP Effluent Management (WE)

6.2.5.1 Conceptual Options

The primary objective of WRP effluent management is to identify outlets for the recycled water produced at the WRPs. The systems must be:

- Reliable: Able to consistently manage effluent from all flows generated
- Compliant: Achieve all pertinent regulatory requirements

In addition to these characteristics, the effluent management approaches considered as options should be able to accommodate future flow increases tributary to a facility, enhance the environment, and foster resource reuse.

The LACAWRP effluent management system is self-contained (i.e., all effluent is reused for irrigation) and, therefore, is not reviewed further. The remaining five WRPs' primary means of effluent management consists of regulated, surface water discharges to the San Gabriel River or its tributaries. In addition, all plants provide effluent for beneficial reuse. The level of reuse fluctuates based on demand, which can vary depending on the WRP, the time of day, and the time of year.

WE 1 Current Effluent Management Systems

This conceptual option represents a continuation of the current practices for effluent management, which include a combination of surface water discharge and reuse. No major changes to either the discharge locations or protocols employed are included within this option.

WE 2 All Reuse – No Surface Water Discharge

In this conceptual option, all surface water discharges from the WRPs would be eliminated. This would entail significantly increased levels of water recycling, with emphasis on approaches that are not weather dependent. This option would include evaluating the potential for water recycling associated with:

- Landscape irrigation
- Agricultural irrigation
- Industrial processes (e.g., cooling water)
- Recreational impoundments
- Groundwater recharge – spreading
- Groundwater recharge – injection
- Seawater barrier creation – injection

The highest WRP flows correspond with wet weather events. During these conditions, a number of the reuse alternatives are not available to accept flows. The reclamation alternatives not affected by wet weather events, in many cases, are likely to require higher levels of treatment at the WRPs, as well as additional facilities for treated effluent storage, conveyance, and reuse.

WE 3 All Surface Water Discharge – No Reuse

In this conceptual option, all current reuse of WRP effluent would be discontinued at the earliest feasible date. This would require the renegotiation of current agreements and eliminating from consideration any future arrangements to reuse WRP effluent. All effluent disposal would take place using current, approved surface water discharge locations.

6.2.5.2 Options Eliminated Through Level 1 Screening

Three conceptual options for management of the effluent from the WRPs were reviewed. Of these, the following two approaches were eliminated from further consideration.

WE 2 All Reuse – No Surface Water Discharge: This option would require the reclamation and reuse of all WRP effluent. The recycled water demand to permit acceptance of all effluent during the full range of seasonal events (e.g., extended wet weather periods) does not exist, and, therefore, would not provide for a reliable means of effluent management. Without adequate management capabilities, the system capacity to meet the needs of the growing JOS population could not be achieved. The Sanitation Districts are also dependent on the parties reusing the recycled water and the water retailers to develop reuse opportunities. Despite over four decades of aggressively marketing recycled water, over half of the recycled water produced is not reused and is discharged to receiving waters. Therefore, planning for complete reuse of all WRP effluent is not practicable or responsible. The costs for additional treatment, as well as conveyance, could also decrease the relative cost effectiveness of this approach. Elimination of this option does not preclude continued growth of the existing, robust program of recycling and reuse within the JOS.

WE 3 All Surface Water Discharge – No Reuse: This option would require the termination of all existing agreements to provide recycled water. In addition, no action would be taken to capitalize on future recycled water reuse opportunities. The feasibility of doing so, and associated legal ramifications, would need to be carefully evaluated. This approach would also contradict the Sanitation Districts' current policies, as well as those of the state of California, relative to water recycling and reuse. It would not accommodate emerging reuse opportunities. In a water-limited region such as Southern California, the public would consider any type of exclusion of reuse and recycling as wasting a potentially valuable resource. Associated negative publicity and political impacts could detrimentally affect the Sanitation Districts as well.

6.2.5.3 Preliminary Options

Of the three conceptual options examined, one remains. The only preliminary option for WRP effluent management is:

- **WE 1 Current Effluent Management System**

This approach is consistent with the Clearwater Program goal and objectives. This option entails the continuation of existing practices that incorporate a combination of surface water discharge and reuse. While the amount of effluent managed and/or consumed by reuse is likely to increase in the future, surface water discharge capabilities would be retained. The ability to discharge to surface waters provides necessary flexibility in managing the effluent. Many of the current and future reuse opportunities may involve third parties and associated facilities and contractual agreements. The Sanitation Districts have limited control of third parties.

6.2.5.4 Level 2 Screening

Only one preliminary option remains, so it is not subject to any further screening.

6.2.5.5 Options Eliminated Through Level 2 Screening

No options were eliminated through Level 2 Screening.

6.2.5.6 Viable Options

The only viable option for WRP effluent management is:

- **WE 1 Current Effluent Management System**

6.2.5.7 Level 3 Screening

Only one viable option remains, so it is not subject to any further screening.

6.2.5.8 Viable Options Eliminated

No viable options were eliminated.

6.2.5.9 Ranked Feasible Options

The only feasible, thus top-ranked, option for WRP effluent management is:

- **WE 1 Current Effluent Management System**

6.2.6 JWPCP Effluent Management (JE)

6.2.6.1 Conceptual Options

The primary objective of the JWPCP effluent management system is to provide outlets for the wastewater treated at the JWPCP. The systems must be:

- Reliable: Able to consistently manage all effluent flows, including peak storm flows
- Compliant: Achieve all pertinent regulatory requirements

In addition, the effluent management approaches considered as options should be able to accommodate future flow increases and reuse at the JWPCP.

Currently, JWPCP-treated effluent is managed entirely by means of ocean discharge; no reuse of JWPCP effluent currently takes place. Two approximately 6-mile long onshore tunnels convey effluent from the plant to a manifold structure located beneath Sanitation Districts-owned property at Royal Palms Beach, located near White Point on the Palos Verdes Peninsula. The 8-foot diameter tunnel was constructed in 1937, and the 12-foot diameter tunnel was constructed in 1958. Neither of the tunnels has been inspected in over 50 years. Inspection of the tunnels is not possible due to their overall length, limited access, lack of hydraulic separation between the tunnels, and the large quantity of daily effluent flow through the tunnels. For the same reasons, repair and rehabilitation of these tunnels, should it be warranted, is not possible. Furthermore, both tunnels cross an active seismic fault (the Palos Verdes Fault), but neither was constructed to modern day seismic standards and neither have been retrofitted since being built.

From the manifold, effluent flows can be distributed between four ocean outfalls with diameters of 60, 72, 90, and 120 inches that were constructed in 1937, 1947, 1957, and 1966, respectively. The 90- and 120-inch outfalls are used daily, and the 60- and 72-inch lines serve as backups. The 90- and 120-inch outfalls extend approximately one and a half miles offshore to a depth of about 200 feet below sea level. All four ocean outfalls consist of reinforced concrete pipelines constructed on the seafloor with a series of ports (diffusers) at their discharge depths. Unlike the tunnels, there is access to the ocean outfalls for detailed inspection and, if needed, repair and rehabilitation.

JE 1 Existing Ocean Discharge System

In this conceptual option, the existing tunnel and ocean outfall system would be used. There would be no major changes to the facilities or their mode of operation, but the existing ocean outfalls would require rehabilitation. With such an approach, there is very limited activity required and as a result, little in the way of cost and permitting associated with this option's implementation. However, the integrity of the two existing onshore tunnels cannot be verified, and the risk of failure of this critical infrastructure link is not abated with this option.

JE 2 New Ocean Discharge System

In this conceptual option, a new ocean discharge system —comprising an onshore tunnel, an offshore tunnel or seafloor pipeline, and a diffuser —would be constructed. The new system would have the capacity to accommodate all current and projected future flows. This option provides redundancy to critical aging infrastructure (the two existing onshore tunnels and four ocean outfalls), thereby increasing overall system reliability. Any new system would have its diffuser located in an area that would meet or exceed the performance of the existing diffusers with respect to environmental protection and public safety. Construction of this option would allow the existing tunnels to be inspected and repaired as necessary. This option would also include rehabilitation of the existing ocean outfalls.

JE 3 Modified Ocean Discharge System

In this conceptual option, a new onshore tunnel would be constructed between the JWPCP and the existing manifold structure at Royal Palms Beach. The new tunnel would tie into the existing outfalls. Once connected, the modified ocean discharge system would have the capacity to accommodate all current and projected future flows. This option provides redundancy to critical aging infrastructure (the two existing onshore tunnels), thereby increasing overall system reliability. Construction of this option would allow the existing tunnels to be inspected and repaired as necessary. This option would also include rehabilitation of the existing ocean outfalls.

JE 4 Reduced Ocean Discharge

In this conceptual option, flows to the existing ocean discharge would be substantially reduced. Advanced treatment facilities would be constructed at the JWPCP, and the advanced-treated effluent would be diverted for indirect potable reuse via groundwater recharge. The reduction in ocean discharge would need to be of sufficient magnitude to allow for dry-season inspection and repair of the two existing tunnels, one at a time. With one tunnel still in service, the other could be rehabilitated as needed. This option would also include rehabilitation of the existing ocean outfalls.

6.2.6.2 Options Eliminated Through Level 1 Screening

Of the four conceptual options developed for management of effluent from the JWPCP, the following option was eliminated from further consideration.

JE 1 Existing Ocean Discharge System: Continued use of the existing ocean discharge system represents the most simplistic approach to effluent management. The reason for its elimination relates to this option's inability to remove the existing tunnels from service, inspect their condition, and make repairs or rehabilitate them as needed. This element of the aging infrastructure of the JOS has not been inspected in over 50 years. Without the inspection of this critical component of the JWPCP effluent management system, the overall system's reliability would remain in question. Also, the existing tunnels both cross the Palos Verdes Fault, but neither was built to modern day seismic standards. Any system failure could lead to long-term violations of discharge standards and detrimental impacts on both the environment and public health. Furthermore, the existing onshore tunnels are also limited in terms of their 675-MGD hydraulic capacity. They are not capable of handling the estimated 927-MGD peak wet weather flow associated with the 400 MGD of average daily flow projected for the JWPCP by the year 2050.

6.2.6.3 Preliminary Options

Of the four conceptual options reviewed, three remain. The preliminary options for JWPCP effluent management are:

- **JE 2 New Ocean Discharge System**
- **JE 3 Modified Ocean Discharge System**
- **JE 4 Reduced Ocean Discharge**

A more-detailed description of each of these is provided in the subsections that follow.

JE 2 New Ocean Discharge System

In this preliminary option, a new ocean discharge system would be constructed. The major elements of a new system would include:

- Onshore tunnel
- Tunnel shafts
- Offshore tunnel or seafloor pipeline
- Riser and diffuser

The new onshore tunnel would extend from the JWPCP to the shoreline. A number of factors were considered in the development of tunnel alignments. These included:

- Locating the tunnel within public right-of-way
- Minimizing the tunnel's overall length
- Accommodating the required turning radius for non-linear sections
- Positioning the required tunnel shafts in acceptable locations

A large number of possible onshore tunnel alignments exist that would satisfy the baseline criteria.

Tunnel shafts include the working and access shafts used in the construction of the tunnel, as well as subsequent reconfiguration of the shafts for their use in operation and maintenance of the system. For the purposes of evaluating this option at this stage of the program-level alternatives analysis, it is assumed there would be two tunnel shafts. One shaft would be located at the JWPCP. This JWPCP shaft would initially function as a working shaft and would ultimately be converted to an effluent feed down shaft to the tunnel. The second shaft would be located near the shoreline, and its primary function would be to provide supplemental ventilation during tunnel construction. Ultimately, the second shaft would be converted to an access and isolation point for future operation and maintenance.

The selection of an alignment for the offshore tunnel or seafloor pipeline would be dependent on the onshore tunnel alignment and location of the outfall diffuser. The offshore alignment could be constructed using a variety of techniques including:

- All seafloor pipeline
- All offshore tunnel
- A combination of seafloor pipeline and offshore tunnel

For the purposes of evaluating this option at this stage of the program-level alternatives analysis, it is assumed the marine conveyance facilities would consist of a combination of seafloor pipeline and offshore tunnel.

The primary factor in selecting a location for a riser and diffuser relates to the achievement of water quality objectives. Other factors considered include:

- Adequate depth and distance from shore: Performance must meet or exceed that of the existing diffusers
- Favorable currents: Avoid locations that may affect the shore
- Sufficient space: Ability to locate the diffusers, including room to site future diffusers
- Geotechnical stability: Locations with limited potential for significant movement during seismic events

For the purposes of evaluating this option at this stage of the program-level alternatives analysis, it is assumed the diffuser would be located in an area on the southern edge of the Palos Verdes Shelf (PV Shelf) or the San Pedro Shelf (SP Shelf). This places the new diffuser south and east of the existing ocean outfalls and satisfies the listed criteria.

JE 3 Modified Ocean Discharge System

In this preliminary option, a new tunnel would be constructed between the JWPCP and the existing manifold structure at Royal Palms Beach. The major elements of a modified ocean discharge system would include:

- Onshore tunnel
- Tunnel shafts
- Existing ocean outfalls

A number of factors were considered in the development of the onshore tunnel alignments. These included:

- Locating the tunnel within public right-of-way
- Minimizing the tunnel's overall length
- Accommodating the required turning radius for non-linear sections
- Positioning the required tunnel shafts in acceptable locations

A large number of possible onshore tunnel alignments exist that would satisfy the baseline criteria.

Tunnel shafts include the working and exit shafts used in the construction of the tunnel, as well as subsequent reconfiguration of these facilities for their use in operating the system. For the purposes of evaluating this option at this stage of the program-level alternatives analysis, it is assumed there would be two tunnel shafts. One shaft would be located at the JWPCP. This JWPCP shaft would initially function as a working shaft and would ultimately be converted to an effluent shaft to the tunnel. The second shaft would be located near the existing manifold structure at Royal Palms Beach and would function as an exit shaft for the tunneling equipment. Ultimately, the second shaft would be converted to an access and isolation point for future operation and maintenance.

The existing ocean outfalls would be used for diffusing JWPCP effluent. Recent inspections, physical testing, and a hydraulic analysis determined that the three largest outfalls have the structural integrity and capacity to last well beyond 2050.

JE 4 Reduced Ocean Discharge

This preliminary option would substantially reduce the discharge of effluent through the existing ocean discharge system so as to allow for tunnel dewatering, inspection, rehabilitation, and repair as needed. Flow reductions would be achieved by diverting a portion of the JWPCP effluent for reuse.

The only reuse application that could potentially accommodate the amount of treated effluent necessary to support this option is groundwater recharge. Groundwater recharge would be implemented through the use of spreading basins and, possibly, direct injection for the Central and Main San Gabriel Basins and direct injection wells for the West Coast Basin. During wet weather events, when JWPCP flows are peaking, spreading basin capacity is significantly reduced or unavailable. Therefore, tunnel inspection and repair work would need to be conducted during the dry season.

Currently, the JWPCP provides a secondary level of treatment, along with disinfection, to influent flows. A more advanced level of treatment would be required for groundwater recharge. The advanced level of treatment assumed would consist of microfiltration and reverse osmosis (MF/RO), ultraviolet disinfection, and advanced oxidation. Storage for peak diurnal flow attenuation would also be necessary.

This option would need to be implemented within the next 10 to 15 years in order to address the aging infrastructure concerns of the two existing tunnels in a timely manner. By 2025, it is estimated that the average daily flows at the JWPCP would be 335 MGD. This approach is predicated on the assumption that the two existing tunnels can be hydraulically isolated from each other. Based on a diurnal peak flow factor of 1.4 at the JWPCP, a peak flow capacity of 170 MGD in the 8-foot diameter tunnel, and 20 percent brine reject, this option would require approximately 250 MGD of advanced treatment (producing approximately 200 MGD of MF/RO permeate for groundwater recharge and 50 MGD of brine reject to be discharged to the one tunnel still in service) and 27 million gallons (MG) of storage volume.

The advanced treatment, storage, and groundwater recharge facilities would need to remain in operation during the entire planning period in order for the existing JWPCP ocean discharge system to have sufficient capacity to accommodate the projected 2050 average daily flows of 400 MGD and associated peak wet weather flows of 927 MGD.

6.2.6.4 Level 2 Screening

The screening parameters for the JE program component area are:

- Available land/right-of-way
- Institutional feasibility

- Regulatory compliance
- Public acceptability
- Operational flexibility, reliability, and familiarity
- Cost effectiveness

The application of the Level 2 screening parameters is shown in Table 6-23.

Table 6-23. Comparison of Preliminary Options to Level 2 Screening Parameters

	Available Land Right-of-Way	Institutional Feasibility	Regulatory Compliance	Public Acceptability	Operational Flexibility, Reliability, and Familiarity	Cost Effectiveness	Score	Ranking
JE 2 New Ocean Discharge System	0	0	+	0	+	-	+1	2
JE 3 Modified Ocean Discharge System	+	0	+	0	0	+	+3	1
JE 4 Reduced Ocean Discharge	0	-	0	+	-	-	-2	3

6.2.6.5 Options Eliminated Through Level 2 Screening

Of the three preliminary options for JWPCP effluent management, one was eliminated from further consideration.

JE 4 Reduced Ocean Discharge: This option would entail diverting a sufficient amount of flow from the existing ocean discharge system to allow for the inspection/repair of each of the existing tunnels during the dry season. The diverted flow would receive advance treatment before being conveyed to the Central, West Coast, and/or Main San Gabriel Basins for groundwater recharge. There may be enough property available at the JWPCP for approximately 250 MGD of advanced treatment facilities and 27 MG of storage tanks. However, this option would require numerous rights-of-way within major thoroughfares for very large diameter pipelines to convey recycled water to groundwater recharge sites. While increasing the use of recycled water would likely receive public acceptance on a conceptual level, the localized traffic and access disruption due to extensive pipeline construction would likely result in short-term, localized opposition. This option would be very dependent on the numerous inter-agency agreements for groundwater recharge and court-imposed groundwater management plans. Therefore, the institutional feasibility of this option is highly questionable. In addition, the successful procurement of environmental permits would present challenges; regulatory approval would be required for a new groundwater recharge project. The greatest concerns regarding this option relate to constructability, operational flexibility, reliability, and familiarity. Hydraulically separating the two existing tunnels while both are flowing full each day would be a complex undertaking. Then, tunnel inspection/repair work would ensue while sufficient flow is diverted to the advanced treatment facilities for groundwater recharge. The tunnel inspection/repair would need to occur during the dry season when flows are typically lower. However, there would always be the risk of a severe unseasonal storm event that could overwhelm the advanced treatment facilities. In which case, a portion of the secondary-treated JWPCP effluent would need to be diverted directly to the Wilmington Drain, which would be a violation of the

JWPCP discharge permit. This option would also require the operation of a completely new treatment system to enhance the JWPCP's effluent quality. In addition to being different than the existing plant facilities, the advanced treatment facilities are operationally complex. This lack of familiarity and system complexity would reduce the options' overall operational reliability. This option would also be expensive, even taking into consideration the market value of the recycled water produced. In addition to the capital costs of the treatment, transmission, and recharge facilities, there would be considerable energy costs associated with advanced treatment and effluent pumping. Even if all of these impediments could be overcome, it would be very difficult to implement this option by 2025. Only approximately 100 MGD of groundwater recharge capacity has been identified as being potentially available within this timeframe, which represents just half of what would be necessary to make this option viable.

The Sanitation Districts worked with the Metropolitan Water District of Southern California (MWD) during formulation and evaluation of this option. In October 2010, the MWD adopted its Integrated Water Resources Plan 2010 Update to address the challenges associated with the recent declines in the availability of imported water. With respect to pursuing a regional recycled water project, the MWD report only commits at this time to pursuing low-risk, low-cost "foundational actions" (e.g., feasibility studies, legislative efforts, and research) undertaken with the aim of reducing the implementation time of a recycled water project to reach full production, if deemed necessary in the future. If in the short run a significantly large reuse market materialized for JWPCP effluent and/or additional groundwater recharge capacity is identified, the viability of this option would merit reassessment.

6.2.6.6 Viable Options

Of the four preliminary options examined, two remain. The viable options for JWPCP effluent management are:

- **JE 2 New Ocean Discharge System**
- **JE 3 Modified Ocean Discharge System**

6.2.6.7 Level 3 Screening

The screening of the two remaining options consisted of a project-level alternatives analysis, which is detailed in Section 6.3.

6.2.6.8 Viable Options Eliminated

No viable options were eliminated.

6.2.6.9 Feasible Options

The feasible options for JWPCP effluent management are:

- **JE 2 New Ocean Discharge System**
- **JE 3 Modified Ocean Discharge System**

Unlike the other program component areas of the alternatives analysis, the feasible options for JWPCP effluent management were analyzed in greater detail at project level to determine their rankings. This project-level analysis is presented in Section 6.3, and the ranked feasible options for JWPCP Effluent Management are identified in Section 6.3.4.3.

A summary of the JOS program-level alternatives analysis is shown on Figure 6-2.

6.3 Project Analysis by Project Elements

Within the various program component areas evaluated in connection with the program-level JOS alternatives analysis, the two feasible options for JWPCP effluent management consisted of implementing either a new ocean discharge system or a modified ocean discharge system. This section provides an analysis of project element options for the ocean discharge system alternatives related to a new or modified ocean discharge system.

6.3.1 Alternatives Development and Analysis Process

The approach employed to evaluate the project is similar to that undertaken for the program-wide assessment of the JOS. First, the overall project was divided into five project *elements*. Conceptual and preliminary options for each project element were screened to determine the viable options. The viable options from the project elements were then combined to formulate viable project alternatives, which were evaluated to determine a set of ranked feasible project alternatives. The highest ranked feasible alternative was identified as the recommended project. This process is depicted on Figure 6-3. Finally, as previously shown on Figure 6-2, these ranked feasible project alternatives for JWPCP effluent management were combined with the feasible program alternatives to arrive at a recommended plan for the Clearwater Program.

Parsons Water and Infrastructure, Inc., in association with Jacobs Associates and Black □ Veatch, provided much of the technical support for the project-level alternatives analysis. Their input is documented in the Professional Design Services for the Preliminary Engineering of the Joint Water Pollution Control Plant Tunnel and Ocean Outfall Feasibility Report, dated September 2011.

6.3.2 Study Area

The initial step in the project analysis was to develop a study area. The study area represents the conceptual boundary within which various physical project elements could be sited.

The three criteria used as the basis for the development of the study area were:

- Minimize interferences with discharges from other publicly owned treatment works (POTW) outfalls in the area, namely those of the city of Los Angeles and the Orange County Sanitation District
- Stay within the edge of the continental shelf □either the PV Shelf or SP Shelf
- Use as direct a route as practicable between the JWPCP and the ocean diffuser area
- Avoid Marine Protected Areas (MPAs)

The subsequent formulation and assessment of options and alternatives were consistent with these criteria.

On the basis of the criteria used for establishing the project study area boundaries, the area under consideration for a new or modified ocean discharge system is shown on Figure 6-4. This 90-square-mile study area is fan shaped with its apex positioned at the JWPCP. On the westerly side, the fan extends southward from the JWPCP to the existing ocean outfalls. On the easterly side, the fan extends from the JWPCP to the intersection of the Palos Verdes Fault and the SP Shelf.

JOINT OUTFALL SYSTEM – MAJOR PROGRAM COMPONENT AREAS

CONVEYANCE/TREATMENT (CT)	SOLIDS PROCESSING (SP)	BIOSOLIDS MANAGEMENT (BM)	WRP EFFLUENT MANAGEMENT (WE)	JWPCP EFFLUENT MANAGEMENT (JE)
CONCEPTUAL OPTIONS – BY PROGRAM COMPONENT AREA				
1. JWPCP Expansion 2. WRP Expansion – Existing 3. WRP Expansion – New 4. WRP Expansion – Existing & New	1. Centralized Processing at JWPCP 2. Processing at Source Plants 3. Centralized Processing – New Site	1. Current Biosolids Management Practice – Beneficial Use/Landfill 2. Landfill Disposal – All Biosolids 3. Beneficial Use – All Biosolids	1. Current Effluent Management Systems – Reuse & Surface Discharge 2. All Reuse – No Surface Discharge 3. All Surface Discharge – No Reuse	1. Existing Ocean Discharge System 2. New Ocean Discharge System 3. Modified Ocean Discharge System 4. Reduced Ocean Discharge

LEVEL 1 SCREENING – PROGRAM OBJECTIVES

Provide adequate system capacity to meet the needs of the growing population

Provide for overall system reliability by allowing for the inspection, maintenance, repair, and replacement of aging infrastructure

Provide support for emerging recycled water reuse and biosolids beneficial use opportunities

Provide a long-term solution for meeting water quality requirements set forth by regulatory agencies

PRELIMINARY OPTIONS – BY PROGRAM COMPONENT AREA

CT	SP	BM	WE	JE
CT 2A-F WRP Expansion – Existing	SP 1 Centralized Processing at JWPCP	BM 1 Current Biosolids Management Practice BM 3 Beneficial Use – All Biosolids	WE 1 Current Effluent Management Systems	JE 2 New Ocean Discharge System JE 3 Modified Ocean Discharge System JE 4 Reduced Ocean Discharge

LEVEL 2 SCREENING – PROGRAM COMPONENT AREAS SCREENING CRITERIA

CT	SP	BM	WE	JE
Conveyance System Impacts	Treatment Plant Impacts	Maximize Resource Reuse	Maximize Resource Reuse	Available Land/Right-of-Way
Treatment Plant Impacts	Institutional Feasibility	Sustainability	Sustainability	Institutional Feasibility
Regulatory Compliance	Regulatory Compliance	Regulatory Compliance	Regulatory Compliance	Regulatory Compliance
Public Acceptability	Public Acceptability	Public Acceptability	Public Acceptability	Public Acceptability
Operational Flexibility	Operations Familiarity	Operational Flexibility & Reliability	Operations Familiarity	Operational Reliability
Cost Effectiveness	Cost Effectiveness	Cost Effectiveness	Cost Effectiveness	Cost Effectiveness
VIABLE OPTIONS – BY PROGRAM COMPONENT AREA				
CT 2A-E WRP Expansion - Existing (SJCWRP)	SP 1A Continue Use of Existing Solids Processing Systems	BM 1 Current Biosolids Management Practice	WE 1 Current Effluent Management Systems	JE 2 New Ocean Discharge System JE 3 Modified Ocean Discharge System

VIABLE ALTERNATIVES (PROGRAM)

CT 2A : SP 1A : BM 1 : WE 1 : JE 2

CT 2A : SP 1A : BM 1 : WE 1 : JE 3

LEVEL 3 SCREENING – ALTERNATIVES EVALUATION CRITERIA

Project-Level Alternatives Analysis - see Figure 6-15 for detailed evaluation of JE component area

RANKED FEASIBLE ALTERNATIVES

HIGHEST RANKED	Alternative 4:	CE 2A : SP 1A : BM 1 : WE 1 : JE 3
↓	Alternative 1:	CE 2A : SP 1A : BM 1 : WE 1 : JE 2A
	Alternative 3:	CE 2A : SP 1A : BM 1 : WE 1 : JE 2B
LOWEST RANKED	Alternative 2:	CE 2A : SP 1A : BM 1 : WE 1 : JE 2C

ENVIRONMENTAL ANALYSIS (EIR/EIS)

JOINT OUTFALL SYSTEM RECOMMENDED PLAN

FIGURE 6-2

CLEARWATER Program

Master Facilities Plan Program-Level Alternatives Screening Process

Source: Sanitation Districts of Los Angeles County 2011

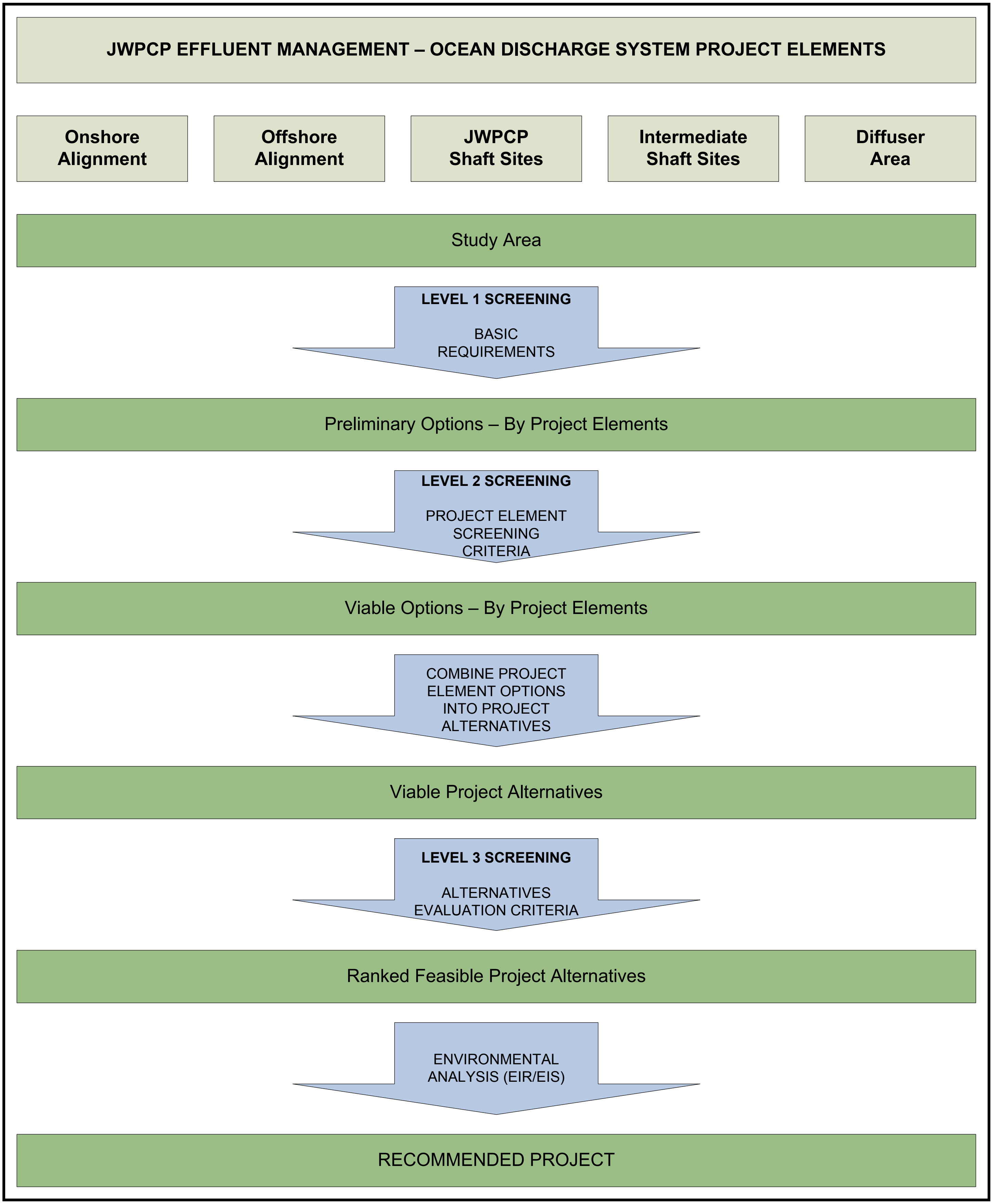


FIGURE 6-3

CLEARWATER Program

Master Facilities Plan
Project-Level Alternatives Screening Process

Source: Sanitation Districts of Los Angeles County 2011

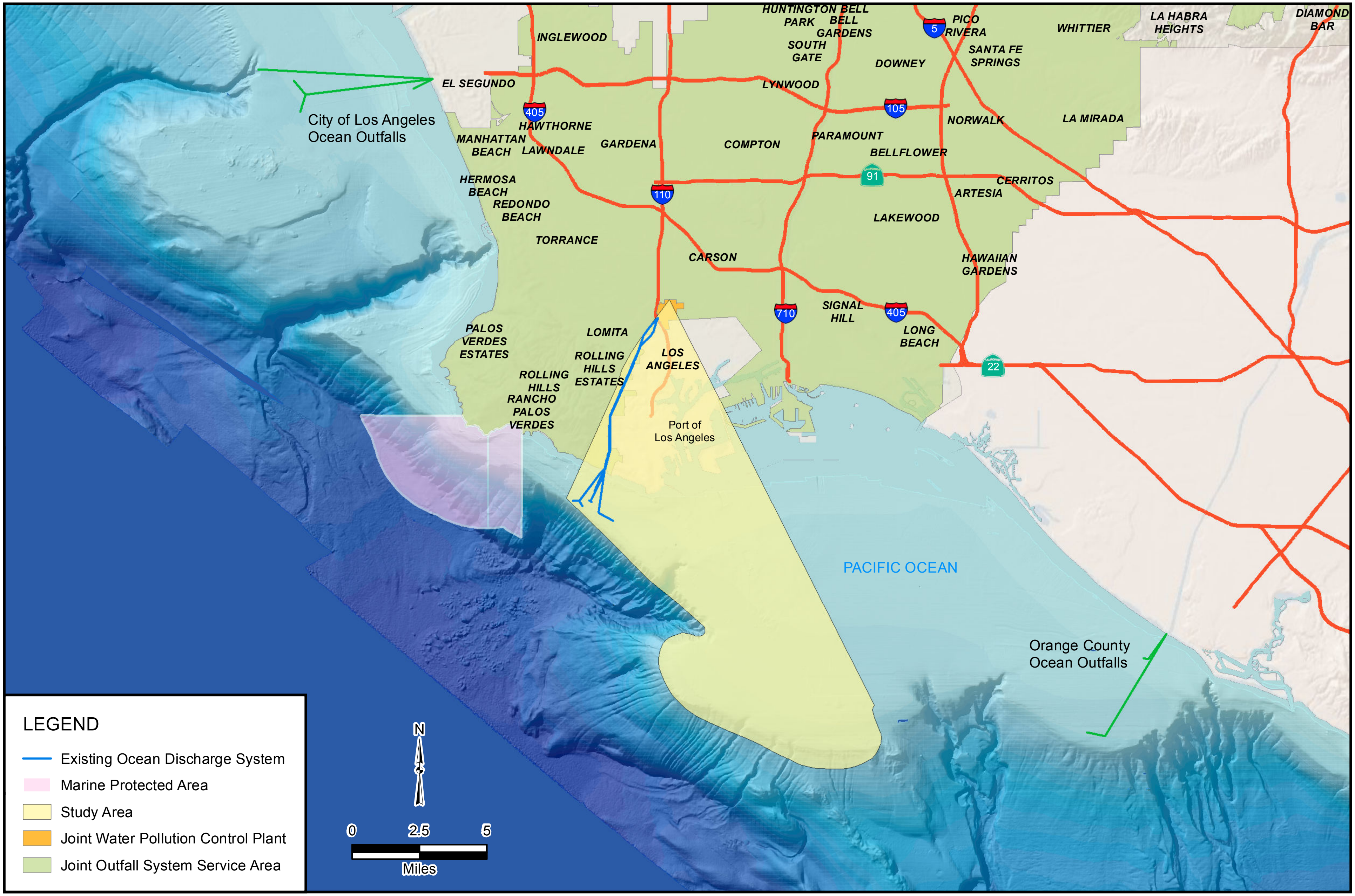


FIGURE 6-4

Study Area for a New or Modified Ocean Discharge System

CLEARWATER Program

Source: Sanitation Districts of Los Angeles County 2011, LA Dept of Public Works 2011, CA Dept of Fish & Game 2011, OC Sanitation Districts 2011, Thomas Bros 2011, ESRI 2011

6.3.3 Evaluation of Project Elements

For the purpose of initial options formulation and assessment, the ocean discharge systems examined were divided into five project elements based on primary functionality. These are:

- Onshore tunnel alignment
- JWPCP shaft site
- Intermediate shaft site
- Diffuser area
- Offshore alignment

The initial development and evaluation of options was compartmentalized within these five project elements through the viable options stage. At that point, the viable options were combined into comprehensive discharge system alternatives.

6.3.3.1 Onshore Tunnel Alignment

The onshore alignment would begin at the JWPCP and end near the coast. The onshore alignment would be approximately 6 to 7 miles in length, ranging in depth from approximately 70 to 450 feet below ground level. Due to the depths of excavation that would be needed, open-cut trenching for the onshore alignment was deemed infeasible. Therefore, the onshore alignment would be constructed as a tunnel using a tunnel boring machine (TBM). This approach avoids the complication of open-cut trenching, including traffic and business disruptions as well as impacts on existing utilities and other underground facilities.

Preliminary Options

The Level 1 screening criteria used for the development of the conceptual options for the tunnel alignment were:

- Existing easements or public rights-of-way would be used to the maximum extent practicable
- The routing must allow a sufficient turning radius for the TBM (approximately 800 to 1,000 feet)
- The overall length of the alignment should be minimized

On the basis of these criteria, 23 conceptual options for an onshore tunnel alignment were originally identified. One of these options was an alignment that parallels the existing tunnels. However, the 68 current easements would not permit construction of a new tunnel, and a parallel tunnel alignment just outside the existing easements would require approximately 1,060 new easements. Therefore, this conceptual option was eliminated, and a total of 22 options were carried forward for an onshore alignment. The preliminary options for onshore tunnel alignments are:

- **Wilmington Blvd – Port of Los Angeles**
- **Frigate Ave – Port of Los Angeles**
- **Figueroa St – Port of Los Angeles**
- **Frigate Ave – China Shipping – Harbor Blvd**
- **Figueroa St – China Shipping – Harbor Blvd**
- **Frigate Ave – John S Gibson Blvd – Harbor Blvd**

- **Figueroa St John S Gibson Blvd Harbor Blvd**
- **Figueroa St Harbor Regional Park North Gaffey St Harbor Blvd**
- **Frigate Ave John S Gibson Blvd Pacific Ave Cabrillo Beach**
- **Figueroa St John S Gibson Blvd Pacific Ave Cabrillo Beach**
- **Figueroa St Harbor Regional Park North Gaffey St Pacific Ave Cabrillo Beach**
- **Frigate Ave John S Gibson Blvd Pacific Ave**
- **Figueroa St John S Gibson Blvd Pacific Ave**
- **Figueroa St Harbor Regional Park North Gaffey St Pacific Ave**
- **Frigate Ave John S Gibson Blvd South Gaffey St**
- **Figueroa St John S Gibson Blvd South Gaffey St**
- **Figueroa St Harbor Regional Park North Gaffey St South Gaffey St**
- **Frigate Ave John S Gibson Blvd Capitol Dr Western Ave**
- **Figueroa St John S Gibson Blvd Capitol Dr Western Ave**
- **Figueroa St Harbor Regional Park North Gaffey St Capitol Dr Western Ave**
- **Figueroa St Harbor Regional Park Navy Fuel Depot Western Ave**
- **Lomita Blvd Western Ave**

The preliminary options for onshore tunnel alignments are shown on Figure 6-5. These alignment designations reflect the major streets under which each tunnel option is located.

Viable Options

A total of 22 preliminary options for an onshore tunnel alignment were identified. Level 2 screening parameters used in the assessment of these options were:

- Minimize exposure to major geotechnical faults
- Ensure compatibility with intermediate shaft site locations
- Reduce the number of easements required
- Favor overlapping alignments with shorter overall lengths

On this basis, the 22 preliminary options were reduced to 8 viable options for the onshore tunnel alignment. The options that did not have an appropriate intermediate shaft site and were, therefore, eliminated included the alignments along Harbor Boulevard, Pacific Avenue, and Cabrillo Beach. The Figueroa Street alignment that extends to the Port of Los Angeles was eliminated because it runs parallel and in close proximity to the Palos Verdes Fault zone. This alignment also potentially interferes with the West Turning Basin of the Port of Los Angeles. The alignments that begin on Frigate Avenue and continue to South Gaffey Street and Western Avenue were eliminated because the majority of the alignments are identical to the Figueroa Street alignments that follow the same path, and the Frigate Avenue alignments are longer.

Of the 22 preliminary options reviewed, eight remain. The viable options for onshore tunnel alignments are:

- **Wilmington Blvd Port of Los Angeles**

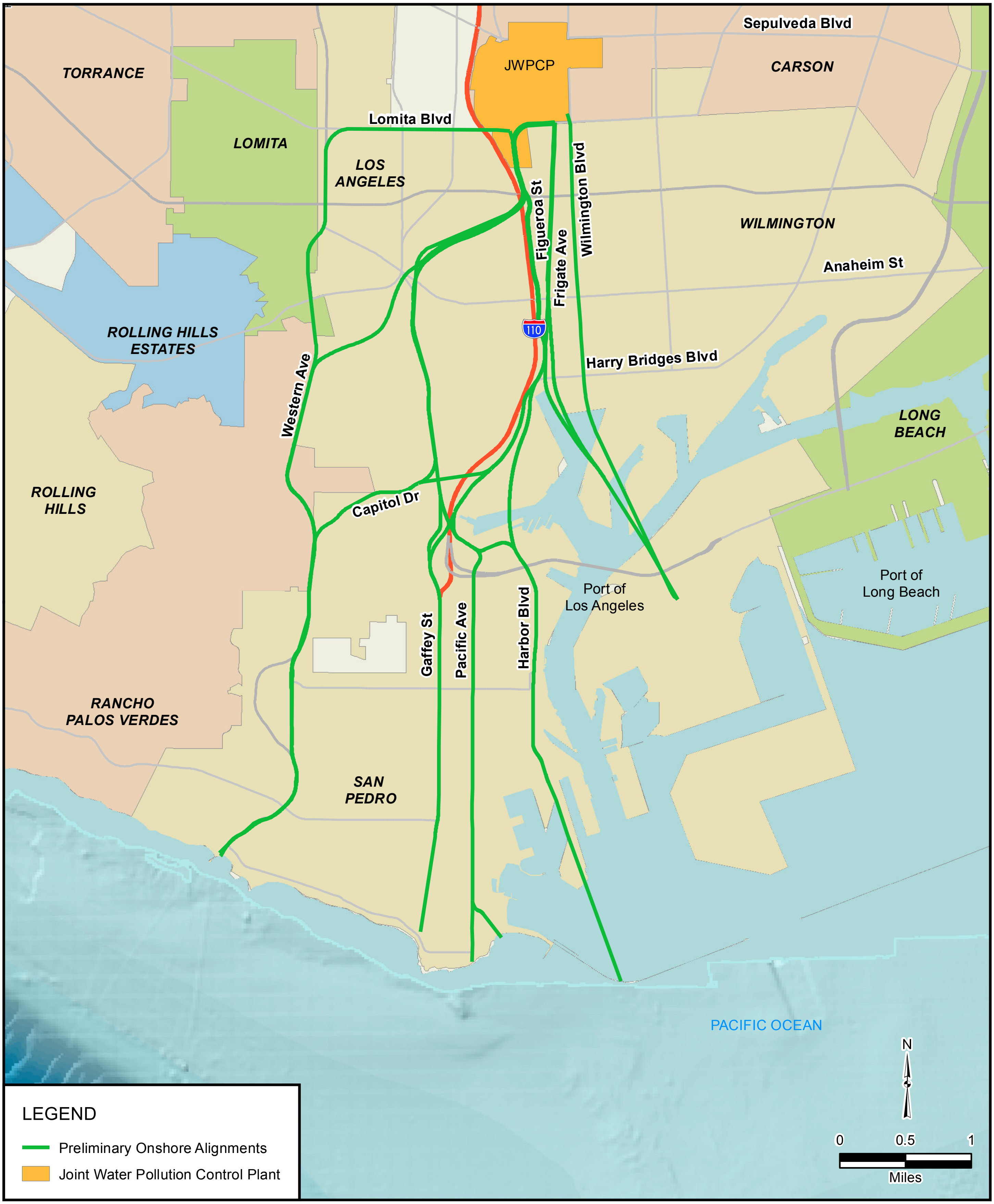


FIGURE 6-5

CLEARWATER Program

Preliminary Onshore Alignments

Source: Sanitation Districts of Los Angeles County 2011, Thomas Bros 2011, ESRI 2011

- **Frigate Ave – Port of Los Angeles**
- **Figueroa St – John S Gibson Blvd – South Gaffey St**
- **Figueroa St – Harbor Regional Park – North Gaffey St – South Gaffey St**
- **Figueroa St – John S Gibson Blvd – Capitol Dr – Western Ave**
- **Figueroa St – Harbor Regional Park – North Gaffey St – Capitol Dr – Western Ave**
- **Figueroa St – Harbor Regional Park – Navy Fuel Depot – Western Ave**
- **Lomita Blvd – Western Ave**

These viable options for onshore tunnel alignments are shown on Figure 6-6 and carried forward for the development of viable project alternatives in Section 6.3.4.1.

6.3.3.2 JWPCP Shaft Site

For all alternatives, one end of the tunnel would be at the JWPCP; therefore, a shaft site would be required at the JWPCP to facilitate tunnel construction. The shaft site at the JWPCP would be classified as a working shaft and would require sufficient access and area to permit the insertion of the TBM, ancillary equipment, tunnel segments, and personnel, as well as the continuous removal of excavation materials that originate from the tunneling process. Tunneling would take place over a period of years and, therefore, the working shaft would be an active construction site over this time. Ultimately, the shaft would function as the connection between the existing facilities and the new or modified ocean discharge system.

Preliminary Options

Level 1 screening parameters for location of a JWPCP shaft site are:

- The majority of the site must be within the confines of the JWPCP property boundaries
- The location must avoid conflicts with current facilities or planned future facilities
- The minimum area requirement is 8 acres
- The geometry of the area must be roughly rectangular to square
- The area must be relatively flat
- There must be access for equipment, ventilation systems, and personnel, as well as long-term access for excavation material removal on a continuous basis

On the basis of these criteria, two options were identified. The preliminary options for a JWPCP shaft site are:

- **JWPCP East shaft site**
- **JWPCP West shaft site**

The preliminary options for a JWPCP shaft site are shown on Figure 6-7.

Viable Options

A total of two preliminary options for a JWPCP shaft site were identified. Level 2 screening parameters used in the assessment of these options were:

- Compatibility of location with current land use

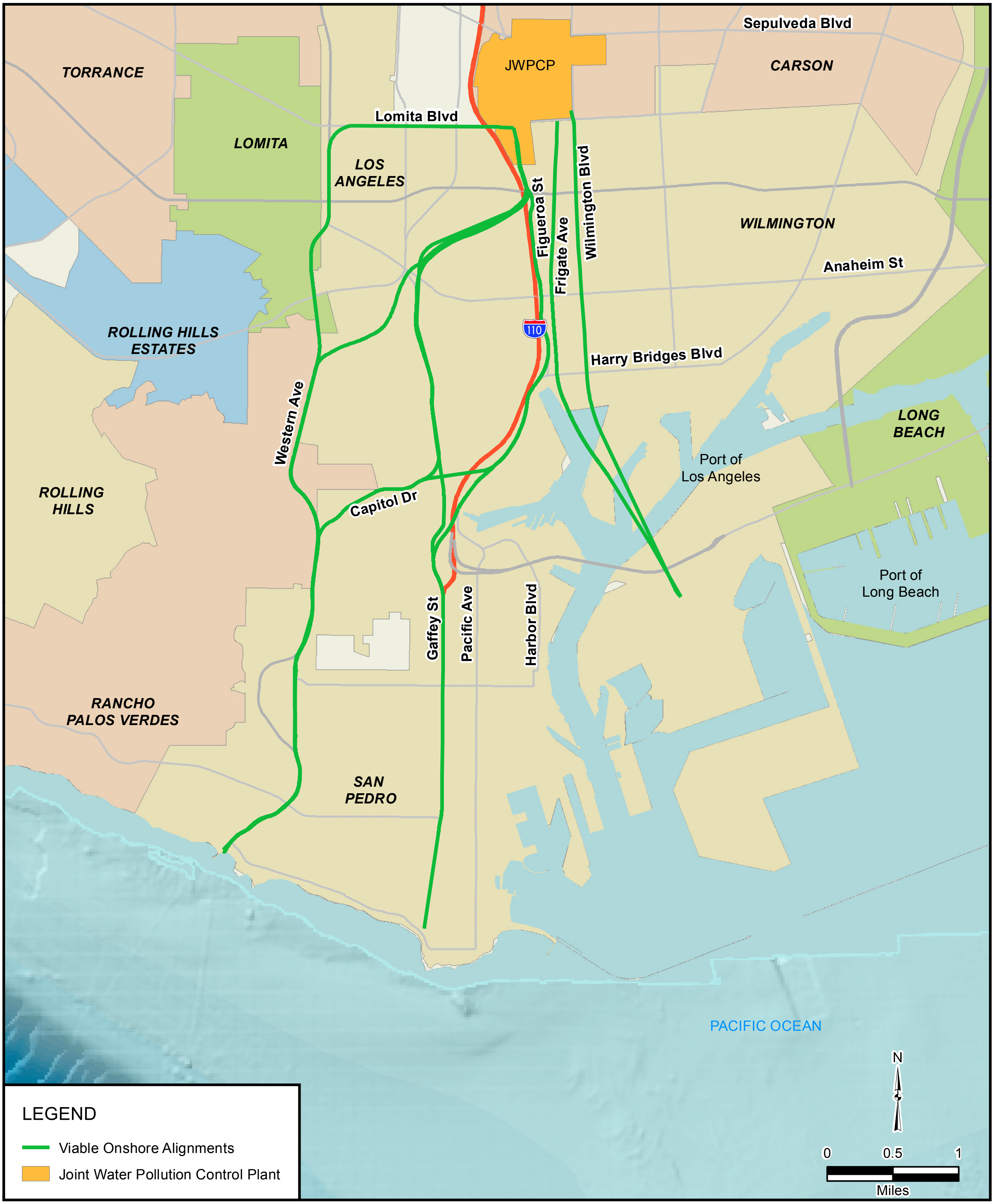


FIGURE 6-6

CLEARWATER Program

Viable Onshore Alignments

Source: Sanitation Districts of Los Angeles County 2011, Thomas Bros 2011, ESRI 2011

FIGURE 6-7

Preliminary Viable JWPCP Shaft Sites

CLEARWATER Program

Source: Sanitation Districts of Los Angeles County 2011, LARIAC 2007

- Avoidance of major environmental concerns based on a preliminary assessment
- Avoidance of major impacts on public use facilities
- Institutional constraints relative to use

Both of the proposed shaft sites at the JWPCP were compliant with the screening parameters. Therefore, the viable options for a JWPCP shaft site are:

- **JWPCP East shaft site**
- **JWPCP West shaft site**

These viable options for the JWPCP shaft site were carried forward for the development of viable system alternatives in Section 6.3.4.1.

6.3.3.3 Intermediate Shaft Site

An intermediate shaft site, depending on available area, access, and project requirements, would fall into one of three categories:

- Working Shaft: A working shaft site would be used for approximately 4 to 8 years as the aboveground staging area for the tunneling construction and support system activities. The working shaft would serve as the entry point for construction workers and as the exit point for all of the excavated material.
- Access Shaft: An access shaft site would be used primarily for supplemental ventilation during tunnel construction. It would also be available as an entry and exit point for construction workers, TBM maintenance, and removal of salvageable portions of the TBM at the project's conclusion. The access shaft site would be approximately 0.5 to 3 acres.
- Exit Shaft: An exit shaft site would be used for the removal of the TBM and have a land requirement of approximately 1 to 4 acres.

Preliminary Options

Level 1 screening parameters for location of an intermediate shaft site are:

- Area requirements depending on type of shaft
- Relatively flat
- The geometry of the area must be roughly rectangular to square
- Public land
- Close proximity to onshore tunnel alignment

On the basis of these criteria, the following 13 locations were identified as preliminary options for an intermediate shaft site:

- **Navy Fuel Depot**
- **Peck Park**
- **Averill Park**
- **White Point Nature Preserve**
- **Field of Dreams**

- **Fort MacArthur**
- **Angels Gate Park**
- **Point Fermin Park**
- **Port of Los Angeles (3)**
  - **Trans Pacific Container Service Corporation (TraPac)**
  - **Los Angeles Export Terminal (LAXT)**
  - **Southwest Marine**
- **Royal Palms Beach**
- **Cabrillo Beach**

The preliminary options for intermediate shaft sites are shown on Figure 6-8.

Viable Options

A total of 13 preliminary options were identified for an intermediate shaft site. Level 2 screening parameters used in the assessment of these options were:

- Avoidance of sites that have incompatible land uses such as landfills, military land, and other lands that entail national security
- Avoidance of sites that present significant environmental concerns such as those designated for conservation or that support endangered species
- Avoidance of sites that are currently used for public recreational activities such as parks, beaches, and athletic fields because the shaft site would use a considerable portion of the available recreational area.
- Avoidance of sites that may be contaminated to the degree where remediation is required
- Consideration of input from local jurisdictions and the general public with respect to shaft locations

The Navy Fuel Depot was eliminated due to the potential for contamination, disruption to the function of the Navy facilities, and potential impact on the Palos Verdes Peninsula Land Conservancy plans for coastal sage brush habitat preservation. Peck Park, Averill Park, and Point Fermin Park were eliminated from consideration based on the conflicts with the public recreational uses of these facilities and public input. The White Point Nature Preserve was eliminated from consideration due to its biological significance and public input. The Field of Dreams was eliminated due to its prior use as a landfill, its heavy recreational use, and public input. Fort MacArthur was eliminated due to its interference with current use and concerns raised by the Air Force over national security. Cabrillo Beach was eliminated due to the potential for extended beach closures and public input.

Of the 13 preliminary options evaluated, five remain. The viable options for an intermediate shaft site are:

- **Port of Los Angeles –TraPac (access shaft site)**
- **Port of Los Angeles –LAXT (working shaft site)**
- **Port of Los Angeles –Southwest Marine (access shaft site)**
- **Angels Gate Park (access shaft site)**

FIGURE 6-8

CLEARWATER Program

Preliminary Intermediate Shaft Sites

Source: Sanitation Districts of Los Angeles County 2011, Thomas Bros 2011, ESRI 2011

- **Royal Palms Beach (exit shaft site)**

The viable options for an intermediate shaft site are shown on Figure 6-9 and were carried forward in the development of offshore alignments described in Section 6.3.3.5 and the viable project alternatives in Section 6.3.4.1.

6.3.3.4 Diffuser Area

The diffuser area is where effluent would be discharged to the ocean. The length of the diffuser would depend on a variety of factors including projected flows and discharge depth. An underlying criterion for the proposed diffuser is that it should perform as well as the existing diffusers. To attain this criterion, initial parameters of distance from shore, discharge depth, and bathymetry profile were established. In addition, the diffuser area had to avoid the existing ocean outfalls and be located in a geotechnically stable area. Locations for a diffuser area that had sufficient length to construct a diffuser at a fairly constant bathymetric contour (same depth) were preferred over locations where the diffuser would need to be constructed at varying depths.

Preliminary Options

Level 1 screening parameters for the development of potential diffuser areas are:

- The new ocean outfall system must perform equal to, or better than, the existing ocean outfall system with respect to achieving water quality objectives
- The location and discharge should be such that it does not significantly influence other POTW outfalls
- The diffuser must be located in a geotechnically stable area with respect to slope stability and potential lateral movement
- There should be a somewhat consistent slope to the area with relatively straight contours

Based on these criteria, the following four locations areas were identified as preliminary options for a diffuser area:

- **Diffuser Area A:** Off Point Fermin on the PV Shelf, adjacent to the location of the Sanitation Districts existing ocean outfalls
- **Diffuser Area B:** East of the San Pedro Sea Valley
- **Diffuser Area C:** On the southern edge of the SP Shelf
- **Existing Ocean Outfalls**

The preliminary options for a diffuser area are shown on Figure 6-10.

Viable Options

Four separate locations were identified as preliminary options for a potential diffuser area location. Level 2 screening parameters used in the assessment of these options were:

- Areas situated where favorable ocean conditions exist to decrease the potential for water quality impacts on sensitive receptors
- Sufficient length and space to accommodate the construction of a diffuser system that could accommodate JWPCP flows beyond the 2050 projections

FIGURE 6-9

CLEARWATER Program

Viable Intermediate Shaft Sites

Source: Sanitation Districts of Los Angeles County 2011, Thomas Bros 2011, ESRI 2011

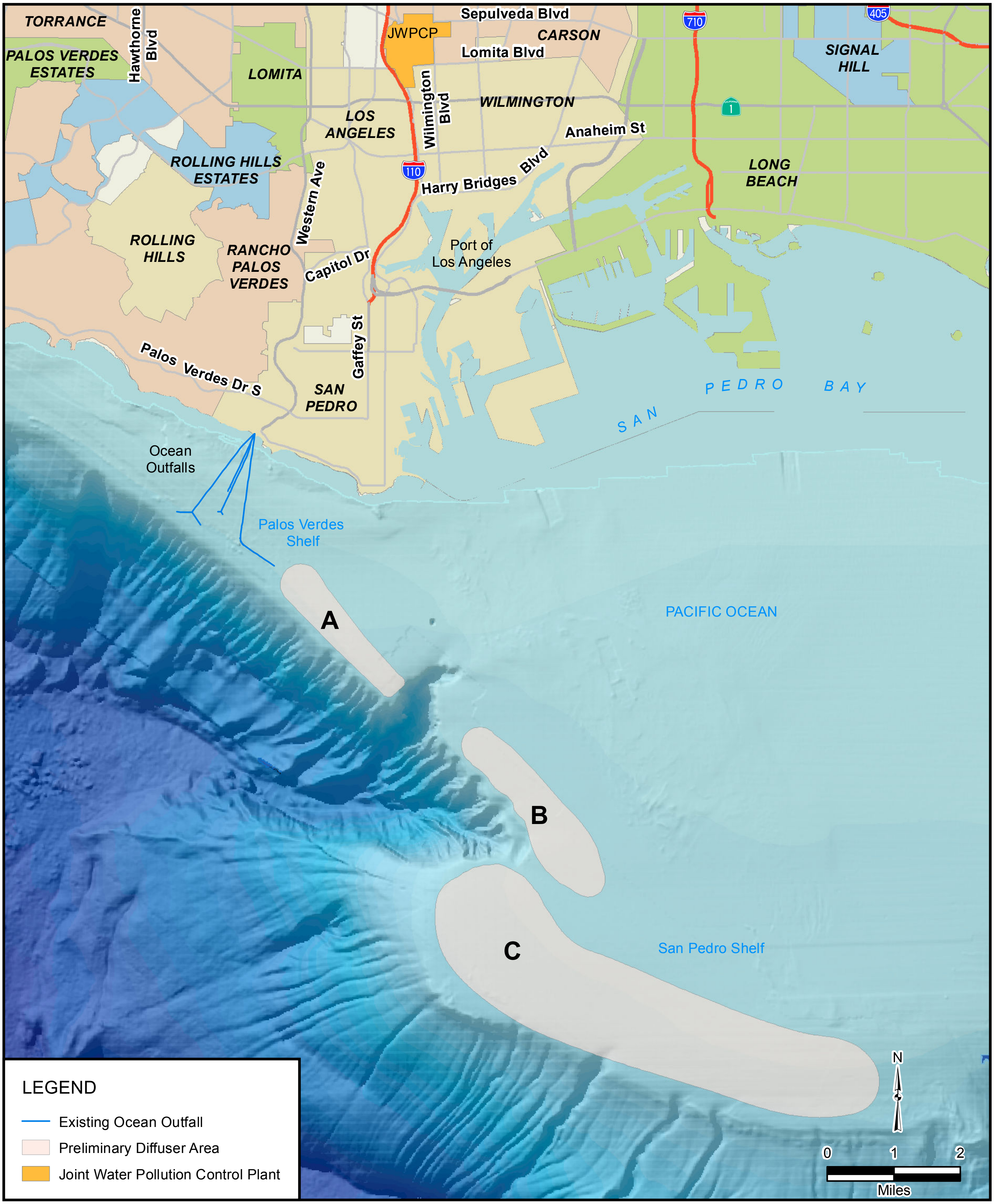


FIGURE 6-10

CLEARWATER Program

Preliminary Diffuser Areas

Source: Sanitation Districts of Los Angeles County 2011, Thomas Bros 2011, ESRI 2011

On this basis, Diffuser Area B was eliminated from consideration because of its location within active shipping lanes, proximity to the shoreline, potential for water quality impacts due to shallower depth and poor initial dilution, unfavorable currents, and insufficient area to accommodate the diffuser length that could be required.

Of the four preliminary options evaluated, three remain. The viable options for a diffuser area are:

- **Diffuser Area A (hereinafter referred to as PV Shelf)**
- **Diffuser Area C (hereinafter referred to as SP Shelf)**
- **Existing Ocean Outfalls**

These three diffuser area locations, shown on Figure 6-11, were carried forward as viable options and used in the development of offshore alignments described in Section 6.3.3.5 and the viable system alternatives in Section 6.3.4.1.

6.3.3.5 Offshore Alignment

The offshore alignment would connect an intermediate shaft site to the diffuser. The alignment could consist of a tunnel or a combination of a tunnel and a seafloor pipeline. Because each offshore alignment is dependent on the locations of the intermediate shaft site and the diffuser area, preliminary options for the offshore alignment were established after the viable options for the intermediate shaft site and diffuser area were determined.

Preliminary Options

Level 1 screening parameters for the development of potential offshore alignments were:

- Viable intermediate shaft site (working, access, or exit)
- Viable diffuser area
- Tunnel only or a combination of tunnel and seafloor pipeline

The remaining viable options for intermediate shaft sites included three in the Port of Los Angeles, one at Angels Gate Park, and one at Royal Palms Beach. Because all onshore alignments through the Port of Los Angeles end at the LAXT shaft site, it would serve as the origin of all offshore alignments through the Port of Los Angeles. Beginning at the LAXT shaft site, an alignment could continue through Pier 400 to the east of the Palos Verdes Fault into the ocean and cross the fault in the ocean, or the alignment could cross the Palos Verdes Fault within the port and continue through the Southwest Marine shaft site into the ocean. The Angels Gate shaft site would serve as the beginning of any offshore alignment through that shaft site. The Royal Palms shaft site would be an exit shaft connecting to the existing ocean outfalls and, therefore, would not serve as the start of an offshore alignment. In determining preliminary options for the offshore alignment, only the LAXT and Angels Gate shaft sites would be considered for the origin of the offshore alignment.

Combining the two shaft sites, the two viable diffuser area locations, and the type of alignments (tunnel or combined tunnel and seafloor pipeline) resulted in the following 12 preliminary options for offshore tunnel alignments:

- **LAXT through Pier 400 to PV Shelf (tunnel)**
- **LAXT through Pier 400 to PV Shelf (combined)**
- **LAXT through Pier 400 to SP Shelf (tunnel)**

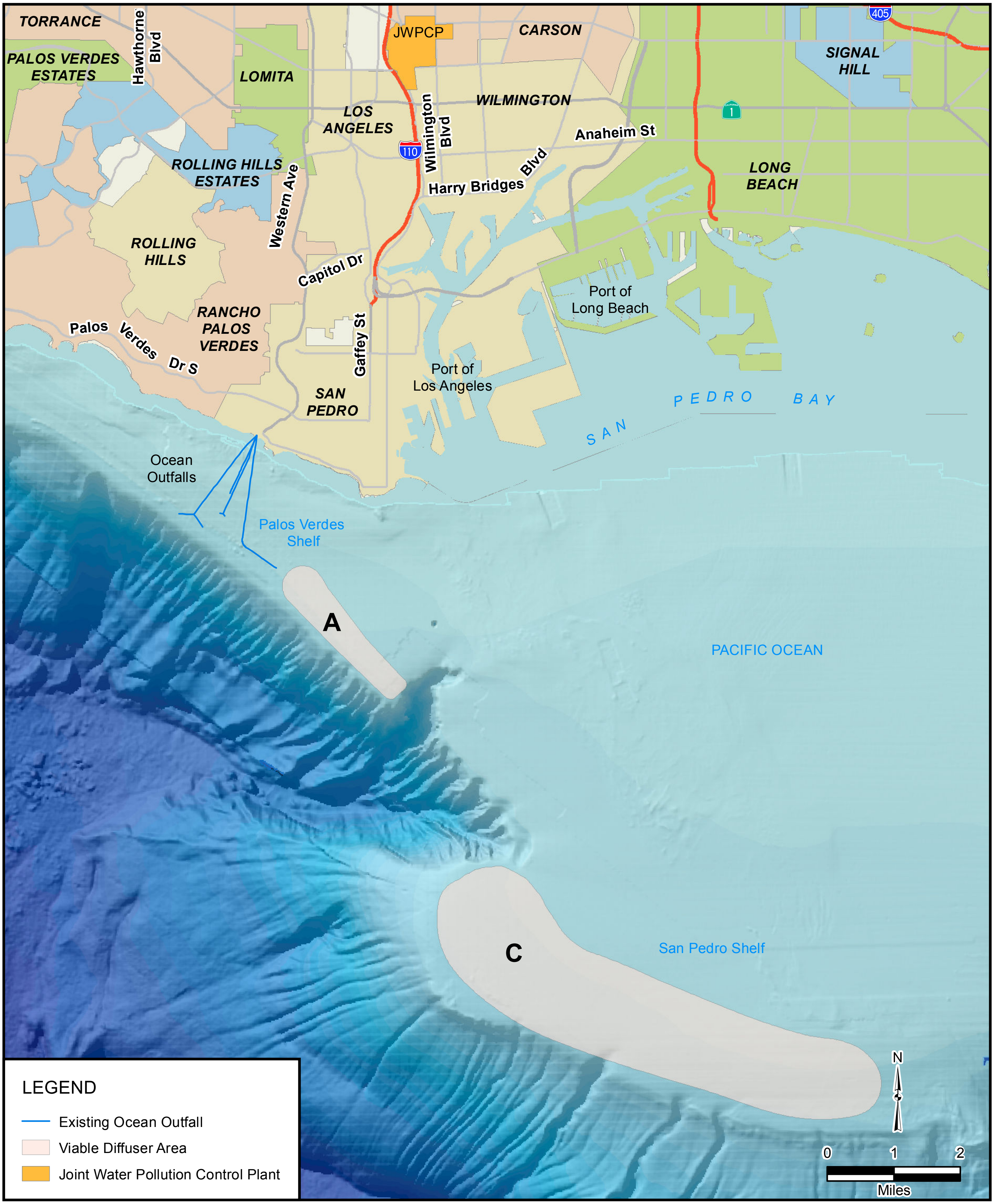


FIGURE 6-11

Viable Diffuser Areas

CLEARWATER Program

Source: Sanitation Districts of Los Angeles County 2011, Thomas Bros 2011, ESRI 2011

- **LAXT through Pier 400 to SP Shelf (combined)**
- **LAXT through Southwest Marine to PV Shelf (tunnel)**
- **LAXT through Southwest Marine to PV Shelf (combined)**
- **LAXT through Southwest Marine to SP Shelf (tunnel)**
- **LAXT through Southwest Marine to SP Shelf (combined)**
- **Angels Gate to PV Shelf (tunnel)**
- **Angels Gate to PV Shelf (combined)**
- **Angels Gate to SP Shelf (tunnel)**
- **Angels Gate to SP Shelf (combined)**

The preliminary options for offshore alignments are shown on Figure 6-12.

Viable Options

Level 2 screening parameters used in the assessment of the 12 preliminary options for an offshore alignment were:

- Maximum depth of riser is 200 feet of water
- Maximum length of submarine tunnel in rock is 10 miles
- Maximum length of submarine tunnel in soil is 4 miles
- Minimization of costs
- Minimization of marine impacts
- Avoidance of crossing the Palos Verdes Fault in the ocean

All options with combined tunnel and seafloor pipeline were eliminated because construction of a seafloor pipeline would increase the cost and marine impacts. The options that went from LAXT through Pier 400 to both the PV Shelf and the SP Shelf were eliminated because they would cross the Palos Verdes Fault in the ocean and would require an extensive amount of seafloor pipeline, which would increase the cost and marine impacts. The option that went from Angels Gate to SP Shelf was eliminated because it exceeded the maximum length of tunnel drive. Of the 12 preliminary options evaluated, three remain. The viable options for an offshore alignment are:

- **Angels Gate to PV Shelf (tunnel)**
- **LAXT through Southwest Marine to PV Shelf (tunnel)**
- **LAXT through Southwest Marine to SP Shelf (tunnel)**

These three offshore alignments were carried forward as viable options and used in the development of viable system alternatives in Section 6.3.4.1.

6.3.4 Development and Screening of Project Alternatives

6.3.4.1 Viable Alternatives

The next step in the alternatives development and assessment process for a new or modified ocean discharge system was the generation of viable alternatives. As previously described, viable options for

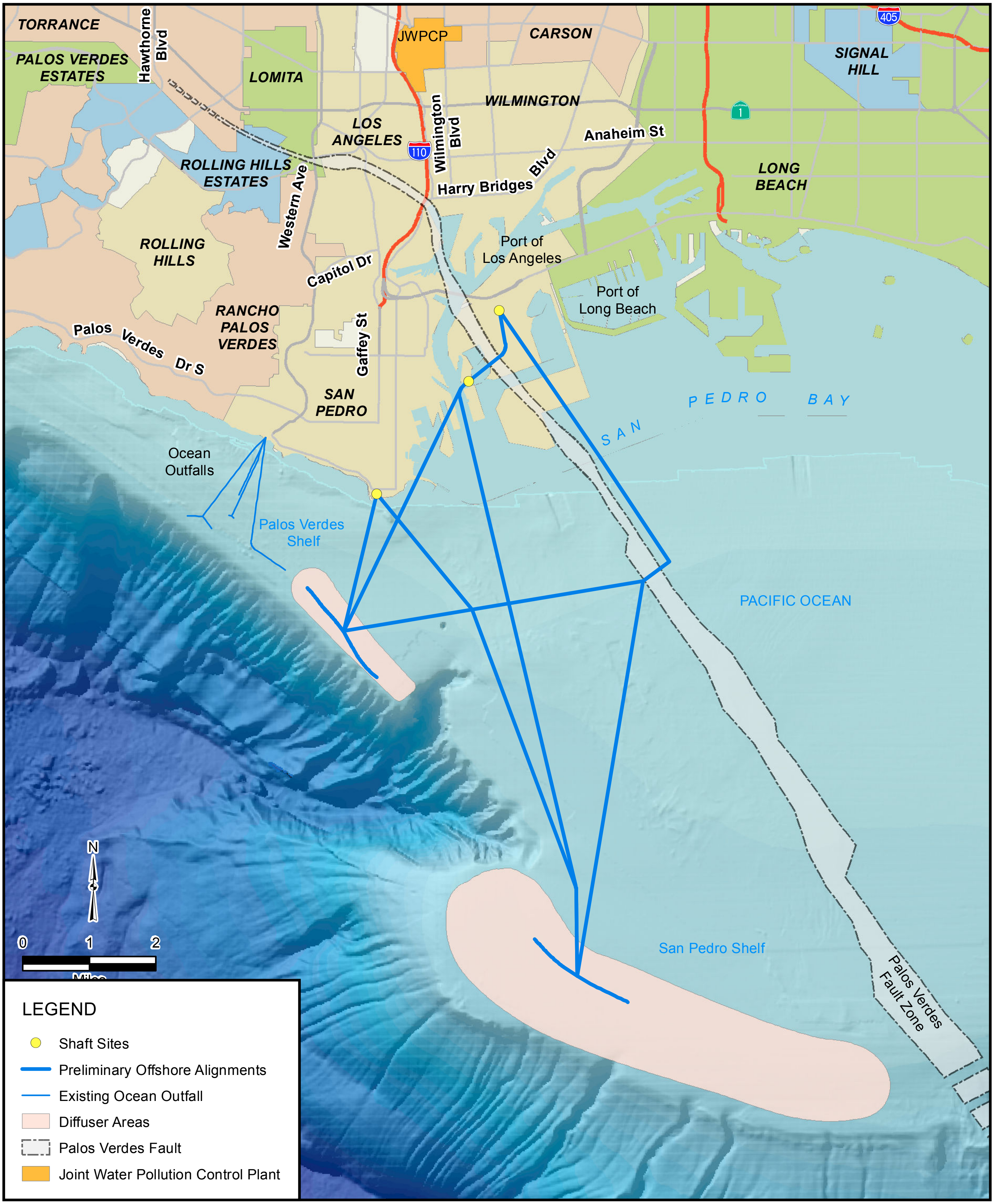


FIGURE 6-12

CLEARWATER Program

Preliminary Offshore Alignments

Source: Sanitation Districts of Los Angeles County 2011, Thomas Bros 2011, ESRI 2011

each project element area were identified. These viable options were then combined into viable alternatives for a new or modified ocean discharge system.

Various permutations of viable options from each project element were amalgamated into viable alternatives that are logical and practical in terms of the resulting functionality (e.g., a viable intermediate shaft site would only be paired with a viable onshore alignment if the shaft site were adjacent to the alignment).

The number of viable options for each project element is as follows:

- Onshore alignment (8)
- JWPCP shaft site (2)
- Intermediate shaft site (5)
- Diffuser area (3)
- Offshore alignment (3)

Logically combining these various options into comprehensive alternatives resulted in a total of 10 viable alternatives for an ocean discharge system. These 10 viable alternatives can be further categorized as either new ocean discharge systems or modified ocean discharge systems. The viable project alternatives for each category are listed in Table 6-24 and Table 6-25, respectively, and shown on Figure 6-13.

Table 6-24. Viable Alternatives: New Ocean Discharge System

JWPCP Shaft Site	Onshore Alignment	Intermediate Shaft Sites	Offshore Alignment	Diffuser Area
JWPCP East	Wilmington	TraPac, LAXT, Southwest Marine	LAXT through Southwest Marine to SP Shelf	SP Shelf
JWPCP East	Frigate	TraPac, LAXT, Southwest Marine	LAXT through Southwest Marine to SP Shelf	SP Shelf
JWPCP East	Wilmington	TraPac, LAXT, Southwest Marine	LAXT through Southwest Marine to PV Shelf	PV Shelf
JWPCP East	Frigate	TraPac, LAXT, Southwest Marine	LAXT through Southwest Marine to PV Shelf	PV Shelf
JWPCP West	N Gaffey / S Gaffey	Angels Gate	Angels Gate to PV Shelf	PV Shelf
JWPCP West	Figueroa / S Gaffey	Angels Gate	Angels Gate to PV Shelf	PV Shelf

Table 6-25. Viable Alternatives: Modified Ocean Discharge System

JWPCP Shaft Site	Onshore Alignment	Intermediate Shaft Site	Diffuser Area
JWPCP West	Figueroa / John S Gibson / Capitol / Western	Royal Palms	Existing Outfalls
JWPCP West	Figueroa / Harbor Regional Park / North Gaffey / Capitol / Western	Royal Palms	Existing Outfalls
JWPCP West	Figueroa / Harbor Regional Park / Navy Fuel Depot / Western	Royal Palms	Existing Outfalls
JWPCP West	Lomita / Western	Royal Palms	Existing Outfalls

6.3.4.2 Level 3 Screening

The next step in the alternatives development and assessment process for a new or modified ocean discharge system was the Level 3 screening of viable alternatives and determination of ranked feasible alternatives to carry forward for detailed environmental analysis in the associated EIR/EIS.

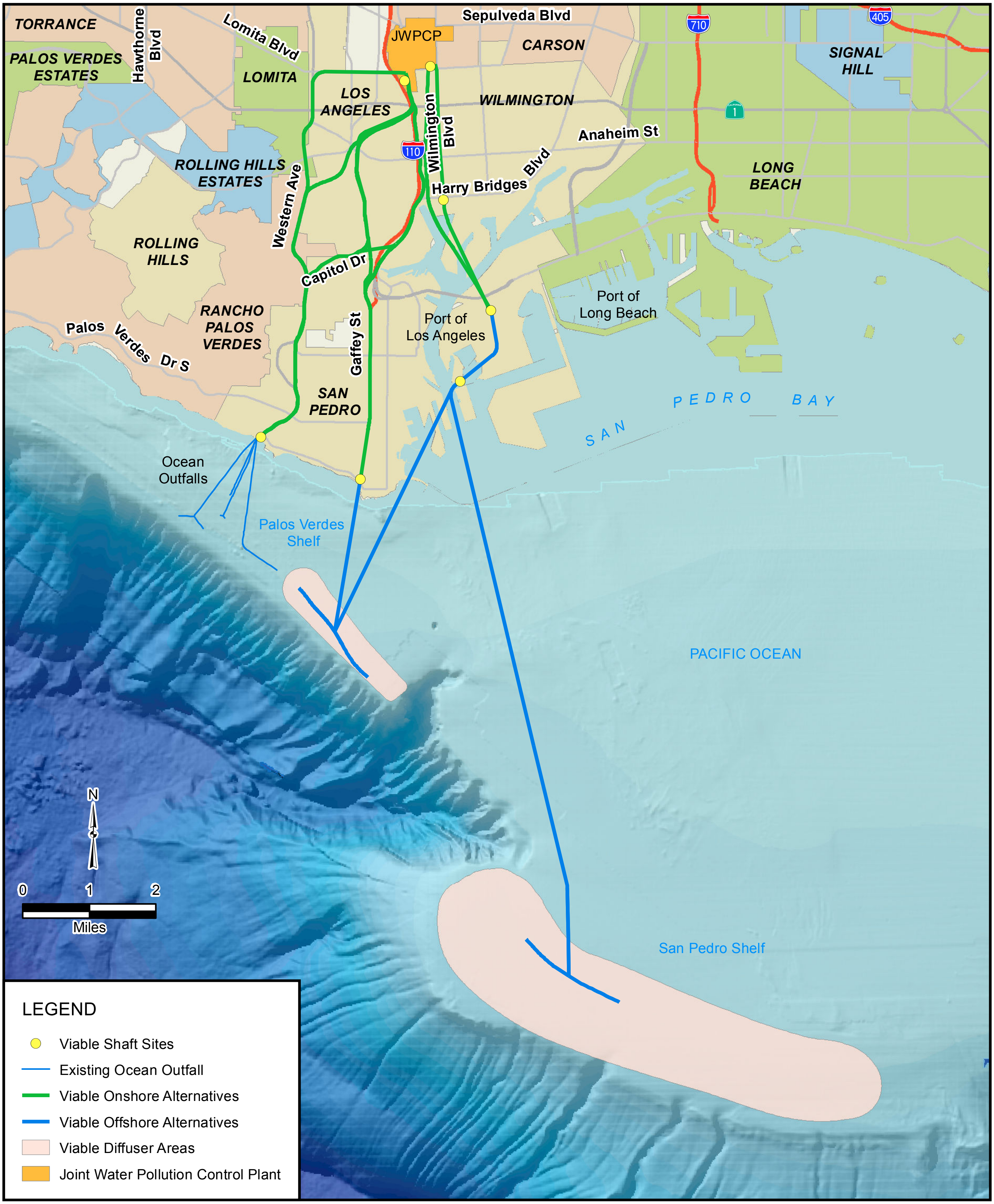


FIGURE 6-13

CLEARWATER Program

Viable Alternatives for a New or Modified Ocean Discharge System

Source: Sanitation Districts of Los Angeles County 2011, Thomas Bros 2011, ESRI 2011

The Level 3 screening process employed a multi-criteria decision support software tool to facilitate the overall assessment effort. The software provided the flexibility to investigate a wide range of evaluation approaches and allowed for a sensitivity analysis of outcomes. The steps in assessing the viable alternatives and determining the ranked feasible alternatives were as follows:

- Determine screening parameters, parameter weights, and guidelines for application of criteria
- Disaggregate viable alternatives into project elements and determine importance factors to apply to each project element in scoring compilation
- Score the project elements of each alternative with respect to the screening parameters and apply importance factor weights
- Compile aggregate weighted scores for each alternative by applying screening parameter weights and totaling the weighted element scores
- Carry forward top scoring alternatives as ranked feasible alternatives for detailed environmental assessment

Screening Parameters and Weighting

Viable alternatives were evaluated with respect to their relative ranking against a set of screening parameters. The criteria and relative weights used in the assessment process are listed in Table 6-26.

Table 6-26. Screening Parameters and Weighting

Screening Parameter	Weight (Percent)
Environmental Impacts	20
Public Input	15
Operational Considerations	10
Constructability	15
Long-Term Uncertainty	20
Cost Effectiveness	20

The assigned weights reflect the Sanitation Districts assessment of the relative importance of each of these parameters in the decision-making process. The screening parameters were selected and defined so as to provide measurable, comprehensive, and independent results. Each option was scored on a system from zero (worst) to ten (best). Each of these parameters is briefly discussed in the paragraphs that follow.

Environmental Impacts

Environmental impacts consider both the short-term (construction) and long-term (operational) impacts related to the subject alternative. This parameter takes into account both the extent of construction and the sensitivity of areas affected. The scores for this parameter range from zero, for a high degree of impacts and a high level of mitigation required, to ten, for limited impacts and no mitigation required.

Public Input

Public input considers the relative degree of public acceptance anticipated for the subject alternative. This includes views of individuals and community groups collected as part of a public outreach program. If documented public input was unavailable, public perception was anticipated or inferred. The scores for this parameter range from zero, for a high degree of public opposition, to ten, for positive public perceptions and support.

Operational Considerations

Operational considerations deal with the benefits the subject alternative provides to the ongoing operation of the JWPCP. Operational flexibility, redundancy, and anticipated O&M and monitoring costs are among the factors evaluated in this category. The scores for this parameter range from zero, for no flexibility and high O&M and monitoring costs, to ten, for a high degree of flexibility and low O&M and monitoring costs.

Constructability

Constructability considers the relative ease or difficulty of constructing the facilities for the subject alternative. For instance, would construction require methods that are commonly used or would it require innovative techniques? Seismic design is considered in this category, as well as the hazards that may be encountered during construction. Institutional feasibility, an indication of the Sanitation Districts' control over a given alternative, is also considered. The scores for this parameter range from zero, for highly complex construction methods, state-of-the-art technology, many hazards, and dependence on third-party approvals, to ten, for relatively easy, standard construction, limited hazards, and greater Sanitation Districts' control.

Long-Term Uncertainty

Long-term uncertainty considers the impacts of future events and changes in conditions that may occur but cannot be predicted (e.g., future flows and regulatory requirements). Areas such as seismic vulnerability and the ability to access and repair the elements of the subject alternative are considered as well. Asset reliability and expansion potential are also considered in this category. The scores for this parameter range from zero, if future significant events and conditions would require significant effort or changes, to ten, if future significant events and conditions could be handled with relative ease or no changes.

Cost Effectiveness

Cost effectiveness considers the capital costs associated with the implementation of the subject alternative. The scores for this parameter range from zero, for the most expensive alternative, to ten, for a no-cost alternative.

Project Element Importance Factors

Some of the project elements play a greater role in the development of the alternatives or have greater importance than the others. Each project element was assigned an importance factor based on the Sanitation Districts' assessment its relative importance. Subsurface project elements, particularly the offshore tunnels, were generally deemed less important than surface project elements with respect to overall potential project impacts. The importance factors for each project element are shown in Table 6-27.

Table 6-27. Project Element Importance Factors

Project Element	Importance Factors (Percent)
JWPCP Shaft Site	25
Onshore Tunnel Alignment	15
Intermediate Shaft Site	25
Offshore Alignment	10
Diffuser Area	25

Viable Alternative Scoring

To determine an aggregate score for each alternative, the project elements were first scored with respect to the screening parameters, and the importance factors were applied. The results were then multiplied by the screening parameter weights and totaled. The aggregate scores for the viable alternatives are presented in Table 6-28, along with the relative rankings.

The scores reflect the relative superiority of the modified ocean discharge alternatives (the last four alternatives listed in Table 6-28), particularly with respect to environmental impacts, public support, and cost. The lower, closely grouped scores for the new ocean discharge alternatives (the first six alternatives listed in Table 6-28) reflect the tradeoffs between siting a shaft site within the Port of Los Angeles or Angels Gate Park and constructing a diffuser on the SP Shelf or the PV Shelf. For example, the public strongly opposes siting any kind of shaft at Angels Gate Park and prefers a new diffuser area on the SP shelf because it would be further offshore and deeper than a new diffuser area on the PV Shelf. However, a diffuser area on the SP Shelf would be very difficult to construct and expensive given its distance offshore.

Table 6-28. Viable Alternatives Scoring Summary

Alternative	Aggregate Weighted Score	Relative Ranking
Wilmington □LAXT □SP Shelf	5.63	5
Frigate □LAXT □SP Shelf	5.55	6
Wilmington □LAXT □PV Shelf	5.43	8
Frigate □LAXT □PV Shelf	5.36	10
Figueroa □Angels Gate □PV Shelf	5.48	7
N Gaffey □Angels Gate □PV Shelf	5.42	9
Figueroa □Harbor Regional Park □N Gaffey □Capitol □Western	7.56	1
Figueroa □John S Gibson □Capitol □Western	7.49	2
Figueroa □Harbor Regional Park □Navy Fuel Depot □Western	7.47	3
Lomita □Western	7.39	4

Selecting Feasible Alternatives

There are a number of potential approaches to using the scoring as a way to rank the viable alternatives and select those to carry forward as feasible alternatives. The simplest approach would be to rank alternatives based strictly on the scoring, with the highest score ranked as number one and the lowest ranked as number ten, as presented in Table 6-28.

With this approach, the top three or four alternative scores could be used to determine the feasible alternatives. However, there was no clear delineation between the higher and lower ranked alternatives for a new ocean discharge system, and selecting only the alternatives for a modified ocean discharge system would not constitute a reasonable range of alternatives, as required for environmental review under the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA).

A sensitivity analysis was performed in which the screening parameter weights were varied. This analysis indicated that the ten viable alternatives could be logically divided into four distinct groups based on the intermediate shaft site and the diffuser location. The three groups within the new ocean discharge system are LAXT to SP Shelf, LAXT to PV Shelf, and Angels Gate to PV Shelf. The fourth group would consist of the modified ocean discharge alternatives, which would have a shaft site at Royal Palms Beach and would utilize the existing ocean outfalls. The grouping of the viable alternatives is shown in Table 6-29.

Table 6-29. Grouping of Viable Alternative by Intermediate Shaft Site and Diffuser Location

Program Alternative	Intermediate Shaft Site and Diffuser Area	Project Alternative	Aggregate Score	Relative Ranking Within Grouping
New Ocean Discharge System	LAXT to SP Shelf	Wilmington LAXT SP Shelf	5.63	1
		Frigate LAXT SP Shelf	5.55	2
	LAXT to PV Shelf	Wilmington LAXT PV Shelf	5.43	1
		Frigate LAXT PV Shelf	5.36	2
	Angels Gate to PV Shelf	Figueroa AG PV Shelf	5.48	1
		N Gaffey AG PV Shelf	5.42	2
Modified Ocean Discharge System	Royal Palms to Existing Ocean Outfalls	Figueroa Harbor Regional Park N Gaffey Capitol Western	7.56	1
		Figueroa John S Gibson Capitol Western	7.49	2
		Figueroa Harbor Regional Park Navy Fuel Depot Western	7.47	3
		Lomita Western	7.39	4

In all four of these groups, one alternative always ranked highest in the sensitivity analysis, regardless of the screening criteria weights. These top-ranked alternatives are the feasible project alternatives (shown on Figure 6-14).

6.3.4.3 Ranked Feasible Alternatives

On the basis of the analysis performed, the ranked feasible project alternatives, listed from highest to lowest ranking, are:

- **JE 3 (Figueroa Harbor Regional Park North Gaffey Capitol Western Royal Palms Existing Ocean Outfalls):** JWPCP West (working shaft); beneath Figueroa Street, Harbor Regional Park, North Gaffey Street, Capitol Drive, and Western Avenue (through Dodson Avenue); to Royal Palms Beach (exit shaft); and rehabilitation of the existing ocean outfalls
- **JE 2A (Wilmington LAXT SP Shelf):** JWPCP East (working shaft); beneath Wilmington Boulevard to the Port of Los Angeles (access shaft at TraPac; construction shaft at LAXT); out through Southwest Marine (access shaft); to diffuser area on SP Shelf; and rehabilitation of the existing ocean outfalls
- **JE 2B (Figueroa Angels Gate PV Shelf):** JWPCP West (working shaft); beneath Figueroa Street and South Gaffey Street to Angels Gate Park (access shaft); to diffuser area on PV Shelf; and rehabilitation of the existing ocean outfalls
- **JE 2C (Wilmington LAXT PV Shelf):** JWPCP East (working shaft); beneath Wilmington Boulevard to the Port of Los Angeles (access shaft at TraPac; construction shaft at LAXT); out through Southwest Marine (access shaft); to diffuser area on PV Shelf; and rehabilitation of the existing ocean outfalls

A summary of the JOS project-level alternatives analysis is shown on Figure 6-15.

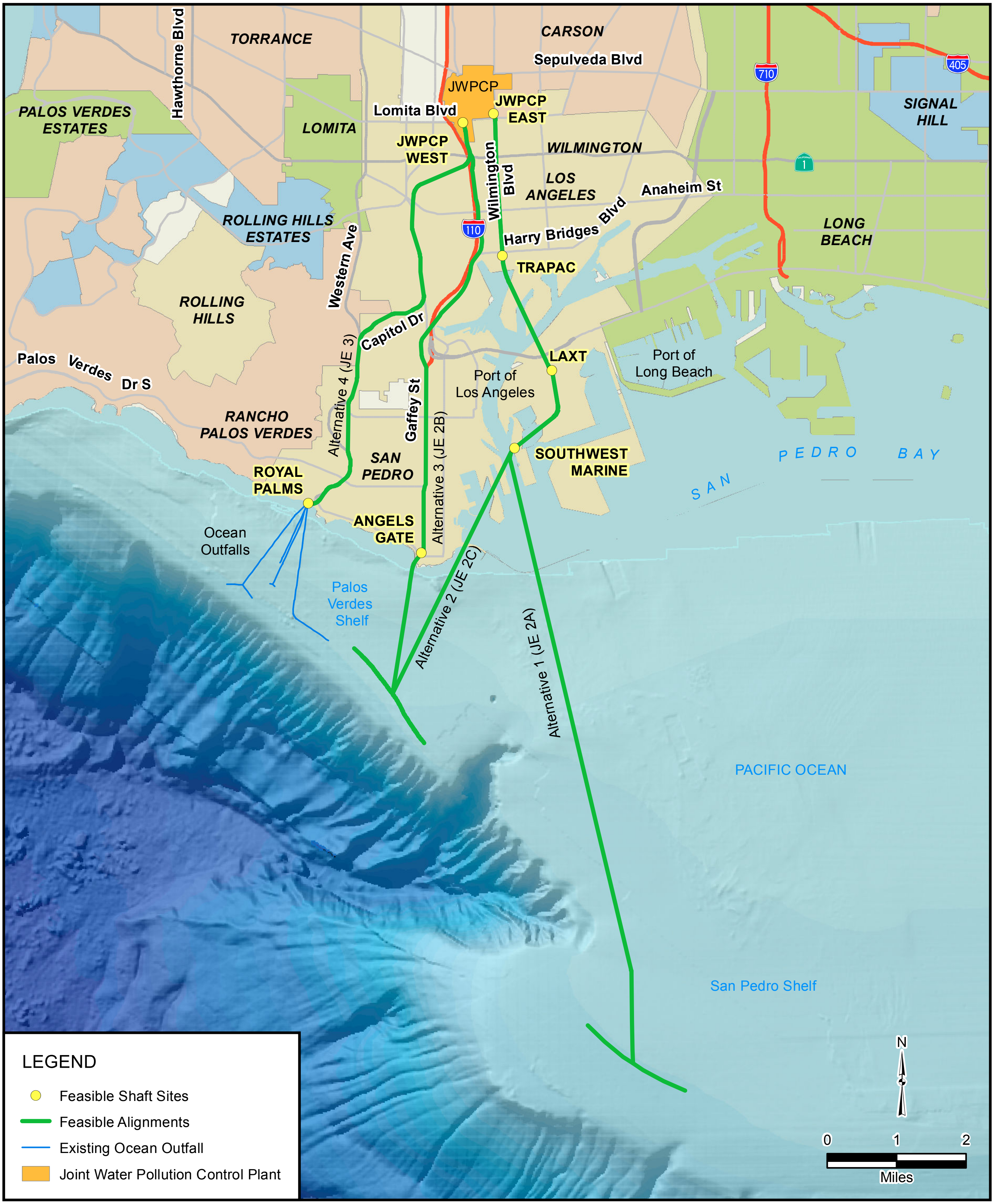


FIGURE 6-14

CLEARWATER Program

Feasible Alternatives for New or Modified Ocean Discharge System

Source: Sanitation Districts of Los Angeles County 2011, Thomas Bros 2011, ESRI 2011

STUDY AREA CRITERIA

Use a direct route from JWPCP to diffuser	Remain on continental shelf	Maintain appropriate distance from other outfalls	Avoid Marine Protected Areas

LEVEL 1 SCREENING – PROJECT OBJECTIVES

JWPCP SHAFT SITES	ONSHORE ALIGNMENT	INTERMEDIATE SHAFT SITES	OFFSHORE ALIGNMENT	RISER & DIFFUSER AREA
Minimum area – 8 acres Mostly within JWPCP boundaries Sufficient access Appropriate shape/geometry Avoid existing facilities	Use public ROW and easements Sufficient turning radius for tunnel boring machine Minimize overall length	Sufficient area Appropriate shape/geometry Relatively flat Use public lands Proximity to onshore alignment	Input from viable land and diffuser options All tunnel (T) Combined tunnel & ocean floor pipeline (C)	Perform as well as existing outfalls Slope (straight contour) Geotechnically stable area Avoid other agency outfalls

PRELIMINARY OPTIONS – BY PROJECT ELEMENT

JWPCP SHAFT SITES	ONSHORE ALIGNMENT	INTERMEDIATE SHAFT SITES	OFFSHORE ALIGNMENT	RISER & DIFFUSER AREA
JWPCP West JWPCP East	Fig-NGaf-SGaf Fig-NGaf-Pac Fig-NGaf-Pac-CBch Fig-NGaf-Harb Fig-Nav-West Fig-NGaf-Cap-West Fig-JSG-SGaf Fig-JSG-Pac Fig-JSG-Pac-CBch Fig-JSG-Harb Fig-JSG-Cap-West Fig-CS-Harb Frig-JSG-SGaf Frig-JSG-Pac Frig-JSG-Pac-CBch Frig-JSG-Cap-West Frig-JSG-Harb Frig-CS-Harb Fig-POLA Frig-POLA Wilm-POLA Lom-West	Navy Fuel Depot Fort MacArthur Averill Park Cabrillo Beach Field of Dreams Peck Park Point Fermin Park White Pt Nature Reserve Royal Palms Beach Angels Gate Park Port of Los Angeles	AG-PV(T) AG-SP(T) AG-PV(C) AG-SP(C) LAXT-SWM-PV(T) LAXT-SWM-SP(T) LAXT-SWM-PV(C) LAXT-SWM-SP(C) LAXT-P400-PV(T) LAXT-P400-SP(T) LAXT-P400-PV(C) LAXT-P400-SP(C)	Palos Verdes Shelf San Pedro Shelf at Sea Valley San Pedro Shelf Existing ocean outfalls

LEVEL 2 SCREENING – PROJECT ELEMENT SCREENING CRITERIA

JWPCP SHAFT SITES	ONSHORE ALIGNMENT	INTERMEDIATE SHAFT SITES	OFFSHORE ALIGNMENT	RISER & DIFFUSER AREA
Compatible land use Minimize environmental concerns Minimize impact to public facilities Institutional constraints relative to use	Minimize exposure to faults Compatible with intermediate shaft sites Minimize easement required Minimize length	Compatible land use Minimize environmental concerns Minimize impact to recreational areas Avoid contaminated sites Input from local jurisdictions and public	Stay within state of art tunnel/riser limits Minimize cost Minimize marine impacts Avoid offshore crossing of PV Fault	Favorable currents Ability to accommodate future flows

VIABLE OPTIONS – BY PROJECT ELEMENT

JWPCP SHAFT SITES	ONSHORE ALIGNMENT	INTERMEDIATE SHAFT SITES	OFFSHORE ALIGNMENT	RISER & DIFFUSER AREA
JWPCP West JWPCP East	Fig-NGaf-SGaf Fig-Nav-West Fig-NGaf-Cap-West Fig-JSG-Cap-West Fig-JSG-SGaf Wilm-POLA Lom-West Frig-POLA	Angels Gate Park Port of Los Angeles Royal Palms Beach	AG-PV(T) LAXT-SWM-PV(T) LAXT-SWM-SP(T)	Palos Verdes Shelf San Pedro Shelf Existing ocean outfalls

VIABLE ALTERNATIVES (PROJECT)

JWPCP West : Fig-JSG-SGaf : AG : AG-PV(T) : PV
JWPCP West : Fig-NGaf-SGaf : AG : AG-PV(T) : PV
JWPCP East : Wilm-POLA : POLA : LAXT-SWM-PV(T) : PV
JWPCP East : Wilm-POLA : POLA : LAXT-SWM-SP(T) : SP
JWPCP East : Frig-POLA : POLA : LAXT-SWM-SP(T) : SP
JWPCP East : Frig-POLA : POLA : LAXT-SWM-PV(T) : PV
JWPCP West : Fig-Nav-West : RP : Existing ocean outfalls
JWPCP West : Fig-NGaf-Cap-West : RP : Existing ocean outfalls
JWPCP West : Fig-JSG-Cap-West : RP : Existing ocean outfalls
JWPCP West : Lom-West : RP : Existing ocean outfalls

LEVEL 3 SCREENING – ALTERNATIVES EVALUATION CRITERIA (PROJECT)

Public input | Cost effectiveness | Long-term uncertainty | Operational considerations | Constructability | Environmental impacts

RANKED FEASIBLE ALTERNATIVES (PROJECT)

HIGHEST RANKED	Alternative 4 (JE 3):	JWPCP West : Fig-NGaf-Cap-West : RP : Existing ocean outfalls
	Alternative 1 (JE 2A):	JWPCP East : Wilm-POLA : POLA : LAXT-SWM-SP(T) : SP
	Alternative 3 (JE 2B):	JWPCP West : Fig-JSG-SGaf : AG : AG-PV(T) : PV
LOWEST RANKED	Alternative 2 (JE 2C):	JWPCP East : Wilm-POLA : POLA : LAXT-SWM-PV(T) : PV

ENVIRONMENTAL ANALYSIS (EIR/EIS)

RECOMMENDED PROJECT

AG: Angels Gate
Cap: Capitol Dr
CBch: Cabrillo Beach
CS: China Shipping
Fig: Figueroa St
Frig: Frigate Ave
Harb: Harbor Blvd
JSG: John S Gibson Blvd
LAXT: Los Angeles Export Terminal
Lom: Lomita Blvd
NAV: Naval Fuel Depot
NGaf: North Gaffey St
Pac: Pacific Ave
P400: Pier 400
POLA: Port of Los Angeles
PV: Palos Verdes Shelf
RP: Royal Palms
SGaf: South Gaffey St
SP: San Pedro Shelf
SWM: Southwest Marine
West: Western Ave
Wilm: Wilmington Blvd

FIGURE 6-15

CLEARWATER Program

Master Facilities Plan Project-Level Alternatives Screening Process

Source: Sanitation Districts of Los Angeles County 2011

6.4 Final Plan Alternatives

6.4.1 Viable Alternatives

In Section 6.2, the program component areas were analyzed, and four of the program component areas resulted in one feasible option. They are:

- **Wastewater Conveyance and Treatment □CT 2A:** Expansion at the SJCWRP; Process Optimization at the SJCWRP, POWRP, LCWRP, and LBWRP; and Additional Conveyance Capacity
- **Solids Processing □SP 1A:** Centralized Processing at the JWPCP□Use of Existing Systems
- **Biosolids Management □BM 1:** Current Practices: Beneficial Use□Landfill
- **WRP Effluent Management □WE 1:** Use of Current Effluent Management Systems

Analysis of the fifth program component area, JWPCP effluent management, resulted in two feasible options that were analyzed at a project level in Section 6.3:

- **JWPCP Effluent Management □JE 2:** New Ocean Discharge System
- **JWPCP Effluent Management □JE 3:** Modified Ocean Discharge System

The results of this analysis provided a set of four ranked feasible project alternatives (listed from highest to lowest ranking):

- **Modified Ocean Discharge System □JE 3:** Figueroa □Harbor Regional Park □North Gaffey □ Capitol □Western □Royal Palms □Existing Ocean Outfalls
- **New Ocean Discharge System □JE 2A:** Wilmington □LAXT □SP Shelf
- **New Ocean Discharge System □JE 2B:** Figueroa □Angels Gate □PV Shelf
- **New Ocean Discharge System □JE 2C:** Wilmington □LAXT □PV Shelf

Combining the program and project elements into a set of system wide alternatives results in four feasible plan alternatives, which are listed in Table 6-30 and shown on Figure 6-2.

Table 6-30. Feasible Plan Alternatives

Alternative	Component Areas	Relative Ranking
1	CT 2A □SP 1A □BM 1 □WE 1 □JE 2A	2
2	CT 2A □SP 1A □BM 1 □WE 1 □JE 2C	4
3	CT 2A □SP 1A □BM 1 □WE 1 □JE 2B	3
4	CT 2A □SP 1A □BM 1 □WE 1 □JE 3	1

6.4.1.1 Cost of Feasible Alternatives

The capital cost to implement each of the four feasible plan alternatives is shown in Table 6-31.

Table 6-31. Capital Costs for Feasible Plan Alternatives

Component Area	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Wastewater Conveyance and Treatment	\$658M	\$658M	\$658M	\$658M
Solids Processing	\$66M	\$66M	\$66M	\$66M
Biosolids Management	\$0M	\$0M	\$0M	\$0M
WRP Effluent Management	\$0M	\$0M	\$0M	\$0M
JWPCP Effluent Management[a]	\$1,362M	\$984M	\$909M	\$550M
Total:	\$2,086M	\$1,708M	\$1,633M	\$1,274M

[a] Includes \$15 million to rehabilitate the existing ocean outfalls.
M = million

6.4.2 No-Project and No-Federal-Action Alternatives

Environmental reviews (CEQA and NEPA) associated with new facilities require the inclusion of no-project and no-federal-action alternatives as a basis for comparison in the evaluation of the environmental impacts for the recommended facilities.

Under the No-Project Alternative for the Clearwater Program, it is assumed that the recommendations for WRP expansion, conveyance system improvements, WRP effluent management, solids processing, and biosolids management from the previous comprehensive JOS facilities planning effort (JOS 2010 Master Facilities Plan) would be implemented when needed. There would be no process optimization at the WRPs and a new or modified ocean discharge system would not be constructed. Under this approach, project objectives previously outlined would not be achieved, so it is not considered feasible.

Under the No-Federal-Action Alternative, it is assumed that no federal permits would be issued for any of the recommendations of the Clearwater Program. The only aspect of the Clearwater Program that requires federal permits is the construction of a new or modified ocean discharge system. Therefore, under this alternative, all of the conveyance/treatment, solids processing, biosolids management, and WRP effluent management recommendations of the Clearwater Program would be implemented, but there would be no new or modified ocean discharge system. Under this approach, project objectives previously outlined would not be achieved, so it is not considered feasible.

6.4.3 Identification of Recommended Plan

The four plan alternatives consist of program and project aspects. Because the alternatives are identical in all aspects except for the selected approach to JWPCP effluent management, the ranking of the feasible project alternatives, shown in Section 6.3.4.3, represents the ranking of the plan alternatives. Therefore, Alternative 4 from Table 6-30 is the recommended plan alternative. The program and project elements of the recommended plan are:

- **Wastewater Conveyance and Treatment – CT 2A:** Expansion at the SJCWRP; Process Optimization at the SJCWRP, POWRP, LCWRP, and LBWRP; and Additional Conveyance Capacity
- **Solids Processing – SP 1A:** Centralized Processing at the JWPCP
- **Biosolids Management – BM 1:** Current Practices: Beneficial Use/Landfill
- **WRP Effluent Management – WE 1:** Use of Current Effluent Management Systems
- **JWPCP Effluent Management – JE 3:** Figueroa – Harbor Regional Park – North Gaffey – Capitol – Western – Royal Palms (JWPCP West [working shaft]; Beneath Figueroa Street,

Harbor Regional Park, North Gaffey Street, Capitol Drive, and Western Avenue [through Dodson Avenue]; to Royal Palms Beach [exit shaft]); and Rehabilitation of the Existing Ocean Outfalls

The specifics of the recommended plan are described in more detail within Chapter 7.

Chapter 7
RECOMMENDED PLAN SUMMARY

7.1 Introduction

Based on the alternatives analysis presented in Chapter 6, the recommended plan for the Clearwater Program is a combination the highest-ranked feasible program alternatives for each of the Joint Outfall System (JOS) component areas and the highest-ranked feasible project alternative (Alternative 4) for effluent management at the Joint Water Pollution Control Plant (JWPCP). Chapter 7 presents a detailed description of the facilities needed to implement the recommended plan. Given the speculative nature of the program, which would be implemented over the long term, the emphasis of this chapter is on the recommended project a modified ocean discharge system.

This chapter is organized into the following major sections:

- Summary of the Recommended Plan
- Plan Implementation and Schedule
- Project Cost
- Revenue Program
- Project Financing

7.2 Summary of the Recommended Plan

Program recommendations, which are broad and long term, would be implemented as needed. Project recommendations, which require a greater level of detail, would be implemented in the short term.

The five major program component areas are:

- Wastewater conveyance and treatment
- Solids processing
- Biosolids management
- Water reclamation plant (WRP) effluent management
- JWPCP effluent management

The four component areas with recommended program-level improvements are wastewater conveyance and treatment, solids processing, biosolids management, and WRP effluent management. The one component area with recommended project-specific improvements is JWPCP effluent management.

7.2.1 Wastewater Conveyance and Treatment

Recommendations for the conveyance and treatment program component area of the recommended plan include a 25 million gallons per day (MGD) expansion at the San Jose Creek Water Reclamation Plant (SJCWRP); process optimization at the Pomona Water Reclamation Plant (POWRP), SJCWRP, Los Coyotes Water Reclamation Plant (LCWRP), and Long Beach Water Reclamation Plant (LBWRP); and approximately 32.5 miles of relief sewers within the JOS. Process optimization consists of modifications within the existing plants to ensure that the Sanitation Districts of Los Angeles County (Sanitation Districts) continue to consistently meet permit conditions in anticipation of increasing regulatory requirements. Process optimization construction activities include flow equalization through the addition of storage capacity; treatment system modifications, as well as ancillary support facilities; and other in-plant upgrades.

7.2.1.1 Pomona Water Reclamation Plant

The POWRP would be upgraded to include flow equalization of the primary effluent, as shown on Figure 7-1. The flow equalization volume required for the POWRP is approximately 20 percent of the plant's daily permitted flow of 15 MGD. Therefore, the recommended equalization volume is 3 million gallons (MG). Based on a unit cost of $4 per gallon of storage, the total capital cost associated with the flow equalization facilities at the POWRP is approximately $12 million.

The current POWRP property boundary is large enough to accommodate the process optimization facilities, so additional land would not be required. Process optimization would likely be implemented between 2018 and 2028 depending on future flows, recycled water demands, regulatory requirements, and funding considerations.

7.2.1.2 San Jose Creek Water Reclamation Plant

Based on the wastewater flow projections presented in Chapter 4 and the assessment of current capabilities relative to future needs presented in Chapter 5, approximately 20 MGD of additional treatment plant capacity is required for the JOS by the 2050 planning horizon. As concluded by the alternatives analysis presented in Chapter 6, the SJCWRP is the most suitable location for a treatment plant expansion of at least 20 MGD. Therefore, the recommended plan calls for the SJCWRP to be expanded from its current permitted capacity of 100 MGD to 125 MGD. This 25-MGD expansion consists of the addition of two 12.5-MGD treatment modules that are consistent with the existing modules at the SJCWRP. The design criteria for the SJCWRP expansion is provided in Appendix C. Based on a unit cost of $8 per gallon of wastewater treated, the total capital cost associated with the 25-MGD wastewater treatment facilities expansion is approximately $200 million.

The current SJCWRP property boundary is large enough to accommodate the recommended wastewater treatment facilities expansion. Consequently, construction of the facilities would not require acquisition of additional land. Based on wastewater flow projections, SJCWRP expansion would likely be implemented between 2040 and 2050. The locations of the recommended treatment facilities are shown on Figure 7-2.

In addition to a 25-MGD expansion, the SJCWRP would be upgraded to include flow equalization of the primary effluent. The flow equalization volume required for the SJCWRP is approximately 25 percent of the plants' expanded daily permitted flow of 125 MGD. Therefore, the recommended equalization volume is 31 MG. Based on a unit cost of $4 per gallon of storage, the total capital cost associated with 31 MG of flow equalization facilities at the SJCWRP is approximately $125 million.

FIGURE 7-1

Pomona Water Reclamation Plant Proposed Facilities

CLEARWATER Program

Source: Sanitation Districts of Los Angeles County 2011, LARIAC 2007

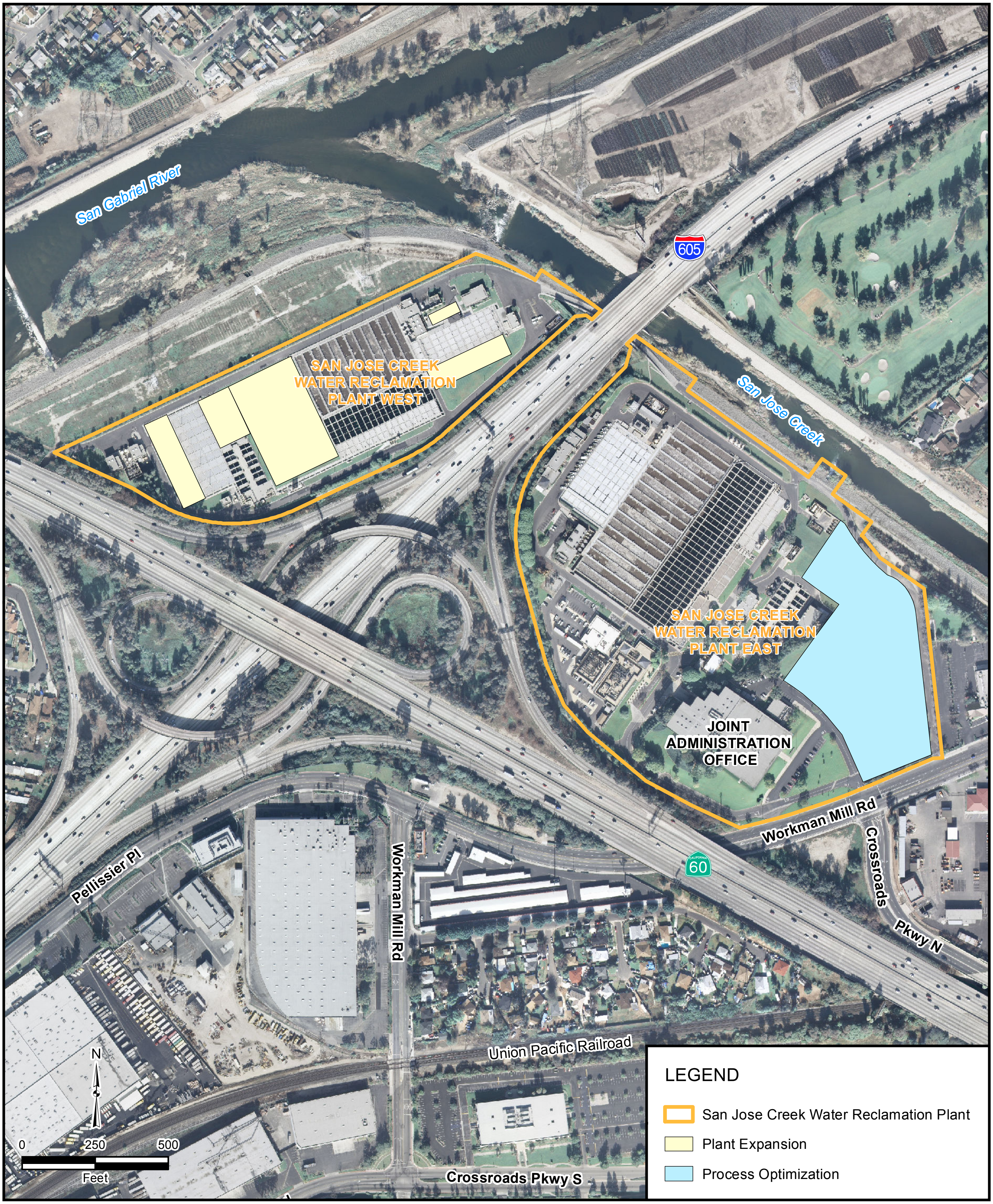


FIGURE 7-2

CLEARWATER Program

San Jose Creek Water Reclamation Plant Proposed Facilities

Source: Sanitation Districts of Los Angeles County 2011, LARIAC 2007

The current SJCWRP property boundary is large enough to accommodate the process optimization facilities, so additional land would not be required. Process optimization would likely be implemented between 2018 and 2028, depending on future flows, recycled water demands, regulatory requirements, and funding considerations. The location of the recommended process optimization facilities is shown on Figure 7-2.

7.2.1.3 Los Coyotes Water Reclamation Plant

The LCWRP would be upgraded to include flow equalization of the primary effluent, as shown on Figure 7-3. The flow equalization volume required for the LCWRP is approximately 20 percent of the plant's daily permitted flow of 37.5 MGD. Therefore, the recommended equalization volume is 7.5 MG. Based on a unit cost of $4 per gallon of storage, the total capital cost associated with the flow equalization facilities at the LCWRP is approximately $30 million.

The current LCWRP property boundary is large enough to accommodate the process optimization facilities, so additional land would not be required. Flow equalization facilities can be built under the existing driving range for the Iron-Wood Nine Golf Course, thus not impacting its long-term use. Process optimization would likely be implemented between 2018 and 2028, depending on future flows, recycled water demands, regulatory requirements, and funding considerations.

7.2.1.4 Long Beach Water Reclamation Plant

The LBWRP would be upgraded to include flow equalization of the primary effluent, as shown on Figure 7-4. The flow equalization volume required for the LBWRP is approximately 20 percent of the plant's daily permitted flow of 25 MGD. Therefore, the recommended equalization volume is 5 MG. Based on a unit cost of $4 per gallon of storage, the total capital cost associated with the flow equalization facilities at the LBWRP is approximately $20 million.

The current LBWRP property boundary is large enough to accommodate the process optimization facilities, so additional land would not be required. Process optimization would likely be implemented between 2018 and 2028, depending on future flows, recycled water demands, regulatory requirements, and funding considerations.

7.2.1.5 Conveyance System

Based on the projected wastewater flows for the year 2050 and a 25-MGD expansion at the SJCWRP, approximately 32.5 miles of Joint Outfall (JO) relief trunk sewers would be required during the planning period. The Sanitation Districts would continue to closely monitor the JOS conveyance system throughout the planning period to determine actual relief needs. The future conveyance system improvement projects, which would be implemented on an as-needed basis, are graphically depicted on Figure 7-5. Based on a unit cost of $30 per inch-diameter per linear foot, the total capital cost associated with the conveyance system improvements is approximately $271 million.

7.2.2 Solids Processing

The recommended plan is to continue centralized solids processing at the JWPCP using existing systems. Sludges generated at the upstream WRPs would continue to be returned to the conveyance system and removed and treated at the JWPCP.

FIGURE 7-3

CLEARWATER Program

Los Coyotes Water Reclamation Plant Proposed Facilities

Source: Sanitation Districts of Los Angeles County 2011, LARIAC 2007

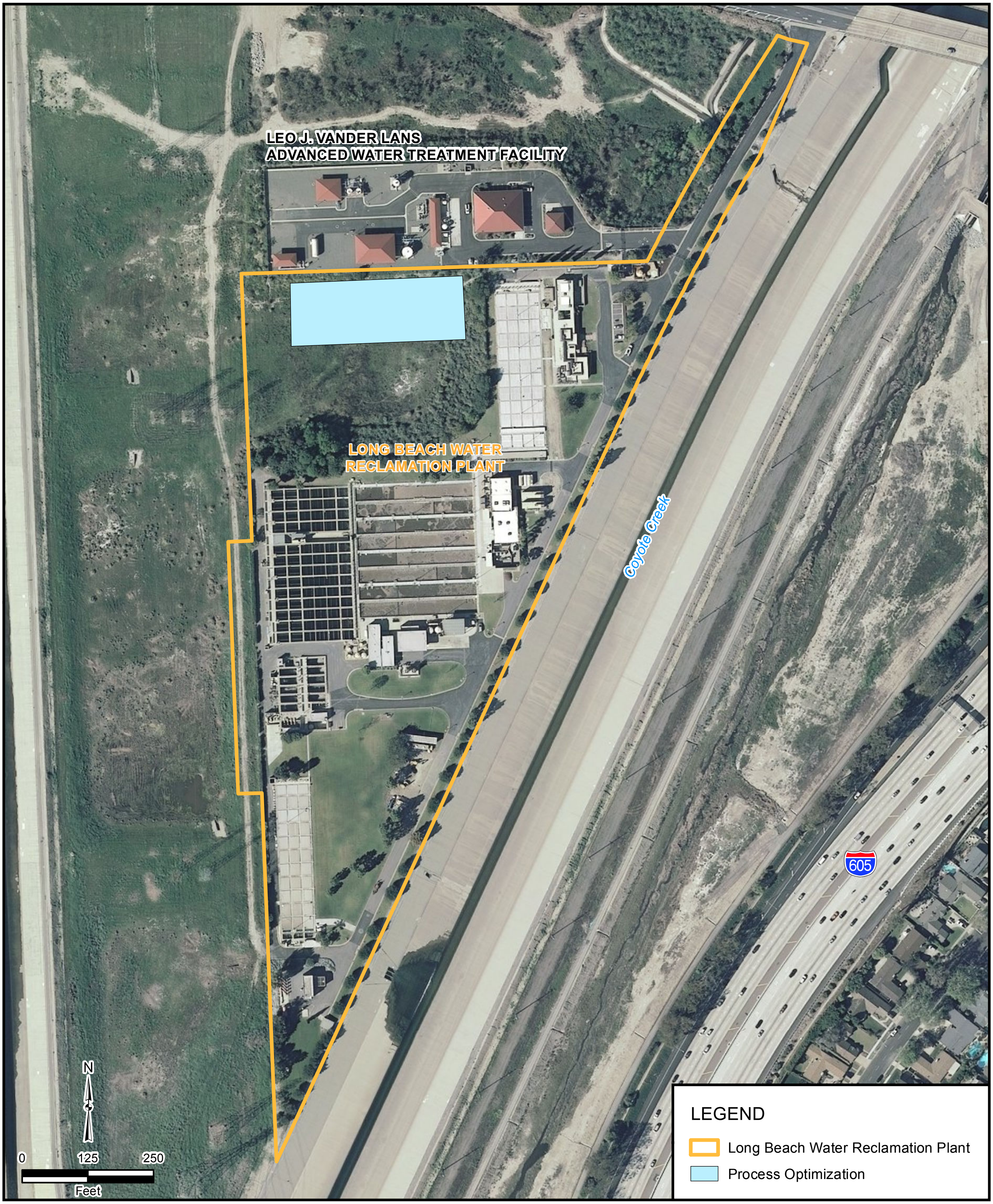


FIGURE 7-4

CLEARWATER Program

Long Beach Water Reclamation Plant Proposed Facilities

Source: Sanitation Districts of Los Angeles County 2011, ESRI 2011

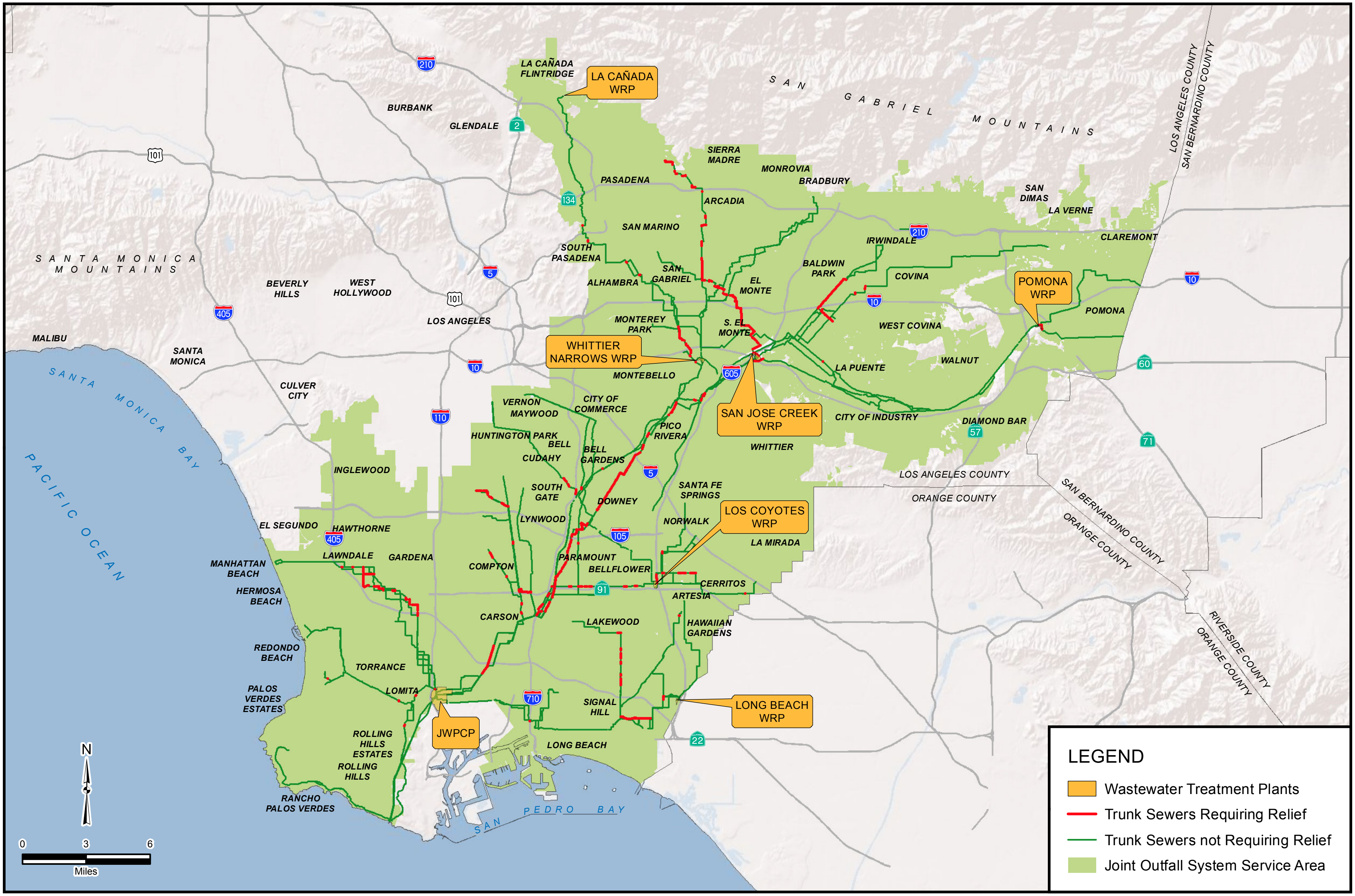


FIGURE 7-5

Conveyance System Improvements

Source: Sanitation Districts of Los Angeles County 2011, Thomas Bros 2011, ESRI 2011

7.2.2.1 Sludge Thickening

The capacity of the existing dissolved air flotation thickener system at the JWPCP is anticipated to be sufficient to meet the projected needs for 2050. Therefore, no additional thickening systems would be required over the duration of the planning period.

7.2.2.2 Sludge Stabilization

Based on the solids projections presented in Chapter 4 and the needs assessment presented in Chapter 5, additional sludge stabilization capacity would be required at the JWPCP. It is anticipated that the additional capacity would be in the form of units of similar design to those currently existing. Based on this assumption, six additional anaerobic digesters would be required by 2050. The total capital cost associated with the sludge stabilization facilities expansion is approximately $66 million.

The current JWPCP property boundary is large enough to accommodate the six additional digesters, so additional land would not be required. The location for the new digesters is shown on Figure 7-6. The timing for digester construction is dependent on future trending of sludge production at the JWPCP.

7.2.2.3 Sludge Dewatering

The capacity of the existing sludge dewatering system is anticipated to be sufficient to meet the projected future digested sludge flow for 2050. Therefore, no additional sludge dewatering facilities would be required over the duration of the planning period. The Sanitation Districts would continue the existing program of replacing aging centrifuges as needed throughout the duration of the planning period.

7.2.2.4 Digester Gas Handling and Power Generation

The power plant at the JWPCP currently utilizes two turbines that run on digester gas, a third turbine that is used for standby, four boilers that create steam from digester gas for process heating, and twelve flares that burn excess digester gas. Additional gas resulting from an increased number of digesters would be managed by these facilities. The turbines are currently supplemented with natural gas. As digester gas increases, it would be used in lieu of natural gas.

7.2.3 Biosolids Management

The recommended plan for biosolids management is the continuation of current practices. During the planning period, it is projected that the JOS biosolids generation rate would increase nearly 30 percent. The Sanitation Districts currently have a robust and diverse system in place to address the projected increase. The Sanitation Districts also have the ability to co-dispose biosolids in landfills, but this option would become more restrictive with the scheduled closure of the Puente Hills Landfill in 2013. However, the Westlake Farms Composting Facility should begin operations by the same year, and can be expanded in phases if and when future needs arise. Therefore, it is anticipated that there is no additional physical infrastructure required to accommodate future biosolids management. The Sanitation Districts would continue to explore options that provide for additional biosolids management diversity and further optimize the beneficial use of these materials.

7.2.4 WRP Effluent Management

The recommended plan for WRP effluent management is the continuation of existing practices. The existing system of WRP effluent management is effective and provides the Sanitation Districts flexibility

FIGURE 7-6

Joint Water Pollution Control Plant Proposed Facilities

Source: Sanitation Districts of Los Angeles County 2011, LARIAC 2007

with respect to providing recycled water for reuse and discharging any excess flows to surface waterways. While the amount of reuse is likely to increase in the future, surface water discharge capabilities would be retained.

7.2.5 JWPCP Effluent Management (Project)

The recommend plan for JWPCP effluent management includes a project to modify the existing ocean discharge system (Alternative 4 from Chapter 6). Project elements comprise a working shaft site at the JWPCP, an onshore tunnel between the JWPCP and the existing ocean outfall manifold structure at Royal Palms Beach near White Point, an exit shaft site at Royal Palms Beach, and the rehabilitation of the existing ocean outfalls. Overall, it is anticipated that the project would take approximately 6.5 years to construct. The new tunnel, when connected to the existing ocean outfalls, would have a maximum hydraulic capacity of approximately 1,080 MGD, which can accommodate the peak storm flows of 927 MGD projected for the year 2050. Therefore, upon completion of the recommended project, the two existing effluent tunnels could be dewatered, inspected, and repaired or rehabilitated as necessary.

7.2.5.1 JWPCP West Shaft Site

The JWPCP West shaft site would be located mostly within the JWPCP property boundary on approximately 18 acres to the south and 1 acre to the north of Lomita Boulevard near Figueroa Street in the cities of Los Angeles and Carson as shown on Figure 7-7. The JWPCP West shaft site would function as a working shaft site and would be used throughout the duration of the project for site preparation, mobilization, shaft construction, staging and support for tunnel construction, and connection to the existing JWPCP effluent force main. The shaft would serve as the entry/exit point for construction workers, tunnel materials (e.g., liner segments), and equipment and the exit point for all of the excavated material. If needed, a noise barrier, approximately 20 feet in height, would be erected between the major sources of noise at the shaft site and nearby sensitive receptors. It is anticipated that the shaft itself would be constructed in the northern half of the 18-acre portion of the site. Access to the shaft site would likely occur from Figueroa Street via Lomita Boulevard, Pacific Coast Highway, or Sepulveda Boulevard.

The shaft depth would be approximately 140 feet below ground surface, and the shaft diameter would be about 40 to 60 feet. The shaft profile is shown in Figure 7-8. Shaft construction would take about 10 to 12 months. Upon completion of the tunneling activities, the shaft would be converted into a drop structure and connected to the existing JWPCP effluent force main, located within the 1-acre portion of the site. This connection would likely either be tunneled or jacked under Lomita Boulevard. Approximately 0.5 acre would be required at the shaft site for permanent aboveground facilities, which would include a ground-level concrete lid over the shaft, a surge tower, vent pipes, access lids, and possibly a pumping plant.

7.2.5.2 Figueroa/Harbor Regional Park/North Gaffey/Capitol/Western Tunnel Alignment

The recommended tunnel alignment, as shown on Figure 7-9, would begin at the JWPCP West shaft site, continue approximately 2,600 feet south under Figueroa Street, approximately 6,000 feet southwest under Harbor Regional Park, approximately 8,000 feet south under North Gaffey Street, approximately 5,300 feet southwest under Capitol Drive, approximately 5,200 feet south under Western Avenue, approximately 4,000 feet south under South Dodson Avenue, and approximately 5,500 feet southwest under Western Avenue to the Royal Palms shaft site for a total distance of approximately 36,600 feet, or 6.9 miles. The tunnel would terminate adjacent to the existing ocean outfall manifold structure at Royal Palms Beach.

FIGURE 7-7

CLEARWATER Program

JWPCP West Shaft Site

Source: Sanitation Districts of Los Angeles County 2011, LARIAC 2007

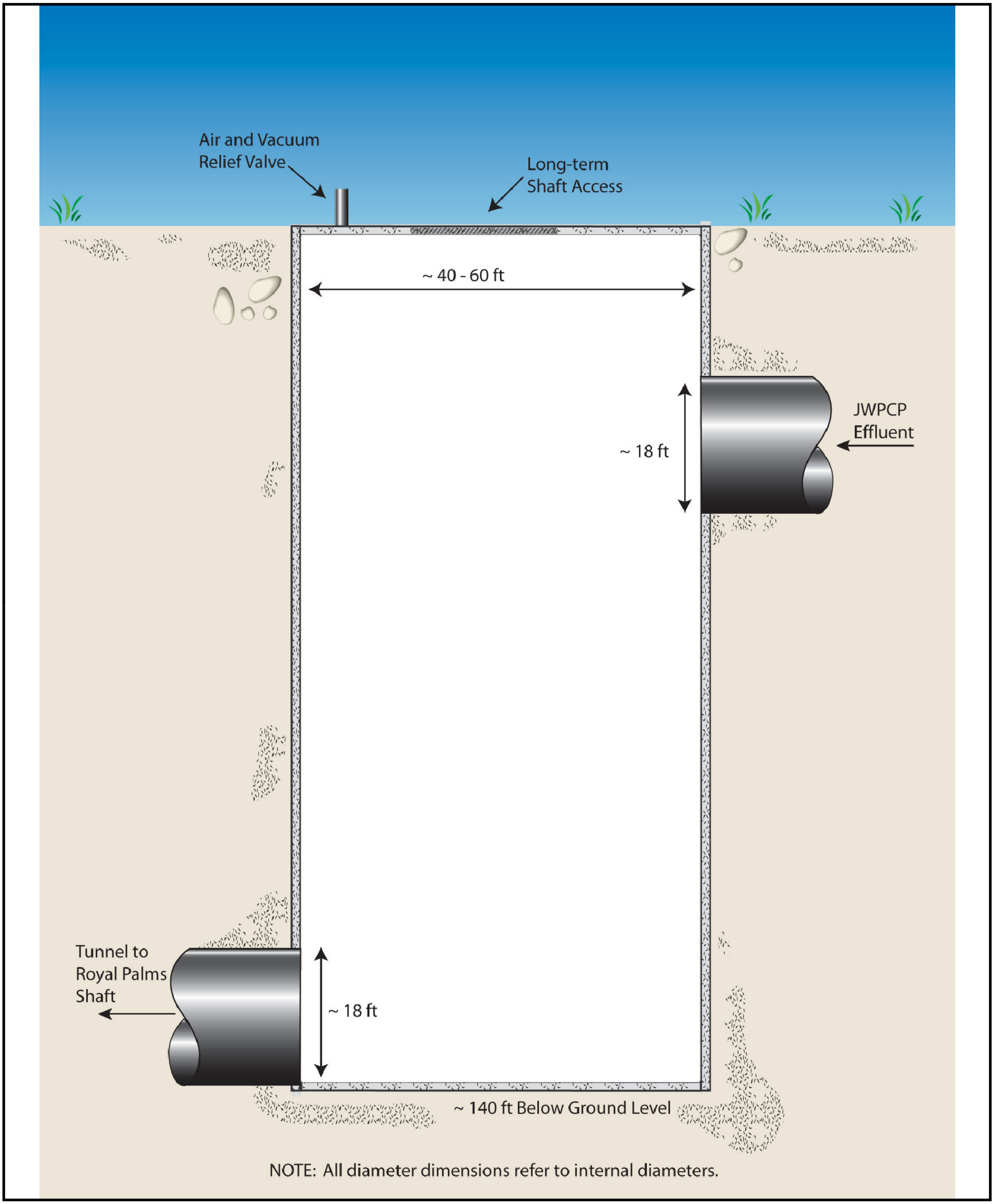


FIGURE 7-8

CLEARWATER Program

JWPCP West Shaft Profile

Source: Sanitation Districts of Los Angeles County 2011

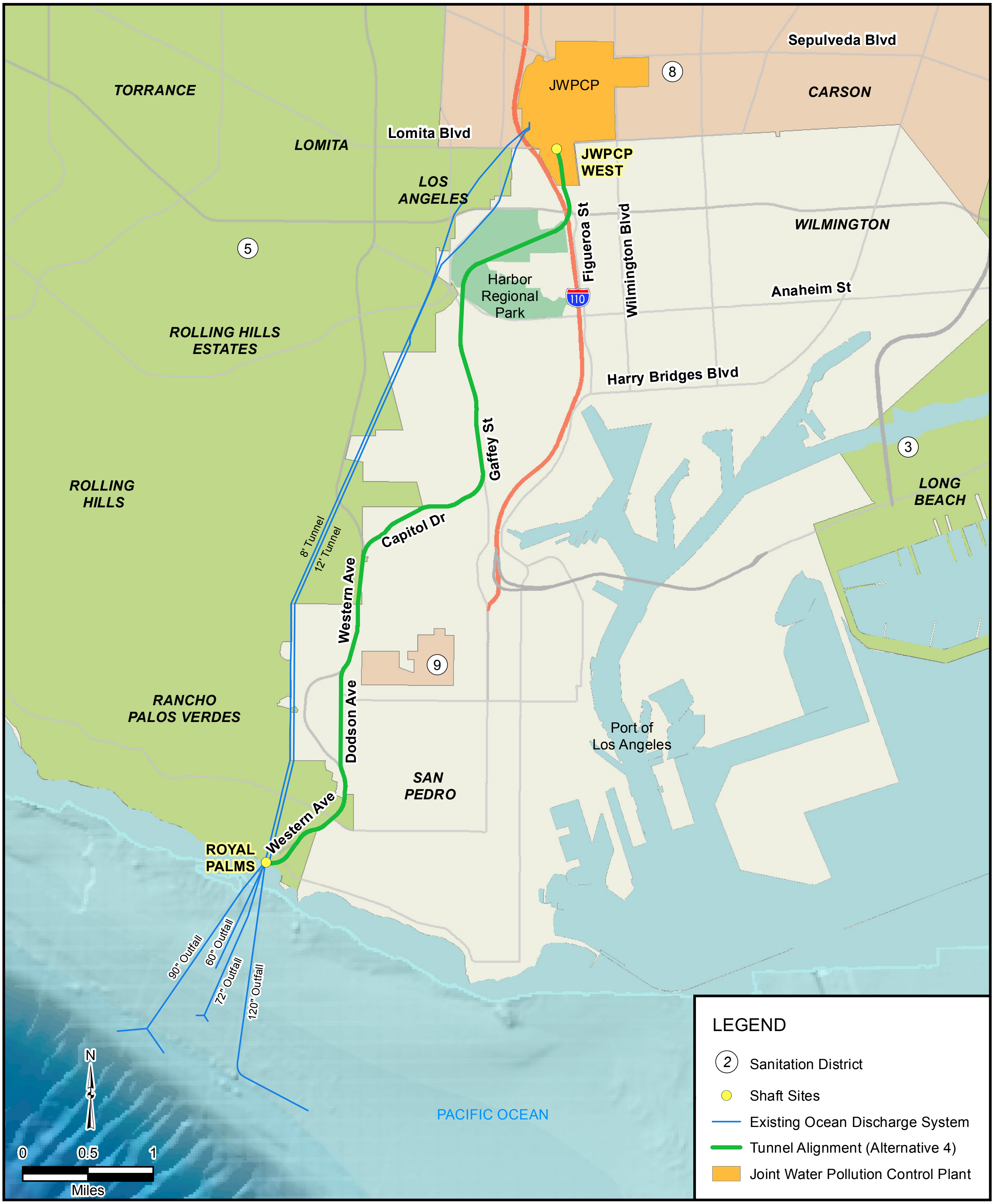


FIGURE 7-9

Recommended Tunnel Alignment

CLEARWATER Program

Source: Sanitation Districts of Los Angeles County 2011, Thomas Bros 2011, ESRI 2011

The tunnel would be constructed with a tunnel boring machine (TBM). The TBM, which would be placed underground at the JWPCP West shaft site, would be capable of excavating soil/rock and installing a tunnel liner as it advances. The excavated material would be removed for disposal or, possibly, beneficial use. Tunneling is expected to advance at an average rate of 35 feet per day through soil and an average rate of 40 feet per day through rock. Tunnel construction for this alignment would take approximately 4 years.

The tunnel depth at tunnel crown would range from approximately 70 to 450 feet below ground surface, except for where the tunnel alignment would connect to the Royal Palms shaft (approximately 30 feet below ground surface). The tunnel would have an excavated diameter of approximately 20 to 22 feet and an internal finished diameter of approximately 18 feet. The tunnel would be constructed of pre-fabricated, steel-reinforced concrete liner segments with watertight gaskets.

Tunnel construction would require mobilization of various support equipment for activities such as assembly of the TBM and trailing gear; operation of the tunnel ventilation system; and movement of workers, materials, and equipment between the ground surface and the bottom of the shaft.

Either an earth-pressure balance (EPB) TBM or a slurry TBM would be utilized on this project. The primary difference between the two TBM types is how the excavated material generated from the tunneling operation is removed. With an EPB TBM, specialized locomotives would convey the excavated material in rail cars back through the constructed portion of the tunnel to the JWPCP West shaft for removal by crane. The excavated material would be retained at the surface to allow any water to separate before removal. With a slurry TBM, the excavated material would be blended with a slurry mixture (such as bentonite clay and water) and pumped back through the constructed portion of the tunnel to the ground surface at the JWPCP West shaft. The excavated material and slurry mixture would be processed at a temporary slurry separation plant, located at the shaft site, which extracts the slurry for reuse. The type of TBM would not be specified until completion of final design.

7.2.5.3 Royal Palms Shaft Site

The Royal Palms shaft site would be located mostly within Sanitation Districts-owned property surrounding the existing ocean outfall manifold structure on approximately 1 acre at Royal Palms Beach near the access road off of West Paseo Del Mar as shown on Figure 7-10. The Royal Palms shaft site would function as an exit shaft site for removal of the TBM upon tunnel completion. The shaft site would also be used to connect the new tunnel to the existing ocean outfalls at the manifold structure.

The shaft depth would be approximately 50 feet below ground surface, and the shaft diameter would be about 25 to 35 feet. The shaft profile is shown in Figure 7-11. Shaft construction would take approximately 6 to 9 months. A noise barrier, approximately 20 feet in height, would be erected between the major sources of noise at the shaft site and nearby sensitive receptors.

A new underground manifold structure would be constructed next to the shaft to facilitate the connections between the tunnel and the existing ocean outfalls. Valves would be installed to control the amount of effluent flow to each of the outfalls and to allow for isolation of the new tunnel between the Royal Palms and JWPCP West shaft sites. The interconnection work would take approximately 1.5 years.

After construction, the beach parking area would be restored to its original configuration. There would be no permanent aboveground facilities at the shaft site, except a ground-level concrete lid over the shaft and new manifold structure, vent pipes, and access lids. A permanent access easement of approximately 0.1 acre would be needed for future operation and maintenance activities.

FIGURE 7-10

CLEARWATER Program

Royal Palms Shaft Site

Source: Sanitation Districts of Los Angeles County 2011, ESRI 2011

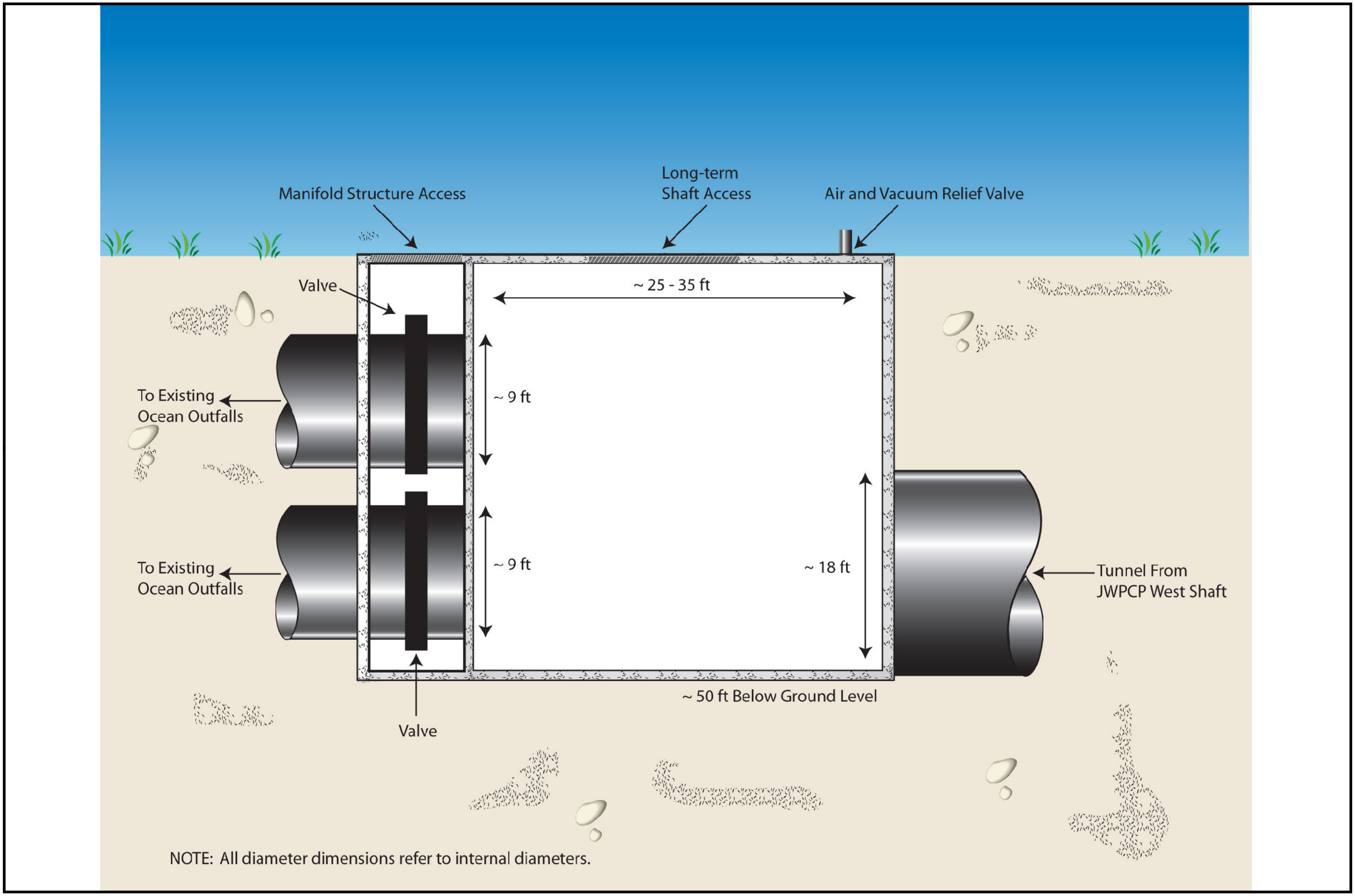


FIGURE 7-11

CLEARWATER Program

Royal Palms Shaft Profile

Source: Sanitation Districts of Los Angeles County 2011

7.2.5.4 Existing Ocean Outfall Rehabilitation

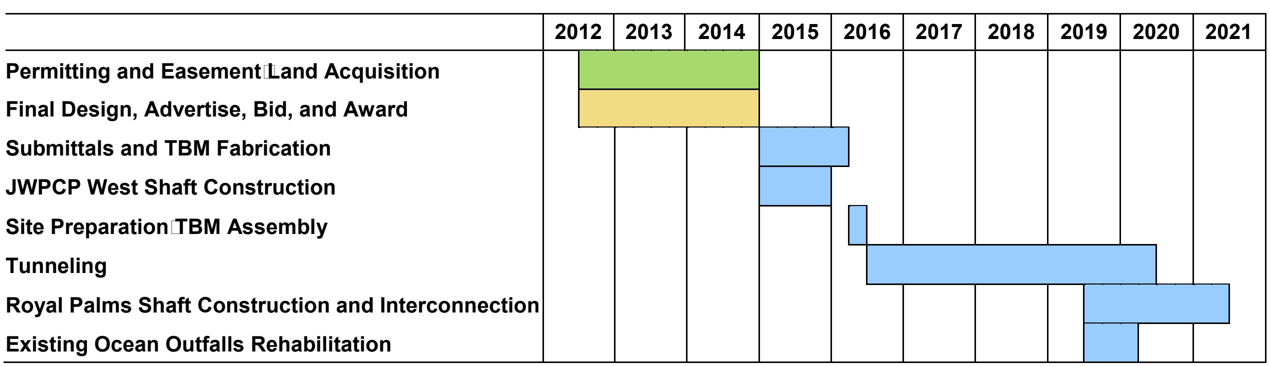
Under the recommended plan, JWPCP effluent would continue to be discharged through the existing ocean outfalls. The recommended plan would include rehabilitation of the three largest existing ocean outfalls and abandonment of the 60-inch outfall. Re-ballasting work would occur on the existing 72-, 90-, and 120-inch outfalls in ocean depths ranging from approximately 20 to 50 feet. Joint repairs would involve temporarily removing some of the existing ballast rock from around the outfalls to fully expose the joint being repaired. A coupling would be installed around the joint and the annular space filled with concrete, and the ballast rock would be replaced around the pipe. Cathodic protection would be restored or added as necessary. Overall, the rehabilitation work, including mobilization, construction, and demobilization, would take approximately 9 months. Once rehabilitated, it is anticipated that the three existing ocean outfalls would have a remaining service life that extends well beyond the 2050 planning horizon. (Parsons 2011)

7.3 Plan Implementation and Schedule

The program-level components of the recommended plan would be implemented as necessary during the planning period. Process optimization improvements at the POWRP, SJCWRP, LCWRP, and LBWRP would likely occur between 2018 and 2028 but are contingent on actual future flows, recycled water demands, regulatory requirements, and funding considerations. Similarly, the conveyance system relief projects and the six digesters at the JWPCP would be constructed on an as-needed basis. Based on wastewater flow projections, the 25-MGD expansion at the SJCWRP would be implemented between 2040 and 2050. If the actual flows materialize later than anticipated, the construction of the recommended facilities would be delayed accordingly. Likewise, if the actual flows materialize sooner than anticipated, the construction of the recommended facilities would be accelerated accordingly.

The estimated implementation schedule for the modified ocean discharge system is summarized in Table 7-1. The actual schedule could vary depending on permitting, right-of-way and land acquisition, final design, funding, and construction considerations. Project construction is scheduled from early 2015 to mid-2021, a total duration of approximately 6.5 years.

Table 7-1. Implementation Schedule for Modified Ocean Discharge System



7.4 Project Cost

The total capital cost and equivalent annual capital cost for the modified ocean discharge system are presented in Table 7-2. Although the project cost would be incurred over multiple years in the future, all amounts shown in Table 7-2 are in 2011 dollars and include design, construction, and project management. The anticipated total project cost, in 2021 dollars (at the end of construction, when repayment of long-term financing would commence) is approximately □739,000,000.

Table 7-2. Capital and Annualized Capital Cost Breakdown of the Recommended Project[a,b]

Project Element	Total
JWPCP West Shaft Site	□33,000,000
Tunnel (Figueroa □ Harbor Regional Park □ North Gaffey □ Capitol □ Western)	□478,000,000
Royal Palms Shaft Site	□24,000,000
Existing Ocean Outfalls Rehabilitation	□15,000,000
Total Capital Costs	□550,000,000
Equivalent Annual Capital Cost[c]	□37,000,000

[a] 2011 dollars.
[b] All costs include design support, construction, and project management.
[c] Amortized at a 3-percent annual interest rate for 20 years.

7.4.1 Upgrade and Expansion Costs

For funding purposes, the capital cost of the recommended project has been split into two subcategories: upgrade and expansion. Upgrade portions of the project benefit existing users by addressing needed improvements or existing deficiencies without providing additional capacity. Expansion portions of the project benefit new users by providing increased capacity to accommodate their discharge. For the purposes of this financial analysis, the upgrade portion is based on the peak wet weather plant flow associated with current average daily flow. The expansion portion is based on the additional capacity above and beyond current peak wet weather flows.

As discussed in the previous chapters, the two existing JWPCP effluent tunnels are critical components of the existing JOS ocean discharge system. Neither of the tunnels has been inspected in over 50 years, and one of the tunnels has been in service for over 70 years. Inspection of the tunnels is not possible due to their overall length, limited access, lack of hydraulic separation between the tunnels, and the large quantity of daily effluent flow through the tunnels. For the same reasons, repair and rehabilitation of these tunnels, should it be warranted, is not possible. Furthermore, both tunnels cross an active seismic fault (the Palos Verdes Fault), but neither was constructed to modern day seismic standards and neither has been retrofitted since being built. The recommended project would provide a redundant effluent tunnel with the capacity to accommodate all current flows to the JWPCP, thus allowing the existing tunnels to be taken out of service and dewatered as needed for inspection and rehabilitation□repair. The recommended project would also increase the hydraulic capacity of the ocean discharge system by approximately 25 percent, which would accommodate the projected peak storm flows through the year 2050.

Therefore, with the exception of the existing ocean outfall rehabilitation, all elements of the recommended project should be allocated at a 3:1 ratio between upgrade and expansion, respectively. Because the rehabilitation of the existing ocean outfall would not provide any additional capacity, 100 percent of the cost associated with this project element should be attributed to upgrade. As shown in Table 7-3, of the recommended project□s □550,000,000 total estimated capital cost, □416,250,000 is attributable to upgrade and □133,750,000 is attributable to expansion.

Table 7-3. Capital Cost of Upgrade and Expansion Portions of the Recommended Project[a,b]

Project Element	Upgrade	Expansion	Total
JWPCP West Shaft Site	$24,750,000	$8,250,000	$33,000,000
Onshore Tunnel	$358,500,000	$119,500,000	$478,000,000
Royal Palms Shaft Site	$18,000,000	$6,000,000	$24,000,000
Existing Ocean Outfalls Rehabilitation	$15,000,000	-	$15,000,000
Total Capital Costs	$416,250,000	$133,750,000	$550,000,000

[a] 2011 dollars.
[b] All costs include design support, construction, and management.

The upgrade portion of the recommended project does not provide additional capacity to the ocean discharge but, instead, addresses the aging infrastructure concerns regarding key system elements. Consequently, the existing users are responsible for paying for the capital costs associated with the upgrades. A portion of the service charge collected from the existing users would ultimately pay for this portion of the recommended project as discussed in the following sections.

The expansion portion of the recommended project would provide additional hydraulic capacity to the ocean discharge system. Consequently, the new users of the system, as well as existing users who significantly increase their discharge flow and/or strength, are responsible for paying the capital costs associated with expansion. The new users would ultimately pay for this portion of the recommended project through connection fees as discussed in the following sections.

7.5 Revenue Program

A major consideration in proposing any capital construction program is the cost and impact it would have on both existing and future users. The Sanitation Districts have developed a comprehensive revenue program to address these issues. In general, this means a program, including appropriate ordinances, to allocate costs and collect revenues as needed from the users of the wastewater management system to ensure sufficient revenues for the construction and subsequent operation of facilities. Specifically, a revenue program must demonstrate that the proposed system of user charges is fair, equitable, and based on both the flow and the strength of the users' discharges. Furthermore, a revenue program must provide that, following completion of construction, there would be a sufficient revenue stream to continue to operate and maintain each facility throughout its useful life. Lastly, a revenue program must provide for the repayment of any long-term financing used to fund the construction of facilities.

The Sanitation Districts first addressed the issue of a revenue program in the May 1979 Report on the Future Revenue Program of the Sanitation Districts of Los Angeles County. This report has been updated numerous times as subsequent facilities plans were submitted to the State Water Resources Control Board (SWRCB) in conjunction with State Revolving Fund (SRF) loan applications. In summary, these reports recommended a revenue program based on maximum utilization of existing sources of revenue, supplemented by revenues from two additional programs: the Service Charge Program and the Connection Fee Program.

7.5.1 Service Charge Program

In fiscal year 1978–79, with the passage of Proposition 13 and the subsequent reduction in ad valorem taxes, the Sanitation Districts' expenses began to exceed available revenues. In order to remain solvent, the Sanitation Districts utilized available cash reserves. These reserves had been accumulated in anticipation of having to construct secondary treatment facilities at the JWPCP. As the Sanitation

Districts were successful in obtaining grant funding for a number of projects, the previously accumulated funds were not needed for the capital construction program and were available for on-going expenses. Although these reserves served to keep the Sanitation Districts solvent in the near term, the Service Charge Program was developed as a long-term solution.

The development of the Service Charge Program was approached from two basic perspectives: charge structure and method of collection. As part of the development process, an extensive public information program was conducted. The key factors stressed by the public were a low administrative cost, a low delinquency factor, and equity for all users. With respect to equity, a point repeatedly voiced by the public was that existing users of the sewerage system should not be required to subsidize new growth. From this latter point came the development of the Connection Fee Program (see Section 7.5.2).

The Service Charge Program, as developed, includes the following provisions:

- Existing users are charged for operations, maintenance, and upgrade capital costs
- Charges are based on the estimated usage of the system (i.e., based on user category with estimated loadings per unit of usage and facility size)
- Charges are based on a combination of flow rate and strength (i.e., chemical oxygen demand [COD] and suspended solids [SS])
- Dischargers may receive a rebate based on demonstrated water usage below the estimated loading of their particular user category
- Charges are collected as specific liens on the property tax bills

The historic, current, and adopted annual service charge rates per sewage unit (equivalent single-family home) are provided in Table 7-4.

Table 7-4. Joint Outfall System Annual Service Charge Rates per Sewage Unit

District[a]	Fiscal Year 2006□07	Fiscal Year 2007□08	Fiscal Year 2008□09	Fiscal Year 2009□10	Fiscal Year 2010□11	Fiscal Year 2011□12	Fiscal Year 2012□13	Fiscal Year 2013□14
1	□108.75	□116.00	□126.00	□138.00	□152.00	□154.00	□156.00	□158.00
2	104.50	111.00	121.00	133.00	147.00	148.00	149.00	150.00
3	105.00	112.00	122.00	134.00	148.00	150.00	152.00	154.00
5	95.75	100.00	108.00	118.00	130.00	132.00	134.00	136.00
8	94.00	99.00	109.00	121.00	135.00	139.00	143.00	147.00
15	98.00	103.00	110.00	119.00	130.00	132.00	134.00	136.00
16	101.00	106.00	113.00	122.00	133.00	135.00	137.00	139.00
17	102.00	107.00	114.00	123.00	134.00	136.00	138.00	140.00
18	104.50	112.00	122.00	134.00	148.00	149.00	150.00	151.00
19	103.75	110.00	120.00	132.00	146.00	148.00	150.00	152.00
21	102.50	109.00	119.00	131.00	145.00	146.00	147.00	148.00
22	106.25	113.00	121.00	131.00	143.00	145.00	147.00	149.00
23	79.00	85.00	92.00	101.00	112.00	114.00	116.00	118.00
28[b]	308.00	308.00	315.00	324.00	335.00	336.00	337.00	338.00

Table 7-4 (Continued)

District[a]	Fiscal Year 2006–07	Fiscal Year 2007–08	Fiscal Year 2008–09	Fiscal Year 2009–10	Fiscal Year 2010–11	Fiscal Year 2011–12	Fiscal Year 2012–13	Fiscal Year 2013–14
28[c]	100.00	100.00	107.00	116.00	127.00	128.00	129.00	130.00
29	141.75	201.75	261.75	321.75	327.75	333.75	339.75	-
SBC	90.00	92.00	99.00	108.00	119.00	120.00	121.00	122.00

[a] Although District No. 34 is a Joint Outfall District, it is currently inactive and, therefore, is not listed.
[b] Rate applies to those users who directly connect to the La Cañada Outfall Trunk Sewer or the Foothill Main Trunk Sewer or are in an area tributary to the La Cañada WRP.
[c] Rate applies to those users who are within a city of La Cañada Flintridge assessment district.

7.5.2 Connection Fee Program

The Connection Fee Program only applies to new users and existing users who significantly increase their discharge flow and/or strength. This program includes the following provisions:

- New users, or existing users who significantly increase their discharge flow and/or strength, are charged a one-time fee for the incremental cost of expanding capital facilities to accommodate the new or significantly increased discharge
- Charges are based on the anticipated usage of the system (i.e., based on user category and facility size)
- Charges are based on a combination of flow rate and strength (i.e., COD and SS)

The connection fees from new users, or existing users who significantly increase their discharge flow and/or strength, are collected and deposited into a restricted fund designated as the Capital Improvement Fund. As expansion-related projects are constructed, the necessary funds are withdrawn from this account and used to cover the cost of expansion.

The historic, current, and adopted connection fee rates per capacity unit (equivalent single-family home) are provided in Table 7-5.

Table 7-5. Joint Outfall System Connection Fee Rates per Capacity Unit

District[a]	Fiscal Year 2006–07	Fiscal Year 2007–08	Fiscal Year 2008–09	Fiscal Year 2009–10	Fiscal Year 2010–11	Fiscal Year 2011–12	Fiscal Year 2012–13	Fiscal Year 2013–14
1	$1,735	$1,860	$2,520	$3,280	$4,140	$4,260	$4,390	$4,520
2	1,765	1,890	2,550	3,310	4,170	4,300	4,430	4,560
3	1,665	1,790	2,410	3,130	3,950	4,070	4,190	4,320
5	1,785	1,910	2,580	3,350	4,220	4,350	4,480	4,610
8	1,745	1,870	2,530	3,290	4,150	4,270	4,400	4,530
15	1,625	1,750	2,350	3,050	3,850	3,970	4,090	4,210
16	1,635	1,760	2,360	3,060	3,860	3,980	4,100	4,220
17	1,675	1,800	2,420	3,140	3,860	3,980	4,100	4,220
18	1,765	1,890	2,560	3,330	4,200	4,330	4,460	4,590
19	1,715	1,840	2,480	3,220	4,060	4,180	4,310	4,440
21	1,665	1,790	2,410	3,130	3,950	4,070	4,190	4,320
22	1,725	1,850	2,490	3,230	4,070	4,190	4,320	4,450

Table 7-5 (Continued)

District[a]	Fiscal Year 2006–07	Fiscal Year 2007–08	Fiscal Year 2008–09	Fiscal Year 2009–10	Fiscal Year 2010–11	Fiscal Year 2011–12	Fiscal Year 2012–13	Fiscal Year 2013–14
23	1,495	1,620	2,140	2,760	3,480	3,580	3,690	3,800
28[b]	4,863	5,274	6,087	7,000	8,013	8,114	8,218	8,325
28[c]	1,489	1,614	2,141	2,768	3,495	3,596	3,700	3,807
28[d]	5,855	6,266	7,079	7,992	9,005	9,106	9,210	9,317
28[e]	5,569	5,980	6,793	7,706	8,719	8,820	8,924	9,031
29	2,105	2,230	2,770	3,410	4,150	4,270	4,400	4,530
SBC	1,785	1,910	2,580	3,350	4,220	4,350	4,480	4,610

[a] Although District No. 34 is a Joint Outfall District, it is currently inactive and, therefore, is not listed.
[b] Rate applies to those users who connect in an area tributary to the La Cañada WRP.
[c] Rate applies to those users who connect within a city of La Cañada Flintridge assessment district.
[d] Rate applies to those users who directly connect to the La Cañada Outfall Trunk Sewer.
[e] Rate applies to those users who directly connect to the Foothill Main Trunk Sewer.

7.5.3 Additional Sources of Revenue

In addition to the Service Charge and Connection Fee Programs, the Sanitation Districts rely on five revenue sources to support wastewater management services.

7.5.3.1 Ad Valorem Taxes

The Sanitation Districts receive a pro rata share of the 1-percent ad valorem property tax levy pursuant to Proposition 13. The pro rata share is based on the percentage of the total tax levy each district received prior to the implementation of Proposition 13 in fiscal year 1978–79. Accordingly, the pro rata share varies slightly from district to district. All ad valorem taxes are deposited into the respective district's operating fund and are used to help offset bonded indebtedness, operation expenses, and capital expenses. The average annual ad valorem taxes collected across the Joint Outfall Districts equates to approximately $25 per single-family home.

7.5.3.2 Contracts

The Sanitation Districts generate revenue through disposal contracts to certain facilities located outside of the JOS boundaries. The contracts are structured to recover the total cost of services rendered to these facilities. In addition, revenue is generated through sales contracts for recycled water and power generated from the wastewater treatment process.

7.5.3.3 Industrial Waste Surcharge

In 1972, the Sanitation Districts instituted a surcharge program for industrial dischargers. It requires industrial dischargers to pay a fair share of operations and maintenance (O&M) and upgrade capital costs according to their usage of the sewerage system. Usage is measured in terms of three parameters: flow, COD, and SS. In addition, dischargers with excessive peak flows must pay a supplemental peak flow charge. The method for determining the surcharge rates is similar to that for determining the service charge rate.

7.5.3.4 Investment Income

Investment income refers to interest received during the fiscal year. This source of revenue is variable and depends on the cash balance maintained by each district as well as the prevailing interest rates. Sanitation Districts' funds are invested in various instruments in conformance with the Investment Policy that is adopted on an annual basis.

7.5.3.5 Annexation Fees

Annexation fees are paid by each property owner annexing territory into a district. The annexation fee program is in conformance with Cortese-Knox-Hertzberg Local Government Reorganization Act of 2000. The revenue received from annexation fees varies considerably and unpredictably. Since each annexation fee solely covers the cost of processing that annexation request, this revenue source is not relied on during budget preparation.

7.6 Project Financing

As discussed in Section 7.4.1, the portion of the estimated cost of the recommended projected attributable to upgrade is $416,250,000 (2011 dollars). On a per sewage unit basis, this equates to $214 per equivalent single-family home. If all of this had to be collected in a single year or even a few years, the impact would be unacceptable to the public. Therefore, it is imperative that a long-term financing solution be developed.

7.6.1 Available Financing Sources

There are generally two sources of long-term financing available for wastewater agencies: (1) SRF loans and (2) revenue bonds. In some respects, these two sources are very similar in that they both provide project funding with an extended repayment period at a fixed interest rate.

In the case of SRF loans, the repayment period is 20 years, beginning one year after the completion of construction at an interest rate equal to one-half of the most current state of California general obligation bond rate. Interest is capitalized during the construction period and calculated into the principal amount of the loan that must be repaid. Currently, there is an annual cap of $50 million per agency on SRF loans.

In the case of revenue bonds, the repayment period is typically 30 years with repayment beginning as soon as the bonds are issued. Interest rates are dependent on market conditions on the date the bonds are issued and the financial strength of the Joint Outfall Districts. There are ways to structure revenue bonds so that the beginning of the repayment period can effectively be pushed back until construction is complete.

7.6.2 Financing Analysis

Because of the current cap on SRF loans, the funding for the recommended project is expected to be a combination of SRF loans and revenue bonds. However, by structuring the bonds to have repayment begin toward the end of construction, they would take on the appearance of SRF loans. Additionally, although bonds generally have higher interest rates than SRF loans, the longer repayment period makes it such that the annual payments are roughly equivalent under both funding options. Therefore, for the financing analysis, it is assumed that 20-year SRF loans at 3-percent interest would be used for funding the project attributable to the upgrade portions of the recommended project. Furthermore, it is assumed that the expansion-related portions of the recommended project would be funded utilizing previously accumulated connection fees currently held in the Joint Outfall Districts' Capital Improvement Fund.

Because interest would be capitalized during construction, the total principal amount of the SRF loan must be projected into 2021 dollars. As discussed in Section 7.4, this equates to an estimated $739 million. Using the upgrade/expansion allocations developed in Section 7.4.1, the total upgrade cost of the project in 2021 dollars would be $559 million. At 3-percent interest for 20 years, this results in an annual repayment of $37.6 million per year.

Based on the best available financing assumptions and escalation of construction costs, the recommended project would result in a service charge rate increase of approximately $20 per year per sewage unit (or equivalent single-family home) in 2021 dollars (when construction would be completed). For comparison, the current JOS average annual service charge rate is $146 per sewage unit.

7.6.3 Opportunities for Public Input

Even after a funding source has been identified, long-term financing cannot be undertaken until the Sanitation Districts actually adopt appropriate service charge rates to ensure that repayment can be made. Given the current economic climate and the public's concern over any rate increases, this is a process that would involve multiple opportunities for public input. At a minimum, the Sanitation Districts must comply with Proposition 218. For the Clearwater Program, this would entail mailing public notices to approximately 1.2 million property owners at least 45 days before the Joint Outfall Districts' Boards of Directors hold a public hearing. Each public notice, in addition to providing information about the public hearing, must include the actual charges to be imposed on a given parcel and the basis for those charges.

In practice, the Sanitation Districts typically go much further than what is required by law. The public notices explain what projects are being undertaken, what the cost is, and what the future rates would be. The notices also include a series of commonly asked questions and provide answers to those questions. Lastly, the notices reference the Sanitation Districts' internet site where, in addition to supplementary information, Spanish language translations are provided. Furthermore, the Sanitation Districts have a dedicated toll free telephone line for people to ask questions and obtain more information. Prior to the public hearing, the Sanitation Districts also conduct a series of information meetings, usually consisting of a brief presentation followed by a question and answer period. A video version of the information meetings is made available on the Sanitation Districts' internet site.

LIST OF APPENDICES

Appendix A
STATE WATER RESOURCES CONTROL BOARD REQUIREMENTS FOR PROJECT REPORTS

State Revolving Fund Loan Program Compliance

The State Revolving Fund (SRF) loan program was created by the 1987 Amendments to the Federal Clean Water Act and replaces the previous federal grant program. The SRF loan program provides low interest loans for many public works projects, including construction of publicly owned treatment works.

The Sanitation Districts of Los Angeles County (Sanitation Districts) have prepared the Clearwater Program Master Facilities Plan (MFP) to identify a recommended plan that will meet the wastewater management needs of the Joint Outfall System (JOS) through the year 2050. The MFP identifies both program-level and project-level portions of the recommended plan. The program-level portion of the recommended plan includes: expansion of the conveyance system with approximately 32.5 miles of relief trunk sewers; expansion of the San Jose Creek WRP (SJCWRP) by 25 million gallons per day (MGD); process optimization at the Pomona WRP (POWRP), the SJCWRP, the Los Coyotes WRP (LCWRP), and the Long Beach WRP (LBWRP); a continuation of current practices for water reclamation plant (WRP) effluent management and biosolids management practices; and additional sludge stabilization facilities at the Joint Water Pollution Control Plant (JWPCP). The project-level portion of the recommended plan includes installation of a new effluent tunnel originating at the JWPCP and extending to the existing ocean outfall manifold structure at Royal Palms Beach near White Point. Rehabilitation of the existing ocean outfalls will be included in the project scope of work.

The SRF loan program is administered by the State Water Resources Control Board (SWRCB). The purpose of this appendix is to facilitate review of the project report requirements by the SWRCB. Applicable sections of the MFP are referenced, and in some cases, supplemental information is provided as necessary to address SRF requirements. The project, referred to as the recommended plan, is evaluated and defined in the MFP and analyzed the associated environmental impact report/environmental impact study (EIR/EIS), which was prepared by the environmental consulting firm ICF International in conformance with the California Environmental Quality Act and the National Environmental Policy Act, respectively. The Clearwater Program EIR/EIS is available under separate cover.

Project Report Requirements

The SRF Policy published by the SWRCB (as amended March 17, 2009) contains a list of items that a project report must contain, as appropriate. Applicable items addressed in the MFP are as follows:

1. *A statement of Project needs and benefits, including a discussion of the water quality benefits of the Project and the public health or water quality problems to be corrected.*

The statement of the Clearwater Program purpose and needs, as well as the goal and objectives, are found in Section 1.4. Water quality and health benefits are also discussed in this section. A project needs assessment is included in Section 5.9.

2. *Proposed Project service area and composition information*:

   a. *Median household income (MHI) and population for the proposed Project service area using census data or the most recent income survey if the census data do not accurately reflect the community's MHI.*

      The MHI and population, derived from the Department of Finance, are contained in Sections 2.2.3 and 2.2.1, respectively. In 2000, the MHI was $47,834 and the population was 4,720,505 within the JOS service area.

   b. *Total number of active wastewater service connections that are currently and directly served by the wastewater collection system. This includes a breakdown by each category for all domestic or residential, industrial, commercial, or other connections. A map for the existing wastewater service area for the proposed Project must be provided.*

      As of fiscal year 2010-2011, a total of 1,068,384 parcels are served by the JOS. Of this number: 1,005,667 are domestic or residential; 19,894 are industrial; 40,609 are commercial; and 2,214 are other (such as schools, government buildings, etc.). A map of the existing wastewater service area for the recommended plan is shown in Chapter 1 (Figure 1-2).

   c. *The average current monthly wastewater charges by category. If the wastewater system uses a "tiered" rate, the charge should reflect what a typical user pays in each category and the basis of the charges. The rate should reflect direct wastewater charges plus any other fees or charges that support the wastewater service such as parcel fees, standby charges, wastewater taxes, and surcharges.*

      The historic, current, and adopted wastewater service charge rates within the JOS are contained in Section 7.5.1 and shown in Table 7-4. Rates within the JOS are not tiered. Approximately $25 per year of local property taxes per parcel supports wastewater service. An average of $41 per year is charged for local sewer maintenance by the district or city responsible for such maintenance.

3. *A cost effectiveness and climate change evaluation of alternatives over the useful life of the Project. The evaluations presented must include an evaluation of the alternative of upgrading operation and maintenance of the existing facility to improve effluent quality, and a regional treatment solution.*

   Alternatives are evaluated for cost effectiveness in Chapter 6 in both the Level 2 and Level 3 screening (Sections 6.2.6.4 and 6.3.4.2, respectively). The alternatives are evaluated for climate change (greenhouse gasses) in Section 6.2.1.4, where they are considered as part of regulatory compliance in Level 2 screening, and in Chapter 9 of the associated Clearwater Program EIR/EIS. Upgrading operation and maintenance of existing facilities has been evaluated on a regional basis spanning the JOS.

4. *An evaluation of alternative methods for reuse or ultimate disposal of treated wastewater and sludge material resulting from the treatment process.*

Section 5.4 discusses WRP effluent management while Section 5.6 discusses effluent management at the JWPCP. Section 5.8 discusses the biosolids history, biosolids strategy, recent management practices, landfill co-disposal, and future solids management. Alternative methods are evaluated in Section 6.2 for program components and Section 6.3 for project elements.

For wastewater treatment Projects producing sludge material, the following information needs to be identified and compared:

a. *All landfills within a 100-mile radius that accept sewage sludge;*

   All landfills within at least a 100-mile radius that accept sewage sludge are identified in Chapter 5 and shown in Table 5-9.

b. *Any composing facilities within a 100-mile radius accepting sewage sludge;*

   All composting facilities within at least a 100-mile radius that accept sewage sludge are identified in Chapter 5 and shown in Table 5-9.

c. *The potential for dedicated land disposal;*

   Future solids management is discussed in Section 5.8.5. All of the solids generated in the JOS are conveyed to and treated at the JWPCP. Biosolids management follows a diversified management program that actively seeks out alternative biosolids disposal methods as discussed in Section 5.8.2.

d. *Conversion of sludge to biosolids for distribution as soil amendment or as another agricultural product; and*

   The sludge material is anaerobically digested at the JWPCP, becoming biosolids, and is concentrated in centrifuges. Recent solids handling practices in the JOS are discussed in Section 5.8.3.

e. *Ultimate disposal methods approved by the Regional Water Boards.*

   Disposal methods for solids generated in the JOS are discussed in Sections 5.8.3 through 5.8.5. All in-state facilities have been approved by the Regional Water Board with local oversight responsibility. All out of state facilities have been approved by the appropriate regulatory agencies with oversight responsibility.

5. *An evaluation of the non-existence or possible existence of excessive infiltration/inflow (I/I) in the existing sewer system. If the average daily flow during periods of sustained high groundwater is less than 120 gallons per capita per day (gpcd), a Sewer System Evaluation Survey (SSES) is not required. If it is above 120 gpcd, the applicant must perform a SSES to determine whether it is cost-effective to treat or correct the I/I. If a SSES is not submitted, funding will be based on a maximum flow rate of 120 gpcd. If the peak flow during a storm event (highest three-hour average) exceeds 275 gpcd, a SSES must be completed or funding will be based on a maximum peak flow rate of 275 gpcd. Cost-effective corrections under these criteria are eligible for funding.*

   An evaluation of I/I is provided in Section 4.8.3.3.

6. *Information on total capital costs, annual operation and maintenance costs.*

   Total capital cost, total annual cost, and the estimated cost to users for implementing the recommended plan are provided in Sections 7.2, 7.4, and 7.6.

7. *A discussion of the existing population, flows, loadings, and projections of the same, used to estimate the capacity needs for the funded facilities.*

   Section 4.8 discusses wastewater flow projections. Existing and projected population, flows, and loadings are discussed in Sections 4.8.1.2, 4.8.2, and 4.8.1.1, respectively.

8. *A discussion of the anticipated eligible capacity for the Project, and how that capacity was derived.*

   The anticipated eligible capacity and its derivation are identified in Section 4.8.

9. *A summary of public participation.*

   Sections 1.4.5 and 6.1.4, respectively, summarize the public participation efforts for the Clearwater Program. A greater level of detail is provided in the associated Clearwater Program Agency and Public Scoping Report, which is available under separate cover in Appendix 1-B of the EIR/EIS.

10. *The following must be submitted for the selected alternative:*

    a. *A detailed description of the selected alternative and the complete waste treatment system of which it is a part;*

       Section 7.2 contains a summary of the selected alternative. Chapter 5 provides an overview of the complete JOS waste treatment system.

    b. *A summary of relevant design criteria (i.e., design flow, peak flows, daily Biochemical Oxygen Demand (BOD) or Chemical Oxygen Demand (COD) loadings, daily suspended solids loadings, overflow rates, detention times, sludge production, etc.);*

       The recommended plan includes the expansion of the SJCWRP. A summary of the design criteria for this plant is contained in Appendix C and shown in Table C-1.

    c. *The estimated construction and annual operation and maintenance costs and a description of the anticipated manner in which all the costs will be financed;*

       Costs associated with the recommended plan are provided in Sections 7.2 and 7.4, the Sanitation Districts' revenue program is described in Section 7.5, and financing is presented in Section 7.6. Operation and maintenance costs are anticipated to remain the same for the proposed modified ocean discharge system.

    d. *A summary of the cost impacts on wastewater system users. Provide the average projected monthly wastewater charges that will be passed on to wastewater users by category and the basis of the charges during the useful life of the proposed Project. Include any ineligible project costs as well as non-Project-related wastewater system costs that will be imposed on* *the residential users during the next five years. Also include any income generated by the project, such as income generated by the sale of recycled water;*

Total capital cost, total annual cost, and the estimated cost to users for implementing the recommended plan are provided in Sections 7.2, 7.4, and 7.6. Past, current, and future adopted Service Charge and Connection Fee rates are provided in Section 7.5. No additional operation and maintenance costs would be incurred. The proposed modified ocean discharge system would not result in the generation of income.

e. *A summary of the significant environmental impacts of the selected Project and any proposed mitigation measures;*

The Clearwater Program Executive Summary, which is available under separate cover, provides a summary of all significant environmental impacts of the recommended plan and the proposed mitigation measures.

f. *A statement that identifies and discusses the source(s) and the amount of unallocated potable water currently available in the Project service area. If the amount of potable water is less than what is needed to serve the projected population for the proposed Project, a plan identifying how that deficiency will be mitigated shall be presented;*

A comprehensive discussion of existing and future water supply and demand is provided in Sections 4.1, 4.2, 4.3, 4.4, 4.5, and 4.6. As described in Section 4.8, population projections provided by the Southern California Association of Governments were used as the basis for projecting future flows within the JOS service area and determine the wastewater management facilities necessary to accommodate the projected flows. Therefore, the Clearwater Program is growth accommodating, not growth inducing.

g. *A discussion of facilities that were previously funded by federal/state grants, loans, or other financing, if such facilities are to be repaired or replaced;*

The Clearwater Program would not involve the replacement of existing facilities. The ocean outfalls being proposed for rehabilitation were not funded by federal/state grants, loans, or other financing.

h. *A discussion, if applicable, where minority populations are included in the facilities planning area, showing that such areas will be served or excluded from service only for reasons of cost-effectiveness. Applicants much comply with the Civil Rights Act of 1964.*

The Clearwater Program is in compliance with the Civil Rights Act of 1964 in that wastewater management services are provided in a cost-effective manner to all residents within its service area, without regard to race, color, religion, sex, national origin, age, disability, ancestry, marital status, cancer-related medical condition, or status as a disabled veteran. Refer to of the MFP, Section 2.2, for a description of the social-economic characteristics of the region.

i. *A description of operation and maintenance requirements;*

The operation and maintenance requirements for the proposed modified ocean discharge system would be the same as those for the existing tunnel and ocean outfalls. Tunnel/outfall operation consists of opening and closing the valves that control the routing of the effluent through the specific outfalls. Maintenance requirements include general valve maintenance for the above noted valves and annual underwater inspection of the outfall, followed by maintenance (typically re-ballasting) as required.

j. *A demonstration that the selected alternative is consistent with any applicable approved water quality management plan;*

The recommended plan would provide for continued compliance with all applicable effluent and receiving water standards in the 1994 Water Quality Control Plan for the Los Angeles Region. Refer to Section 3.2.2 for more details on state water quality management regulations.

k. *A summary of public participation; and*

Sections 1.4.5 and 6.1.4, respectively, summarize the public participation program for the Clearwater project. A greater level of detail is provided in the Clearwater Program Agency and Public Scoping Report, which is available under separate cover in Appendix 1-B of the EIR/EIS.

l. *For existing facilities, the applicant must submit a copy of the current adopted WDRs issued by the Regional Water Board. If there are no existing facilities, the applicant must submit a copy of the tentative WDRs, which must become final before disbursement of costs for construction. Division staff will track the status of the WDRs and may require additional relevant information and updates from the applicant.*

There are current adopted WDRs for the JWPCP and WRPs. The WDRs issued by the Los Angeles Regional Water Board for the can be found at the following links:

- JWPCP: http://63.199.216.6/larwqcb_new/permits/docs/1758_R4-2011-0151_WDR_PKG.pdf
- Pomona WRP: http://63.199.216.6/larwqcb_new/permits/docs/0755_R4-2009-0076_WDR.pdf
- Whittier Narrows WRP: http://63.199.216.6/larwqcb_new/permits/docs/2848_R4-2009-0077_WDR_PKG.pdf
- San Jose Creek WRP: http://63.199.216.6/larwqcb_new/permits/docs/5542_R4-2009-0078_WDR.pdf
- Long Beach WRP: http://63.199.216.6/larwqcb_new/permits/docs/5662_R4-2007-0047_WDR_PKG.pdf
- Los Coyotes WRP: http://63.199.216.6/larwqcb_new/permits/docs/5059_R4-2007-0048_WDR_PKG.pdf
- La Cañada WRP: There are no on-line documents for the La Cañada WRP.

m. *Applicants requesting Extended Term Financing must include the following in the Project Report: 1) an assessment of the useful life of the selected alternative; and 2) an affordability analysis, which demonstrates the financing term necessary to make the selected alternative affordable for the community.*

Extended Term Financing is not being requested for this project.

11. *A description of how the applicant's Project addresses each of the state planning priorities defined in Section 65041.1 of the Government Code and sustainable water resource management priorities. These are intended to promote equity, strengthen the economy, protect the environment, and promote public health and safety in the state, including in urban, suburban, and rural communities. The state planning priorities and sustainable water resources management priorities as of the date of adoption of this Policy are as follows:*

    a. *To promote infill development and equity by rehabilitating, maintaining, and improving existing infrastructure that supports infill development and appropriate reuse and redevelopment of previously developed, underutilized land that is presently served by transit, streets, water, sewer, and other essential services, particularly in underserved areas, and to preserving cultural and historic resources;*

       Sections 7.2 and 7.3 describe the recommended plan, which improves existing infrastructure, therefore supporting infill development and appropriate reuse and redevelopment of underutilized land.

    b. *To protect environmental and agricultural resources by protecting, preserving, and enhancing the state's most valuable natural resources, including working landscapes such as farm, range, and forest lands, natural lands such as wetlands, watersheds, wildlife habitats, and other wildlands, recreation lands such as parks, trails, greenbelts, and other open space, and landscapes with locally unique features and areas identified by the state as deserving special protection;*

       Section 4.10 discusses the use of recycled water to benefit the local environment. As described in Chapters 4, 6, 11, 12, 13, and 17 of the Clearwater Program EIR/EIS, which is available under separate cover, the recommend plan would result in less than significant impacts to natural resources such as working landscapes, recreation lands, and landscapes afforded special state protection.

    c. *To encourage efficient development patterns by ensuring that any infrastructure associated with development that is not infill supports new development that uses land efficiently, is built adjacent to existing developed areas to the extent consistent with the priorities specified pursuant to subdivision (b), in an area appropriately planned for growth, services, and minimizes ongoing costs to taxpayers.*

       New facilities associated with the recommended plan would be located primarily at existing treatment plant sites or within existing developed areas; therefore, infill development patterns would be more likely to follow this project.

    d. *To encourage sustainable water resources management by ensuring that sustainable water resources measures, such as recycling wastewater, conserving water, conserving energy, and applying Low Impact Development Best Management Practices to the maximum extent practicable. Agencies that are legislatively prohibited from engaging in these activities are exempt from this requirement. Exempt agencies shall provide a statement in their Project Report citing the legislation and what activities are prohibited.*

       Section 3.5 discusses regulations associated with recycled water reuse. All wastewater entering the JOS WRPs is treated to a level suitable for reuse. This recycled water is made available to local water wholesale or retail agencies, which in turn supply recycled water to their clients. Per the California Public Utilities Code Chapter 8.5, Service Duplication, the Sanitation Districts are prohibited from selling recycled water directly to a user served by a private water company.

State Revolving Fund Water Conservation Requirement

The Sanitation Districts are not water purveyors. Therefore, to comply with SRF requirements, the Sanitation Districts must (1) certify that 75 percent of the water connections in the service area are covered by adopted water conservation programs approved by the Division or (2) demonstrate that the water purveyors have signed the Memorandum of Understanding covering at least 75 percent of the water connections with the sewer service area.

Table A-1 lists the member agencies of the Metropolitan Water District of Southern California (MWD) that serve the JOS service area and their total water supply for fiscal year 2009-10 in acre-feet (AF). Of an estimated 954,644 AF of total water supply utilized in the JOS service area in fiscal year 2009-10, at least 950,032 AF came from member agencies that are signatory to a memorandum of understanding with MWD. Therefore, 99.5 percent of the water supplied by MWD was through signatory agencies. Since these agencies provide more than 75 percent of the total water supply within the JOS, the Sanitation Districts are in compliance with the SRF water conservation requirement.

Table A-1. Total Water Supply for Signatory Agencies (Fiscal Year 2009-2010)

Member Agency	Total Water Supply (AF)	Water Supply of Signatory Agencies (AF)
Central Basin MWD	301,381	301,381
City of Compton	8,270	8,270
Foothill MWD	20,125	20,125
City of Long Beach	63,742	63,742
City of Pasadena	33,755	33,755
City of San Marino	4,612	NS
Three Valleys MWD	117,028	117,028
City of Torrance	23,613	23,613
Upper San Gabriel MWD	205,387	205,387
West Basin MWD	176,731	176,731
Total:	954,644	950,032

AF acre feet
NS not a signatory agency to the MOU
Source: MWD Annual Report for Fiscal Year 2009-10 (http://www.mwdh2o.com/mwdh2o/pages/about/AR/AR10.html)

Appendix B
SANITATION DISTRICTS THAT PROVIDE SERVICE TO LOCAL JURISDICTIONS

Table B-1. Sanitation Districts That Provide Service to Local Jurisdictions

Jurisdiction	District
Alhambra	2-16
Arcadia	15-22
Artesia	2-18-19
Azusa	22
Baldwin Park	15-22
Bell	1-2
Bellflower	2-3-18
Bell Gardens	2
Beverly Hills	4
Bradbury	15-22
Carson	8
Cerritos	2-3-18-19
Claremont	21
Commerce	2
Compton	1-2-8
Covina	22
Cudahy	1
Culver City	5
Diamond Bar	21
Downey	2-18
Duarte	15-22
El Monte	15
El Segundo	SBC-5
Gardena	5
Glendora	22
Hawaiian Gardens	19
Hawthorne	5
Hermosa Beach	SBC
Huntington Park	1
Industry	15-18-21
Inglewood	5
Irwindale	15-22
La Cañada Flintridge	28-34
La Habra Heights	18
Lakewood	3-19
La Mirada	18

Table B-1 (Continued)

Jurisdiction	District
Lancaster	14
La Puente	15-21
La Verne	21-22
Lawndale	5
Lomita	5
Long Beach	1-2-3-8-19
Los Angeles	1-2-3-4-5-8-9-16
Lynwood	1
Manhattan Beach	SBC-5
Maywood	1
Monrovia	15-22
Montebello	2-15
Monterey Park	2-15
Norwalk	2-18
Palmdale	14-20
Palos Verdes Estates	SBC-5
Paramount	1-2
Pasadena	15-16-17
Pico Rivera	2-18
Pomona	21
Rancho Palos Verdes	SBC-5
Redondo Beach	SBC-5
Rolling Hills	5
Rolling Hills Estates	SBC-5
Rosemead	15
San Dimas	21-22
San Gabriel	2-15
San Marino	15-16
Santa Clarita	SCV (32)
Santa Fe Springs	18
Sierra Madre	15
Signal Hill	3-29
South El Monte	15
South Gate	1-2
South Pasadena	16
Temple City	15
Torrance	SBC-5
Vernon	1-2-23
Walnut	21-22
West Covina	15-21-22
West Hollywood	4
Whittier	2-15-18
Los Angeles County	1-2-3-5-8-9-14-15-16-17-18-19-20-21-22-SCV
Unincorporated Area Only	27

Source: Sanitation Districts of Los Angeles County 2011

Appendix C
DESIGN CRITERIA FOR THE SAN JOSE CREEK WATER RECLAMATION PLANT

Table C-1. Design Criteria for the San Jose Creek WRP

Design Element	Units	SJCWRP-East (Existing)	SJCWRP-West (Existing)	SJCWRP-West (Ultimate)
Plant Flows				
Average	MGD	62.5	37.5	62.5
Peak Sanitary	MGD	90	60	100
Peak Storm	MGD	125	75	125
Equalized Waste Filter Backwash	MGD	1.6	-	-
Primary Sedimentation Tanks				
Number	-	8	5	8
Dimensions (LxWxD)	feet	300x20x12	300x20x12	300x20x12
Avg. Overflow Rate	gpd/ft^2	1,300	1,300	1,300
Avg. Detention Time	hours	1.65	1.65	1.65
SS Removal (Avg)	□	65	62	62
BOD_5 Removal (Avg)	□	35	36	36
Aeration Tanks				
Process Configuration	-	SFA	SFA	SFA
Number	-	20	12	20
Dimensions (LxWxD)	feet	225x30x15	225x30x15	225x30x15
Fraction Anoxic	□	25	25	25
Fraction Aerobic	□	75	75	75
Equipment Type	-	Fine Bubble	Fine Bubble	Fine Bubble
Make	-	Sanitaire	Sanitaire	Sanitaire
HRT Total	hours	1.86	1.86	1.86
Process Air Compressors				
Number	-	5	3	3
Type	-	Centrifugal	Centrifugal	Centrifugal
Capacity (Per Unit)	cfm	3□ 44,000 2□ 20,000	44,000	44,000
Final Sedimentation Tanks				
Number, Total	-	30	18	30
Number Assigned to BWR	-	-	-	-
Dimensions (LxWxD)	feet	150x20x10	150x20x10	150x20x10
Avg Overflow Rate	gpd/ft^2	694	694	694
Avg Detention Time	hours	1.94	1.94	1.94

Table C-1 (continued)

Design Element	Units	SJCWRP-East (Existing)	SJCWRP-West (Existing)	SJCWRP-West (Ultimate)
Filters				
Number	-	20	14	24
Type	-	Gravity - Dual	Gravity - Mono	Gravity - Mono
Dimensions (LxWxD media)	feet	37x16x7.6	37x16x7.2	37x16x7.2
Avg SLR (All in Service)	gpd/ft^2	3.63	3.11	3.03
Filter Effluent Pumps				
Number	-	5	3	3
Type	-	Vertical Mixed Flow	Vertical Mixed Flow	Vertical Mixed Flow
Capacity Per Pump	gpm	2□ 22,800 1□ 22,000 1□ 12,200 1□ 13,800	23,000	23,000
Filter Backwash Pumps				
Number	-	2	2	2
Type	-	Vertical Mixed Flow	Vertical Mixed Flow	Vertical Mixed flow
Capacity Per Pump	gpm	6,500	13,500	13,500
Filter Waste Backwash Recovery Tank				
Number	-	1	1	1
Volume (Effective)	gallons	136,925	135,000	135,000
Chlorine Contact Tanks				
Number	-	4 (Series)	4	6
Dimensions (LxWxD)	feet	386x13x16	300x27x15	300x27x15

Notes:
Avg □ average
MGD □ million gallons per day
gpd □ gallons per day
gpm □ gallons per minute
ft^2 □ square feet
cfm □ cubic feet per minute
SFA □ step-feed anoxic
SS □ suspended solids
COD □ chemical oxygen demand
BOD_5 □ biochemical (or biological) oxygen demand
HRT □ hydraulic retention time
BWR □ backwash recovery
SLR □ surface loading rate

Appendix D
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Appendix E
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Appendix F
LIST OF ABBREVIATIONS

°F	degrees Fahrenheit
µg/L	micrograms per liter
1977 Plan	1977 JOS Facilities Plan
2010 Plan	Joint Outfall System 2010 Master Facilities Plan
ACS	American Community Survey
ADWF	average dry weather flow
AF	acre-feet
AFY	acre-feet per year
AQMP	air quality management plan
ATCM	Airborne Toxic Control Measure
AWTF	Advanced Water Treatment Facility
AWWA	American Water Works Association
BACT	best available control technology
Basin Plan	Water Quality Control Plan, Los Angeles Region
BM	Biosolids Management
BMP	best management practice
BOD	biochemical (or biological) oxygen demand
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
Cal/OSHA	California Occupational Safety and Health Administration
CARB	California Air Resources Board
CBMWD	Central Basin Municipal Water District
CCC	California Coastal Commission
CCR	California Code of Regulations
CCT	chlorine contact tank
CDFG	California Department of Fish and Game
CDPH	California Department of Public Health
CDWS	California drinking water standards

CEC	Constituents of Emerging Concern
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESA	California Endangered Species Act
cfm	cubic feet per minute
CFR	Code of Federal Regulations
cfs	cubic feet per second
CFU	Coliform Forming Units
CI	cast iron
CII	commercial, industrial, and institutional
CIP	capital improvement plan
CMOM	capacity, management, operations, and maintenance
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
COD	chemical oxygen demand
Corps	U.S. Army Corps of Engineers
County DPH	Los Angeles County Department of Public Health
CPRC	California Public Resources Code
CRS	combined raw sludge
CSDLAC	County Sanitation Districts of Los Angeles County
CSLC	California State Lands Commission
CT	(wastewater) conveyance and treatment
CT	contact time
CTR	California Toxics Rule
CUP	conditional use permit
CWA	Clean Water Act
CWC	California Water Code
CZMA	Coastal Zone Management Act
DAF	dissolved air flotation
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethylene

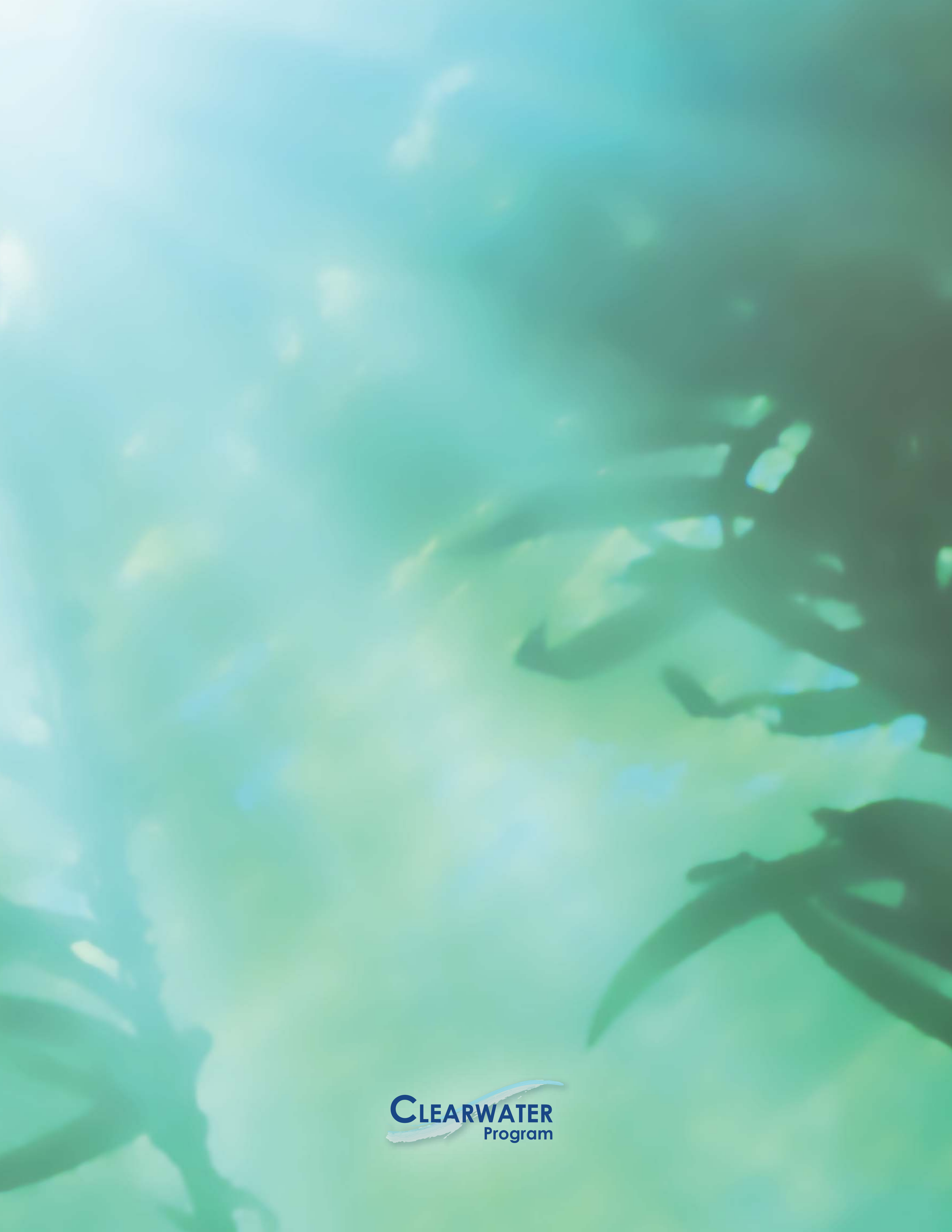
DDT	dichlorodiphenyltrichloroethane
Delta	Sacramento-San Joaquin Delta
DHS	Department of Health Services
DOF	Department of Finance
DPM	diesel particulate matter
DRP	Department of Regional Planning
dtpd	dry tons per day
DWR	Department of Water Resources
DWUR	Dry weather urban runoff
EIR	environmental impact report
EIR/EIS	environmental impact report/environmental impact statement
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
EPB	earth-pressure balance
FESA	federal Endangered Species Act
GBT	gravity belt thickener
General Permit	General Waste Discharge Requirements for Landscape Irrigation Uses of Municipal Recycled Water
GHG	greenhouse gas
GIS	geographic information system
gpcd	gallons per capita per day
gpm	gallons per minute
GRIP	Groundwater Reliability Improvement Program
GRP	Gross Regional Product
GRRP	groundwater reuse recharge project
GVWR	gross weight rating greater
HSWA	Hazardous and Solid Waste Amendments of 1984
HWCA	Hazardous Waste Control Act
I-	Interstate
I/I	infiltration and inflow
ICM	Inflow Coefficient Method
in/hr	inches per hour
IRP	Integrated Resource Planning
ISWP	Inland Surface Waters Plan

IW	industrial waste
JAA	Joint Administration Agreement
JE	JWPCP Effluent Management
JO	Joint Outfall
JOA	Joint Outfall Agreement
JOS	Joint Outfall System
JWPCP	Joint Water Pollution Control Plant
Kellogg	H.C. Kellogg
LA/OMA	Los Angeles/Orange County Metropolitan Area
LACAWRP	La Ca□ada Water Reclamation Plant
LACDPW	Los Angeles County Department of Public Works
LARWQCB	Los Angeles Regional Water Quality Control Board
LAXT	Los Angeles Export Terminal
lbs/d	pounds per day
LBWD	Long Beach Water Department
LBWRP	Long Beach Water Reclamation Plant
LCFS	low carbon fuel standard
LCWRP	Los Coyotes Water Reclamation Plant
LFG	landfill gas
M&I	municipal and industrial
MBR/RO	membrane bioreactor/reverse osmosis
MBRs	membrane bioreactors
MCL	maximum contaminant level
MF/RO	microfiltration and reverse osmosis
MFP	(Clearwater Program) Master Facilities Plan
MG	million gallons
mg/L	milligrams per liter
MGD	million gallons per day
MGY	million gallons per year
mL	milliliters
MLE	Modified Ludzack-Ettinger
MLSS	mixed liquor suspended solids
MPAs	Marine Protected Areas
MPN	most probable number

MW	megawatts
MWD	Metropolitan Water District of Southern California
MWh	megawatt hour
NAAQS	National Ambient Air Quality Standards
NACWA	National Association of Clean Water Agencies
NAHC	Native American Heritage Commission
NDMA	N-nitrosodimethylamine
NDN	nitrification-denitrification
NDN Plan	Nitrification/Denitrification Facilities Plan
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NO_X	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NTR	National Toxics Rule
NTUs	nephelometric turbidity units
O&M	operations and maintenance
OES	Office of Emergency Services
OLAC	Orange and Los Angeles County
OPR	Office of Planning and Research
PCA	Porter-Cologne Water Quality Control Act of 1969
PERP	Statewide Portable Equipment Registration Program
PM	particulate matter
PM_{10}	respirable particulate matter
$PM_{2.5}$	fine particulate matter
POTWs	publicly owned treatment works
POWRP	Pomona Water Reclamation Plant
ppcd	pounds per capita per day
ppd	pounds per day
PV Shelf	Palos Verdes Shelf
RCP	reinforced concrete pipe
RCRA	Resource Conservation and Recovery Act
RDI/I	rainfall dependent infiltration and inflow
RO	reverse osmosis

RPS	raw primary sludge
RTP	Regional Transportation Plan
RWC	recycled water contribution
RWQCBs	Regional Water Quality Control Boards
SAA	Streambed Alteration Agreement
Sanitation Districts	Sanitation Districts of Los Angeles County
SB	Senate Bill
SCAB	South Coast Air Basin
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Air District
SDWA	Safe Drinking Water Act
SDWSRF	Safe Drinking Water State Revolving Fund
SEA	significant ecological area
SEATAC	Significant Ecological Areas Technical Advisory Committee
sf	square feet
SFA	Step-Feed Anoxic
SFR	single-family residence
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SJCWRP	San Jose Creek Water Reclamation Plant
SOI	sphere of influence
SP	Solids Processing
SP Shelf	San Pedro Shelf
SR-	State Route
SRF	State Revolving Fund
SS	suspended solids
SSECAP	Sewer System Evaluation and Capacity Assurance Plan
SSES	Sewer System Evaluation Survey
SSMP	sewer system management plan
SSO	Sanitary Sewer Overflow
SWP	State Water Project
SWPPP	storm water pollution prevention plan
SWRCB	State Water Resources Control Board
TBM	tunnel boring machine

TDS	total dissolved solids
THM	trihalomethane
TICH	Total Identifiable Chlorinated Hydrocarbons
TMDL	Total Maximum Daily Load
TOC	total organic carbon
TraPac	Trans Pacific Container Service Corporation
TSDF	treatment, storage, and disposal facility
TU_c	chronic toxicity unit
TWAS	thickened waste activated sludge
U.S.	United States
UF/RO	ultrafiltration/reverse osmosis
USBR	United States Bureau of Reclamation
USFWS	U.S. Fish and Wildlife Service
USGVMWD	Upper San Gabriel Valley Municipal Water District
UV	ultraviolet
UWMP	Urban Water Management Plan
VOCs	volatile organic compounds
WAS	waste activated sludge
waters of the U.S.	waters of the United States
WDR	waste discharge requirement
WE	WRP Effluent Management
WNWRP	Whittier Narrows Water Reclamation Plant
WQOs	water quality objectives
WRD	Water Replenishment District of Southern California
WRP	water reclamation plant
WRR	water reclamation requirements
WSDM Plan	Water Surplus and Drought Management Plan
wtpd	wet tons per day
wtpy	wet tons per year
WVWD	Walnut Valley Water District
WWUR	Wet weather urban runoff


CLEARWATER
Program

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SANITATION DISTRICTS OF LOS ANGELES COUNTY

STEPHEN R. MAGUIN
Chief Engineer and General Manager

Memorandum

Date: August 9, 2010

To: Anthony Mahinda

Through: Mark McDannel

From: Andre Schmidt

Subject: **San Jose Creek WRP Process Air Compressor Efficiency Study R1**

Summary

A study was performed to evaluate the potential energy savings of replacing the process air compressors (PACs) at San Jose Creek WRP. The study included power monitoring of all eight existing PACs, analysis of plant data, determination of the energy usage of new compressors, and gathering of equipment cost estimates.

Results of the analysis are shown in Table 1. With an estimated equipment cost of $4.8 million, an annual energy savings of $1.0 million can be achieved. Excluding design and construction costs, and including the energy efficiency rebate incentive from Southern California Edison, the project has a simple payback period of less than four years.

Table 1: San Jose Creek WRP PAC Replacement Payback Period

Area of Plant	Turblex Models	Number of Duty Units	Number of Standby Units	Total Price	Annual Power Savings	SCE Rebate Incentive	Equipment Payback Period (Years)
SJC WRP East & West PACs	KA66 & KA80	4	1	$4,755,000	$1,003,289	$834,009	3.9

Background and Objectives

The PACs at San Jose Creek WRP consume 62 percent of the total plant power at a cost of $3.6 million per year. There are three sets of PACs that were installed at different stages of plant development (see Table 2). These compressors range in age from 18 years to 39 years. At the request of Wastewater Management, Energy Recovery Engineering conducted an energy efficiency study for the PACs. The objectives of the study were:

- Accurately monitor the power usage of the existing PACs
- Compare this energy usage to new high efficiency compressors
- Determine the potential financial savings associated with new equipment

Table 2: San Jose Creek WRP Existing Process Air Compressor Data

Area of Plant	Number of PACs	Duty	Standby	Horsepower Each	Capacity Each (scfm)	Age (Years)
East Stage One	3	2	1	1750	44,000	39
East Stage Two	2	2	0	900	20,000	28
West	3	1	2	1750	44,000	18

The PACs are high voltage equipment (4160 V) and therefore require specialized equipment for power monitoring. Southern California Edison (SCE) provided equipment and personnel to monitor the power of all eight compressors at no charge to the Districts. At the direction of SCE personnel, Districts staff connected the power monitoring equipment to the PAC electrical panels on December 17, 2009. Power was monitored on all eight compressors at 15-minute intervals for almost three months. The monitoring equipment was removed on February 11, 2010.

PAC Performance Data

Plant performance data for the same period of time was collected including plant flows, PAC airflow rate, and PAC discharge pressure. The data was compiled into average diurnal profiles for the entire three month test period. The diurnal profiles for power and airflow are compared in Figure 1 for each of the three sets of PACs. Power usage vs. airflow is plotted in Figure 2. The ratio of airflow to power is an energy efficiency metric that enables a direct comparison of the efficiency of each set of PACs. The diurnal profiles for airflow per kW are presented in Figure 3. Airflow per kW vs. influent flow is plotted in Figure 4.

Even though the West compressors are the newest of the three sets of PACs, they had the lowest average efficiency rate (see Figure 3). The West compressors actually have relatively good efficiencies of 34 to 37 icfm per kW between 5:00 a.m. and 10:00 a.m. when airflow is about ten percent less then peak airflow. But during the afternoon and early evening when airflow peaks at around 35,000 icfm, the efficiency rate drops to about 27 to 28 icfm per kW. This effect is also displayed in Figure 2, where the power usage of the SJC West compressors increases significantly when airflow increases just slightly. This increase is much more dramatic than the increase for the Stage 1 and Stage 2 compressors. At SJC West, it appears that the peak airflow demand is beyond the optimal range for one compressor operation (only one West PAC runs at a time). A compressor with slightly higher airflow capacity would be much more energy efficient.

The East Stage Two compressors had the opposite efficiency profile of the West compressors. During the afternoon and early evening, the compressors operated at about 33 icfm per kW. But during late night and early morning the efficiency dropped down to 24 icfm per kW. This is primarily due to the fact that only one compressor is needed at night, but rather than shutting down the second compressor, it is allowed to idle for 4 to 6 hours per night without providing any air. This is due to experience with premature mechanical coupling failure on the Stage Two compressors when they are shut down and restarted on a regular basis. The compressor idles for an average of 5 hours per night at an average power usage of 240 kW, costing approximately □50,000 in electricity per year.

Power was also compared to influent flow in Figure 5. It was found that the power usage of the PACs drops only slightly at night, while the influent flows drop much more substantially. This can be quantified by looking at the PAC energy usage per influent flow (Figure 6). For both the East and the West, the PAC energy usage was about 800 to 900 kWh per mgal during the day. But at night, the energy usage jumped to 1500 kWh per mgal for the West, and to 2000 kWh per mgal for the East. This points to the fact that the existing system has much lower efficiency during low flow periods.

The air ratios help examine the causes of the poor low flow system efficiency (see Figures 8 and 9). During the afternoon and early evening, the air ratio for both the East and West was about 1.5 icfm per gpm. But during early morning, the air ratio increased to 3.5 icfm per gpm on the East side, and 3.2 icfm per gpm on the West side. It appears that that there may be opportunity to increase the efficiency of the system by reducing the airflow during low flow periods.

Energy Savings of New PACs

The PAC performance data was analyzed to compare the energy usage of the existing equipment to new high efficiency compressors. A comparison between the existing equipment and new equipment was accomplished by breaking down the average diurnal airflow curve into four regimes based on airflow ranges (see Figures 13 thru

15). The average performance, including airflow, discharge pressure, and power was determined for each regime (see Tables 4 thru 6). The number of hours of operation per day was also determined for each regime. This established four discrete points of operation for each set of PACs that could be used to compare the existing compressors to new high efficiency compressors at the existing operating conditions.

Turblex was contacted to provide selection of new PACs, including projected energy usage and equipment costs. The various options for replacement of the existing compressors with Turblex compressors are presented in Table 3. The detailed energy usage calculations are provided in the appendix. Note that the payback periods in Table 3 are for the equipment costs only and do not take into account design, installation, or auxiliary equipment costs. The payback periods do take into account energy efficiency rebate incentives offered by SCE . Also, the equipment cost estimates include the typical features that the Districts have specified for other recent projects.

Table 3: San Jose Creek WRP PAC Replacement Payback Period

Area of Plant	Turblex Model	Number of Duty Units	Number of Standby Units	Price per Unit	Total Price	Annual Power Savings	SCE Rebate Incentive	Equipment Payback Period (Years)
East Stage One								
Option 1	KA66	2	1	□881,000	□2,643,000	□394,364	□327,825	5.9
Option 2	KA100	1	1	□1,438,000	□2,876,000	□380,969	□316,690	6.7
East Stage Two	KA66	1	1	□881,000	□1,762,000	□175,297	□145,720	9.2
East Stage One □ Two Combined	KA66	3	1	□881,000	□3,524,000	□556,266	□462,410	5.5
West								
Option 1	KA80	1	0	□1,231,000	□1,231,000	□447,024	□371,599	1.9
Option 2	KA80	1	2	□1,231,000	□3,693,000	□447,024	□371,599	7.4
TOTAL - East Stage One □ Two Combined and West Option 1	KA66 □ KA80	4	1	n□a	□4,755,000	□1,003,289	□834,009	3.9

For Stage One, it is less expensive and more efficient to install two duty compressors with one standby than one duty and one standby, with a payback period of 5.9 years in comparison to 6.7 years. This replacement would save □394,000 per year in energy costs. Stage Two has a longer payback period of 9.2 years with □146,000 in annual energy savings. But since Stage One and Stage Two can use the same compressor model, the PACs for these could be combined for use of a common standby compressor. This combined option would require some ducting modifications, but would cut the equipment payback period for Stage One and Stage Two to 5.5 years.

For the West side, replacement of all three compressors would have a payback period of 7.4 years. However, Operations has indicated that the existing equipment is considered to be well within its useful life. Therefore, a better alternative may be to replace just one of the existing compressors, while keeping the other two as standby machines. This would have a payback period of just 1.9 years with a power savings of □447,000 per year. In total, replacement of all three sets of compressors would have an annual power savings of □1.0 million with a payback period of as low as 3.9 years.

Recommendations and Other Possible Energy Saving Measures

Operations has indicated that it does not have plans for extensive renovations to the aeration system for the West side of the plant. This being the case, it recommended to fast track installation of one duty compressor for the

West as a separate project. This separate project would provide □447,000 in annual energy savings. The equipment cost of □1.23 million would be offset by a rebate incentive from SCE of approximately □370,000, bringing the actual cost down to □860,000 and resulting in an equipment payback period of just 1.9 years. A project of this size may also be able to qualify for special financing. The California Energy Commission conducts a low interest energy efficiency financing program, which provides 3□ interest loans of up to □3 million per application. This program is currently on hold due to lack of funds, but it is expected that new funding will be available in the future.

In addition to replacing the PACs, there may be other opportunities for further improvements to the energy efficiency of the aeration system. Advanced DO control could help cut down on excess aeration that may be occurring during late night and early morning low flow periods. If the average daytime air ratio of 1.5 cfm per gpm were maintained during low flow, it is estimated that with the Turblex units, the West plant could save an additional □100,000 in energy costs per year and the East plant an additional □180,000. Advanced DO control could also help optimize the amount of air being delivered to different stages of the aeration system, thereby improving the overall treatment efficiency.

Other possible energy saving measures for the aeration system include the following:

- Similar to DO control, some plants have also begun to adjust airflow based on ammonia levels, enabling the reduction of air where ammonia has already reached an acceptable level and providing further energy savings.

- The May 2010 issue of Water Environment □ Technology discussed modifications that were made at the 167 mgd San Jose□Santa Clara Water Pollution Control Plant. The plant recently replaced continuous aeration in its anoxic compartments and mixed liquor channel with pulsed aeration for maintaining solids in suspension. This reduction in aeration demand has resulted in approximately □800,000 in annual energy savings.

- Some plants have optimized the performance of their primary clarifiers by providing improved baffling and hydraulics. This reduces the loading on the secondary treatment system and can cut plant energy use by as much as five percent.

- Improvements to diffuser cleaning represent another energy saving opportunity. The installation of power monitoring devices on the PACs would enable a comparison of energy use before and after diffuser cleaning to determine the impact of cleaning on energy usage. This could help optimize the methods and interval of diffuser cleaning. In addition, Sanitaire markets an in-place cleaning system that aspirates chemical into the aeration distribution system to clean the diffusers while tanks are in service. This enables uninterrupted cleaning of the diffusers at optimum intervals.

- Operations has indicated the need for higher DO levels in the first pass of the aeration system, with the possibility of converting to coarse bubble aeration in the first pass to accomplish this need. An alternative to coarse bubble aeration to provide more DO may be a FlexAir system offered by Environmental Dynamics Incorporated (represented by Pacific Process). Their MiniPanel Diffuser provides the efficiency of fine bubble diffusion, but has higher floor coverage than traditional ceramic disc diffusers, thereby providing more oxygen transfer per square foot. This system is apparently being used at Valencia WRP for side stream treatment of filtrate.

Energy Recovery Engineering is available to provide assistance with the development of a PAC replacement project at San Jose Creek WRP, including investigation into any promising related technologies that may help further improve the efficiency of the secondary treatment system. In addition, Energy Recovery Engineering can work with SCE to conduct energy efficiency analyses of the PACs at other WRPs to determine the potential savings associated with replacement of those compressors.

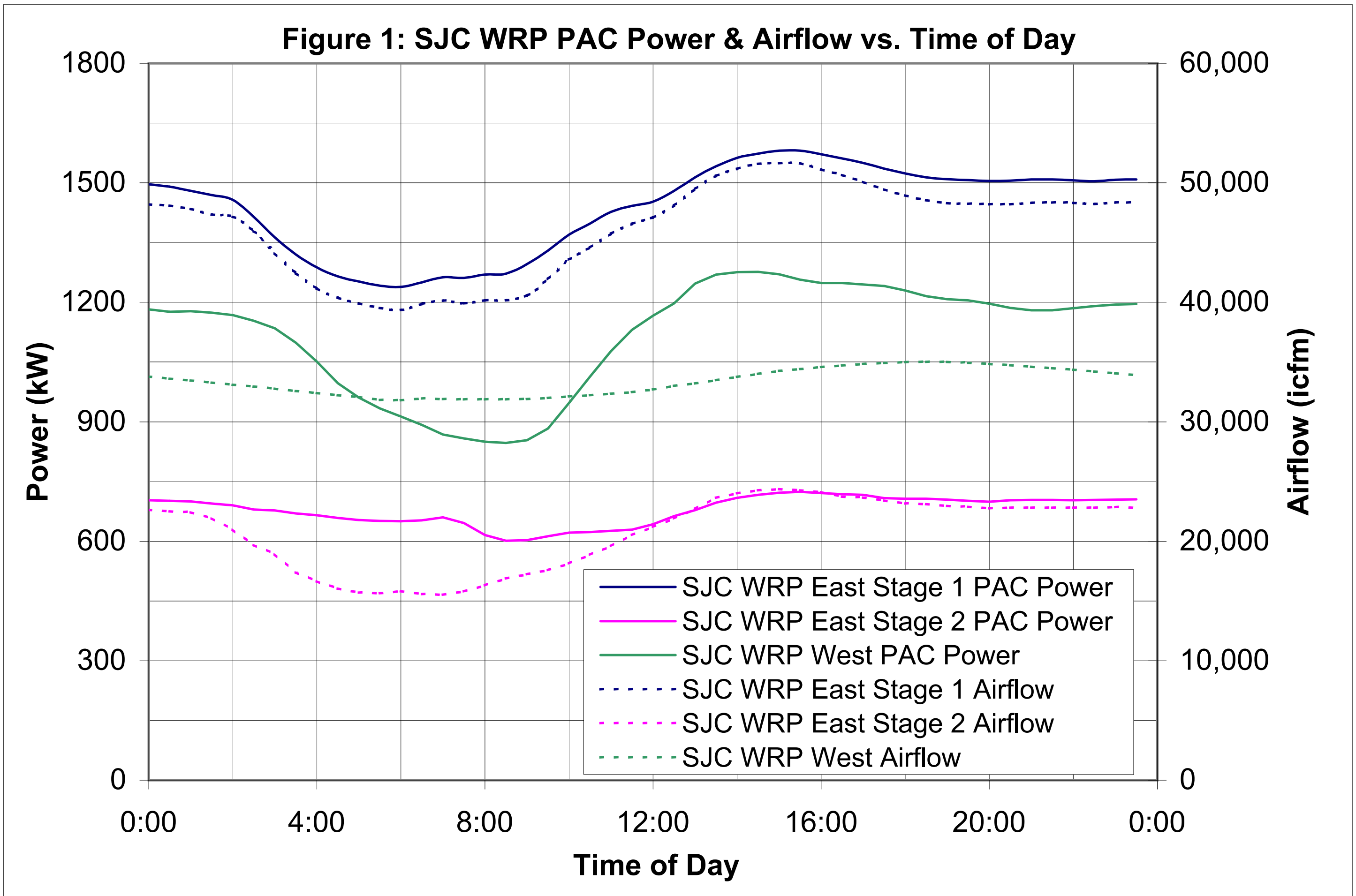


Figure 1: SJC WRP PAC Power & Airflow vs. Time of Day
Power (kW)
Airflow (icfm)
Time of Day
0
300
600
900
1200
1500
1800
0
10,000
20,000
30,000
40,000
50,000
60,000
0:00
4:00
8:00
12:00
16:00
20:00
0:00
SJC WRP East Stage 1 PAC Power
SJC WRP East Stage 2 PAC Power
SJC WRP West PAC Power
SJC WRP East Stage 1 Airflow
SJC WRP East Stage 2 Airflow
SJC WRP West Airflow

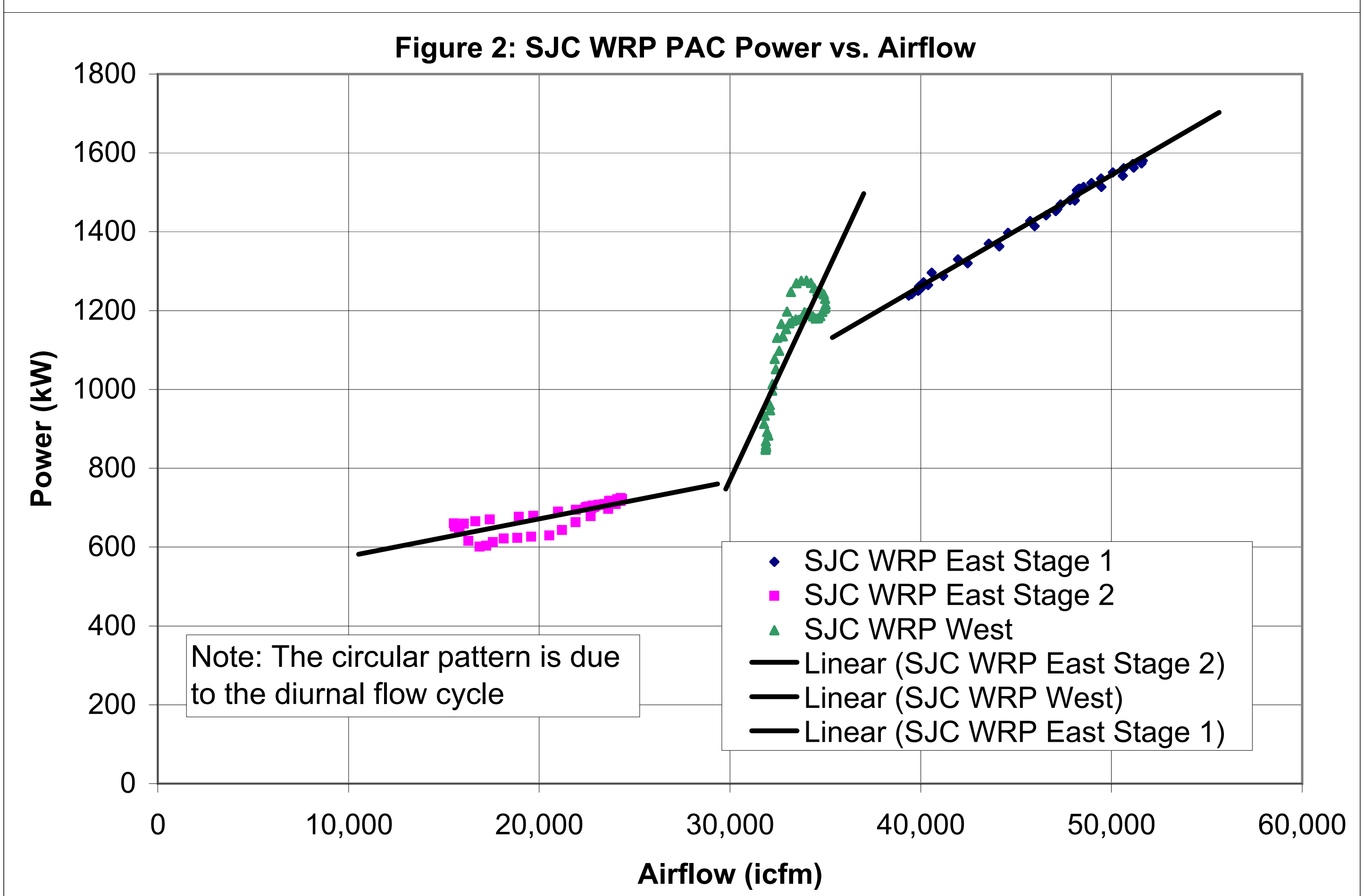


Figure 2: SJC WRP PAC Power vs. Airflow
Power (kW)
Airflow (icfm)
0
200
400
600
800
1000
1200
1400
1600
1800
0
10,000
20,000
30,000
40,000
50,000
60,000
Note: The circular pattern is due to the diurnal flow cycle
SJC WRP East Stage 1
SJC WRP East Stage 2
SJC WRP West
Linear (SJC WRP East Stage 2)
Linear (SJC WRP West)
Linear (SJC WRP East Stage 1)

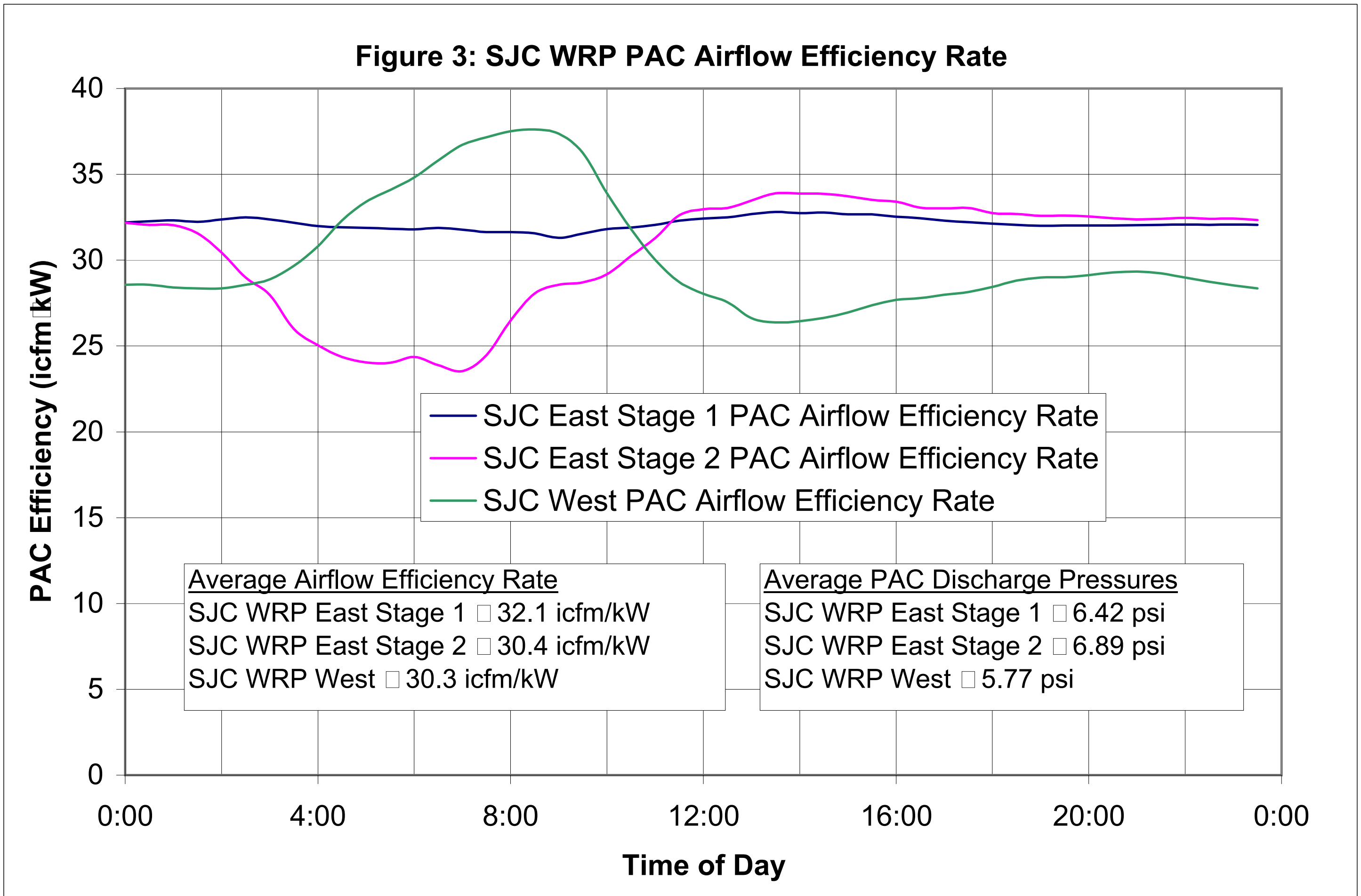


Figure 3: SJC WRP PAC Airflow Efficiency Rate
PAC Efficiency (icfm/kW)
Time of Day
SJC East Stage 1 PAC Airflow Efficiency Rate
SJC East Stage 2 PAC Airflow Efficiency Rate
SJC West PAC Airflow Efficiency Rate
Average Airflow Efficiency Rate
SJC WRP East Stage 1 32.1 icfm/kW
SJC WRP East Stage 2 30.4 icfm/kW
SJC WRP West 30.3 icfm/kW
Average PAC Discharge Pressures
SJC WRP East Stage 1 6.42 psi
SJC WRP East Stage 2 6.89 psi
SJC WRP West 5.77 psi
0:00
4:00
8:00
12:00
16:00
20:00
0:00
0
5
10
15
20
25
30
35
40

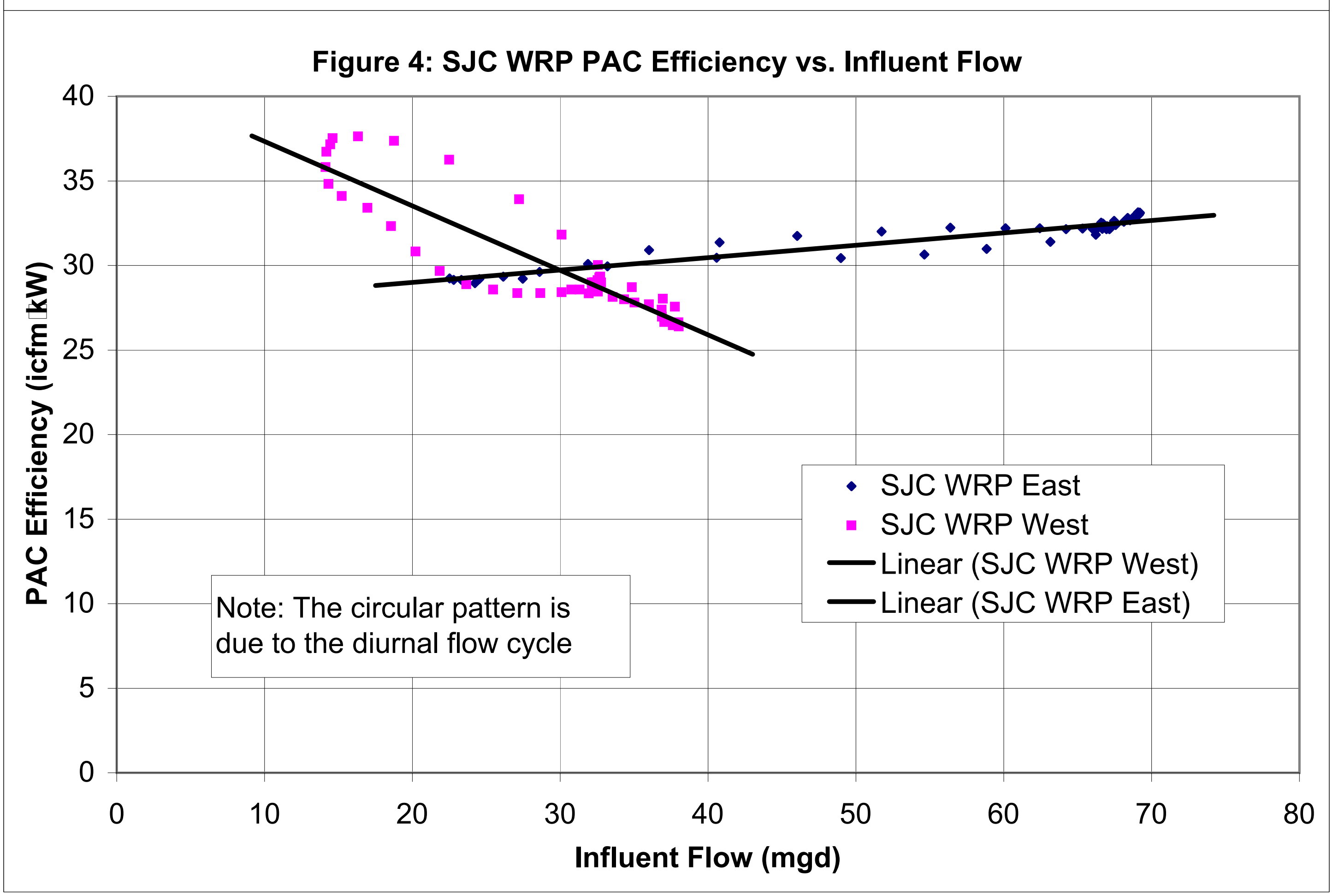


Figure 4: SJC WRP PAC Efficiency vs. Influent Flow
PAC Efficiency (icfm/kW)
Influent Flow (mgd)
SJC WRP East
SJC WRP West
Linear (SJC WRP West)
Linear (SJC WRP East)
Note: The circular pattern is due to the diurnal flow cycle
0
10
20
30
40
50
60
70
80
0
5
10
15
20
25
30
35
40

Figure 5: San Jose Creek WRP PAC Power & Plant Flow vs. Time of Day

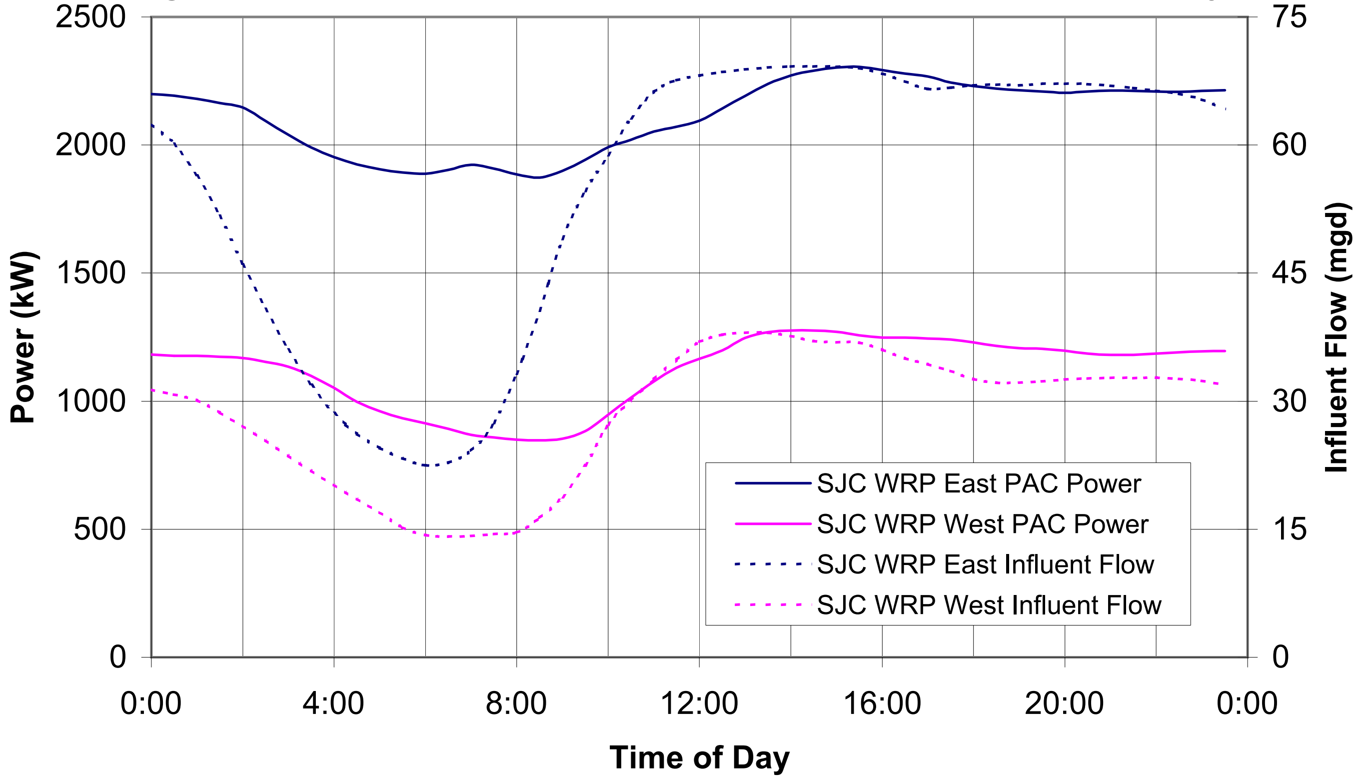
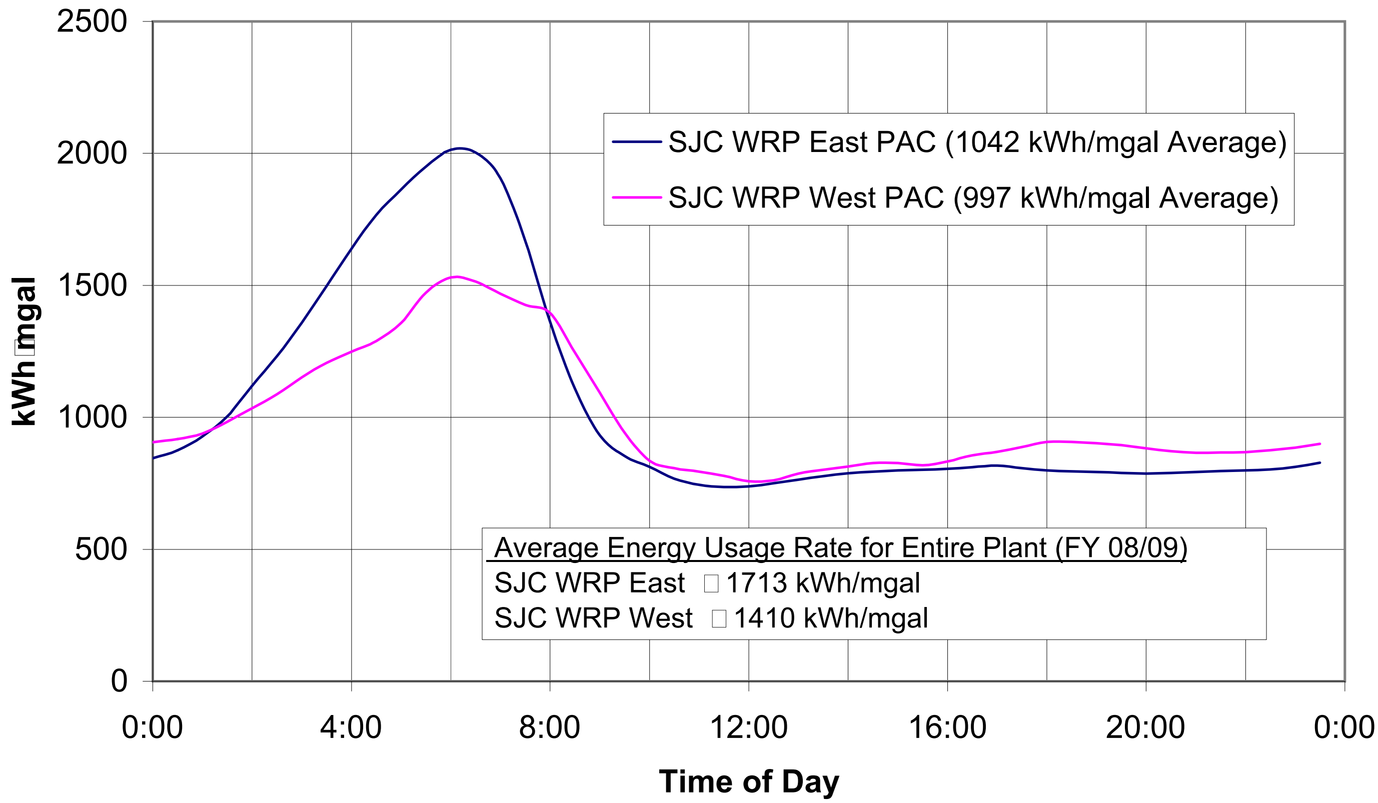


Figure 6: PAC Energy Use Per Influent Flow vs. Time of Day



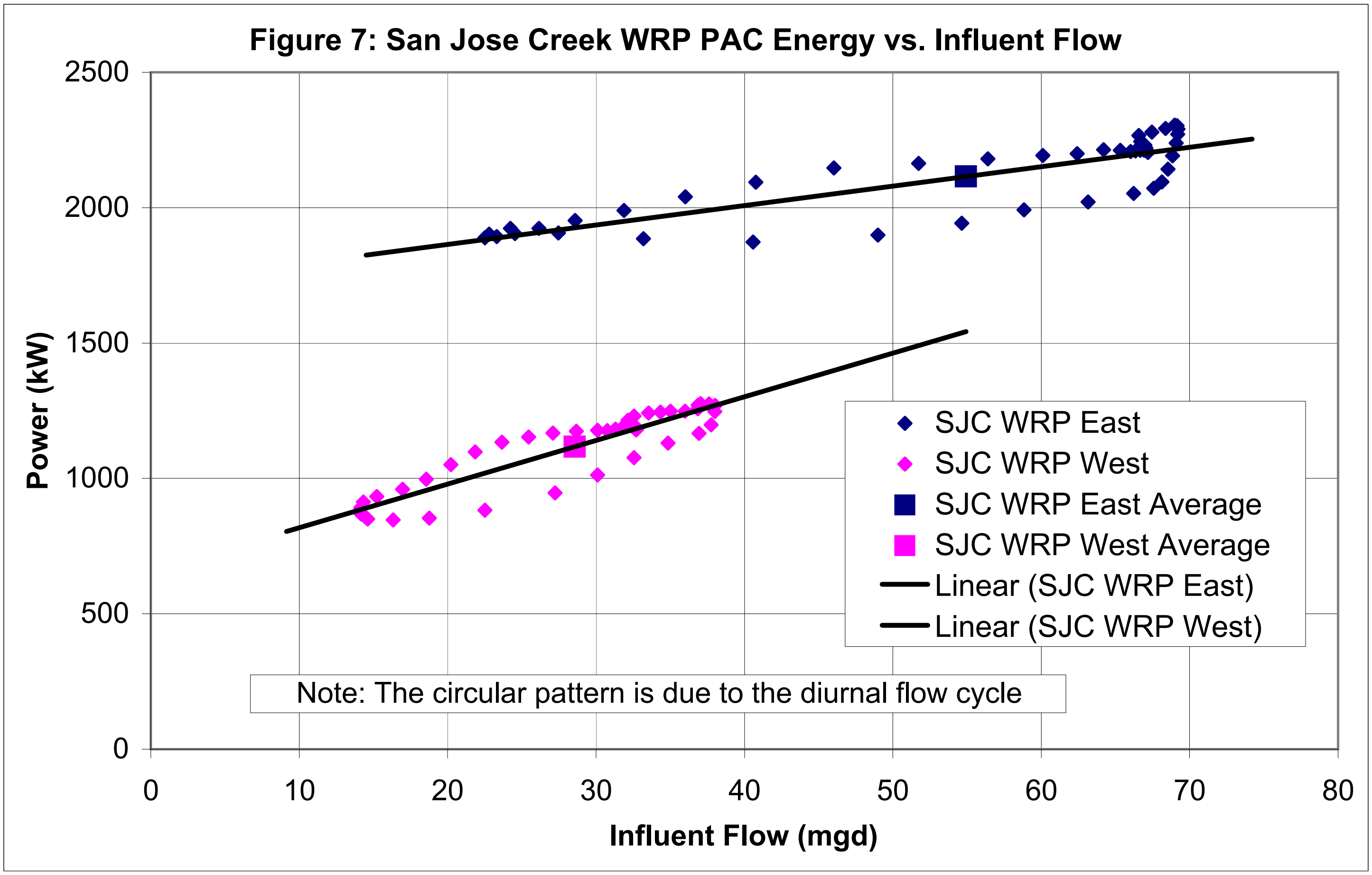


Figure 7: San Jose Creek WRP PAC Energy vs. Influent Flow
Power (kW)
2500
2000
1500
1000
500
0
0
10
20
30
40
50
60
70
80
Influent Flow (mgd)
SJC WRP East
SJC WRP West
SJC WRP East Average
SJC WRP West Average
Linear (SJC WRP East)
Linear (SJC WRP West)
Note: The circular pattern is due to the diurnal flow cycle

Figure 8: San Jose Creek East WRP Airflow Rates

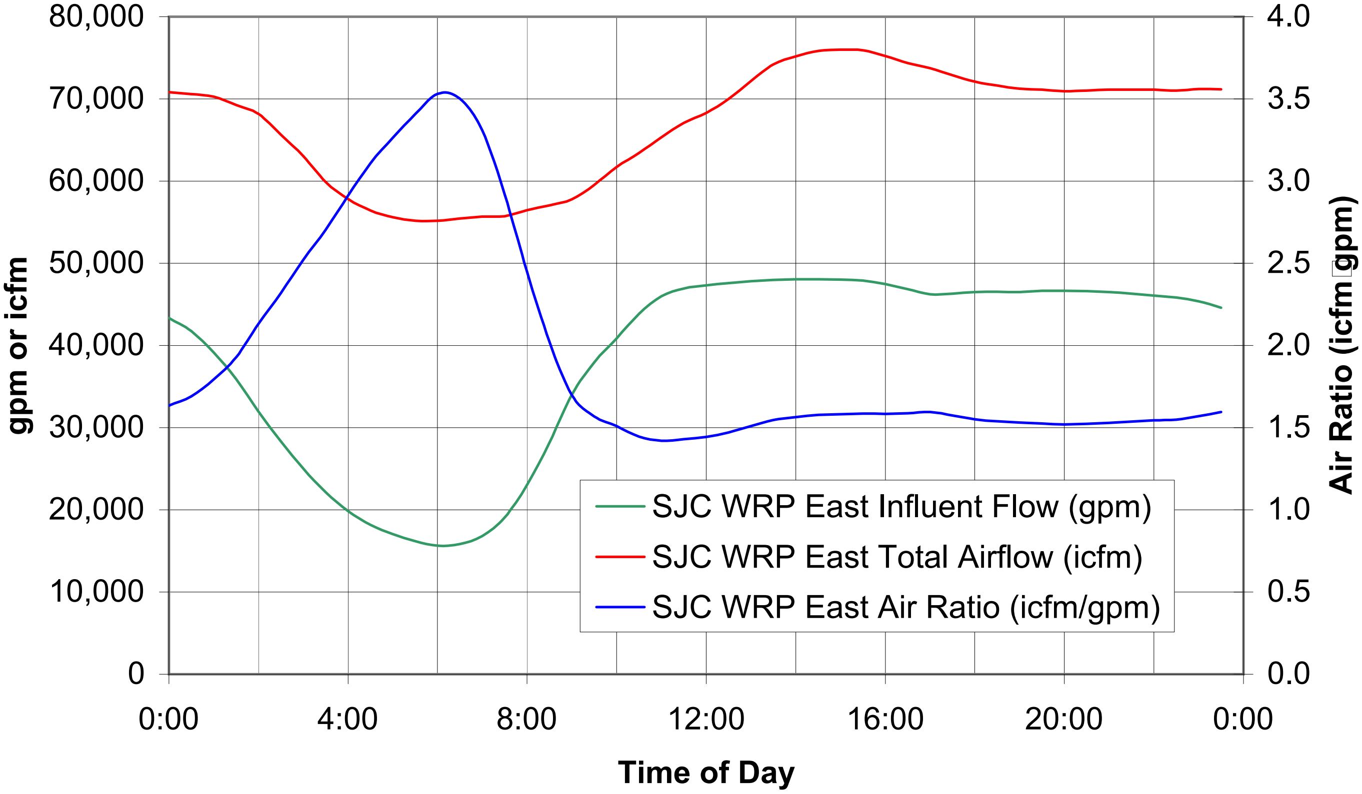
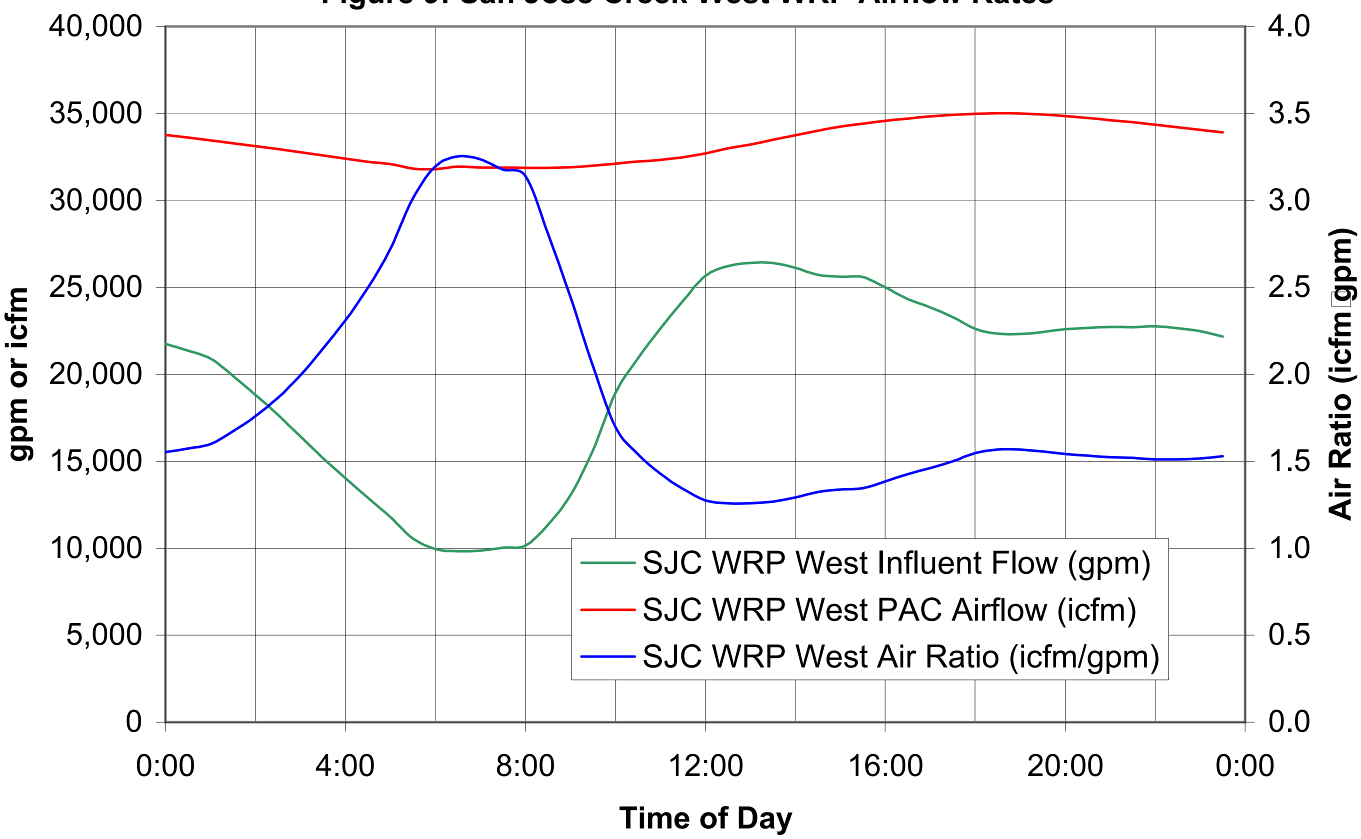


Figure 9: San Jose Creek West WRP Airflow Rates



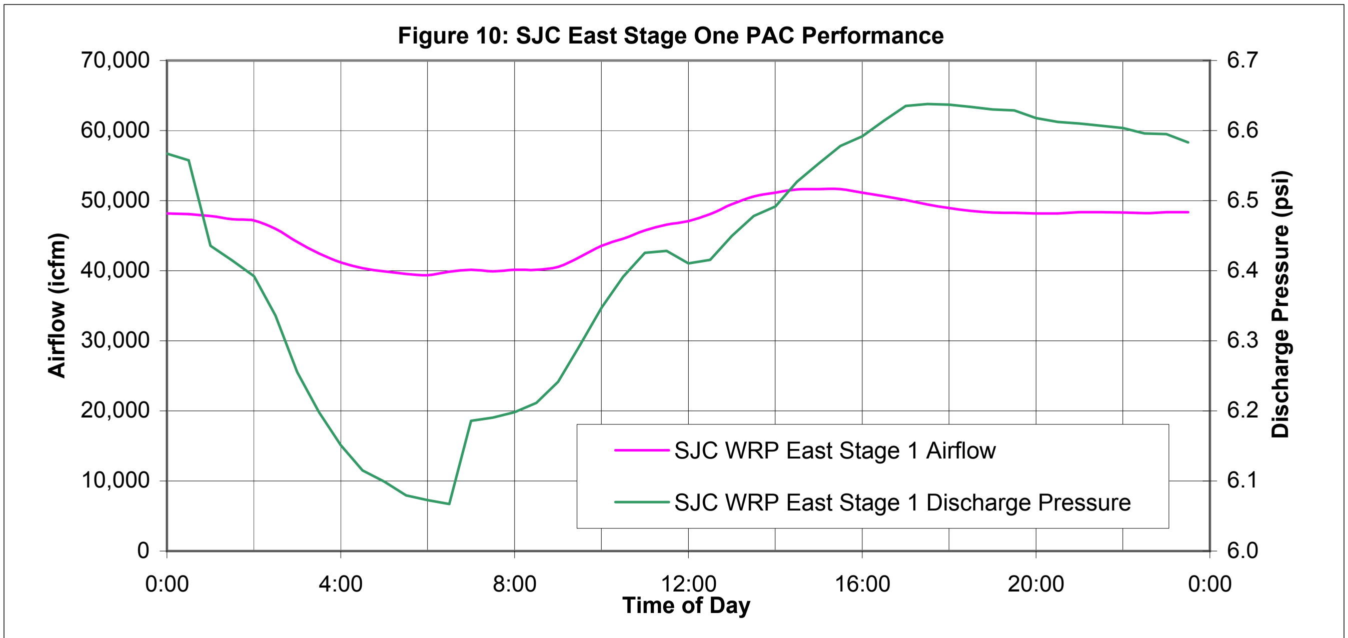


Figure 10: SJC East Stage One PAC Performance
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
Airflow (icfm)
6.7
6.6
6.5
6.4
6.3
6.2
6.1
6.0
Discharge Pressure (psi)
0:00
4:00
8:00
12:00
16:00
20:00
0:00
Time of Day
SJC WRP East Stage 1 Airflow
SJC WRP East Stage 1 Discharge Pressure

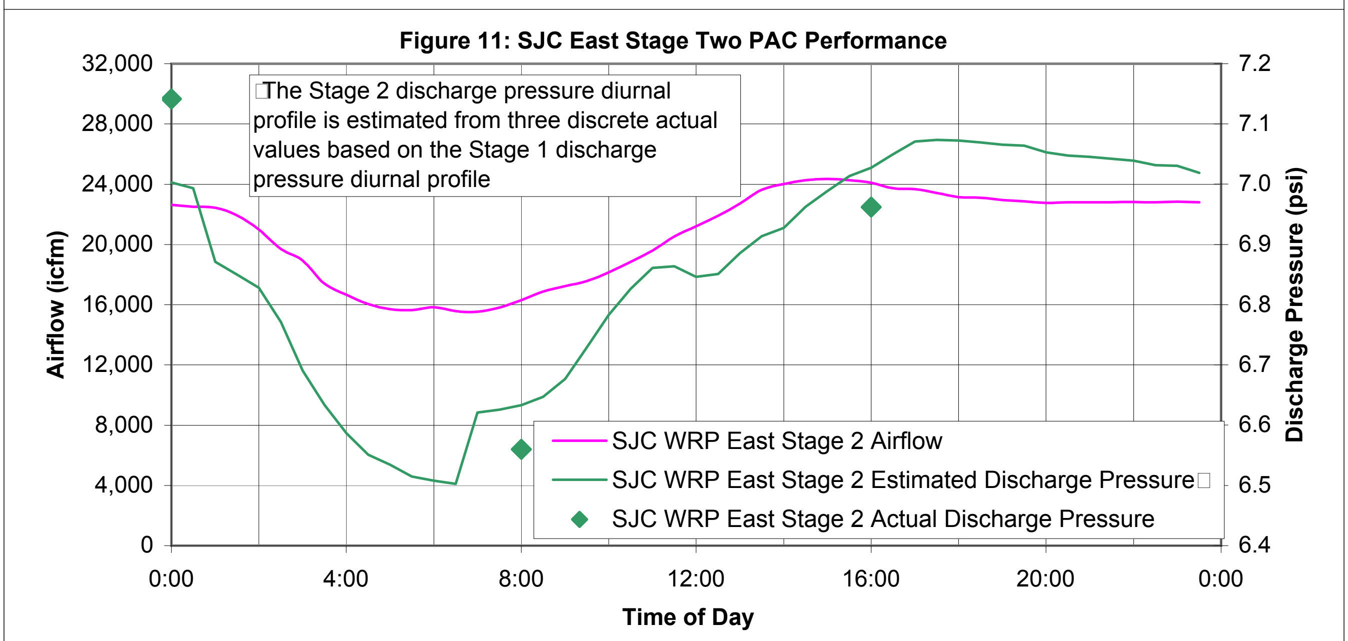


Figure 11: SJC East Stage Two PAC Performance
The Stage 2 discharge pressure diurnal profile is estimated from three discrete actual values based on the Stage 1 discharge pressure diurnal profile
32,000
28,000
24,000
20,000
16,000
12,000
8,000
4,000
0
Airflow (icfm)
7.2
7.1
7.0
6.9
6.8
6.7
6.6
6.5
6.4
Discharge Pressure (psi)
0:00
4:00
8:00
12:00
16:00
20:00
0:00
Time of Day
SJC WRP East Stage 2 Airflow
SJC WRP East Stage 2 Estimated Discharge Pressure
SJC WRP East Stage 2 Actual Discharge Pressure

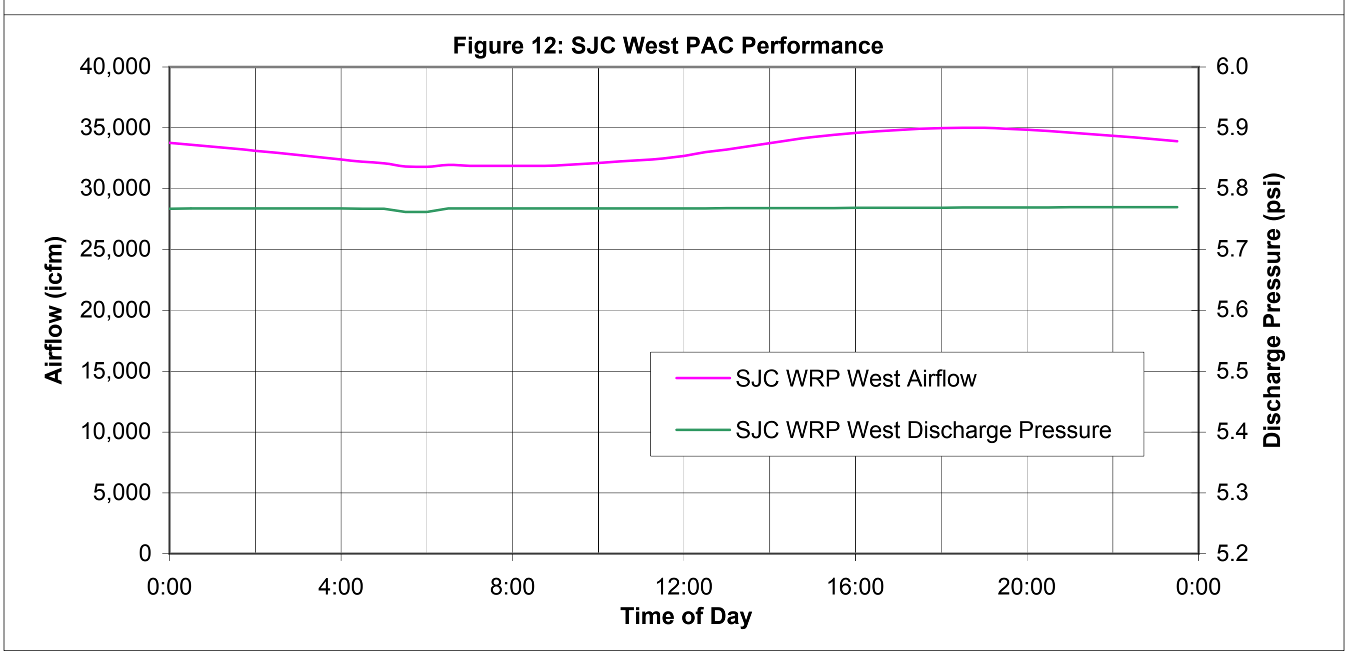


Figure 12: SJC West PAC Performance
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
Airflow (icfm)
6.0
5.9
5.8
5.7
5.6
5.5
5.4
5.3
5.2
Discharge Pressure (psi)
0:00
4:00
8:00
12:00
16:00
20:00
0:00
Time of Day
SJC WRP West Airflow
SJC WRP West Discharge Pressure

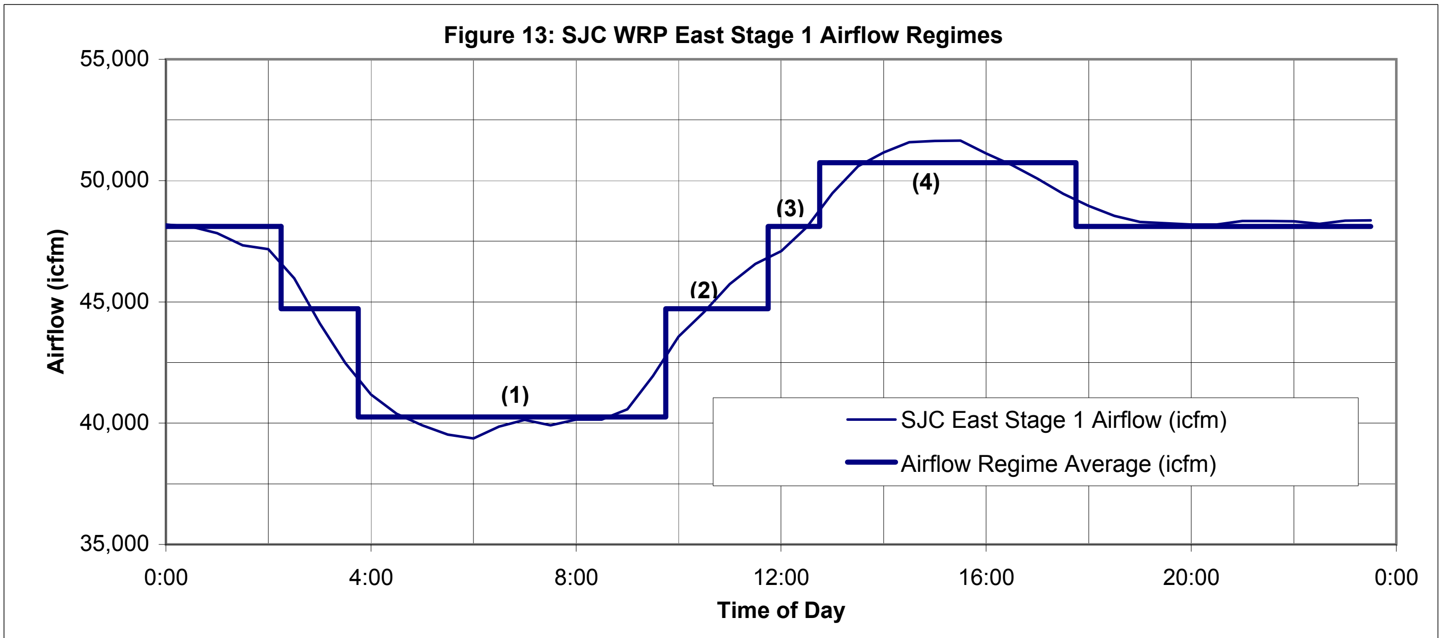


Figure 13: SJC WRP East Stage 1 Airflow Regimes
55,000
50,000
45,000
40,000
35,000
Airflow (icfm)
0:00
4:00
8:00
12:00
16:00
20:00
0:00
Time of Day
(1)
(2)
(3)
(4)
SJC East Stage 1 Airflow (icfm)
Airflow Regime Average (icfm)

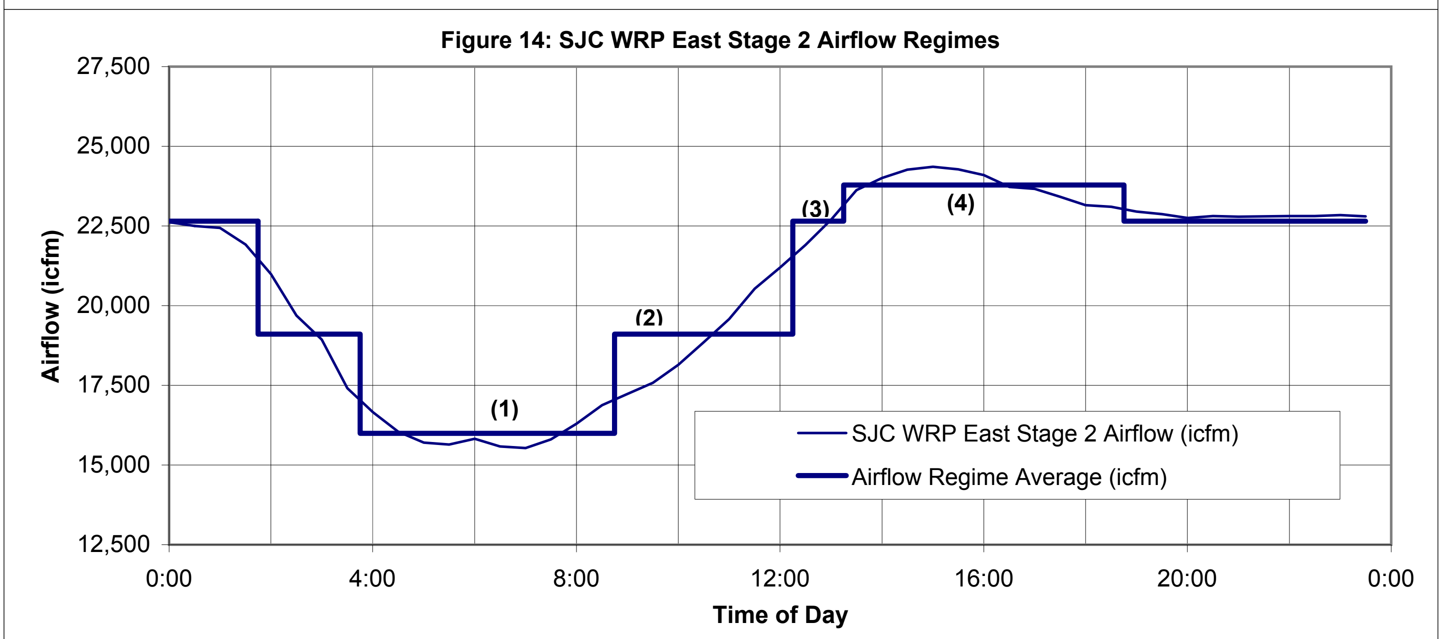


Figure 14: SJC WRP East Stage 2 Airflow Regimes
27,500
25,000
22,500
20,000
17,500
15,000
12,500
Airflow (icfm)
0:00
4:00
8:00
12:00
16:00
20:00
0:00
Time of Day
(1)
(2)
(3)
(4)
SJC WRP East Stage 2 Airflow (icfm)
Airflow Regime Average (icfm)

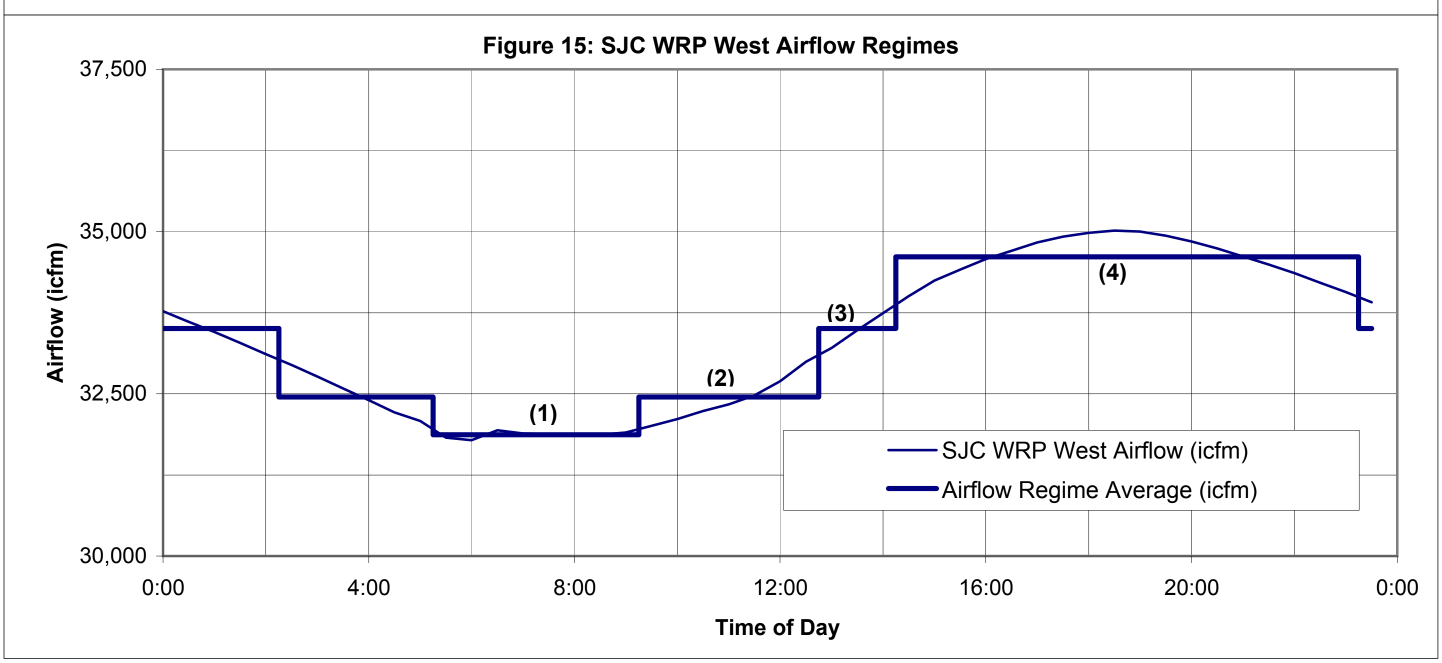


Figure 15: SJC WRP West Airflow Regimes
37,500
35,000
32,500
30,000
Airflow (icfm)
0:00
4:00
8:00
12:00
16:00
20:00
0:00
Time of Day
(1)
(2)
(3)
(4)
SJC WRP West Airflow (icfm)
Airflow Regime Average (icfm)

Table 4
San Jose Creek WRP East - Stage One
PAC Performance

Regime Number	Airflow Range	Hours/Day	Average Airflow within Range (icfm)	Average Discharge Pressure within Range (psi)	Average Power within Range (kW)
1	39,000 - 42,000 icfm	6.0	40,257	6.16	1269
2	42,000 - 47,000 icfm	3.5	44,715	6.34	1390
3	47,000 - 49,000 icfm	9.5	48,110	6.56	1496
4	49,000 - 52,000 icfm	5.0	50,737	6.56	1557

SJC WRP East Stage One has three 1750 hp Elliot compressors with 44,000 scfm capacity each. During the test period, two compressors normally ran at a time.

Table 5
San Jose Creek WRP East - Stage Two
PAC Performance

Regime Number	Airflow Range	Hours/Day	Average Airflow within Range (icfm)	Average Discharge Pressure within Range (psi)	Average Power within Range (kW)
1	15,000 - 17,000 icfm	5.0	15,997	6.57	645
2	17,000 - 21,500 icfm	5.5	19,104	6.77	643
3	21,500 - 23,000 icfm	8.0	22,646	6.99	698
4	23,000 - 25,000 icfm	5.5	23,790	7.02	713

SJC WRP East Stage Two has two 900 hp Roots compressors with 20,000 scfm capacity each. Both compressors ran continuously during the test period. One compressor idles for 4 to 8 hours per day without delivering any air.

Table 6
San Jose Creek WRP West
PAC Performance

Regime Number	Airflow Range	Hours/Day	Average Airflow within Range (icfm)	Average Discharge Pressure within Range (psi)	Average Power within Range (kW)
1	31,000 - 32,000 icfm	4.0	31,871	5.77	877
2	32,000 - 33,000 icfm	6.5	32,449	5.77	1062
3	33,000 - 34,000 icfm	4.5	33,507	5.77	1207
4	34,000 - 36,000 icfm	9.0	34,608	5.77	1220

SJC WRP West has three 1750 hp Roots compressors with 44,000 scfm capacity each. Only one compressor ran at a time during the test period.

Notes:
Data is for 12/17/09 through 2/11/10
Average high temperature during test period was 67 degrees
Average low termperature during test period was 47 degrees

Appendix

San Jose Creek WRP
Process Air Compressor Energy Analysis

Energy Usage Calculations for
Turblex Compressors

Data Provided by Lou Giordano
of Pacific Process

San Jose Creek WRP East - Stage 1, Option 1 (Two Duty, One Standby)

SJC WRP Power Cost □ $0.122 per kWh

Turblex Power Savings

Point No.	Yearly Hours of Opeation	Power Cost per kWh	Airflow (ICFM)	Temp (F)	Turblex Power (HP)	Turblex Power (kW)	Existing Power (kW)	Turblex Power Cost	Existing Power Cost
1a	0	□0.122	40,257	67	1226	915	1288	□0	□0
1b	2190	□0.122	40,257	47	1190	888	1250	□237,186	□334,041
2a	638.75	□0.122	44,715	67	1386	1034	1411	□80,574	□109,944
2b	638.75	□0.122	44,715	47	1342	1001	1369	□78,016	□106,718
3a	1733.75	□0.122	48,110	67	1534	1144	1518	□242,053	□321,177
3b	1733.75	□0.122	48,110	47	1476	1101	1474	□232,901	□311,754
4a	1825	□0.122	50,737	67	1628	1214	1580	□270,406	□351,866
4b	0	□0.122	50,737	47	1566	1168	1534	□0	□0

First Year Power Cost	□1,141,136	□1,535,500
First Year Power Savings	□394,364	
Annual kWh Savings	3,232,494	
Average kW Savings	369	
Turblex Model	KA66	
No. of Duty Units	1	
No. of Standby Units	1	
Price w. LACSD Features	□881,000	
Total Price w. LACSD Features	□1,762,000	
SCE Rebate Incentive	□327,825	
Equipment Payback Period	3.6	

Regime Average Performance Data

Point No.	Hrs□Day	Hrs□Yr	Temp (F)	Flow (cfm)	Disch. Pres.	Power (kW, uncorrected)
1a	0	0	67	40,257	6.16	1269
1b	6	2190	47	40,257	6.16	1269
2a	1.75	638.75	67	44,715	6.34	1390
2b	1.75	638.75	47	44,715	6.34	1390
3a	4.75	1733.75	67	48,110	6.56	1496
3b	4.75	1733.75	47	48,110	6.56	1496
4a	5	1825	67	50,737	6.56	1557
4b	0	0	47	50,737	6.56	1557

<u>Methodology of Temperature Correction for Power of Existing Equipment:</u>
Average high temperature during test period was 67F
Average low termperature during test period was 47F

From Turblex, power ratio from 47F to 67F is 97□ .
Therefore multiply 67F number by 1.015 and divide 47F number by 1.015.

Point 1 (Regime □1) is during early morning, so temperature is assumed to be 47F
Point 2 (Regime □2) is very early and very late morning, so temperature is assumed to be half 47F and half 67F
Point 3 (Regime □3) is midday and midnight, so temperature is assumed to be half 47F and half 67F
Point 4 (Regime □4) is mid-afternoon, so temperature is assumed to be 67F

San Jose Creek WRP East - Stage 1, Option 2 (One Duty, One Standby)

SJC WRP Power Cost □ $0.122 per kWh

Turblex Power Savings

Point No.	Yearly Hours of Opeation	Power Cost per kWh	Airflow (ICFM)	Temp (F)	Turblex Power (HP)	Turblex Power (kW)	Existing Power (kW)	Turblex Power Cost	Existing Power Cost
1a	0	□0.122	40,257	67	1241	926	1288	□0	□0
1b	2190	□0.122	40,257	47	1210	903	1250	□241,173	□334,041
2a	638.75	□0.122	44,715	67	1402	1046	1411	□81,504	□109,944
2b	638.75	□0.122	44,715	47	1361	1015	1369	□79,120	□106,718
3a	1733.75	□0.122	48,110	67	1547	1154	1518	□244,104	□321,177
3b	1733.75	□0.122	48,110	47	1495	1115	1474	□235,899	□311,754
4a	1825	□0.122	50,737	67	1642	1225	1580	□272,731	□351,866
4b	0	□0.122	50,737	47	1585	1182	1534	□0	□0

First Year Power Cost	□1,154,531	□1,535,500
First Year Power Savings	□380,969	
Annual kWh Savings	3,122,693	
Average kW Savings	356	
Turblex Model	KA100	
No. of Duty Units	1	
No. of Standby Units	1	
Price w. LACSD Features	□1,438,000	
Total Price w. LACSD Features	□2,876,000	
SCE Rebate Incentive	□316,690	
Equipment Payback Period	6.7	

Regime Average Performance Data

Point No.	Hrs□Day	Hrs□Yr	Temp (F)	Flow (cfm)	Disch. Pres.	Power (kW, uncorrected)
1a	0	0	67	40,257	6.16	1269
1b	6	2190	47	40,257	6.16	1269
2a	1.75	638.75	67	44,715	6.34	1390
2b	1.75	638.75	47	44,715	6.34	1390
3a	4.75	1733.75	67	48,110	6.56	1496
3b	4.75	1733.75	47	48,110	6.56	1496
4a	5	1825	67	50,737	6.56	1557
4b	0	0	47	50,737	6.56	1557

<u>Methodology of Temperature Correction for Power of Existing Equipment:</u>
Average high temperature during test period was 67F
Average low termperature during test period was 47F

From Turblex, power ratio from 47F to 67F is 97□ .
Therefore multiply 67F number by 1.015 and divide 47F number by 1.015.

Point 1 (Regime □1) is during early morning, so temperature is assumed to be 47F
Point 2 (Regime □2) is very early and very late morning, so temperature is assumed to be half 47F and half 67F
Point 3 (Regime □3) is midday and midnight, so temperature is assumed to be half 47F and half 67F
Point 4 (Regime □4) is mid-afternoon, so temperature is assumed to be 67F

San Jose Creek WRP East - Stage 2 (One Duty, One Standby)

SJC WRP Power Cost □ $0.122 per kWh

Turblex Power Savings

Point No.	Yearly Hours of Opeation	Power Cost per kWh	Airflow (ICFM)	Temp (F)	Turblex Power (HP)	Turblex Power (kW)	Existing Power (kW)	Turblex Power Cost	Existing Power Cost
1a	0	□0.122	15,997	67	526	392	655	□0	□0
1b	1825	□0.122	15,997	47	513	383	636	□85,208	□141,605
2a	1003.75	□0.122	19,104	67	631	471	653	□57,644	□79,965
2b	1003.75	□0.122	19,104	47	613	457	634	□56,000	□77,638
3a	1460	□0.122	22,646	67	773	577	709	□102,714	□126,287
3b	1460	□0.122	22,646	47	744	555	688	□98,861	□122,547
4a	2007.5	□0.122	23,790	67	819	611	724	□149,637	□177,318
4b	0	□0.122	23,790	47	787	587	703	□0	□0

First Year Power Cost	□550,063	□725,360
First Year Power Savings	□175,297	
Annual kWh Savings	1,436,862	
Average kW Savings	164	
Turblex Model	KA66	
No. of Duty Units	1	
No. of Standby Units	1	
Price w. LACSD Features	□881,000	
Total Price w. LACSD Features	□1,762,000	
SCE Rebate Incentive	□145,720	
Equipment Payback Period	9.2	

Regime Average Performance Data

Point No.	Hrs□Day	Hrs□Yr	Temp (F)	Flow (cfm)	Disch. Pres.	Power (kW, uncorrected)
1a	0	0	67	15,997	6.57	645
1b	5	1825	47	15,997	6.57	645
2a	2.75	1003.75	67	19,104	6.77	643
2b	2.75	1003.75	47	19,104	6.77	643
3a	4	1460	67	22,646	6.99	698
3b	4	1460	47	22,646	6.99	698
4a	5.5	2007.5	67	23,790	7.02	713
4b	0	0	47	23,790	7.02	713

Methodology of Temperature Correction for Power of Existing Equipment:
Average high temperature during test period was 67F
Average low termperature during test period was 47F

From Turblex, power ratio from 47F to 67F is 97□ .
Therefore multiply 67F number by 1.015 and divide 47F number by 1.015.

Point 1 (Regime □1) is during early morning, so temperature is assumed to be 47F
Point 2 (Regime □2) is very early and very late morning, so temperature is assumed to be half 47F and half 67F
Point 3 (Regime □3) is midday and midnight, so temperature is assumed to be half 47F and half 67F
Point 4 (Regime □4) is mid-afternoon, so temperature is assumed to be 67F

San Jose Creek WRP West - Option 1 (One Duty Only)

SJC WRP Power Cost □ $0.122 per kWh

Turblex Power Savings

Point No.	Yearly Hours of Opeation	Power Cost per kWh	Airflow (ICFM)	Temp (F)	Turblex Power (HP)	Turblex Power (kW)	Existing Power (kW)	Turblex Power Cost	Existing Power Cost
1a	0	□0.12	31,871	67	910	679	890	□0	□0
1b	1460	□0.12	31,871	47	877	654	864	□116,534	□153,903
2a	1186.25	□0.12	32,449	67	929	693	1078	□100,298	□156,001
2b	1186.25	□0.12	32,449	47	894	667	1046	□96,519	□151,424
3a	821.25	□0.12	33,507	67	962	718	1225	□71,903	□122,746
3b	821.25	□0.12	33,507	47	925	690	1189	□69,138	□119,145
4a	3285	□0.12	34,608	67	997	744	1238	□298,077	□496,273
4b	0	□0.12	34,608	47	959	715	1202	□0	□0

First Year Power Cost	□752,469	□1,199,492	
First Year Power Savings	□447,024		
Annual kWh Savings	3,664,128		
Average kW Savings	418		
Turblex Model	KA80		
No. of Duty Units	1		
No. of Standby Units	0		
Price w. LACSD Features	□1,231,000		
Total Price w. LACSD Features	□1,231,000	Years	
SCE Rebate Incentive	□371,599		
Equipment Payback Period	1.9		

Regime Average Performance Data

Point No.	Hrs□Day	Hrs□Yr	Temp (F)	Flow (cfm)	Disch. Pres.	Power (kW, uncorrected)
1a	0	0	67	31,871	5.77	877
1b	4	1460	47	31,871	5.77	877
2a	3.25	1186.25	67	32,449	5.77	1062
2b	3.25	1186.25	47	32,449	5.77	1062
3a	2.25	821.25	67	33,507	5.77	1207
3b	2.25	821.25	47	33,507	5.77	1207
4a	9	3285	67	34,608	5.77	1220
4b	0	0	47	34,608	5.77	1220

<u>Methodology of Temperature Correction for Power of Existing Equipment:</u>
Average high temperature during test period was 67F
Average low termperature during test period was 47F

From Turblex, power ratio from 47F to 67F is 97□ .
Therefore multiply 67F number by 1.015 and divide 47F number by 1.015.

Point 1 (Regime □1) is during early morning, so temperature is assumed to be 47F
Point 2 (Regime □2) is very early and very late morning, so temperature is assumed to be half 47F and half 67F
Point 3 (Regime □3) is midday and midnight, so temperature is assumed to be half 47F and half 67F
Point 4 (Regime □4) is mid-afternoon, so temperature is assumed to be 67F

San Jose Creek WRP West - Option 2 (One Duty, Two Standby)

SJC WRP Power Cost □ $0.122 per kWh

Turblex Power Savings

Point No.	Yearly Hours of Opeation	Power Cost per kWh	Airflow (ICFM)	Temp (F)	Turblex Power (HP)	Turblex Power (kW)	Existing Power (kW)	Turblex Power Cost	Existing Power Cost
1a	0	□0.12	31,871	67	910	679	890	□0	□0
1b	1460	□0.12	31,871	47	877	654	864	□116,534	□153,903
2a	1186.25	□0.12	32,449	67	929	693	1078	□100,298	□156,001
2b	1186.25	□0.12	32,449	47	894	667	1046	□96,519	□151,424
3a	821.25	□0.12	33,507	67	962	718	1225	□71,903	□122,746
3b	821.25	□0.12	33,507	47	925	690	1189	□69,138	□119,145
4a	3285	□0.12	34,608	67	997	744	1238	□298,077	□496,273
4b	0	□0.12	34,608	47	959	715	1202	□0	□0

First Year Power Cost	□752,469	□1,199,492
First Year Power Savings	□447,024	
Annual kWh Savings	3,664,128	
Average kW Savings	418	
Turblex Model	KA80	
No. of Duty Units	1	
No. of Standby Units	2	
Price w. LACSD Features	□1,231,000	
Total Price w. LACSD Features	□3,693,000	Years
SCE Rebate Incentive	□371,599	
Equipment Payback Period	7.4	

Regime Average Performance Data

Point No.	Hrs□Day	Hrs□Yr	Temp (F)	Flow (cfm)	Disch. Pres.	Power (kW, uncorrected)
1a	0	0	67	31,871	5.77	877
1b	4	1460	47	31,871	5.77	877
2a	3.25	1186.25	67	32,449	5.77	1062
2b	3.25	1186.25	47	32,449	5.77	1062
3a	2.25	821.25	67	33,507	5.77	1207
3b	2.25	821.25	47	33,507	5.77	1207
4a	9	3285	67	34,608	5.77	1220
4b	0	0	47	34,608	5.77	1220

<u>Methodology of Temperature Correction for Power of Existing Equipment:</u>
Average high temperature during test period was 67F
Average low termperature during test period was 47F

From Turblex, power ratio from 47F to 67F is 97□ .
Therefore multiply 67F number by 1.015 and divide 47F number by 1.015.

Point 1 (Regime □1) is during early morning, so temperature is assumed to be 47F
Point 2 (Regime □2) is very early and very late morning, so temperature is assumed to be half 47F and half 67F
Point 3 (Regime □3) is midday and midnight, so temperature is assumed to be half 47F and half 67F
Point 4 (Regime □4) is mid-afternoon, so temperature is assumed to be 67F

SANITATION DISTRICTS OF LOS ANGELES COUNTY

GRACE ROBINSON CHAN
Chief Engineer and General Manager

Memorandum

Date: October 29, 2012

To: Bryan Langpap

Through: Mark McDannel

From: Andre Schmidt

Subject: **Update to San Jose Creek East WRP Process Air Compressor Efficiency Study**

Summary

A study was performed in 2010 to evaluate the energy usage of the process air compressors (PACs) at San Jose Creek East WRP (SJCE) and to determine how much energy could be saved by replacing the PACs with new high efficiency units. It was determined that replacing all Stage One and Stage Two PACs at SJCE would annually save the plant 4.67 million kilowatt hours (kWh) and $570,000 in electricity costs (see DOC#1586534 for the study summary memo).

The Planning Section has requested that the energy savings calculations be updated for current conditions at SJCE as part of a grant funding application for a project that would include replacement of the PACs at SJCE. New data was collected for September 13, 2012 through October 17, 2012. Based on current air usage and PAC performance at SJCE, it is calculated that the plant would annually save 4.14 million kWh by replacing the PACs. Based on the 10-year historical average power price at SJCE of $0.109, this represents an annual electricity cost savings of $450,000. As with the 2010 study, these savings assume that there would be no changes to the air distribution or dissolved oxygen control systems. Optimizing these systems would result in additional savings.

Discussion

Several items contributed to the change in energy savings associated with replacing the PACs. The most significant items are as follows:

- The average power price used in the 2010 study was $0.122 per kWh. Since then the price of power has dropped significantly due to record low natural gas prices. It is expected that power prices will rebound in coming years due to compliance costs associated with California's Renewables Portfolio Standard and due to likely increases in natural gas prices. Rather than use the current power price, which is at a temporary ten year low, the average power price over the past ten years ($0.109/kWh) was used for this study.

- Average PAC air flow at SJCE increased from 66,900 scfm during the 2010 study period to 70,300 scfm for the current study period.

- The average efficiency of the PACs was 66% during the 2010 study period. The average efficiency of the PACs was 70% during the current study period. This increase in efficiency is partially due to the fact that during the previous study, one of the Stage Two PACs was being idled during the nighttime to avoid premature coupling failures that had occurred in the past from frequent starts. The second Stage Two PAC was not being operated during the current study period, eliminating the need for idling during the 2010 study period.

- The 2010 study assumed that the Stage One and Stage Two PACs would each be replaced in-kind, and that the two systems would continue to operate independently. The current study assumes that the two stages would be combined into one air distribution system since this is the current plan for the project.

- The 2010 study interpreted the PAC air flow data to be in units of "inlet cubic feet per minute" (icfm) based on information that was available at the time. Accordingly, corrections for temperature were made in the energy savings calculations. Since the 2010 study, it has been determined that the PAC air flow data is in units of "standard cubic feet per minute" (scfm). Therefore, the current study uses scfm and makes no temperature correction. The temperature correction in the 2010 study affected the results by only one or two percent.

The data differences between the two studies are summarized in the table below.

Table 1: Summary of Data Differences between 2010 Study and Current Study

Item	Units	2010 Study	2012 Study
Power Price	$/kWh	$0.122	$0.109
Average SJCE PAC Airflow	scfm	66,900	74,300
Average PAC Efficiency	percent	66.1%	70.3%
Average SJCE Total PAC Power	kW	2,119	2,249
Average SJCE Total PAC Power with New PACs	kW	1,586	1,776
Power Reduction of New PACs	kW	533	472
Annual Electricity Cost Savings	$	$570,000	$451,000

Compiled performance data for the existing PACs and the calculated energy consumption of new PACs is presented in Attachment 1. The energy consumption of new PACs is based upon Turblex model KA66 (the same as for the 2010 study). Performance data for the KA66 is presented in Attachment 2.

Attachment 1: San Jose Creek East WRP PAC Data and Energy Savings Calculations

Time[1]	Total PAC Airflow (kscfm)	Total PAC Power (kW)[2]	PAC 2 Discharge Pressure (psi)[3]	Average PAC Efficiency[4]	Number of Turblex KA66 Units[5]	Percent Airflow Capacity per KA66 Unit	KA66 Efficiency[6]	Total KA66 Power (kW)
0:00	79.6	2387	6.68	72%	4	83%	89.7%	1926
0:15	79.1	2359	6.65	72%	4	83%	89.7%	1907
0:30	78.5	2337	6.64	72%	4	82%	89.7%	1887
0:45	77.2	2328	6.62	71%	4	81%	89.6%	1854
1:00	76.8	2314	6.63	71%	4	80%	89.6%	1846
1:15	75.0	2254	6.60	71%	4	79%	89.4%	1800
1:30	73.2	2203	6.57	71%	4	77%	89.2%	1754
1:45	71.7	2159	6.54	71%	4	75%	89.0%	1712
2:00	70.0	2106	6.50	70%	3	98%	89.3%	1655
2:15	68.1	2054	6.46	69%	3	95%	89.5%	1595
2:30	66.7	2016	6.42	69%	3	93%	89.6%	1552
2:45	64.7	1964	6.38	68%	3	90%	89.7%	1493
3:00	64.0	1939	6.34	68%	3	89%	89.8%	1469
3:15	62.5	1893	6.30	68%	3	87%	89.8%	1425
3:30	62.0	1865	6.27	68%	3	87%	89.8%	1407
3:45	60.3	1828	6.23	67%	3	84%	89.8%	1360
4:00	58.6	1788	6.20	66%	3	82%	89.7%	1317
4:15	57.8	1767	6.16	65%	3	81%	89.6%	1291
4:30	57.4	1766	6.12	65%	3	80%	89.5%	1276
4:45	57.0	1751	6.09	64%	3	80%	89.5%	1261
5:00	56.5	1741	6.07	64%	3	79%	89.4%	1246
5:15	56.1	1729	6.05	64%	3	78%	89.4%	1233
5:30	55.8	1720	6.04	64%	3	78%	89.3%	1225
5:45	55.5	1732	6.03	63%	3	78%	89.3%	1219
6:00	55.5	1727	6.03	63%	3	77%	89.3%	1216
6:15	55.4	1735	6.03	62%	3	77%	89.3%	1215
6:30	54.6	1709	6.03	63%	3	76%	89.1%	1200
6:45	54.0	1686	6.03	63%	3	75%	89.0%	1188
7:00	53.9	1693	6.04	62%	3	75%	89.0%	1187
7:15	54.2	1702	6.05	63%	3	76%	89.1%	1197
7:30	55.2	1720	6.06	63%	3	77%	89.2%	1218
7:45	56.3	1736	6.08	64%	3	79%	89.4%	1243
8:00	57.3	1768	6.10	64%	3	80%	89.5%	1269
8:15	57.7	1778	6.13	65%	3	81%	89.6%	1283
8:30	58.6	1802	6.16	65%	3	82%	89.7%	1309
8:45	61.3	1858	6.19	66%	3	86%	89.8%	1374
9:00	64.2	1945	6.26	67%	3	90%	89.8%	1454
9:15	66.3	2007	6.30	68%	3	93%	89.7%	1513
9:30	67.6	2022	6.34	69%	3	94%	89.6%	1555
9:45	70.8	2127	6.35	69%	3	99%	89.3%	1637
10:00	73.6	2201	6.40	69%	4	77%	89.2%	1715
10:15	75.6	2280	6.44	69%	4	79%	89.5%	1769
10:30	77.3	2332	6.48	70%	4	81%	89.6%	1816
10:45	78.1	2317	6.51	71%	4	82%	89.6%	1843
11:00	79.9	2374	6.56	72%	4	84%	89.7%	1897
11:15	80.7	2398	6.60	72%	4	85%	89.8%	1927
11:30	82.4	2442	6.63	73%	4	86%	89.8%	1976
11:45	83.6	2483	6.65	73%	4	88%	89.8%	2011
12:00	84.2	2502	6.67	73%	4	88%	89.8%	2031
12:15	85.2	2517	6.68	73%	4	89%	89.8%	2061
12:30	85.8	2535	6.69	74%	4	90%	89.8%	2080
12:45	86.5	2549	6.71	74%	4	91%	89.7%	2101

13:00	86.9	2561	6.72	74%	4	91%	89.7%	2114
13:15	86.7	2561	6.73	74%	4	91%	89.7%	2114
13:30	87.1	2569	6.74	74%	4	91%	89.7%	2126
13:45	87.3	2574	6.75	74%	4	91%	89.7%	2134
14:00	87.2	2572	6.76	74%	4	91%	89.7%	2136
14:15	86.8	2570	6.77	74%	4	91%	89.7%	2127
14:30	86.3	2556	6.77	74%	4	90%	89.7%	2117
14:45	85.7	2539	6.74	74%	4	90%	89.8%	2091
15:00	84.7	2519	6.78	74%	4	89%	89.8%	2079
15:15	85.7	2543	6.79	74%	4	90%	89.8%	2105
15:30	85.1	2534	6.80	74%	4	89%	89.8%	2093
15:45	84.4	2525	6.80	74%	4	88%	89.8%	2078
16:00	82.9	2528	6.81	73%	4	87%	89.8%	2042
16:15	82.8	2515	6.82	73%	4	87%	89.8%	2043
16:30	82.6	2516	6.83	73%	4	86%	89.8%	2040
16:45	82.5	2513	6.83	73%	4	86%	89.8%	2040
17:00	82.0	2499	6.84	73%	4	86%	89.8%	2030
17:15	81.6	2492	6.84	73%	4	85%	89.8%	2021
17:30	81.2	2489	6.85	73%	4	85%	89.8%	2012
17:45	80.9	2491	6.85	72%	4	85%	89.8%	2007
18:00	80.8	2486	6.85	72%	4	85%	89.8%	2004
18:15	80.7	2479	6.86	73%	4	85%	89.8%	2003
18:30	80.8	2485	6.86	72%	4	85%	89.8%	2005
18:45	81.0	2489	6.86	72%	4	85%	89.8%	2010
19:00	80.5	2470	6.84	72%	4	84%	89.8%	1993
19:15	80.4	2469	6.84	72%	4	84%	89.8%	1992
19:30	80.4	2463	6.85	73%	4	84%	89.8%	1993
19:45	80.4	2452	6.85	73%	4	84%	89.8%	1992
20:00	80.8	2461	6.85	73%	4	85%	89.8%	2003
20:15	80.9	2466	6.84	73%	4	85%	89.8%	2005
20:30	81.1	2470	6.84	73%	4	85%	89.8%	2009
20:45	81.2	2471	6.84	73%	4	85%	89.8%	2010
21:00	81.1	2469	6.84	73%	4	85%	89.8%	2007
21:15	81.0	2455	6.82	73%	4	85%	89.8%	1998
21:30	81.0	2462	6.80	73%	4	85%	89.8%	1995
21:45	81.5	2478	6.80	73%	4	85%	89.8%	2007
22:00	81.6	2482	6.79	73%	4	86%	89.8%	2008
22:15	81.8	2482	6.78	73%	4	86%	89.8%	2008
22:30	81.8	2481	6.77	73%	4	86%	89.8%	2004
22:45	81.8	2478	6.76	73%	4	86%	89.8%	2003
23:00	81.8	2471	6.75	73%	4	86%	89.8%	1998
23:15	81.6	2461	6.74	73%	4	85%	89.8%	1991
23:30	81.3	2449	6.73	72%	4	85%	89.8%	1978
23:45	80.5	2423	6.71	72%	4	84%	89.8%	1954
Average	**74.3**	**2249**	**6.55**	**70%**	**3.67**	**85%**	**89.6%**	**1776**

Notes:

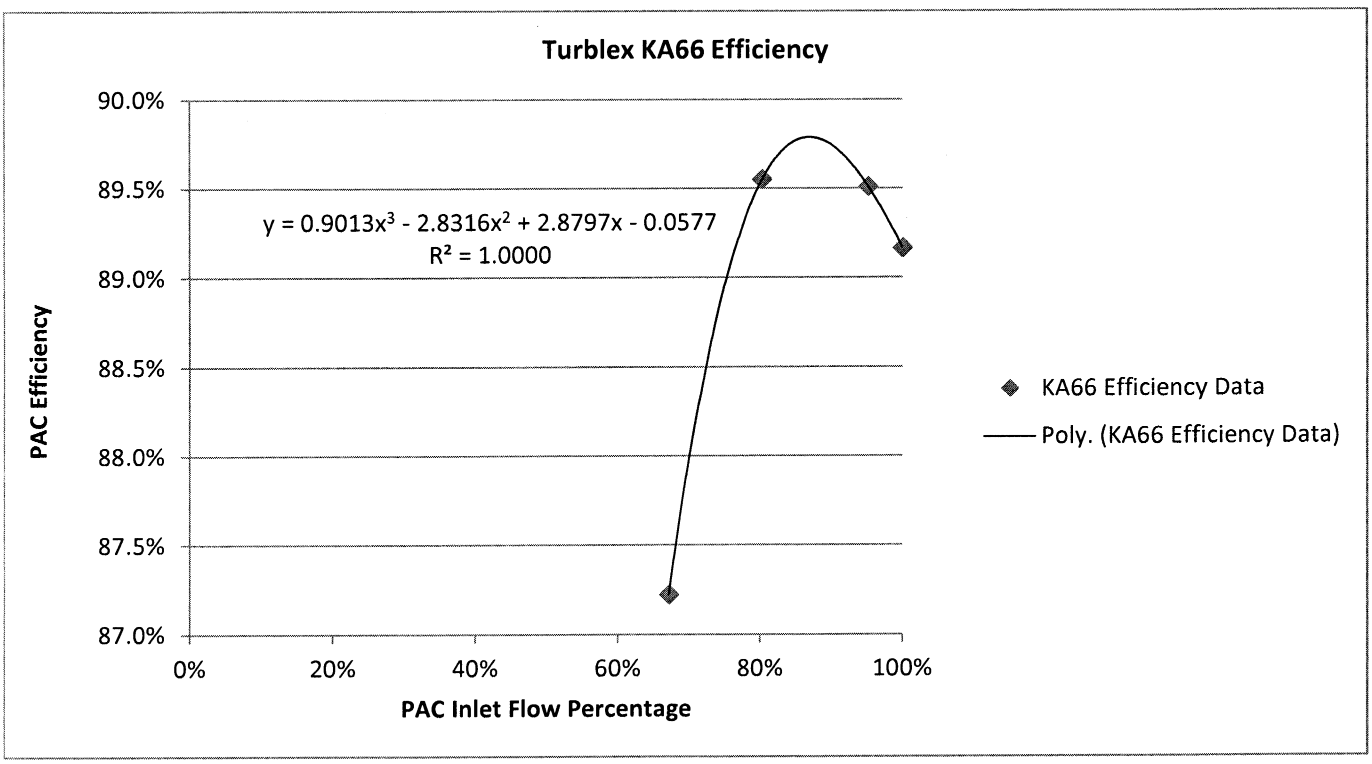
1. 15-minute interval data for time period 9/13/12 to 10/12/12 was collected. Data for each 15-minue period was averaged to create this composite profile.
2. Power data for Stage One PACs #1 and #3 was not available. Total Stage One PAC power was estimated based on PAC #2 power. This estimate is based on the assumption that the total Stage One PAC airflow per kW is the same as the PAC #2 airflow per kW.
3. For the PAC efficiency calcualtion it is assumed that the overall average discharge pressure is the same as the PAC #2 discharge pressure.
4. Efficiency is based on the formula: HP = [Flow (cfm) x Pressure (in w.c.)] / [6356 x Efficiency]
5. Energy of new system is based on Turblex KA66 single stage centrifugal PACs. Capacity of KA66 is 23,872 scfm each.
6. KA66 efficiency for the current data was not collected due to time constraints. The efficiency is derived from the best fit curve equation for data provided during 2010 study. See Attachement 2.

Attachment 2: Turblex KA66 Performance Data[1]

P0 psia	P2 psia	Gauge Pressure (psi)	Guage Pressure (in WC)	Inlet Flow %	acfm at 67 ºF 60% rh	hp at 67 ºF 60% rh	Efficiency[2]
14.7	21.72	7.02	194.3	100%	23872	818.6	89.2%
14.7	21.69	6.99	193.5	95.2%	22726	773	89.5%
14.7	21.47	6.77	187.4	80.3%	19169	631.2	89.6%
14.7	21.27	6.57	181.9	67.2%	16042	526.3	87.2%
14.7	21.27	6.57	181.9	45.0%	10742	374.3	82.1%

Notes:

1. Data per 5/12/10 Performance Data from Siemens (attached). Data for 67 degrees is used since this is the closest to standard conditions.
2. Efficiency = [Flow (cfm) x Pressure (in w.c.)] / [6356 x hp]



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Attachment 2: Turblex KA66 Performance Data

DOC-H

Siemens Performance Data Sheet 12-05-10 : 00:50:04

Project: San Jose Creek WRP East Stage Two/One

Compressor Type: STC-GO(45-1-KA3LV) (Former name: KA66 SV GL400)
Power Supply: E-motor, Rpm = 1800
with Variable Diffuser Vanes: for Flow Regulation
and with Variable Inlet Guide Vanes: for Minimizing Power Consumption.

Inlet Conditions:
Pressure: see Table, Temperature: see Table, Relative Humidity: see Table.
Flow: 23790. scfm (@14.7 psia,36 % rh, 68 °F)

press. P0 psia	press. P2 psia	Inlet-flow %	Compressor Performance and Power Consumption on the Motor Shaft at Inlet Conditions: 100.00 °F 60. % rh acfm	hp	67.00 °F 60. % rh acfm	hp	47.00 °F 60. % rh acfm	hp	°F % rh acfm	hp	°F % rh acfm	hp
14.700	21.720	100.0	26038.	874.3	23872.	818.6	22806.	787.2				
14.700	21.690	95.2	24788.	824.8	22726.	773.0	21711.	743.9				
14.700	21.470	80.3	20908.	677.8	19169.	631.2	18313.	613.5				
14.700	21.270	67.2	17497.	552.9	16042.	526.3	15326.	512.9				
14.700	21.270	45.0	11717.	400.8	10742.	374.3	10263.	365.4				

WARNING -- WARNING -- WARNING -- WARNING -- WARNING

THIS PDS IS CREATED USING EXTENDED PERFORMANCE DATA
IT IS N O T VALID WITHOUT APPROVAL FROM SIEMENS
TURBOMACHINERY EQUIPMENT A/S, HELSINGOER, DENMARK

WARNING -- WARNING -- WARNING -- WARNING -- WARNING

- Inlet pressure drop 0.00 psid
- All losses incl. mech. oil pump are included.
- For ASME PTC-10 TORQUE METER TEST
  with power tolerance of + 0% /- 4%.

SANITATION DISTRICTS OF LOS ANGELES COUNTY

STEPHEN R. MAGUIN
Chief Engineer and General Manager

Memorandum

Date: August 23, 2010

To: Ray Tremblay
Assistant Department Head
Technical Services

Through: Mike Sullivan
Section Head
Monitoring Section

From: Andrew Hall
Project Engineer
Monitoring Section

Subject: **Recycled Water Supply for GRIP August 2010 Update**

The Groundwater Reliability Improvement Program (GRIP) was initially divided into two phases, with the size of Phase I based on available flow as of April 2008 and the size of Phase II based on the need for the Water Replenishment District (WRD), San Gabriel Valley Municipal Water District (SGVMWD), and the Upper San Gabriel Valley Municipal Water District (USVMWD) to displace 21,000 acre-feet per year (AFY) and 25,000 AFY of imported water in the Central (WRD) and Main (USGVMWD and SGVMWD) Basins, respectively. The capacity of Phase II also coincided with the reasonable diversions from facilities and pipelines upstream of the San Jose Creek Water Reclamation Plant (SJCWRP). However, since the feasibility of GRIP was first analyzed in April 2008, the flow within the Joint Outfall System has decreased due to increasing water conservation efforts, statewide drought conditions, and the economic recession. Additionally, previous analyses of recycled water flow tributary to the SJCWRP did not account for variations in reclaimable flow bypassing the treatment plant. As a result, the analysis of recycled water available for GRIP needs to be updated.

Since April 2008, flows bypassing the SJCWRP have been measured multiple times (November 5 through December 1, 2008; September 28 through October 5, 2009; January 5 through February 1, 2010; and April 26 through August 8, 2010). Figure 1 shows the average SJCWRP influent flow and average tributary flow (influent flow plus bypass flow) to the SJCWRP over the periods when flow bypass was measured for 2008, 2009, and 2010. While influent flows to the SJCWRP have decreased since 2008, the total flow tributary to the SJCWRP appears to have actually increased. The average tributary flow to the SJCWRP has remained fairly steady, ranging from 92,900 to 95,200 AFY (83 to 85 MGD). As a worst-case scenario for the GRIP Project, it is recommended that an average SJCWRP tributary flow of 89,600 AFY (80 MGD) and SJCWRP production of 81,200 AFY (72 MGD) be used, which is the lower bound of the error bars shown in Figure 1. Subsequent flow calculations assume that flow bypassing the SJCWRP is 89,600 AFY minus the plant influent flow.

Table 1 shows the SJCWRP flows and demands based on the lower bound estimates for SJCWRP flows, current contractual obligations, and anticipated GRIP demands. Options for increasing SJCWRP flows are presented below. Costs and water gained by implementing these options can be found in Table 2.

1. Allow the Pico Rivera contract to expire.
2. Recycle GRIP Phase I membrane filter backwash to plant influent.
3. Bring Miller Brewing Company discharge into SJCWRP.
4. Implement flow equalization (FE) at the SJCWRP that would have been constructed at GRIP regardless of the site selected and treat additional flow that is currently being bypassed.
5. Reroute SJCWRP media filter backwash to head of the SJCWRP.

6a. Increase tributary flow to the SJCWRP by diverting available flows from WN WRP drainage area.

6b. Gravity diversion from Tyler Avenue Trunk Sewer and Tyler Relief and FE to accommodate flows at the SJCWRP. These flows are a portion of the flows that would be diverted in Option 6a. Therefore, this cannot be implemented if Option 6a is implemented.

7. Divert reclaimable flow from the Pomona WRP drainage area to the SJCWRP.
8. Recycle GRIP Phase II membrane filter backwash to plant influent.

Implementing Options 1 through 5 will provide sufficient water to meet GRIP Phase I demands and contractual obligations with a 5,300 AFY margin of safety, which could be used to upsize GRIP Phase I, at a cost of □100,000. Implementing all options except 6b will provide sufficient water to meet GRIP Phase II demands and contractual obligations with a 2,100 AFY margin of safety at a total cost of □78 million. While this analysis utilizes a conservative estimate for SJCWRP influent and bypass flows, it should be noted that improvements in AWTP recoveries would also provide an additional margin of safety should flows decrease significantly in the future. Additionally, it should be noted that implementation of the options mentioned above for GRIP Phase II would require a 20 MGD expansion of the SJCWRP.

Attachments
Figure 1 - Average Influent and Tributary Flows for the SJCWRP for 2008 to 2010
Table 1 - SJCWRP Flows and Demands
Table 2 - Water Gained and Total Costs of Options for Increasing SJCWRP flows

Attachments

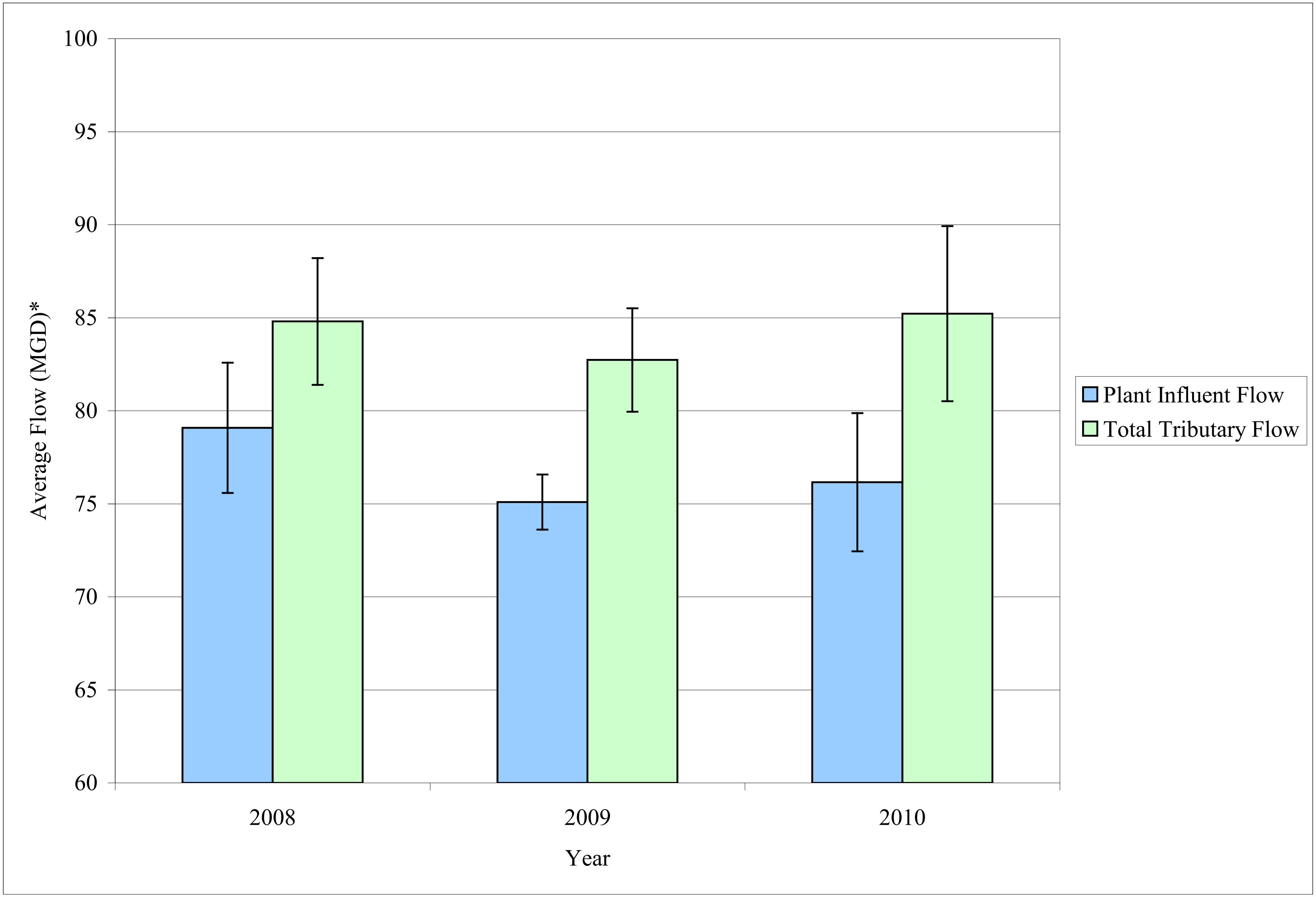

Figure 1. Average Influent and Tributary Flows for the SJCWRP for 2008 to 2010
Error Bars Represent Standard Deviations
***Average flow over periods when bypass flow was measured, (i.e., November 5 through December 1, 2008; September 28 through October 5, 2009; January 5 through February 1, 2010; and April 26 through August 8, 2010)**

Table 1. SJCWRP Flows and Demands

	Flows (AFY)
SJCWRP Production	81,200
SJCWRP Contractual Obligations	76,600
Additional Water Needed to Meet GRIP Phase I Demands[1] □ Contractual Obligations	11,900
Incremental Additional Water Needed to Meet GRIP Phase II Demands[2] □ Contractual Obligations	37,000
Total Additional Water Needed	48,900

1. GRIP Phase I will need 24,000 AFY of tertiary treated water, of which 10,000 AFY is already contracted to USGVMWD□SGVMWD.
2. GRIP Phase II is an expansion requiring a total of 61,000 AFY of tertiary treated water.

Table 2. Water Gained and Total Costs of Options for Increasing the SJCWRP flows

Option	Water Gained (AFY)	Total Cost
1	400	□0
2	1,200	□0
3	1,400	□0
4	8,400	NA[1]
5	3,300	□100,000
6a	27,600	□76,000,000
6b	4,400	□13,700,000[2]
7	4,400	□1,500,000
8	1,800	□0

1. Costs for implementing flow equalization for this option are already included in the GRIP project estimate.
2. Cost includes 1 MG of flow equalization that would be necessary to implement this option

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SEQUENTIAL CHLORINATION: A NEW APPROACH FOR DISINFECTION OF RECYCLED WATER

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AMERICAN ACADEMY OF ENVIRONMENTAL ENGINEERS®

Sequential Chlorination: A New Approach for Disinfection of Recycled Water

Stephen R. Maguin, P.E., BCEE, Philip L. Friess, P.E., BCEE, Shiaw-Jy Huitric, P.E., Chi-Chung Tang, Ph.D., P.E., BCEE, Jeff Kuo, Ph.D., P.E., and Naoko Munakata, Ph.D.[1]

ABSTRACT

Recycled water must be properly disinfected to protect public health. The most widely practiced recycled water disinfection technology is chloramination. However, chloramines are precursors to the carcinogen N-nitrosodimethylamine (NDMA). To address this concern, engineers at the Sanitation Districts of Los Angeles County (Districts) developed the two-step "sequential chlorination" process. In the first step, free chlorine is added to fully nitrified secondary effluent to inactivate pathogens and to react with NDMA precursors, thus reducing subsequent NDMA formation. Chloramines are then added to media filtered effluent to stop formation of trihalomethanes (THMs) and haloacetic acids and to provide further disinfection.

The sequential chlorination process was extensively tested for disinfection efficacy and disinfection byproduct (DBP) formation in the laboratory, at the pilot scale, and at several water reclamation plants operated by the Districts. Results indicate that the process (1) provides effective disinfection against total coliform bacteria and viruses at chlorine contact times well below those required by California regulations for disinfected tertiary recycled paper; (2) reduces NDMA formation by 50 to 85% in comparison to chloramination; (3) produces effluent consistently meeting the total THM limit for recycled water; (4) generates insignificant amounts of cyanide (a DBP of concern); and (5) causes no aquatic toxicity.

INTRODUCTION

The Sanitation Districts of Los Angeles County (Districts) operate 11 wastewater treatment plants serving over five million residents in the Los Angeles County, California. The 11 plants treat a combined average daily flow of approximately 500 million gallons per day (MGD). Seven of the 11 plants are tertiary water reclamation plants (WRPs) that produce over 150 MGD of recycled water. Typical treatment processes at these tertiary WRPs include primary sedimentation, activated sludge with biological nitrogen removal, media filtration, chlorine disinfection, and dechlorination. Approximately one-third of the recycled water is currently reused for groundwater replenishment, landscape and agricultural irrigation, wildlife habitat maintenance, and industrial process water supply; the remainder is discharged to surface water.

Recycled water must be properly disinfected. The disinfection method must be effective for pathogen inactivation, and should minimize the generation of potentially harmful disinfection byproducts (DBPs). In California, disinfection requirements are specified in California Title 22 water recycling criteria. For groundwater replenishment, the recycled water must meet drinking water standards.

Historically, chlorination is the most widely practiced wastewater disinfection technology. Depending on the ammonia level in the water, chlorine may be present as either free chlorine or chloramines. At the Districts' tertiary WRPs, either free chlorine or chloramines may be used for disinfection because these plants are designed to remove nitrogen. Secondary effluents of these plants are considered fully nitrified and usually contain <1 mg NH_3-N/L. Until recently, chloramination was practiced at these WRPs because chloramines produce lower levels of trihalomethanes (THMs) than free chlorine (Kuo *et al.*, 2003). Low levels of ammonia nitrogen (typically 1.0 to 1.5 mg NH_3-N/L) were added to fully nitrified secondary effluent, followed by chlorine addition (8 to 10 mg Cl_2/L) upstream of the media filters. Additional chlorine could be added downstream of the filters, if necessary, to maintain sufficient chlorine residual in the chlorine contact tank effluent.

Chloramination has provided effective disinfection. However, researchers recently found that chloramines generate N-nitrosodimethylamine (NDMA), a chemical with high carcinogenic potency (Mitch *et al.*, 2003; Choi and Valentine, 2004; Mitch and Sedlak, 2004; Sedlak *et al.*, 2005). NDMA precursors are chloramines and dimethylamine, a component in the cationic polymer commonly added to the return activated sludge or to the mixed liquor entering the secondary clarifiers to enhance settling and for foam control. In previous work, the Districts attempted to reduce NDMA formation by replacing the cationic polymer with emulsion polymers that do not contain dimethylamine; although this change reduced NDMA formation, the alternative polymers were less effective than the cationic polymer as a settling aid, caused operational issues with the media filters, and were not considered a practical solution for reducing NDMA formation (Huitric *et al.*, 2006). Free chlorine and chloramines may also produce other DBPs such as cyanide (Kavanaugh *et al.*, 2003; Zheng *et al.*, 2004a & 2004b).

Due to these concerns, the Districts decided to replace chloramination with a new disinfection method that would continue to protect public health with its high disinfection efficacy, minimize DBP (specifically THM, NDMA, and cyanide) formation, and have no adverse impact to

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the environment (i.e., no aquatic toxicity). The new disinfection method should be easily and cost-effectively implemented by using existing infrastructure and practice. To meet these objectives, the Districts' staff conceived the idea of "sequential chlorination" in which chlorine is applied in two steps, as shown in Figure 1.

In the first step of sequential chlorination, free chlorine is added to fully nitrified secondary effluent. Free chlorine rapidly inactivates bacteria and viruses because it is a strong oxidant (Tchobanoglous *et al.*, 2003). It also reacts with NDMA precursors to make them less available for subsequent NDMA formation (Schreiber and Mitch, 2005). Furthermore, free chlorine residual helps to control biofouling on the filter media. In the second step of the process, ammonia and additional chlorine are added to filtered effluent to form chloramines. Chloramines minimize THM formation and provide additional bacterial and viral disinfection. The only change in system configuration from chloramination to sequential chlorination was to relocate the ammonia addition line from upstream to downstream of the media filters.

FIGURE 1
Sequential Chlorination at the Districts' Tertiary Water Reclamation Plants

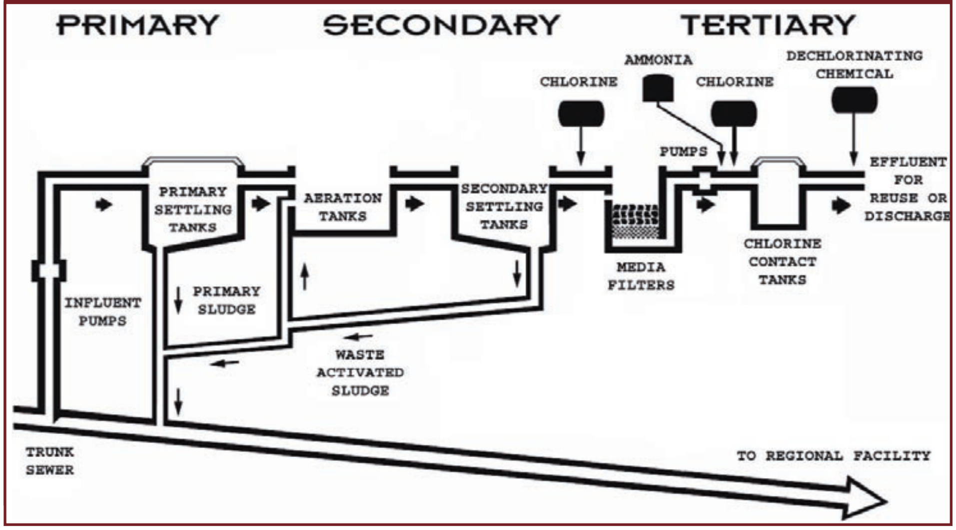


TABLE 1
Sequential Chlorination Research Objectives and Scope

Phase	Objectives	Scope
I	Evaluate DBP formation by sequential chlorination	Laboratory experiments using secondary effluent samples from Long Beach WRP
II	• Verify DBP formation results from laboratory study • Evaluate microbial (coliform and enteric virus) inactivation and aquatic toxicity • Determine operating conditions (i.e., chlorine dose and residual) for full-scale operation	Plant-scale testing at Long Beach WRP, San Jose Creek WRP*, and Whittier Narrows WRP
III	Determine chlorine doses and contact times needed to meet California Title 22 requirements for "disinfected tertiary recycled water" (5-log inactivation of poliovirus or MS2 coliphage and total coliform <2.2/0.1 L)	Laboratory experiments using secondary effluent samples from San Jose Creek WRP* seeded with surrogate viruses (poliovirus and MS2 coliphage)
IV	Verify virus inactivation results from laboratory experiments	Pilot-scale testing using secondary effluent from San Jose Creek West WRP seeded with MS2 coliphage

*San Jose Creek WRP includes two separate treatment systems, San Jose Creek East WRP and San Jose Creek West WRP.

OBJECTIVES AND SCOPE

The main objective of the study was to evaluate the disinfection performance and DBP formation of the sequential chlorination process. The evaluation was conducted in four phases (Huitric *et al.*, 2007, Huitric *et al.*, 2008). Because DBP formation prompted this investigation, the first two phases focused on DBP formation, first at the laboratory scale (Phase I), then at the plant scale (Phase II). Phase II also examined regulatory compliance with respect to microbial inactivation and aquatic toxicity. The last two phases continued to study disinfection efficacy at the laboratory scale (Phase III) and pilot scale (Phase IV) with the specific goal of meeting California Title 22 virus inactivation requirements for "disinfected tertiary recycled water." Table 1 summarizes the specific objectives and scope of each phase of the study.

MATERIALS AND METHODS

Phase I – Laboratory Experiments on DBP Formation

The focus of the Phase I experiments was to determine DBP formation from sequential chlorination and compare that with DBP formation from chloramination. Specific DBPs evaluated included THMs, NDMA, and cyanide. Microbial analyses were not conducted in these bench-scale experiments. Fully nitrified secondary effluent samples from the Districts' Long Beach WRP were used for the experiments. The samples were disinfected by chloramination and sequential chlorination. Figure 2 shows the test plan, including the ammonia and chlorine doses, contact times, and the water quality parameters analyzed. This procedure was repeated five times to evaluate the consistency of the results.

Phase II – Plant-scale Testing on DBP Formation and Disinfection Efficacy

Plant-scale studies were conducted at several WRPs operated by the Districts. Table 2 summarizes the average flow treated and the type of nitrification/denitrification (NDN) processes employed at these WRPs.

Each plant was tested for several weeks during which extensive sample collection and analysis was conducted. Samples were analyzed for chemical parameters (ammonia, THMs, NDMA, and cyanide), microbial indicators (total coliform and enteric virus), and aquatic toxicity. For NDMA analysis, 24-hour composite samples were collected. All other samples were grab samples. Typically, two sets of samples were collected on a daily basis; secondary effluent samples were collected around 7:30 a.m. and 9:30 a.m., and chlorinated final effluent samples at 10:30 a.m. and 12:30 p.m. The time difference was to account for the hydraulic retention time in the filters and in the chlorine contact tanks. Samples were also collected immediately downstream of the media filters (filtered effluent samples) to evaluate disinfection efficacy of free chlorine added upstream of the filters.

Phase III – Laboratory Experiments on Disinfection Efficacy

It was not feasible to demonstrate high levels of virus inactivation (5 logs required by California regulations for "disinfected tertiary recycled water") by sequential chlorination at plant-scale because indigenous virus concentrations are usually lower than 10^5/0.1L in Districts' tertiary WRP secondary effluent, and it was not practical to seed the amount of virus needed for the demonstration. Consequently virus inactivation by the sequential chlorination process was studied initially at the laboratory scale. The experiments were conducted with fully nitrified secondary effluent samples collected from the San Jose Creek WRP. Two indicator viruses, MS2 coliphage and poliovirus, were seeded to the samples, and three disinfection schemes were tested:

1. Chlorination: to simulate the first step of sequential chlorination;
2. Chloramination: to simulate the second step of sequential chlorination; and
3. Sequential chlorination: to simulate overall sequential chlorination process with free chlorine addition followed by chloramines (ammonia then chlorine) addition.

FIGURE 2
Schematic Diagram for Sequential Chlorination Bench-Scale Experiments

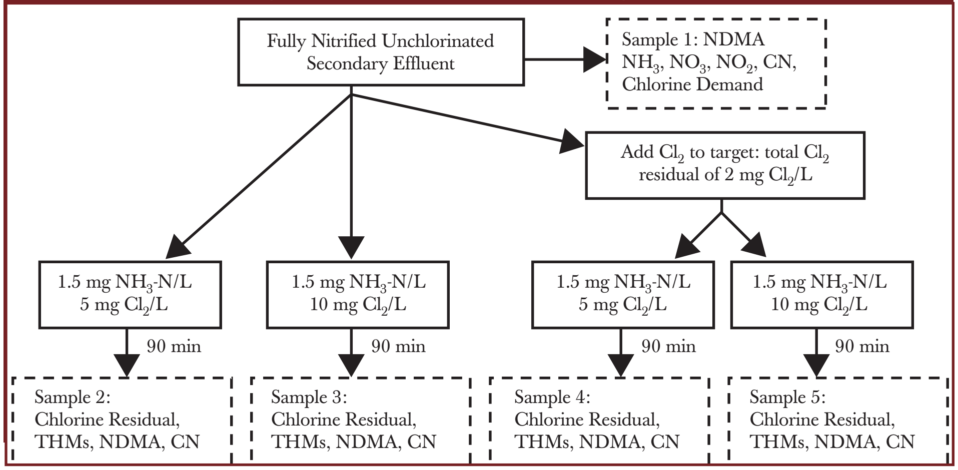


TABLE 2
Full-Scale Sequential Chlorination Testing: Facility Information

Test Facility	Test Period	Average Flow (MGD)	NDN Process
San Jose Creek East WRP	01/23/07 - 02/16/07	55	Step Feed
San Jose Creek West WRP	10/02/06 - 10/30/06	30	Step Feed
Whittier Narrows WRP	11/01/06 - 12/01/06	8	Modified Ludzack-Ettinger
Long Beach WRP	05/22/06 - 06/27/06	20	Step Feed

In each experiment, a portion of the effluent sample was first analyzed to obtain the baseline water quality parameters as well as total coliform concentrations. The rest of the sample was seeded with poliovirus and MS2 coliphage, and thoroughly mixed for at least 20 minutes. After mixing, initial virus concentrations were determined by collecting an aliquot of the sample before any chlorine treatment. For the free chlorine experiments, chlorine was added to the sample. Chloramine experiments added ammonia followed by chlorine. The sequential chlorination experiments added chlorine first, followed by ammonia then more chlorine. At pre-determined contact times, total and/or free chlorine residuals were measured. Samples were then dechlorinated using sodium thiosulfate, and analyzed for viruses as well as total coliform.

Phase IV – Pilot-scale Testing of Virus Inactivation

To verify the results from the Phase III study, the Districts conducted pilot-scale testing on virus inactivation at the San Jose Creek WRP. Figure 3 is a schematic diagram of the pilot-scale chlorine contact system constructed for the study. The system included two channels with 1-foot by 1-foot cross-sections. The length of the channels varied by experiment, as described below. Baffles were installed near the inlet of each channel to provide uniform flow distribution. Tracer tests were performed prior to any virus testing to determine modal contact times corresponding to several test flow rates. During virus testing, the channels were covered, as are the full-scale chlorine contact tanks at the plant, to avoid any effects from sunlight, wind, or dust.

Two types of tests were conducted with nitrified secondary effluent. One tested virus inactivation by free chlorine alone and used a single 24-foot long channel with an effluent flow rate of 8 gallons per minute (gpm). The other tested sequential chlorination and used two channels; the first channel was 12 feet long, used a flow rate of 22 gpm, and was dosed with free chlorine, while the second channel was 36 feet long, used a flow rate of 6 gpm, and was dosed with chloramines. In both types of experiments, virus (M2 coliphage) was mixed into the effluent with a static inline mixer. Following mixing, a sample was collected for analysis of initial virus concentration.

For the free chlorine experiments, chlorine was added upstream of the channel, and mixed into the flow using static inline mixers. Free chlorine residuals were measured at all sampling points within the channel. Samples were collected at four points along the length of the channel (corresponding to four different contact times), dechlorinated, and delivered to the laboratory for virus analysis. For the sequential chlorination experiments, chlorine was also added upstream of the first channel. Ammonia was then added to the end of the first channel, followed by more chlorine addition upstream of the second channel to form chloramines (Figure 3). Free and/or total chlorine residuals were measured at selected locations in each channel. Samples were collected at the end of each channel, dechlorinated, and delivered to the laboratory for virus analysis.

Water Quality

Table 3 provides water quality data for the secondary effluents used in this study. During Phase II at the full-scale plants, water quality samples were not taken specifically for this project; data in Table 3 were taken from routine monitoring samples for process control. During Phase III, some samples were taken in the morning when the effluent flow through the WRP was low and some samples were taken at noon (high flow); no performance differences were observed, so the data were combined for this paper. For Phases III and IV, pH values were also measured, with values of 7.2 ± 0.2 in both phases.

Mixing and Sampling

The rate at which chlorine is mixed into the effluent may affect disinfection efficacy and DBP formation. Consequently, mixing in the laboratory, pilot, and full-scale systems was evaluated through the calculation of the product Gt, where G is the velocity gradient and t is the mixing time. The Gt values for the three systems were of the same order of magnitude

FIGURE 3
Schematic Diagram of Pilot-Scale Chlorine Contact System

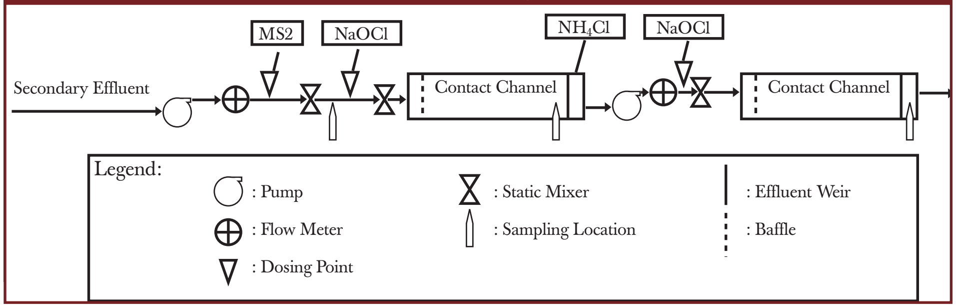


TABLE 3
Water Quality Data

	WRP[a]	Turbidity (NTU)	Ammonia Nitrogen (mg N/L)	Nitrate Nitrogen (mg N/L)	Nitrite Nitrogen (mg N/L)	Chlorine Demand (mg/L)
Phase I: Laboratory	LB	—	0.4 ± 0.3	5.2 ± 2.7	0.22 ± 0.20	—
Phase II: Full-Scale	LB	1.1 ± 0.1	<1[b]	5.6 ± 0.7	0.02 ± 0.01	—
	SJCE	2.0 ± 0.8	1.2 ± 0.6	2.2 ± 0.9	1.30 ± 0.40	—
	SJCW	1.4 ± 0.4	<1[b]	6.1 ± 1.1	0.09 ± 0.03	—
	WN	1.6 ± 0.6	<1[b]	7.2 ± 1.0	0.02 ± 0.00	—
Phase III: Laboratory	SJCE & SJCW	1.0 ± 0.3	0.2 ± 0.1	2.0 ± 1.2	0.06 ± 0.03	3.9 ± 0.5
Phase IV: Pilot-Scale	SJCW	0.8 ± 0.2	<0.10[c]	4.0 ± 1.2	0.05 ± 0.01	3.4 ± 0.4

—: Not measured.
[a]Abbreviations: LB: Long Beach. SJCE: San Jose Creek East. SJCW: San Jose Creek West. WN: Whittier Narrows.
[b]All ammonia samples from LB, SJCW, and WN during Phase II had concentrations below the reporting limit of 1 mg N/L; ammonia analysis in Phases III and IV had a lower reporting limit (0.10 mg N/L).
[c]14 samples were below the reporting limit of 0.10 mg N/L; one sample had an ammonia concentration of 0.13 mg N/L.

TABLE 4
Results of Bench-scale Study to Evaluate DBP Formation

Sample Number	Sample Description	Chlorine Residual (mg/L)	Cyanide (µg/L)	Total THMs (µg/L)	NDMA (ng/L)
1	Unchlorinated Secondary Effluent	—	<5	—	100 - 140
2	Chloramination	2.8 - 3.3	<5	3 - 5	300 - 1,300
3	Chloramination	4.6 - 5.8	<5	7 - 11	1,100 - 5,400
4	Sequential Chlorination	3.4 - 7.0	<5	56 - 65	110 - 230
5	Sequential Chlorination	0.5 - 3.0	<5	63 - 72	100 - 200

TABLE 5
Comparison of NDMA Concentrations in Chlorinated Effluents

Test Facility	Chloramination			Sequential Chlorination		
	No. of samples	NDMA (ng/L)		No. of Samples	NDMA (ng/L)	
		Range	Median		Range	Median
San Jose Creek East WRP	34	1,000 - 5,000	2,050	18	200 - 590	310
San Jose Creek West WRP	28	400 - 3,700	985	21	260 - 650	440
Whittier Narrows WRP	28	52 - 850	320	17	37 - 590	160
Long Beach WRP	21	500 - 3,200	1,400	30	93 - 880	425

(calculations not shown), indicating that the mixing should be similar across the systems; the full-scale system had slightly better mixing, with Gt values 1-3 times higher than at laboratory or pilot-scale.

Samples for NDMA, THMs, and microbial analyses were collected in amber glass jugs, amber glass vials, and sterilized plastic containers, respectively. Plastic containers were used for other samples. Samples for microbial and NDMA analyses were dechlorinated by adding sodium thiosulfate in the sample containers. Samples for THM analysis were first quantitatively dechlorinated and then poured into the sample vials. The quantitative dechlorination procedure avoided over-dechlorination, which may damage the analytical instrument.

Chemicals and Microorganisms

Chlorine was applied as sodium hypochlorite. Sodium hypochlorite, 4-6% by weight (Fisher Scientific, Pittsburgh, PA), was diluted to different strengths and standardized in the laboratory for each bench and pilot scale experiment. For bench scale experiments, ammonia standard (1,000 mg NH_3-N/L) obtained from Environmental Resource Associates (Arvada, CO) was used as received. Ammonia solutions used for pilot-scale experiments were made in the laboratory using ammonium chloride powder (99.5% purity) from EMD Chemicals (Gibbstown, NJ). MS2 coliphage (American Type Culture Collection #15597B1) was purchased from GAP EnviroMicrobial Laboratory in Canada. Poliovirus was cultured in the Districts' Microbiology Laboratory, using CHAT type-1 poliovirus (American Type Culture Collection #VR192, a predecessor to the currently available #VR1562).

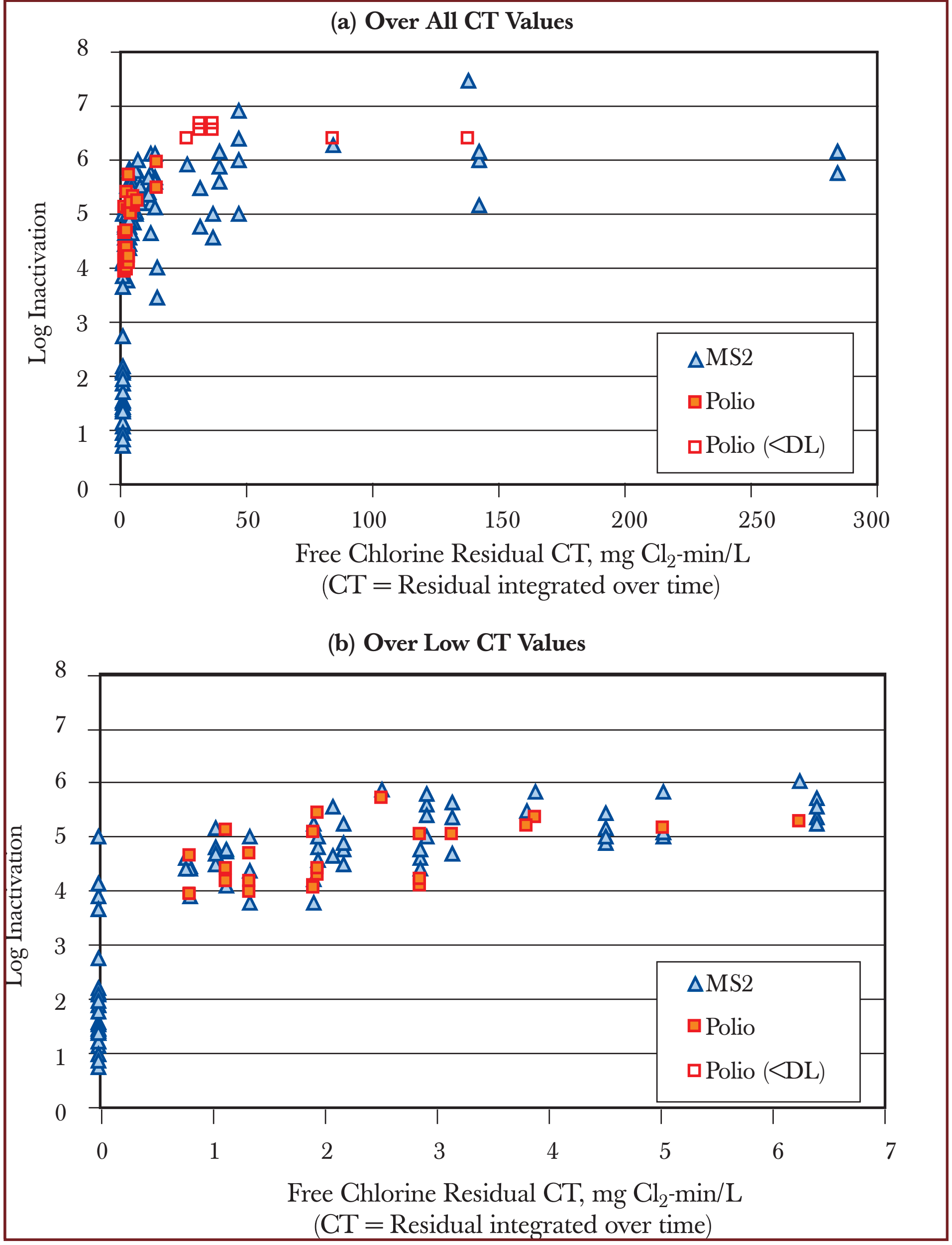
Laboratory Analyses

The Districts' laboratories conducted all chemical analyses for this project, and are certified by the California Department of Public Health for these analyses. NDMA analysis used EPA Method 1625, which employs liquid-liquid extraction followed by chemical ionization isotope dilution gas chromatography/mass spectrophotometry; the reporting limit is 2 nanograms per liter (ng/L) in secondary and final effluent

TABLE 6
Total Coliform Results from Full-Scale Chlorination Testing

Test Facility	Filtered Effluent (After Free Chlorine)		(Sequential Chlorination)	
	No. of Samples	Total Coliform (CFU/0.1 L)	No. of Samples	Total Coliform (CFU/0.1 L)
San Jose Creek East WRP	19	1 - >200	19	<1 - 2
San Jose Creek West WRP	28	<1 - 115	21	<1 - 1
Whittier Narrows WRP	13	1 - 400	15	<1 - 2
Long Beach WRP	22	<1 - 2	26	<1 - 1

FIGURE 4
Laboratory Experiment Results of Virus Inactivation by Free Chlorine



samples. THM analysis used EPA Method 8260 and the reporting limit for each THM species is 2 microgram per liter (µg/L). Free and total chlorine residuals were measured using a colorimeter test kit manufactured by Hach Company (Loveland, Colorado). Free chlorine analysis used EPA-approved Alternative Method 8021, with a factory-reported detection limit of 0.02 mg Cl_2/L. Chloramine analysis used EPA approved Alternative Method 8167, with a factory-reported detection limit of 0.1 mg Cl_2/L. Total cyanide measurements were conducted using the Midi Distillation System followed by manual colorimetric analysis [EPA 335.4, Standard Method 4500-CN-C (American Public Health Association, 1998)]. The method detection limit is 1 µg/L, and laboratory reporting limit is 5 µg/L.

For enteric virus, the laboratories adapted the procedure described in EPA's *Manual of Methods for Virology* for sample collection and concentration; Standard Methods 9510 C and 9510 G were used for poliovirus quantification. The reporting limit of enteric viruses is typically 0.001 IU (infectious unit) per liter. The detection limit for poliovirus analysis depends on the sample volume. EPA Method 1601 was used to measure the concentration of MS2 coliphage. The typical detection limit is 2 MPN/0.1L. Total coliform analysis used Standard Method 9222B, a membrane filter (MF) procedure. The MF method was chosen because the membrane filter technique is highly reproducible and usually yields numerical results more rapidly than the multiple-tube fermentation procedure (American Public Health Association, 1998). The detection limit for the MF method is 1 colony forming unit (CFU)/0.1 L.

Chronic toxicity testing was conducted using concurrently collected secondary effluent (prior to chlorine addition) and final effluent (disinfected) samples. Tests were conducted on *Pimephales promelas* and *Ceriodaphnia dubia* and followed procedures described in *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms* (EPA, 2002). Potential chronic toxicity as a result of sequential chlorination was determined by comparing survival and sub-lethal effects on the two test organisms in secondary effluent samples versus those in disinfected final effluent samples.

FIGURE 5
Laboratory Experiment Results of Total Coliform Inactivation by Free Chlorine

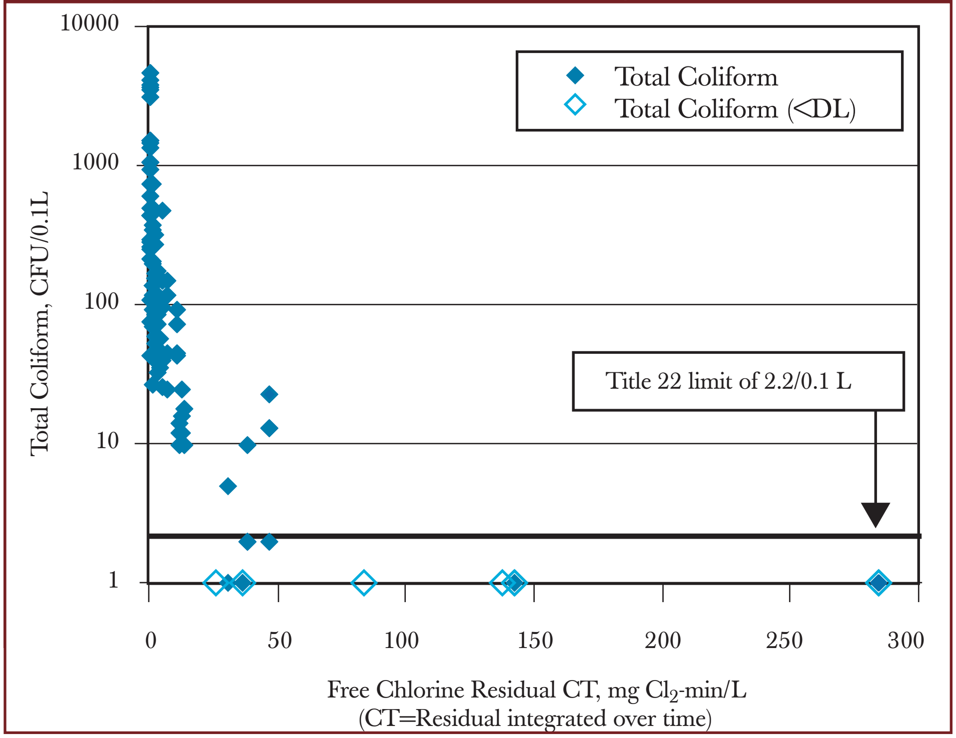
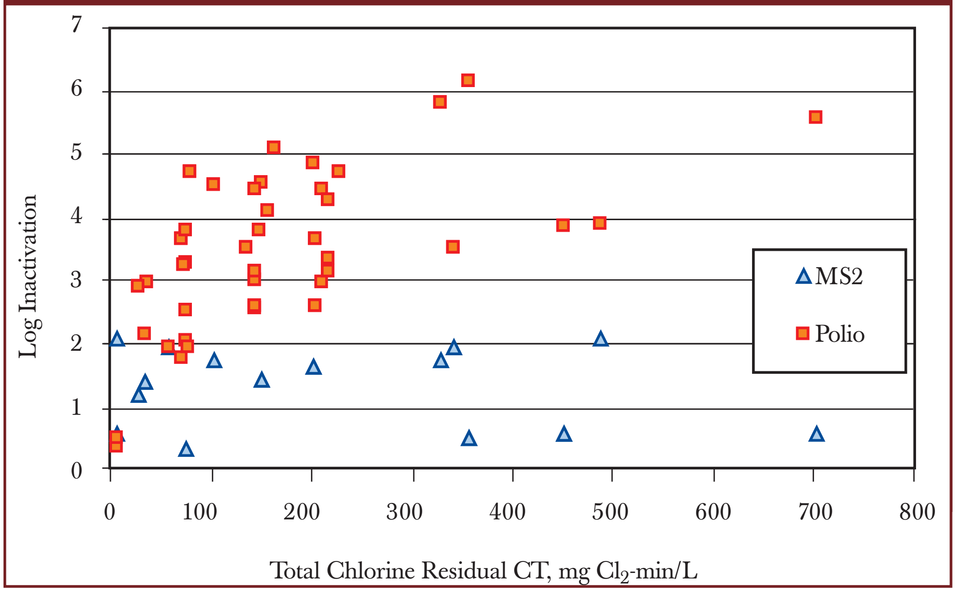


FIGURE 6
Laboratory Experiment Results of Virus Inactivation by Chloramines



RESULTS AND DISCUSSION

Phase I

As indicated in Table 4, sequential chlorination resulted in significantly reduced NDMA levels (100 – 230 ng/L), as compared to the levels from chlorami-

FIGURE 7
Laboratory Experiment Results of Total Coliform Inactivation by Chloramines

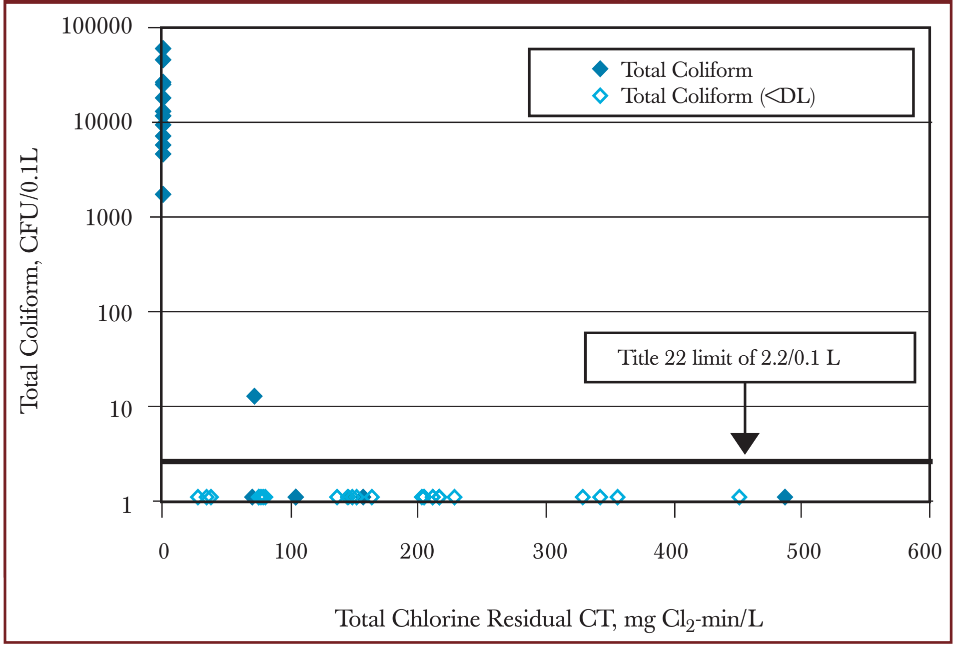
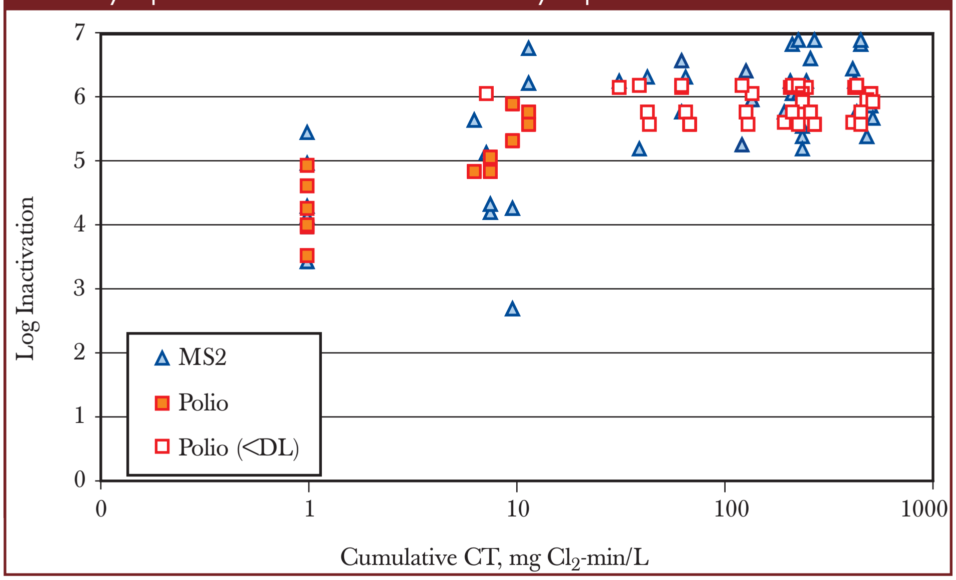


FIGURE 8
Laboratory Experiment Results of Virus Inactivation by Sequential Chlorination



nation (300 – 5,400 ng/L). Sequential chlorination resulted in higher total THM concentrations; however, these concentrations were below the drinking water standard for total THMs, 80 µg/L. Neither chloramination nor sequential chlorination generated cyanide concentrations above the laboratory reporting limit.

Phase II

Because the laboratory DBP results were promising, the Districts tested the sequential chlorination process at several of their WRPs. Operating conditions were as follows: chlorine dose added to nitrified secondary effluent was typically 5 mg Cl_2/L. This chlorine dosage exceeded chlorine demand of the secondary effluent and resulted in approximately 1 mg Cl_2/L of total chlorine residual. Following filtration, ammonia was dosed at approximately 1 mg N/L. Chlorine was then added at a chlorine to ammonia nitrogen mass ratio of approximately 5:1 to form chloramines, which resulted in approximately 4.5 mg Cl_2/L of total chlorine residual immediately after chlorine addition.

Table 5 compares the NDMA concentrations in the final effluent under chloramination (historical data, 2004 – 2006) and sequential chlorination. The table shows that sequential chlorination yielded much lower NDMA concentrations at all four WRPs. Reduction of median NDMA concentrations ranged from 160 ng/L (~50%) at Whittier Narrows WRP to 1,740 ng/L (~85%) at San Jose Creek East WRP. The extent of NDMA reduction appeared to be related to the polymer doses. Among the WRPs tested, the Whittier Narrows WRP used the least amount of polymer, had the lowest NDMA concentrations under chloramination, and experienced the smallest reduction in NDMA concentrations with sequential chlorination.

As expected, total THM concentrations were higher under sequential chlorination. Out of 161 samples analyzed during the sequential chlorination testing, the total THM concentrations ranged from 7.0 to 75 µg/L; median concentration was 35 µg/L. These levels were well within the drinking water standard, 80 µg/L. Out of 162 samples collected for cyanide analysis, all but two samples (from the same WRP; the highest value was 9 µg/L) had concentrations below the laboratory reporting limit of 5 µg/L.

Table 6 summarizes the total coliform results from the Phase II study. Typical total coliform concentration in unchlorinated secondary effluents is approximately 10^4/0.1 L. Free chlorine and filtration reduced total coliform concentrations by at least two to three orders of magnitude. However, the filtered effluent total coliform levels could still exceed the California Title 22 standard of 2.2/0.1 L for unrestricted reuse (except at the Long Beach WRP). The total coliform concentrations after subsequent chloramination, however, were consistently in compliance with the standard. At the Long Beach WRP, three filtered effluent samples were collected and analyzed for indigenous enteric virus. None of the samples detected enteric virus (detection limit = 0.001 IU/L).

A total of 14 sets of secondary and chlorinated final effluent samples (final effluent samples were dechlorinated in the laboratory) were collected for chronic toxicity testing. The results indicated no aquatic toxicity resulting from sequential chlorination.

In summary, the Phase II study results confirmed that sequential chlorination reduced the formation of NDMA while maintaining acceptable levels of THMs and cyanide, meeting Title 22 total coliform requirements, and producing no aquatic toxicity to the receiving water.

Phase III

Chlorination Experiments

Free chlorine disinfection was tested on 16 fully nitrified secondary effluent samples collected from the San Jose Creek WRP. Chlorine doses were between 1.5 and 10 mg Cl_2/L, contact times were between 1 and 90 minutes. Free chlorine residual CT values were calculated by integrating free chlorine residual concentration over contact time. Figures 4(a) and 4(b) show MS2 and poliovirus inactivation results with free chlorine for all CT values and for low CT values, respectively. Points with a zero CT value represent conditions in which free chlorine residual was not detected, i.e., when chlorine doses were lower than the chlorine demand.

Free chlorine generally inactivated MS2 and poliovirus to a similar degree. Most disinfection occurred at or shortly after the time that free chlorine was added (Figure 4(b)). For CT values ≥ 1 mg Cl_2-min/L, MS2 inactivation was ≥ 4-log in 96% (78 of 81) of the samples and poliovirus inactivation was ≥ 4-log in 97% (29 of 30) of the samples. As CT increased above 1 mg Cl_2-min/L, MS2 disinfection increased slowly and leveled off at approximately 6-log inactivation. Poliovirus disinfection also increased slowly as CT increased above 1 mg Cl_2-min/L, but could not be quantified, because poliovirus concentrations in treated samples were below the detection limit (DL).

Inactivation of total coliform was also evaluated. At CT values above 50 mg Cl_2-min/L, disinfection of total coliform consistently met the Title 22 requirement, as indicated in Figure 5.

FIGURE 9
Laboratory Experiment Results of Total Coliform Inactivation by Sequential Chlorination

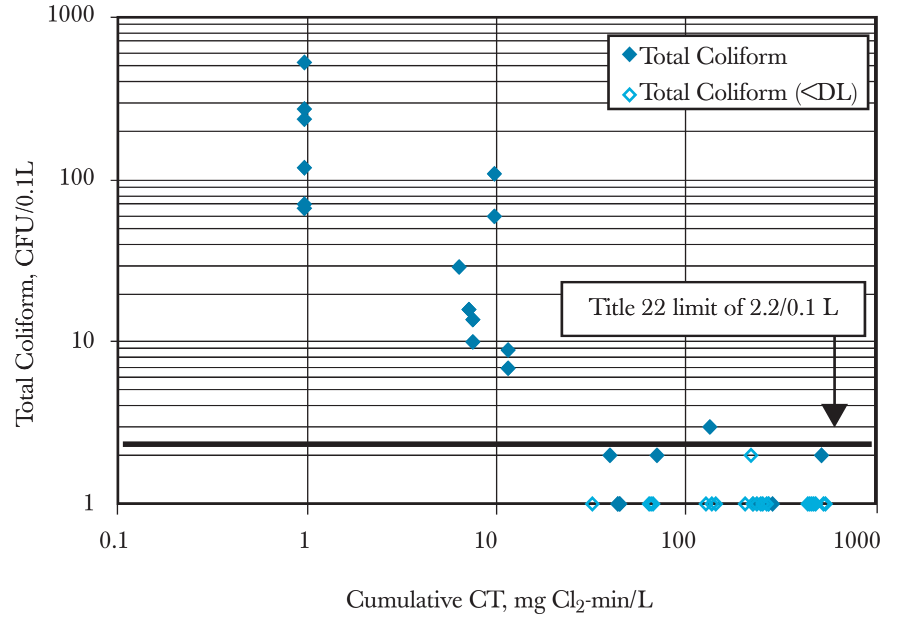
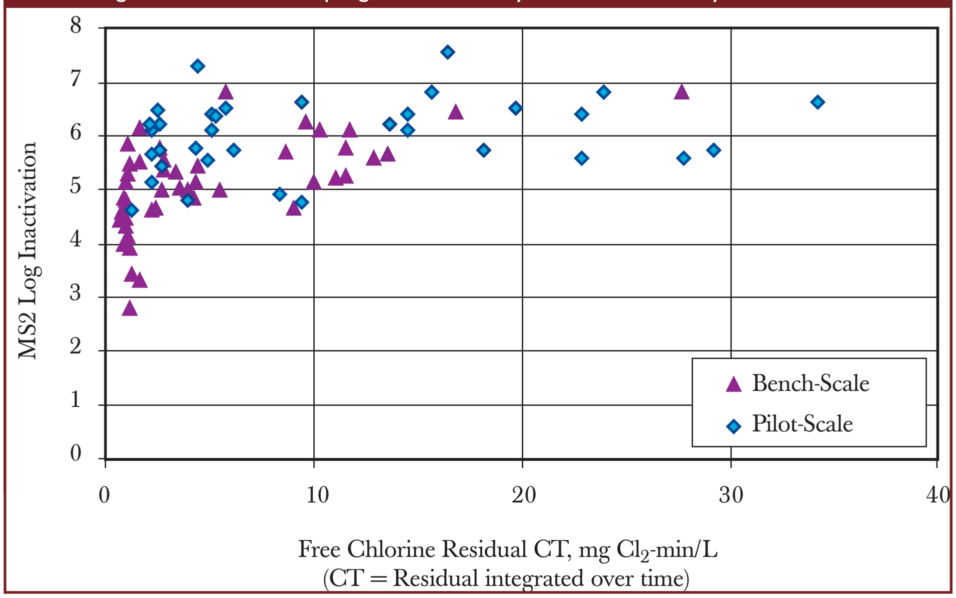


FIGURE 10
Pilot Testing Results of MS2 Coliphage Inactivation by Free Chlorine Only



Chloramination Experiments

The chloramination step of sequential chlorination was tested on 16 fully nitrified secondary effluent samples collected from the San Jose Creek WRP. These samples were dosed with 1 to 3 mg N/L followed by 5 to 10 mg Cl_2/L. The dosed chlorine to ammonia nitrogen mass ratio ranged from 3.3 to 5.3 mg Cl_2/mg N, and contact times ranged from 1 to 90 minutes. The total chlorine residual CT values, ranging from 6 to 774 mg Cl_2-min/L, were calculated as the product of total chlorine residual and contact time. As shown in Figure 6, chloramines were clearly weaker disinfectants than free chlorine, and yielded lower inactivation values for both microorganisms, especially MS2 coliphage. Disinfection of poliovirus generally increased with total chlorine residual CT values, but MS2 coliphage was resistant to chloramines. Little or no improvement in disinfection performance was observed with increasing CT values.

Chloramines effectively disinfected total coliform, as indicated in Figure 7. Total coliform concentration was consistently below the Title 22 requirement at CT value above approximately 100 mg Cl_2-min/L.

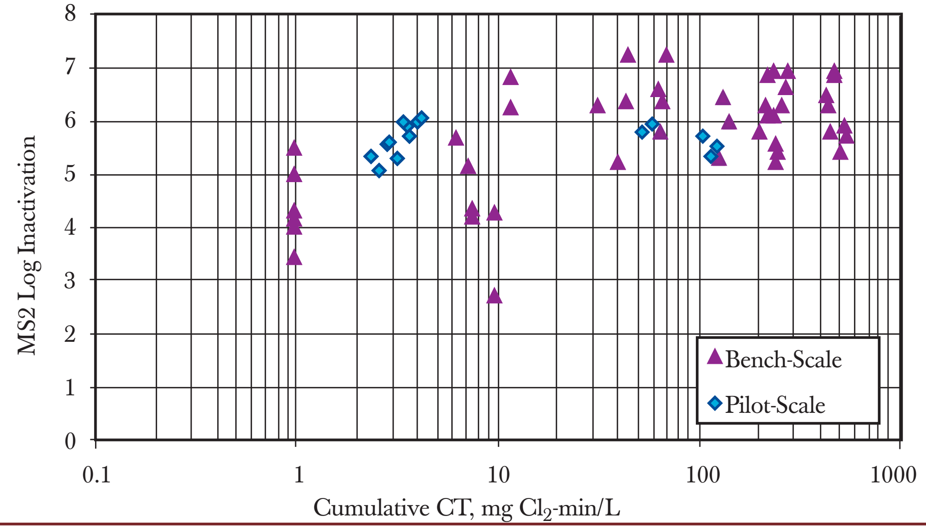
Sequential Chlorination Experiments

Eight experiments were conducted to evaluate the total virus inactivation by sequential chlorination, in which samples were disinfected in two steps. In the first step, 5 to 5.5 mg Cl_2/L of sodium hypochlorite was added to the samples for contact times up to 10 minutes (free chlorine residual CT values between 1 and 10 mg Cl_2-min/L). Ammonia was then added and followed by additional hypochlorite, to form chloramines. Ammonia doses were 0.5 to 1.5 mg N/L, hypochlorite doses were 2.5 to 5.0 mg Cl_2/L, and the dosed chlorine to ammonia mass ratio ranged from 3.3 to 5.0 mg Cl_2/mg N. Chloramine contact times were between 1 and 90 minutes. The cumulative CT values, ranging from 6 and 541 mg Cl_2-min/L, were calculated as the sum of the free chlorine CT value and the total chlorine residual CT value from chloramination.

Virus inactivation results from the sequential chlorination process are shown in Figure 8. In most cases, the first step of sequential chlorination (free chlorine) achieved >4-log inactivation of both MS2 and poliovirus, consistent with results from the free chlorine experiments discussed above. In the few cases that free chlorine did not achieve >4-log inactivation, subsequent chloramination provided additional disinfection. As indicated in Figure 8, inactivation of both poliovirus and MS2 was >5-log in all cases where the cumulative CT value was greater than 15 mg Cl_2-min/L. Beyond this CT value, virus inactivation was not strongly affected by the cumulative CT value. Poliovirus levels were below detection following chloramine addition. MS2 is resistant to chloramines, so additional chloramine contact time has insignificant effect on its inactivation.

Total coliform was also measured in these experiments; results are shown in Figure 9. Total coliform levels decreased rapidly up to a cumulative CT value of 15 mg Cl_2-min/L. Above a cumulative CT value of 30 mg Cl_2-min/L, total coliform levels were <2.2/0.1 L in 31 of 32 samples.

FIGURE 11
Pilot Testing Results of MS2 Coliphage Inactivation by Sequential Chlorination



Phase IV

Ten experiments were conducted to test free chlorine disinfection of seeded virus in the pilot-scale contactor. Free chlorine doses ranged from 3.7 to 5.8 mg Cl_2/L, and the modal contact times ranged from 2 to 10 minutes (based on tracer test results); free chlorine residual CT values were calculated by integrating free chlorine residual concentration over contact time. As shown in Figure 10, free chlorine alone, the first step of the sequential chlorination process, achieved >5-log MS2 inactivation in all but four samples. The minimum MS2 inactivation observed was 4.6-log. These results were consistent with those obtained from the bench-scale experiments (also plotted in Figure 10 for comparison).

Five experiments were conducted to test the overall sequential chlorination disinfection of seeded virus in the pilot-scale contactor. In the first channel, chlorine doses ranged from 4.1 to 4.3 mg Cl_2/L, and the modal contact time was approximately 2.4 minutes (based on tracer test results). The cumulative CT values were calculated as the sum of the free chlorine CT value (calculated by integrating free chlorine residual concentration over contact time) and the total chlorine residual CT value from chloramination (calculated as the product of total chlorine residual and contact time). At the end of the first channel, ammonium chloride (1.1 to 1.2 mg N/L) was added to stop free chlorine reaction. Then, at the beginning of the second channel, more chlorine (3.6 to 5.5 mg Cl_2/L) was applied to form chloramines. Samples were collected at the end of each channel for virus analysis.

Figure 11 shows the results from these experiments. Free chlorine, the first step of sequential chlorination, achieved >5-log MS2 inactivation; the chloramines added in the second step had a marginal effect on MS2 inactivation. These results were in general agreement with those obtained from the bench-scale experiments, also plotted in Figure 11 for comparison.

CONCLUSIONS

The sequential chlorination process is a new approach for disinfection of fully nitrified effluent produced by wastewater treatment and reclamation facilities. The process can be implemented using existing chloramination infrastructure with minor modifications. Plant-scale testing results have shown that the process significantly reduces NDMA formation in comparison to chloramination. By lowering the NDMA levels in the recycled effluent, sequential chlorination could help save the costs of downstream advanced oxidation process for NDMA removal in indirect potable reuse applications. The process does result in a moderate increase in THM formation, but the levels of total THMs are well below the drinking water standards. Sequential chlorination generates insignificant amounts of cyanide and does not cause aquatic toxicity.

Because of the use of free chlorine, the sequential chlorination process is more efficient than chloramination with respect to pathogen inactivation. Sequential chlorination can achieve the same level of pathogen inactivation as chloramination, but with a much shorter chlorine contact time. This could lead to savings in chlorine contact tanks construction for new projects, creation of available space in existing chlorine contact tanks for other uses (e.g., storage, flow equalization), or an increase in treatment capacity.

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EQUALIZATION VOLUME REQUIRED FOR COMPLETE NITRIFICATION AT THE SAN JOSE CREEK EAST WATER RECLAMATION PLANT

Jeff Weiss, Phil Ackman and Chi-Chung Tang

INTRODUCTION

The San Jose Creek East Water Reclamation Plant (SJCEWRP) uses sequential chlorination for disinfection. In sequential chlorination, chlorine alone is initially added to a fully nitrified secondary effluent. The free chlorine inactivates viruses and bacteria and also reduces precursors for N-nitrosodimethylamine (NDMA) formation. At a second location, chlorine is added in combination with NH_3-N to form chloramines. The chloramines further inactivate bacteria and viruses to ensure the effluent meets the California Department of Public Health Title 22 disinfection requirements.

Incomplete nitrification of the secondary effluent can jeopardize the efficacy of virus inactivation. This is a concern at the SJCEWRP where incomplete nitrification events occur frequently during the winter when low water temperature significantly slows the metabolic rate of the nitrifying bacteria. Elimination of such events is necessary to assure that the effluent disinfected by sequential chlorination can reliably meet the Title 22 disinfection standards for unrestricted reuse.

A previous report, Application of a Spreadsheet Tool to Evaluate Ammonia Removal at the San Jose Creek East Water Reclamation Plant (DOCS 2247097), presented estimates of secondary effluent NH_3-N levels and overall plant NH_3-N removal capacity under a variety of loading and operating conditions. The analysis identified conditions under which achievement of complete nitrification was unlikely within the existing volume of the biological system. The risk of incomplete nitrification can be minimized by providing an equalization basin for temporary storage of primary effluent during periods of maximum NH_3-N loading. The basin would enable plant operations to keep the NH_3-N load applied to the secondary system below its removal capacity. This report presents the results of an analysis conducted to determine the equalization volume required to achieve this objective under various environmental and operating conditions.

METHOD OF CALCULATION

General

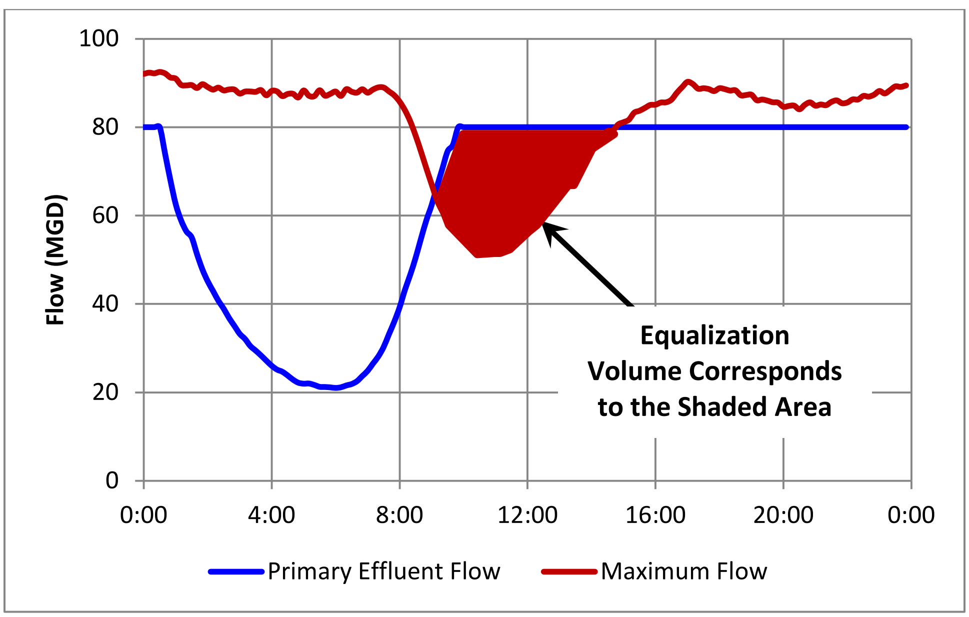
The following information is needed for calculation of the equalization volume

1. A diurnal curve of the primary effluent flow
2. A diurnal curve of the NH_3-N concentration in the primary effluent
3. A design wastewater temperature
4. The DO concentration in each aerated zone
5. The MLSS concentration in each treatment zone and,
6. A target secondary effluent NH_3-N concentration.

When entered into the spreadsheet tool, this information enables calculation of the maximum NH_3-N loading rate that can be successfully nitrified. From this maximum rate, the maximum flow that can be applied to the secondary treatment process at a given time of day is determined by dividing the maximum loading rate by the primary effluent NH_3-N concentration. For the equalization basin volume determination, a set of maximum flows is calculated at 5 minute intervals over a day. Each maximum flow in this set is then compared to the flow at the corresponding time from the diurnal flow curve. When the flow on the diurnal curve exceeds the maximum flow, the excess flow is assumed to be diverted to the equalization basin. The volume of the excess flow is calculated at five minute intervals, and the equalization volume is determined by summing the excess volumes for a 24-hour period.

This method of equalization volume calculation is illustrated in Figure 1. The blue line shows the diurnal flow for a day when the peak flow allowed into the plant is set at 80 MGD. The brown line represents the maximum flow that can be treated to an effluent objective of 0.2 mg N/L, assuming an influent wastewater temperature of 70°F. The maximum flow was based upon a maximum NH_3-N loading to secondary treatment, as determined by the spreadsheet tool, of 21,900 lb/day. From midnight to approximately 9 AM, the maximum flow that can be treated is greater than the flow coming into the plant. No flow diversion to the equalization basin is needed during this time. Beginning at 9 AM, the plant flow exceeds the flow that can be fully nitrified, and thus a portion of the flow has to be diverted. The flow diverted is represented by the difference between the blue and brown lines. Flow diversion must continue until 15:00 when the NH_3-N load drops below 21,900 lb/day. The volume required for equalization is represented by the region shaded solid brown in Figure 1.

FIGURE 1 –Comparison of actual primary effluent flow to the maximum flow that can be nitrified for the purpose of determining equalization basin volume.



The equalization basin volume determined in this fashion is a minimum estimate that assumes perfect knowledge of the information itemized above. For actual plant operations, operators may devise some general guidelines based on the results from the calculations so that the flow diverted to the equalization basin does not need to be continuously adjusted.

The following discussion provides details on the construction of the primary effluent flow and NH_3-N concentration curves, and on other parameters (e.g., wastewater temperature, MLSS concentration, and DO concentration) needed to calculate equalization volumes.

Diurnal Primary Effluent Flow Pattern

The SJCEWRP obtains its wastewater from Joint Outfall "H" Unit 5A. Throughout most of the morning, the plant draws in and treats all the wastewater available in this sewer. At other times of day, the plant has discretion in setting the flow to be treated. The flow from 10:00 to 0:30 of the next day is normally fairly steady, varying minimally around some peak value. During 2011, the daily peak flow ranged from 60 to 99 MGD. Although this range is rather wide, the plant tended to target a 65-MGD peak on weekdays and a 75-MGD peak on weekends. Excess flow in Unit 5A, above that drawn into the SJCEWRP, continues down the collection system towards the JWPCP.

Figure 2 displays a set of diurnal primary effluent flow curves that were prepared for calculating equalization volumes. Data from March 21-27, 2010 were used to establish the primary effluent flow during the morning period when the entire Unit 5A flow was drawn into the plant. These data had been used in the past for other analyses and are typical of the current plant flow pattern. The flow at other times was set to a constant peak value. Curves were prepared for peak flows of 65, 70, 75, 80, 85 and 90 MGD; 65 MGD is typical of current dry weather peak flow, and 90 MGD is the design dry weather peak flow. Table 1 lists the average daily flows for each diurnal curve. The design average dry weather flow of 62.5 MGD can be achieved when the plant accepts a peak flow of 77.5 MGD. Equalization volume calculations reported in this memo are based on the current influent flow management practice.

Diurnal Primary Effluent NH_3-N Concentration

The equalization basin must be sized to prevent excessive NH_3-N bleed through into the secondary effluent on days when the diurnal profile for primary effluent NH_3-N loading is well above that of an average day. The diurnal profile for primary effluent NH_3-N concentration that corresponds to this event will similarly be higher than normal. Primary effluent NH_3-N concentration data obtained using a HACH NH4D analyzer provided the basis for constructing a NH_3-N concentration profile for equalization basin volume determination. These data were available for the period from May 19, 2011 through October 25, 2011. With the exception of a 23-day interruption due to a sensor failure, the analyzer provided measurements at 5 minute intervals. A total of 133 complete days of monitoring data were recorded. The analyzer calibration was checked weekly against a set of four grab samples collected every Tuesday between the hours of 8 AM and noon, the period of maximum NH_3-N concentration change. The calibration was adjusted as necessary.

Examples of the NH4D data are shown in Figures 3 and 4. These figures illustrate the potential for the primary effluent diurnal NH_3-N concentration curve to shift with time. In Figure 3, a similar diurnal pattern is repeated day in, day out with an NH_3-N minimum of around 23 mg N/L and a maximum of around 40 mg N/L. In Figure 4, the day to day diurnal pattern shows more variability, particularly over the September 11 to October 1, 2011 period. After October 1, the pattern becomes more stable. In general, though, the Figure 4 data are displaced upward when compared to those shown in Figure 3.

NH_3-N data from October 6, 2011 were selected to provide a reference diurnal NH_3-N concentration curve for the equalization basin volume calculations reported here. The October 6 data included the highest primary effluent NH_3-N concentration recorded during the monitoring period. The frequency of an October 6 type event in the available monitoring data is less than 1 day in 100.

FIGURE 2 –Diurnal primary effluent flow curves corresponding to peak flows from 65 to 90 MGD.

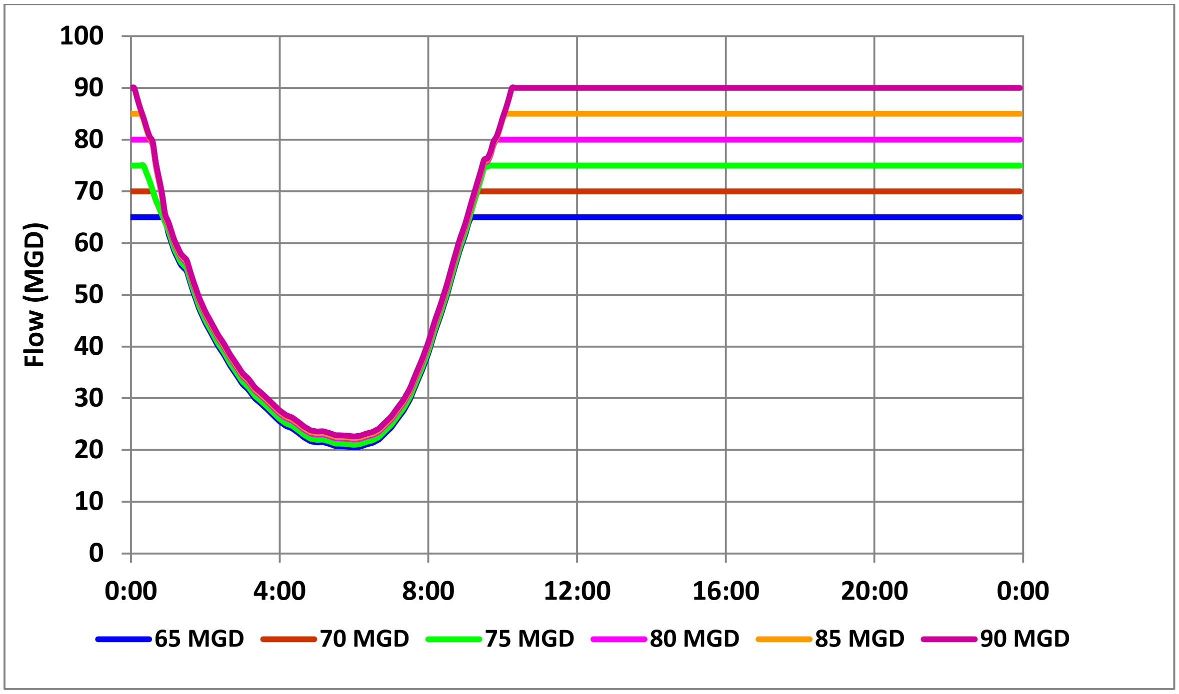


TABLE 1 – Average daily primary effluent flow for the indicated peak flows.

Peak Flow (MGD)	Average Daily Flow (MGD)
65	54.6
70	57.9
75	61.0
80	64.2
85	67.2
90	70.1

The October 6, 2011 data are plotted in Figure 5. Prior to 8 AM, NH_3-N levels varied within a baseline range of 28 to 31 mg N/L. Beginning at 8 AM, the NH_3-N concentration rose rapidly, peaking around 11:00 at 50.8 mg N/L. The return to baseline proceeded from 11:00 to 16:00. After 16:00, the NH_3-N concentration returned to the baseline range for the remainder of the day. The time average NH_3-N concentration for this day was 33.4 mg N/L.

Design Wastewater Temperature

Figure 6 presents a cumulative frequency plot of daily wastewater temperature measurements made at the SJCEWRP from 1986 to 2011. A series of equalization basin volume calculations were performed for temperatures ranging of 68^{o}F to 78^{o}F. A wastewater temperature of 68^{o}F or lower can be expected 1 to 2 times per year on average. A wastewater temperature of 78^{o}F or colder can be expected on 56% of all days. A design temperature of 78^{o}F is not recommended because it exposes the plant to a high risk for

FIGURE 3 – Primary effluent NH_3-N concentrations from July 2, 2011 through August 18, 2011.

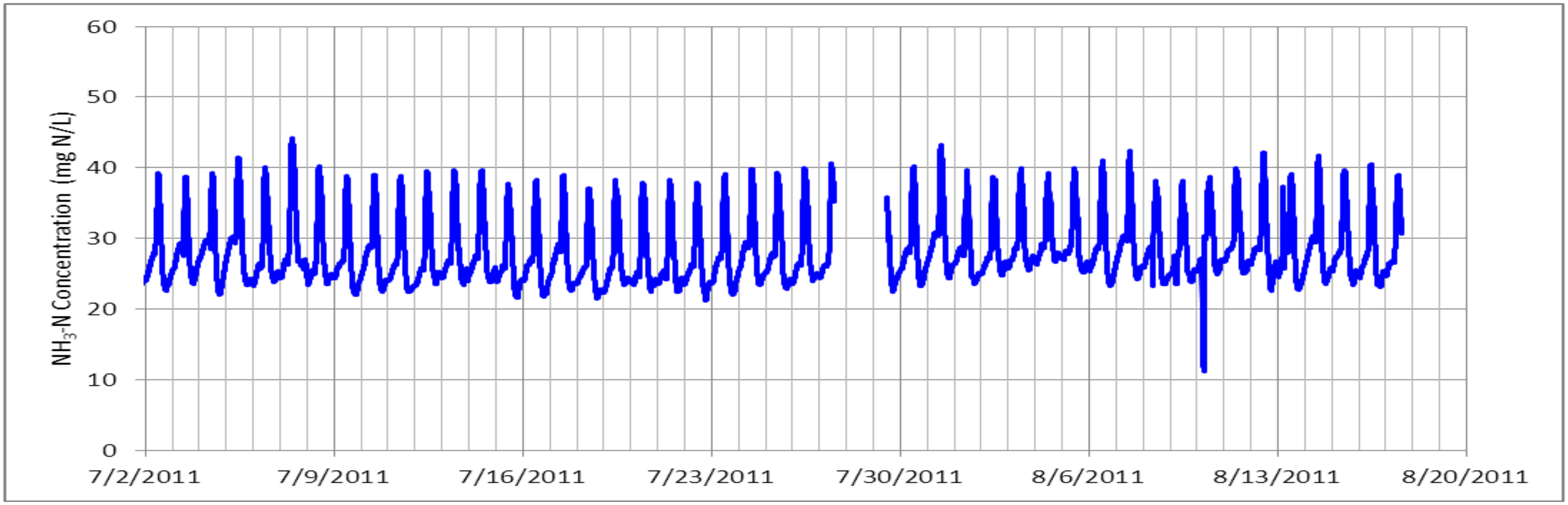


FIGURE 4 - Primary effluent NH_3-N concentrations from September 11, 2011 through October 25, 2011.

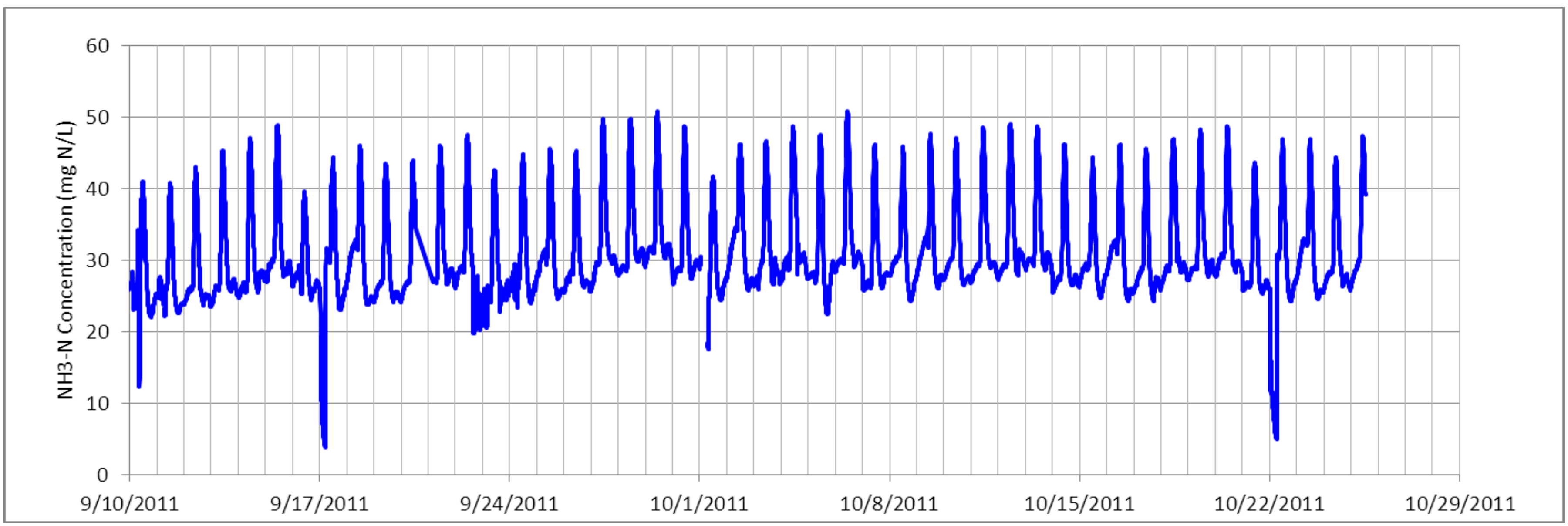


FIGURE 5 –Primary effluent diurnal NH3-N concentration diurnal profile on October 6, 2011.

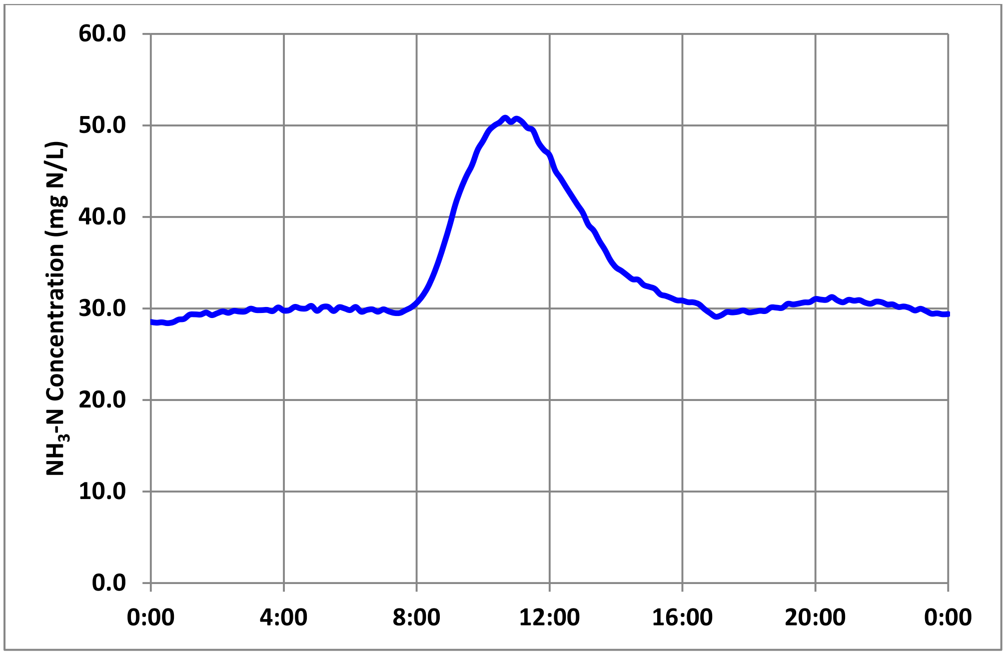
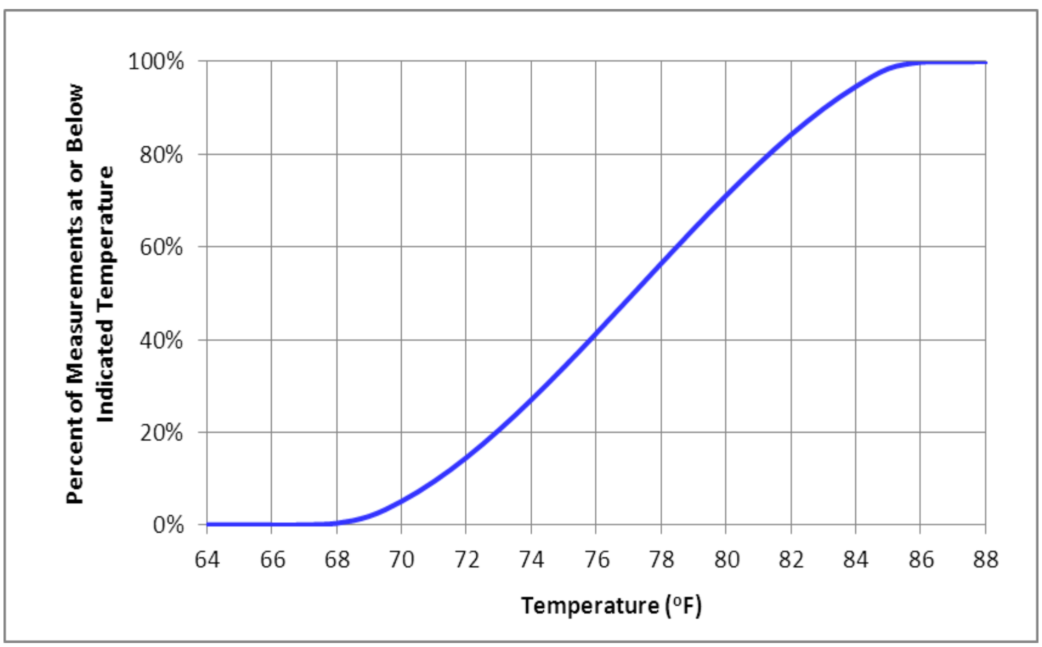


FIGURE 6 – Distribution of wastewater temperatures at San Jose Creek East, 1986 to 2011.



unacceptable NH_3-N bleed through events during the winter. Nevertheless, calculation of the equalization basin volume for temperatures up to 78°F provides information regarding the sensitivity of the required equalization volume to design temperature.

MLSS Concentrations

All maximum load and flow calculations assumed an MLSS concentration in the 1st Pass of 5000 mg/L. This is a median value for the period beginning July 2003, shortly after NDN was implemented at the SJCEWRP, and the end of 2011. MLSS concentrations in Passes 2, 3 and 4 were calculated within the spreadsheet tool using dilution factors determined from the primary effluent flow split and the RAS recycle ratio. The primary effluent flow split was set at 50%-30%-20% and the return activated sludge (RAS) recycle ratio was set at 90%. The 50%-30%-20% split is the target split that Operations attempts to maintain. The 90% RAS recycle ratio is an average for 2011.

The RAS ratio may increase in the future following completion of a project to upgrade the RAS return system. Limitations on the current RAS return rate results in the accumulation of solids in the clarifiers and the loss of nitrification capacity. The spreadsheet tool indicates that the NH_3-N removal capacity increases slightly at higher RAS recycle ratios provided that the 1st Pass MLSS is maintained at 5000 mg/L. The higher RAS recycle ratio reduces the dilution effects of the primary effluent addition at the beginning of the 2nd and 3rd passes. Thus the higher the RAS recycle ratio, the higher the MLSS in the downstream passes. The effect on the calculated equalization volumes, however, will be small.

DO Concentrations

Maximum load and flow rate calculations assumed that constant DO would be maintained in all aerated zones, including the swing zone in Pass 3, during the period of peak NH_3-N loading. Separate calculations were made for DO concentrations of 1.5 mg/L and 2.0 mg/L. A DO of 2.0 mg/L is considered to optimally balance the benefit of the higher ammonia oxidation rates that can be achieved as DO is increased, and the penalty of the additional energy cost incurred to maintain that higher DO. The ability to sustain a DO of 2 mg/L under peak NH_3-N loading conditions has not been demonstrated with the existing aeration facilities. Though aeration system modifications are being designed to provide better DO control, some uncertainty remains regarding whether the 2.0 mg/L target is achievable. Maximum load and flow estimates were therefore made for a DO of 1.5 mg/L to assess how much additional equalization volume might be needed if the 2.0 mg/L target is not attainable.

Secondary effluent NH_3-N objective

The secondary effluent NH_3-N objective defines the complete nitrification condition for the purpose of this analysis. Calculations made with the spreadsheet tool showed that the secondary effluent NH_3-N concentration objective affects the maximum NH_3-N load that can be successfully treated in the activated sludge process. The NH_3-N concentration in individual treatment zones correlates with the NH_3-N concentration at the end of the treatment unit. Raising the allowable NH_3-N level at the end of the treatment unit will result in higher NH_3-N levels throughout the unit. This in turn accelerates the NH_3-N removal rate in each aerobic zone and allows higher loadings to be nitrified.

Calculations for the maximum load and flow to secondary treatment were carried out at effluent NH_3-N concentrations of 0.2 mg N/L and 1.0 mg N/L. The 0.2 mg N/L objective represents the detection limit of the typical online NH_3-N analyzers, whereas the 1 mg N/L objective represents a realistic upper limit for successful operation of the sequential chlorination process.

RESULTS

The maximum NH_3-N loading rates that can be nitrified to meet secondary effluent NH_3-N objectives of 0.2 mg N/L and 1.0 mg N/L, respectively are summarized in Table 2. For each effluent objective, two maximum loading rates were calculated. One calculation assumed that the DO in each aerated zone at the time of peak loading is 1.5 mg/L. The other rate assumes a DO of 2 mg/L. Raising the operating DO from 1.5 mg/L to 2.0 mg/L increases the maximum NH_3-N loading rate that can be nitrified by 1,500 to 2,200 lb/day.

Equalization volumes were calculated for various combinations of temperature, secondary effluent NH_3-N objective, and aerated zone DO. The sensitivity of the equalization volume to these conditions can be seen in Figures 7 through 10. Table 3 lists the calculated equalization basin volumes for a wastewater temperature of 68°F.

TABLE 2 – Maximum NH_3-N load (lb/day) to secondary treatment that can be nitrified at the indicated wastewater temperatures and aerated zones DO.

Temperature (°F)	**Secondary Effluent Less Than 0.2 mg NH_3-N/L**		**Secondary Effluent Less Than 1.0 mg NH_3-N/L**	
	DO = 1.5 mg/L	DO = 2.0 mg/L	DO = 1.5 mg/L	DO = 2.0 mg/L
68	18,900	20,300	21,900	23,400
70	20,500	21,900	23,700	25,200
72	22,200	23,600	25,600	27,300
74	23,900	25,500	27,600	29,500
76	25,900	27,600	29,800	31,800
78	27,900	29,800	32,200	34,400

TABLE 3 - Calculated equalization basin volumes for wastewater at 68°F.

		EQUALIZATION VOLUME (millions of gallons)			
		For Sec Effluent NH_3-N ≤ 0.2 (mg N/L)		For Sec Effluent NH_3-N ≤ 1.0 (mg N/L)	
Average Daily Flow (MGD)	Peak Flow (MGD)	DO = 1.5 mg/L	DO = 2.0 mg/L	DO = 1.5 mg/L	DO = 2.0 mg/L
54.6	65.0	2.9	2.2	1.4	0.8
57.9	70.0	4.2	3.2	2.3	1.6
61.0	75.0	5.9	4.4	3.3	2.5
62.5	77.5	7.8	5.2	3.9	3.0
64.2	80.0	10.2	6.1	4.5	3.5

FIGURE 7 – Equalization volume required to maintain secondary effluent NH_3-N levels below 0.2 mg N/L when aerated zones are operated at 2.0 mg/L of DO

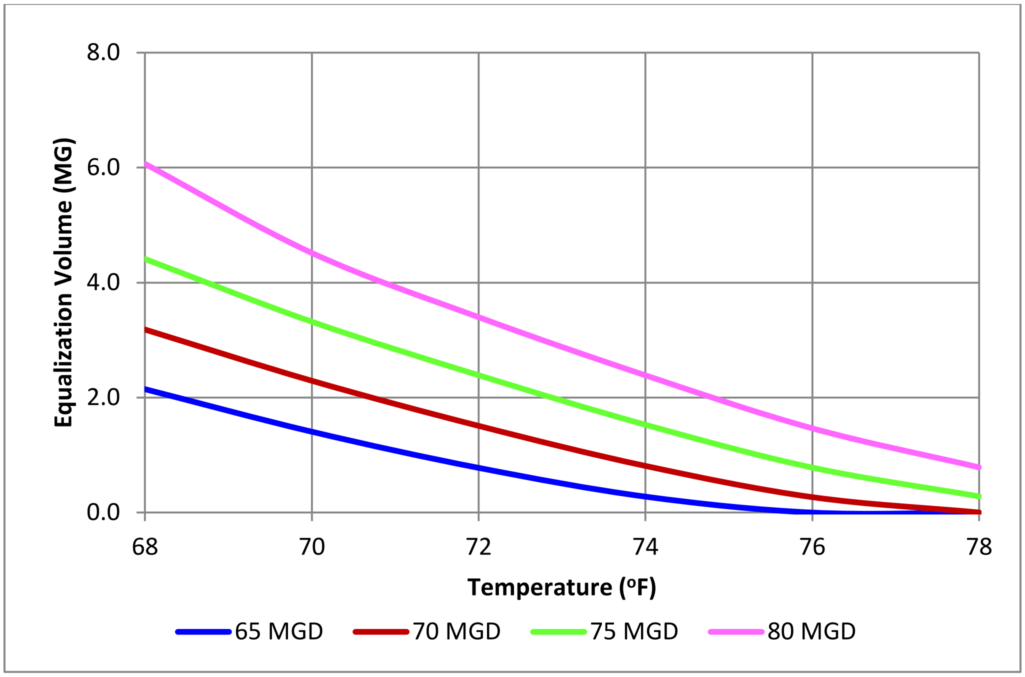


FIGURE 8 - Equalization volume required to maintain secondary effluent NH_3-N levels below 1.0 mg N/L when aerated zones are operated at 2 mg/L of DO

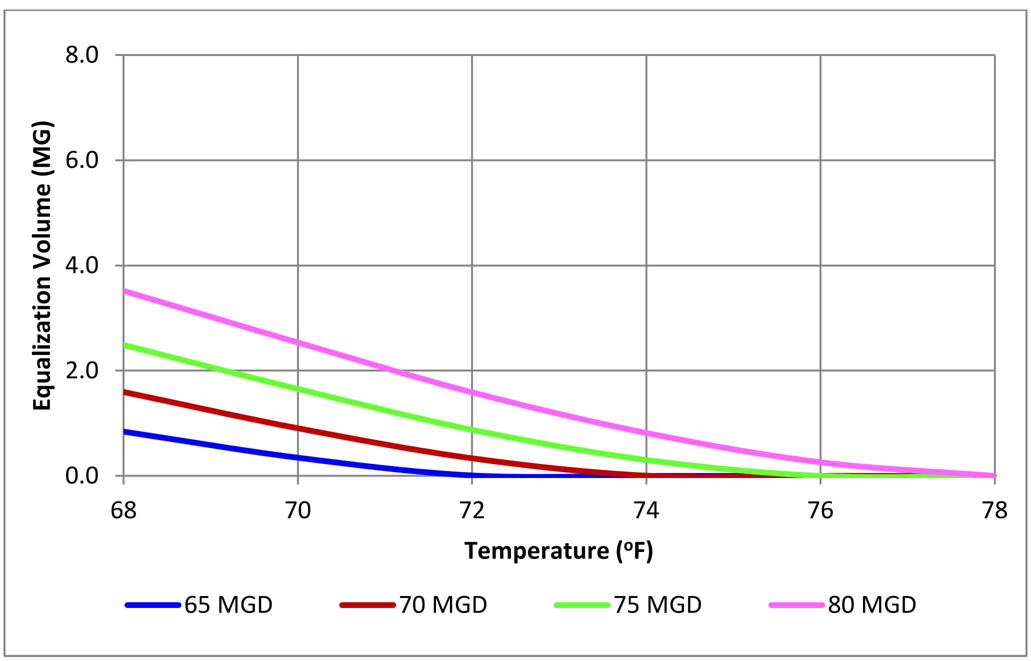


FIGURE 9 – Equalization volume required to maintain secondary effluent NH_3-N levels below 0.2 mg N/L when aerated zones are operated at 1.5 mg/L of DO.

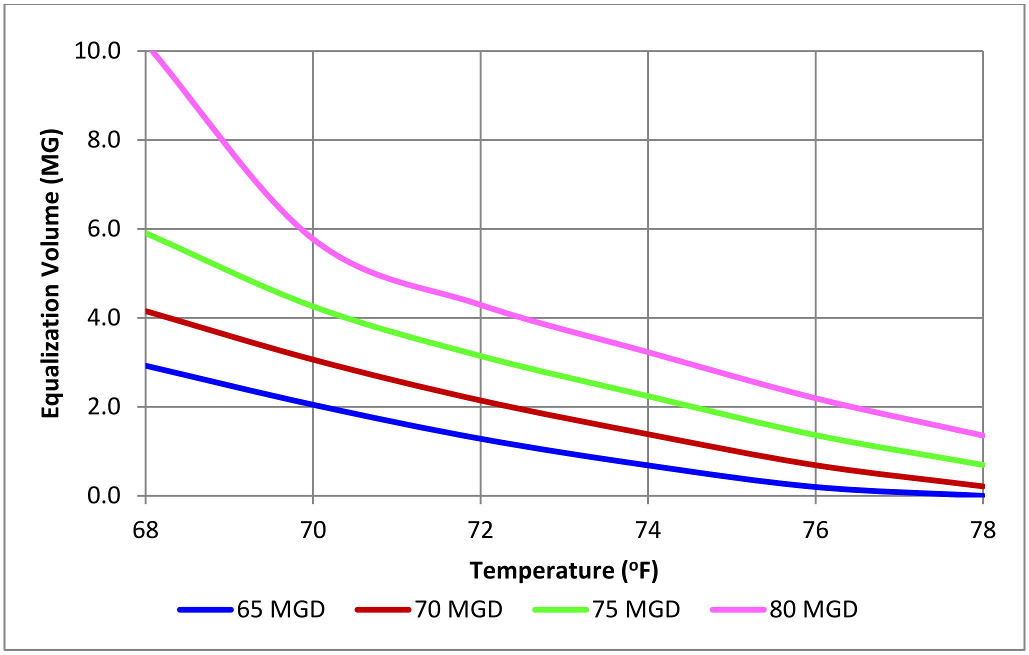
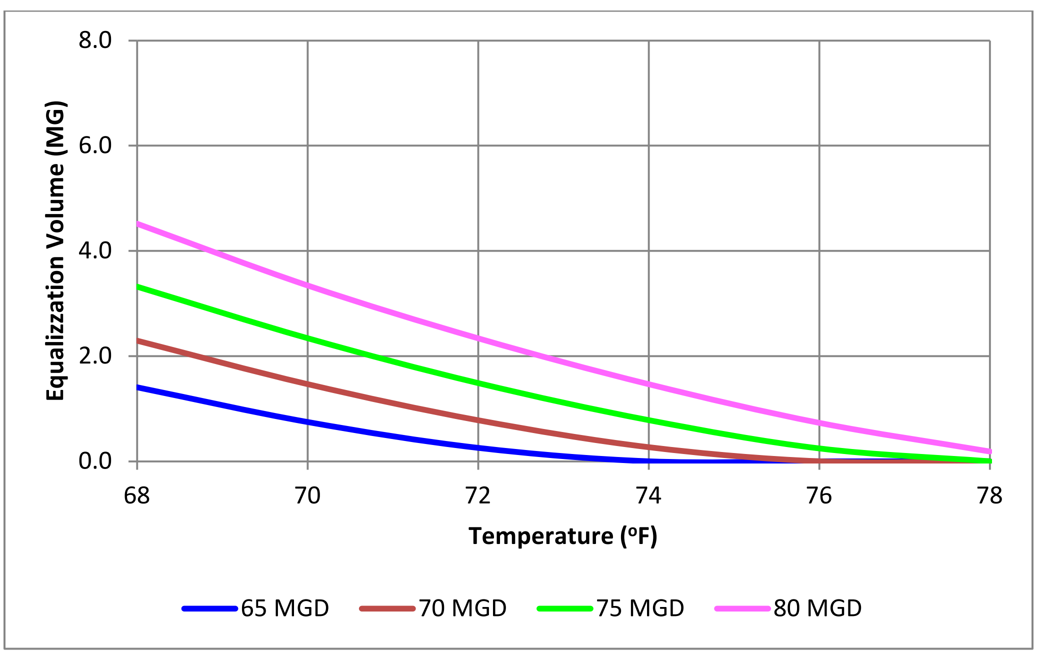


FIGURE 10 – Equalization volume required to maintain secondary effluent NH_3-N levels below 1.0 mg N/L when aerated zones are operated at 1.5 mg/L of DO.



SUMMARY AND RECOMMENDATIONS

This memorandum demonstrates the application of a spreadsheet tool to the problem of calculating the equalization volume needed at the SJCEWRP to enable successful implementation of sequential chlorination. Equalization volumes were calculated for wastewater temperatures ranging from 68^{o}F to 78^{o}F. Calculations assumed that aerated zones, including the swing zone in Pass 3, would be maintained at two DO levels, 1.5 or 2 mg/L. The MLSS concentration in the 1st pass was assumed to be 5,000 mg/L. The MLSS concentrations in other passes were determined using dilution factors based on a 50%-30%-20% split of primary effluent and a RAS recycle ratio of 90%. The equalization volume calculation also assumed the NH_3-N load accepted into the plant will be monitored in real time, and that controls will be installed to regulate the diversion of primary effluent to flow equalization tanks based upon the difference between the actual load and the system's ammonia removal capacity.

Diurnal flow pattern of primary effluent under current influent flow management practices at the SJCEWRP was analyzed and used as the basis calculating equalization volumes. The design average dry weather flow of 62.5 MGD corresponds to a peak dry weather flow of 77.5 MGD. Equalization basin volume calculations were made for a peak dry weather flow range of 65 to 80 MGD. Peak flows greater than 80 MGD were not considered in this exercise; it is infrequently that peak flows exceeded 80 MGD.

If the plant is operated to meet the most stringent target effluent NH_3-N objective of 0.2 mg N/L, i.e., no ammonia breakthrough at all times, a 5.2 MG basin would be required at the plant's average design flow conditions (62.5 MGD) and a wastewater temperature of 68^{o}F. This assumes that a DO of 2 mg/L can be maintained in all aerobic zones. If the aeration system can only maintain a 1.5 mg/L DO in the aerobic zones, a 7.8 MG basin would be needed.

Based on pilot testing results, free chlorine residual required to successfully operate the sequential chlorination process can be maintained for secondary effluent NH_3-N levels up to 1.0 mg N/L. Using 1.0 mg N/L as the effluent NH_3-N objective, a 3.0 MGD basin would suffice at 68^{o}F if a 2.0 mg/L DO can be maintained in all aerobic zones, at the plant's average design capacity (62.5 MGD). If the aeration system can only maintain a 1.5 mg/L DO in the aerobic zones, then a 3.9 MG flow equalization basin would be required.

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Twenty-Second Annual Status Report on Recycled Water

Fiscal Year 2010-2011

Sanitation Districts of Los Angeles County

Twenty-Second ANNUAL STATUS REPORT

ON

RECYCLED WATER USE

Fiscal Year 2010-11

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PREFACE

In addition to its mission of collecting, treating and disposing of municipal wastewater, the Sanitation Districts of Los Angeles County (Sanitation Districts) have adopted the goal of maximizing the beneficial reuse of the highly treated effluents produced by its water reclamation plants. The Sanitation Districts work with a number of local, regional, and state agencies and other entities in an effort to continue developing recycled water as a "local" water supply to supplement the area's limited groundwater and imported water supplies.

In response to many requests for information regarding various aspects of the Sanitation Districts' water reuse program, this fiscal year report has been prepared for distribution to interested parties. This report is the twenty-second of its kind and includes: historic recycled water use activities, descriptions of plant operations, diagrams of the various recycled water distribution systems, lists of the users and quantities used, tables of recycled water quality, and plans for expanding the use of recycled water, among other subjects.

This report is divided into five chapters. Chapter 1 is an overview of the Sanitation Districts' water reuse program. Chapters 2, 3, and 4 detail the water reuse activities at each of the Sanitation Districts' ten water reclamation plants, which are grouped in three geographic areas: Los Angeles Basin, Santa Clarita Valley, and Antelope Valley, respectively. Chapter 5 details the various proposed water recycling projects in the Sanitation Districts' service area that are currently under development or in the planning phase.

In order to improve the flow and readability of this report, the narrative descriptions of the more complicated distribution system facilities (Long Beach Water Department, City of Cerritos, City of Lakewood, Central Basin Municipal Water District's Century and Rio Hondo systems, Walnut Valley Water District, Puente Hills/Rose Hills system, Upper San Gabriel Valley Municipal Water District's Whittier Narrows Recreation Area Extension, and the Sanitation Districts' Eastern Agricultural Site in Lancaster) have been moved to their own individual appendices at the end of this report. The same has been done for the chronology of Sanitation Districts' reuse activities and all of the individual effluent quality tables.

A "Facts-at-a-Glance" summary page containing a brief list of data regarding the Sanitation Districts' water recycling program for the fiscal year appears before Chapter 1.

If you would like additional copies of this report (paper or electronic), or would like to comment on its contents, please contact Earle Hartling, Water Recycling Coordinator at (562) 908-4288, extension 2806, or by email at ehartling@lacsd.org. Further information regarding the Sanitation Districts and its water recycling activities can be found at the Sanitation Districts' website at *http://www.lacsd.org/waterreuse/*.

Cover Photo: Rose Hills Memorial Park is the largest such facility in North America. Beginning in 1998, recycled water from the San Jose Creek Water Reclamation Plant began being delivered for irrigation, first to the upper area from the distribution system serving the Sanitation Districts' Puente Hills Landfill (background), then to the lower area via the Upper San Gabriel Valley Municipal Water District's extension to the Central Basin Municipal Water District's Rio Hondo distribution system. Currently, over 900 acre-feet per year are used on nearly 600 acres of cemetery, consistently making Rose Hills one of the Sanitation Districts' ten largest reuse sites.

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SANITATION DISTRICTS

Total Effluent Produced: 442.43 MGD (495,766 AFY), 0.2% decrease
Total Recycled Water Produced: 163.92 MGD (183,678 AFY), 64.8% of capacity, 37.0% of the total produced, 0.6% increase
Total Recycled Water Used: 76.25 MGD (85,448 AFY), 46.5% of recycled water produced, 12.1% decrease, 649 sites (26 new sites added, 2 sites disconnected)

Groundwater replenishment (4) -	40.52 MGD (45,401 AFY)	52.4% of total reuse	19.2% decrease
Landscape irrigation (602) -	13.66 MGD (15,306 AFY)	18.2% of total reuse	0.4% decrease
Agriculture (11) -	12.13 MGD (13,591 AFY)	16.1% of total reuse	8.1% decrease
Industrial (20) -	2.79 MGD (3,131 AFY)	3.7% of total reuse	1.1% decrease
Environmental (1) -	7.15 MGD (8,012 AFY)	9.5% of total reuse	4.1% increase

Total Reuse Since Inception: 2,497,638 AF (813.6 billion gallons)

Transmission lines: 1,360,790 linear feet (258 miles)

Acreage Served: 14,387 acres (direct non-potable use)

Jurisdictions Served: 31 (30 cities plus Los Angeles County Unincorporated Areas)

Recycled Water Purveyors: 30

Recycled Water Contracts: 24

Chemical Savings[1]: $128,000

Greenhouse Gas Reduction[2]: 192,260 tons of carbon dioxide

Capacity of Future Planned Reuse Projects: 77,220 AFY (68.91 MGD)

JOINT OUTFALL SYSTEM

Total Effluent Produced: 402.46 MGD (450,980 AFY), 0.6% decrease
Total Recycled Water Produced: 123.95 MGD (138,891 AFY), 30.8% of the total produced, 0.1% decrease
Total Recycled Water Used: 56.97 MGD (63,842 AFY), 46.0% of recycled water produced, 15.3% decrease

SANTA CLARITA

Total Recycled Water Produced: 19.96 MGD (22,365 AFY), 1.8% decrease
Total Recycled Water Used: 0.300 MGD (337 AFY), 1.5% of recycled water produced, 9.4% decrease

ANTELOPE VALLEY

Total Wastewater Treated: 23.10 MGD, 1.7% decrease
Total Recycled Water Produced: 20.01 MGD (22,422 AFY), 3.5% increase
Total Recycled Water Used: 18.98 MGD (21,270 AFY), 94.9% of recycled water produced, 1.1% decrease

1 Recycled water delivered to the various distribution systems is not dosed with either sulfur dioxide or sodium bisulfate for dechlorination or with defoamant.

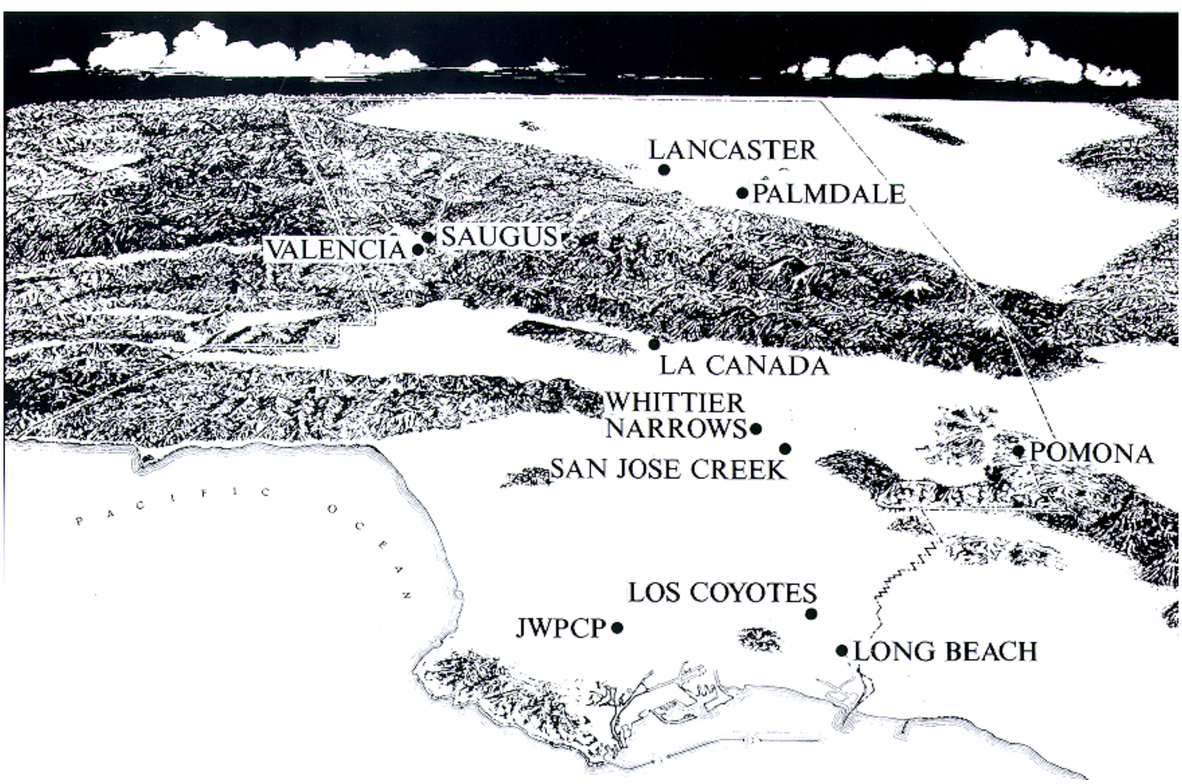
2 The use of locally produced recycled water eliminates the need to pump State Project water into the Los Angeles Basin at an energy cost of approximately 3,000 kWh/AF with the attendant CO_2 production.

1. OVERVIEW

1.1 Water Reclamation Activities

The Sanitation Districts of Los Angeles County (Sanitation Districts) operate 11 wastewater treatment facilities (Figure 1), 10 of which are classified as water reclamation plants (WRPs). These facilities serve approximately five million people in 78 cities and unincorporated areas within Los Angeles County. Effluent quality from the WRPs ranges from undisinfected secondary quality recycled water to filtered, disinfected tertiary quality recycled water. During Fiscal Year 2010-11 (FY 10-11), Sanitation Districts' facilities produced an average of 442.43 million gallons per day (MGD), or 495,766 acre-feet per year (AFY) of effluent, which is a decrease of 0.2% from the preceding fiscal year, and a 17.4% decrease from the historic peak of FY 89-90. Following this peak, total average effluent flow had decreased by 11% in FY 91-92 as a result of widespread water conservation in response to a drought-induced, statewide water crisis, as well as an economic recession. After the drought ended in 1992, overall effluent flows increased, due in part to population growth, a healthier economy, and the easing of conservation measures in response to the improved statewide water supply situation. Total effluent flow peaked again in 1998 due to the extremely heavy, El Niño generated rainfall. Since 1999, total flow production has continued decreasing despite population growth in the Sanitation Districts' service area. The 14.5% decrease in effluent production since FY 04-05 is a result of a downturn in local economic activity combined with increasing water conservation efforts (low flow toilets, waterless urinals, water efficient washing machines, etc.) due to a three-year statewide drought (2006-09). Effluent production at Sanitation Districts' facilities is currently at levels last seen in the late 1970s.

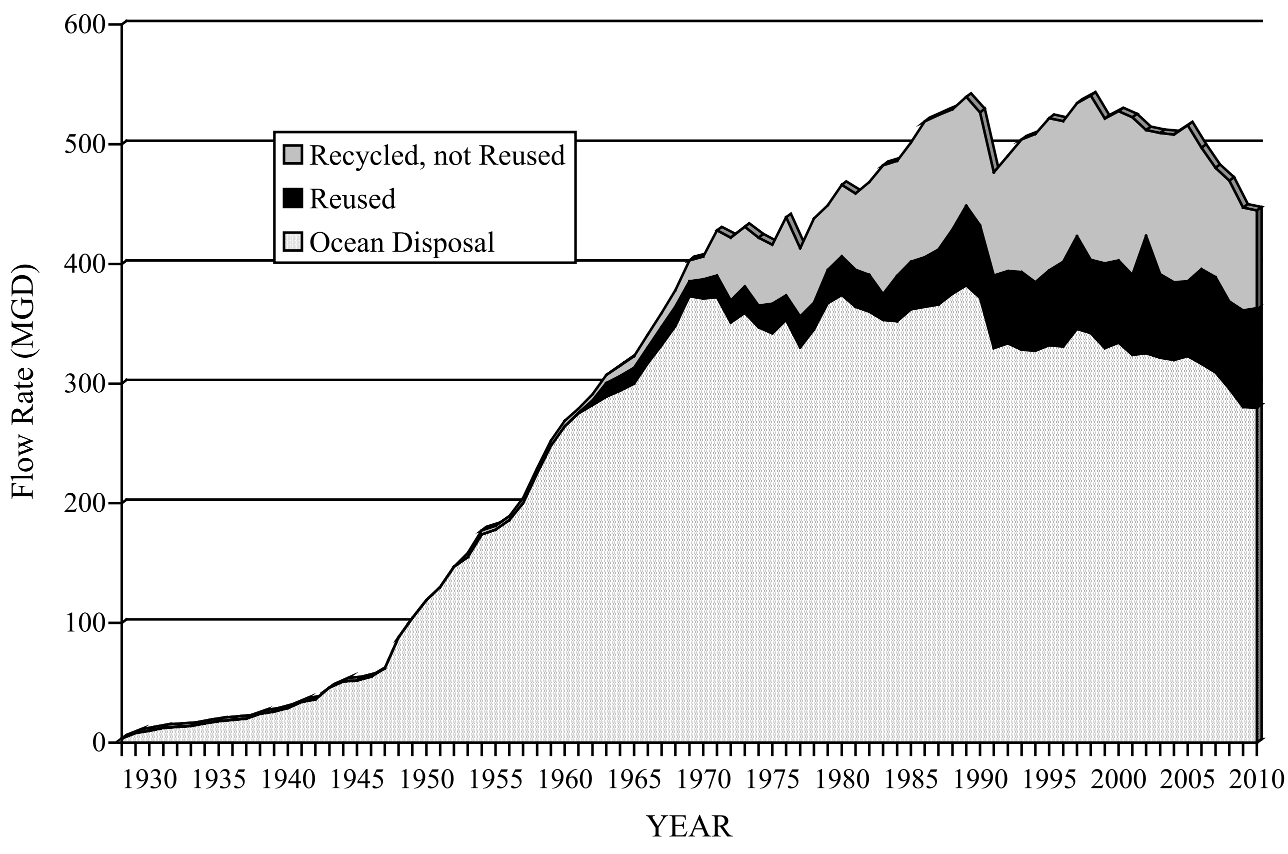
Figure 1
Location of Sanitation Districts' Wastewater Treatment Facilities



Capacity at the ten Sanitation Districts' WRPs is 252.8 MGD (283,285 AFY) as of the end of FY10-11. However, of the total effluent produced, only 163.92 MGD (183,678 AFY) consisted of recycled water available for reuse from these 10 facilities (64.8% of capacity). This amount is 37.0% of the total amount of effluent produced, and an increase of 0.6% over the preceding fiscal year. The remaining 278.51 MGD (312,089 AFY) was effluent discharged to the ocean from the Sanitation Districts' Joint Water Pollution Control Plant (JWPCP) in the City of Carson, a 0.7% decrease from the preceding fiscal year.

For the past half century, the Sanitation Districts have diverted high quality wastewater flows away from direct ocean disposal to the upstream WRPs in order to provide recycled water supplies for eventual reuse, as illustrated in Figure 2 (data through the end of calendar year 2010). Discharge to the ocean (lower band on graph) has steadily decreased since the WRPs in the Los Angeles Basin (i.e., the Joint Outfall System, or JOS) were built in the early 1970's, while additional needed treatment capacity has been added to the WRPs (the combined upper two bands on the graph). Significant drops in effluent production occurred in 1977 and 1991 in response to serious droughts. A similar drop in effluent production has been occurring since 2006 when the current water crisis in the State became apparent and conservation actions began to be implemented. The majority of these decreases came from the JWPCP, while the upstream WRPs were able to maintain a relatively high level of production, which contributed to recycled water's reputation as being "drought-proof." The center band represents the recycled water produced by the WRPs that is actually being put to beneficial use, while the upper band represents the remaining recycled water that is currently being discharged to rivers, but has the potential to be beneficially reused.

FIGURE 2
SANITATION DISTRICTS' FLOW DIVERSION TO RECYCLING
1928-2010



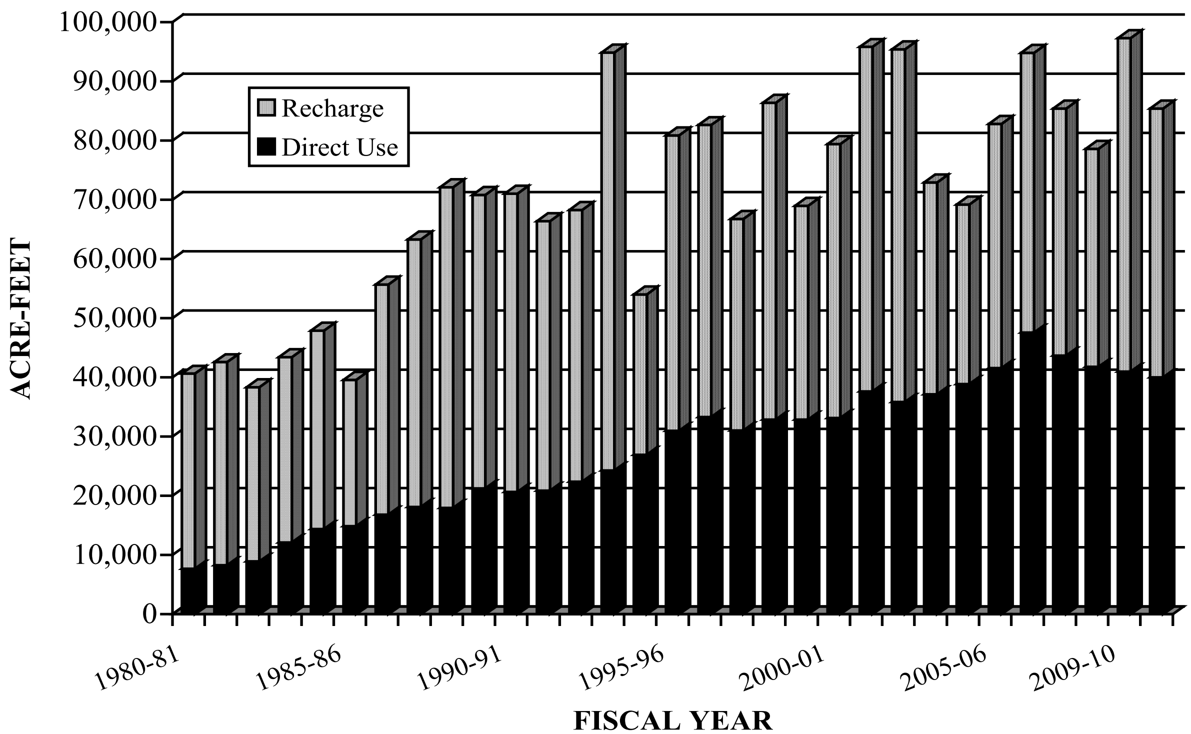
Of the total amount of recycled water produced, 76.256 MGD (85,448 AFY) was actively reused for a variety of applications including urban landscape irrigation, agricultural irrigation, industrial process water, recreational impoundments, wildlife habitat maintenance, and groundwater replenishment. The amount of recycled water produced and reused at each of the WRPs and the percent change from the preceding fiscal year is summarized in Table 1. The amount reused was 46.5% of the recycled water produced, a 12.1% decrease from the preceding fiscal year, which had seen higher than normal reuse volumes. During FY 10-11, 23 new landscape irrigation and three non-irrigation reuse sites began receiving Sanitation Districts' recycled water.

TABLE 1
RECYCLED WATER PRODUCED AND REUSED AT WATER RECLAMATION PLANTS
FISCAL YEAR 2010-11

Water Reclamation Plant	Nominal Treatment Capacity (AFY)	Quantity Recycled (AFY)	Percent Change from FY 09-10 (+/-)	Quantity Reused (AFY)	Percent Change from FY 09-10 (+/-)	Percent of Recycled Water Used
La Cañada	225	106	-0.9	106	-0.9	100
Long Beach	28,015	21,052	+2.7	6,428	-1.9	30.5
Los Coyotes	42,020	23,388	-13.6	5,617	-4.1	24.0
Pomona	16,810	10,089	+7.4	7,620	-7.5	75.6
San Jose Creek	112,055	75,555	-1.7	35,740	-27.5	47.3
Whittier Narrows	16,810	8,701	+64.1	8,330	+57.1	95.7
Valencia	24,205	16,749	-3.9	337	-9.4	2.0
Saugus	7,285	5,616	+5.0	0	0	0
Lancaster	19,050	13,323	+2.0	13,277	+1.6	99.7
Palmdale	16,810	9,099	+6.5	7,993	-5.2	87.8
TOTAL	283,285	183,678	+0.05	85,448	-12.1	46.5

The amount of recycled water used for replenishment of the underground water supply can vary greatly from year to year, depending on the amount and timing of rainfall runoff, maintenance activities in the spreading grounds, and other factors, as illustrated by the upper bar in Figure 3. The long-term trend of recycled water usage is best represented by the increase in direct, non-potable reuse for landscape and agricultural irrigation, industrial process supply, and environmental enhancement. The lower bar on Figure 3 shows the steady growth of annual average daily demand for direct, non-potable reuse through FY 10-11.

FIGURE 3
DIRECT NON-POTABLE REUSE VS. GROUNDWATER RECHARGE
1980-81 TO 2010-11



1.2 WATER RECYCLING PROJECTS

In 1970, prior to the droughts of 1976-77 and 1987-92, there were six reuse customers using 21 MGD on 940 acres (consisting of both irrigable acres and recharge basins). By the end of the subject fiscal year, there were a total of 649 reuse sites on approximately 14,387 acres, utilizing approximately 1,360,790 linear feet (about 258 miles) of transmission pipelines in 30 cities. This usage includes one city employing a water truck to haul recycled water to various greenbelt areas and occasional private water trucks hauling recycled water to construction sites. Table 2 summarizes the approximate length of distribution system pipelines (where applicable), the amount of recycled water used by each of the water recycling projects (detailed in later sections), the percent change from the preceding fiscal year, and the number of new reuse sites added to that recycling project over the past fiscal year. Figure 4 shows the increase in the number of reuse sites receiving recycled water from the Sanitation Districts from 1970 to mid- 2011.

Cities with Sites Using Sanitation Districts' Recycled Water

Bellflower	Norwalk
Bell Gardens	Palmdale
Cerritos	Paramount
Compton	Pico Rivera
Cudahy	Pomona
Diamond Bar	Rowland Heights
Downey	Santa Clarita
El Monte	Santa Fe Springs
Huntington Park	Signal Hill
Industry	South El Monte
La Cañada	South Gate
Lakewood	Vernon
Lancaster	Walnut
Long Beach	West Covina
Lynwood	Whittier

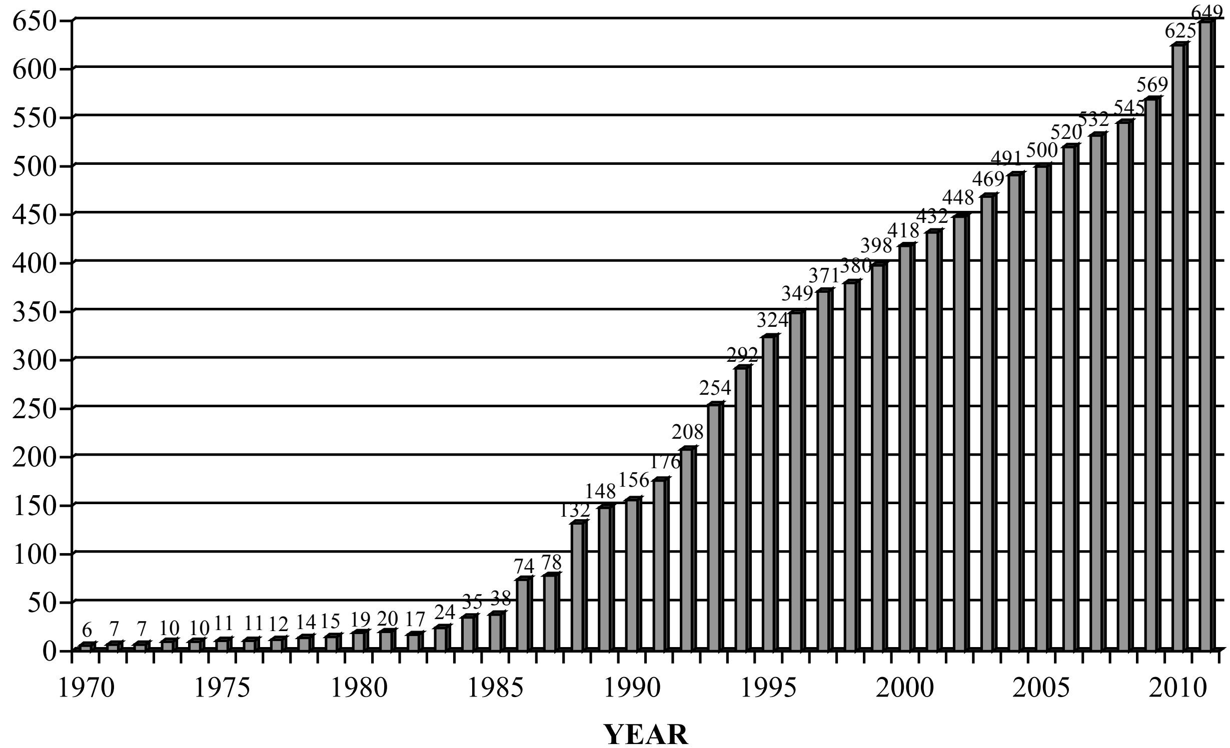
Note: Recycled water is also used in areas of Unincorporated Los Angeles County

Table 2
Recycled Water Used by Water Recycling Project
Fiscal Year 2010-11

Project Name	Pipeline Length (linear feet)	Recycled Water Used (AFY)	Percent Change from FY 09-10 (+/-)	No. of New Reuse Sites
La Cañada-Flintridge Country Club		106	-0.9	
Long Beach Water Department	176,630	4,056	-5.1	2
Alamitos Seawater Barrier		2,372	+4.1	
City of Bellflower	1,900	42	-19.2	
City of Cerritos	142,600	1,823	-2.6	
City of Lakewood	28,300	443	-0.2	
Central Basin MWD (Century)	292,500	3,309	-5.1	2
Pomona Water Department	37,000	1,347	-28.3	
Spadra Landfill		350	-9.1	
Walnut Valley Water District	166,320	1,168	-5.6	2
Water Replenishment District		43,029	-41.8	
City of Industry	44,350	957	-18.9	
Rowland Water District	97,680	75	+8.7	18
California Country Club		423	-10.2	
LA Sanchez Nursery		12	0	
Central Basin MWD (Rio Hondo)	138,900	227	+8.6	
Puente Hills/Rose Hills	8,900	2,109	-6.2	
USGVMWD Rio Hondo Extension	11,020	544	-12.4	
F.L. Norman's Nursery[1]		17	-29.2	
Whittier Narrows Recreation Area	18,900	1,432	+149.0	
Castaic Lake Water Agency	16,490	337	-9.4	1
Piute Pond		8,012	+4.1	
Nebeker Ranch	15,900	4,111	-1.9	
Apollo Community Regional Park	23,800	206	+5.1	
Eastern Agricultural Site	96,600	947	-3.2	
City of Lancaster	29,800	1	-90.0	1
Los Angeles World Airports Lease	13,200	7,993	-5.2	
TOTALS	1,360,790	85,448	-12.1	26

1. Site ceased operations in April 2011.

FIGURE 4
INCREASE IN NUMBER OF REUSE SITES
1970-2011



During FY 10-11, 34.156 MGD (38,274 AFY) was used for groundwater replenishment from the San Jose Creek and Whittier Narrows WRPs. Approximately 1,534,463 acre-feet (AF) of recycled water from these two plants have been used to recharge the Central Basin aquifer since August 1962, when the Whittier Narrows WRP was commissioned, through the end of FY 10-11. Another 4.244 MGD (4,755 AFY) of effluent discharged from the Pomona WRP to the San Jose Creek Channel was credited toward indirect groundwater recharge, after estimating how much of this discharge was lost to the ocean during the winter storm season. In the past, this flow stream was not included in the total amount of recycled water used, since most of it entered groundwater via incidental recharge upstream of the spreading grounds. However, because this flow stream is credited against the allowable amount to be recharged, it has been included in the total amount of water actively reused, beginning in FY 94-95.

More recycled water is typically used for groundwater recharge (via surface spreading) than for all other applications combined because of its cost-effectiveness. The San Jose Creek, Whittier Narrows, and Pomona WRPs discharge to rivers or creeks (i.e., flood control channels) that can convey the water by gravity to existing off-stream recharge basins. These basins and the unlined portions of the rivers and creeks permit large volumes of recycled water to percolate by gravity into the aquifer. Recycled water used in this way requires no additional capital improvement and related operation and maintenance (O□M) costs or any energy consumption for pumping.

There was another source of replenishment water during FY 10-11, as the Alamitos Seawater Intrusion Barrier received 2.116 MGD (2,372 AFY) of recycled water originating from the Long Beach WRP and treated to an advanced level (see details in Section 2.2.2). Even though the purpose of this facility is to prevent seawater from moving inland and contaminating the groundwater aquifer, most of the injected water (roughly 80□) moves inland and becomes part of the region□s drinking water supply. Due to operational limitations, the full capacity of the Leo Vander Lans advanced treatment plant that supplies the Alamitos Barrier is still not being realized.

During FY 10-11, the total of 40.516 MGD (45,401 AFY) that went to groundwater replenishment was a 19.2% decrease from the preceding fiscal year. Of the total amount of water reused during FY 10-11, 52.4% went for groundwater replenishment, which is only the second time in the past seven years that this reuse application has made up more than half of total reuse. Concerns over the potential for a fish kill of a colony of non-native *Tilapia* fish living in effluent from the San Jose Creek WRP discharged to the lined portion of the San Gabriel River had previously prevented that effluent source from being diverted directly into the San Gabriel Coastal Spreading Grounds, necessitating that it continue to be discharged to the lined portion of the river instead. However, modifications were made at the spreading ground diversion gate that allowed it to be partially closed. In March 2009, a partial closure of the gate was initiated, with the degree of closure being increased incrementally over the following months to a point where the majority of flow in the Outfall was being diverted for recharge. The small amount of effluent being discharged to the lined portion of the San Gabriel River is sufficient to sustain the fish until a permanent solution for this invasive species can be found.

The remainder of the recycled water usage was divided between four broad categories of direct usage:

- A total of 602 of the individual reuse sites used recycled water for some form of landscape irrigation, and approximately 13.659 MGD (15,306 AFY), or 18.2% of the total water reused, went toward this application. These sites include 104 parks, 101 schools, 195 commercial and office buildings (e.g., offices, warehouses, retail, car dealerships, hotels, restaurants, etc.), 107 roadway greenbelts, 27 public facilities (e.g., police station, post office, libraries, landfills, etc.), 23 golf courses, 21 nurseries, 17 residential developments, 11 churches, and 7 cemeteries.

- Agricultural usage at 11 reuse sites accounted for approximately 12.129 MGD (13,591 AFY), or 16.1% of the total reused.

- Twenty-one industrial applications of recycled water (which include carpet dyeing, oil field injection, power plant cooling towers, metal finishing, street sweeping, sewer flushing, and construction applications such as dust control and concrete mixing) totaled 2.794 MGD (3,131 AFY), or 3.7% of the total reused.

- Approximately, 7.150 MGD (8,012 AFY), or 9.5% of the total reused, went to environmental enhancement of a wildlife habitat (Piute Ponds) in the Mojave Desert.

TOP TEN LARGEST DIRECT REUSE SITES OF 2010-11*

1. **Antelope Valley Farms** **7,887 AFY**
   Palmdale WRP *(agricultural irrigation of alfalfa)*
2. **Nebeker Ranch** **4,111 AFY**
   Lancaster WRP *(agricultural irrigation of alfalfa)*
3. **Alamitos Intrusion Barrier** **2, 372 AFY**
   Long Beach WRP *(seawater barrier injection)*
4. **THUMS** **1,160 AFY**
   Long Beach WRP *(oil zone repressurization)*
5. **Puente Hills Landfill** **1,005 AFY**
   San Jose Creek WRP *(irrigation & dust control)*
6. **Industry Hills Recreation Area** **957 AFY**
   San Jose Creek WRP *(landscape irrigation)*
7. **Eastern Agricultural Site** **947 AFY**
   Lancaster WRP *(agricultural irrigation of alfalfa)*
8. **Rose Hills Memorial Park** **910 AFY**
   San Jose Creek WRP *(landscape irrigation)*
9. **Whittier Narrows Recreation Area** **798 AFY**
   Whittier Narrows WRP *(landscape irrigation)*
10. **Bonelli County Regional Park** **740 AFY**
    Pomona WRP *(landscape irrigation)*

** excluding discharge-based reuse applications of groundwater recharge by spreading and Piute Ponds*

Table 3 lists the number of sites in each category of use, along with total acreage and average daily usage. Figure 5 shows the distribution of reuse flows among these various applications.

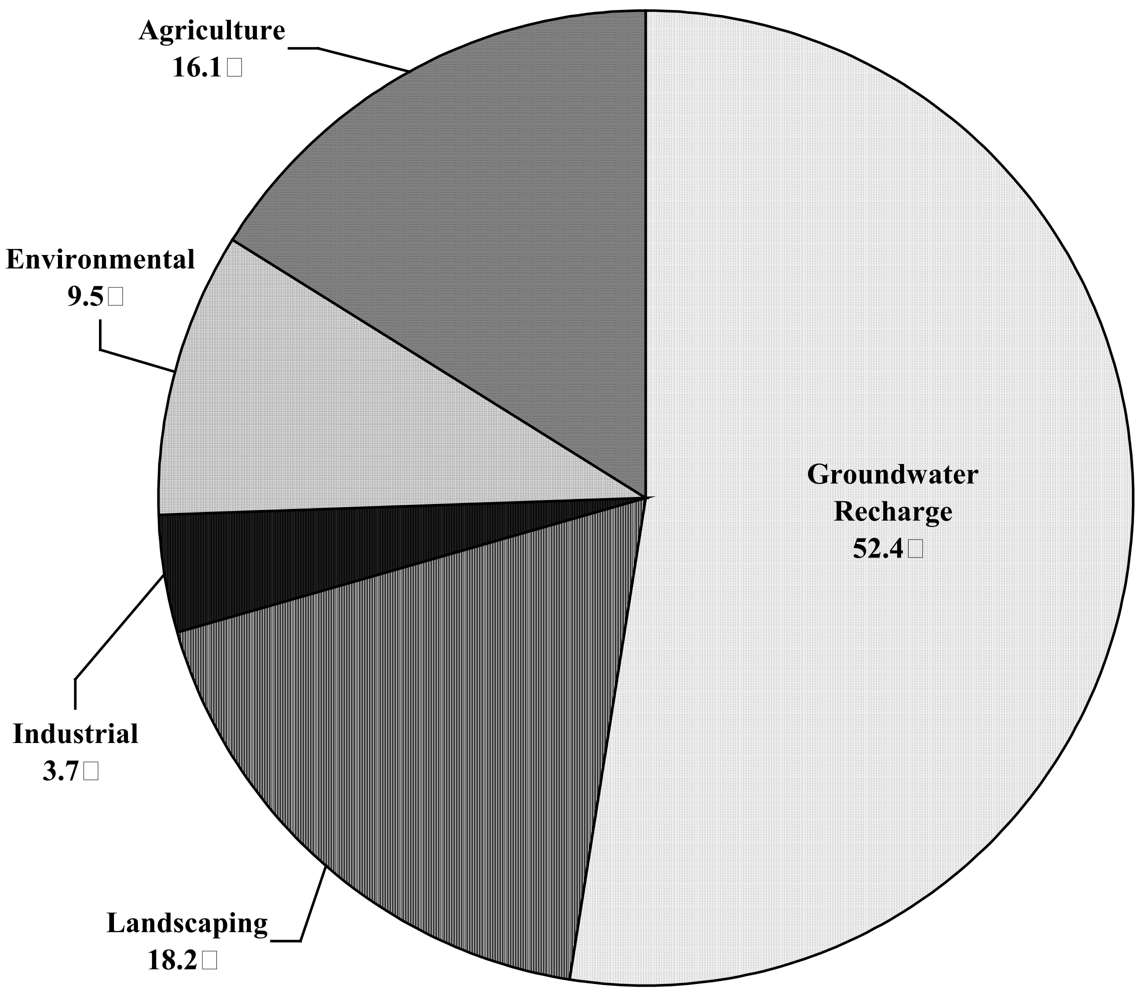
TABLE 3
CATEGORIES OF RECYCLED WATER USAGE
FISCAL YEAR 2010-11

Reuse Application	No. of Sites	Area Applied (acres)	Usage (MGD)
Parks	104	3,458.9	3.770
Golf Courses	23	2,665.8	3.999
Schools	101	1,203.7	1.548
Roadway Greenbelts	107	640.8	0.907
Public Facilities[1]	27	494.0	1.100
Commercial Buildings[2]	195	426.4	0.896
Nurseries	21	134.5	0.130
Cemeteries	7	701.4	1.037
Residential Developments	17	114.3	0.236
Churches	11	12.5	0.036
Industrial[3]	21	157.5	2.794
Agriculture[4]	10	3,977.0	12.129
Environmental Enhancement	1	400	7.150
SUBTOTAL	645	14,386.8	35.732
Groundwater Recharge	4	646	40.516
TOTAL	649	15,032.8	76.248

NOTES:

1. "Public Facilities" includes police stations, libraries, post offices, city halls, government offices, landfills, etc.
2. "Commercial Buildings" includes offices, warehouses, retail, car dealerships, hotels, restaurants, etc.
3. Industrial processes receiving recycled water include paper manufacturing, carpet dyeing, concrete mixing, cooling, oil field injection, construction applications such as soil compaction and dust control, and process equipment testing at the Alamitos Barrier Advanced Treatment Plant.
4. California Polytechnic University, Pomona, while technically a school, uses most of its recycled water for agricultural purposes and is thus included in this category.

FIGURE 5
DISTRIBUTION OF RECYCLED WATER USAGE
FISCAL YEAR 2010-11



1.3 ECONOMIC AND ENVIRONMENTAL IMPACTS

At the end of FY 10-11, the Sanitation Districts had 24 contracts (four pending initial deliveries) for the sale and/or delivery of recycled water produced at its facilities. Actual O&M and energy costs incurred by the Sanitation Districts while operating the pump stations on behalf of the purchasers of recycled water are also fully recovered through these contracts. Since the recycled water delivered to the various distribution systems was not dosed with either sulfur dioxide or sodium bisulfate for dechlorination or with defoamant, an estimated $128,000 in chemical savings was realized at the five Sanitation Districts' tertiary WRPs located in the JOS and at the Valencia WRP in the Sanitation Districts' Santa Clarita Valley Joint Sewerage System (SCVJSS).

Table 4 compares selected potable water rates and recycled water rates (in effect as of the end of FY 10-11), illustrating the savings realized by the end users. Table 5 lists all of the current recycled water purveyors.

TABLE 4
POTABLE VS. RECYCLED WATER RATES
FISCAL YEAR 2010-11

Purveyor	Potable Water ($/AF)	Recycled Water ($/AF)	Discount (%)
Long Beach Water Department	1,062.43	531.43 – 744.00	30 – 50
City of Cerritos	614.20	326.70	47
City of Lakewood	945.25	444.31	53
Central Basin MWD	805.00 – 915.00	283.00 – 506.00	31 – 63
Pomona Water Department	962.68	521.67	46
Walnut Valley Water District	1,019.30	649.04	36
Rowland Water District	1,010.59	635.98	37
San Gabriel Valley Water Co.	899.95	220.00 – 771.62	14 – 76
Valencia Water Company	609.40	511.83	16

To put things into perspective, the 85,448 AF of water reused in FY 10-11 is equivalent to the water supply for a population of 427,240, between the cities of Virginia Beach, VA and Atlanta, GA, the 39th and 40th largest cities in the U.S.[3] The use of locally produced recycled water reduces the need to pump State Project water over the Tehachapi Mountains at a net energy cost of roughly 3,000 kilowatt-hours (kWh) per acre-foot.[4] Thus, approximately 256.3 million kWh of electricity were conserved in FY 10-11, which is equivalent to the annual output of a 29.3-megawatt power plant consuming nearly 140,000 barrels of oil. At $0.15/kWh (based on Southern California Edison residential billing rate), this equates to an annual savings of approximately $38.5 million in electricity. At $94.94/barrel,[5] this equates to an annual savings of approximately $13.2 million in oil.

The conservation of fossil fuels and energy also resulted in significant reductions in potential air pollutants. During FY 10-11, 147.4 tons of nitrogen oxide, 25.6 tons of carbon monoxide, 15.4 tons of sulfur oxides, 5.1 tons of particulates, and 1.3 tons of reactive organic gases were kept out of the atmosphere.[6] Perhaps more important, the use of local recycled water avoided the production of approximately 192,300 tons of carbon dioxide, a greenhouse gas that contributes to global warming.[7]

Table 6 summarizes the water, energy, chemicals, and air pollutant savings realized by the use of local recycled water sources.

3 2010 Census.
4 "Refining Estimates of Water-Related Energy Use in California," California Energy Commission, December 2006.
5 June 30, 2011 spot price for "West Texas Intermediate crude oil".
6 Estimates based upon emission factors from "Power Plant Fuel Use and Emissions," South Coast Air Quality Management District, May 1986.
7 Estimate based upon data from "Compilation of Air Pollutant Emission Factors, Vol. 1: Stationary Point and Area Sources," USEPA, January 1995.

Table 5
Recycled Water Purveyors

City of Long Beach 1800 East Wardlow Road Long Beach, CA 90807-4994 (562) 570-2300	City of Paramount 16400 Colorado Avenue Paramount, CA 90723 (562) 220-2020	Central Basin Municipal Water District 6252 Telegraph Road Commerce, CA 90040-2512 (323) 201-5555
City of Cerritos Bloomfield at 183rd Street Cerritos, CA 90701 (562) 860-0311	City of Santa Fe Springs 11710 Telegraph Road Santa Fe Springs, CA 90670 (562) 868-0511	Park Water Company 9750 Washburn Road Downey, CA 90241 (562) 923-0711
City of Lakewood 5050 North Clark Avenue Lakewood, CA 90714 (562) 866-9771	City of Downey 9252 Stewart □ Gray Road Downey, CA 90242 (562) 904-7202	Bellflower Municipal Water Systems 16913 Lakewood Blvd. Bellflower, CA 90706 (562) 531-1500
City of Bellflower 16600 Civic Center Drive Bellflower, CA 90706 (562) 804-1424	City of Whittier 13250 East Penn Street Whittier, CA 90602 (562) 945-8215	Bellflower-Somerset Mutual Water Co. 10016 Flower Street Bellflower, CA 90706 (562) 866-9980
City of Industry P.O. Box 3366 Industry, CA 91744 (626) 333-2211	City of South Gate 4244 Santa Ana Street South Gate, CA 90280 (323) 563-5795	Golden State Water Company 11469 Rosecrans Avenue Norwalk, CA 90650 (562) 907-9200
City of Pomona 505 South Garey Avenue Pomona, CA 91766 (909) 620-2253	City of Lynwood 11330 Bullis Road Lynwood, CA 90262 (562) 603-0220	San Gabriel Valley Water Company 11142 Garvey Avenue El Monte, CA 91733 (626) 448-6183
City of Cudahy 5220 Santa Ana Street Cudahy, CA 90201 (323) 773-5143	City of Norwalk 12700 Norwalk Boulevard Norwalk, CA 90650 (562) 929-2677	City of Huntington Park 6900 Bissell Street Huntington Park, CA 90255 (323) 584-6323
Walnut Valley Water District 271 South Brea Canyon Road Walnut, CA 91789 (909) 595-1268	Rowland Water District 3021 S. Fullerton Road Rowland Heights, CA 91748 (562) 697-1726	Upper San Gabriel Valley MWD 11310 East Valley Boulevard El Monte, CA 91731 (626) 423-2297
City of Pico Rivera 6615 Passons Boulevard Pico Rivera, CA 90660-1016 (562) 801-4462	Castaic Lake Water Agency 27234 Bouquet Canyon Road Santa Clarita, CA 91350 (661) 297-1600	Valencia Water Company 24631 Avenue Rockefeller Valencia, CA 91355 (661) 294-0828
City of Vernon 4305 Santa Fe Avenue Vernon, CA 90058 (323) 583-8811	City of Lancaster 615 West Avenue H Lancaster, CA 93534 661-945-6863	Los Angeles Co. Waterworks No. 40 900 S. Fremont Avenue Alhambra, CA 91803 (626) 458-5100

TABLE 6
WATER, ENERGY, CHEMICAL, AND AIR POLLUTANT SAVINGS FROM RECYCLED WATER USAGE - FISCAL YEAR 2010-11

Category	Units	Savings
Water Supply	acre-feet	85,448
Water Supply	No. of People	427,240
Energy	kilowatt-hours	256,344,000
Energy	megawatts	29.3
Energy	barrels of oil	138,914
Electricity	dollars	38,451,600
Petroleum	dollars	13,188,495
WRP chemicals	dollars	128,000
Nitrogen oxide	tons	147.4
Carbon monoxide	tons	25.6
Sulfur oxides	tons	15.4
Particulates	tons	5.1
Reactive organic gases	tons	1.3
Carbon dioxide	tons	192,258

1.4 SUMMARY

Of the 442.43 MGD of treated effluent produced by the Sanitation Districts, 163.92 MGD (37.0%) was treated to a suitable level for reuse, with 76.256 MGD (17.2%) actually being reused at 649 individual sites in 30 cities for numerous diverse applications (with slightly more than half of the reuse being for groundwater replenishment). Effluent production continued to decrease due to increased conservation and reduced commercial/industrial activity. The top 10 largest direct reuse sites (less than 2% of all sites, excluding recharge and environmental) used almost 25% of the recycled water delivered during the fiscal year. Twenty-six new reuse sites were added during FY 10-11; however, the amount of recycled water used decreased by 12.1% from the preceding fiscal year mostly due to a decrease in the amount of groundwater replenishment. The use of 85,448 AF of locally produced recycled water essentially resulted in the conservation of the water supply needs of nearly half a million people, and in significant reductions in treatment plant chemical usage, water rates for end users, energy consumption, and air pollution.

Since the official beginning of the Sanitation Districts' water recycling program in August 1962 with the start-up of the Whittier Narrows WRP, approximately 2,497,638 AF (813.6 billion gallons) of recycled water produced by Sanitation Districts' facilities have been beneficially used. This use of recycled water has avoided the release of approximately 5.62 million tons of carbon dioxide and 5,695 tons of other air pollutants into the atmosphere.

All of the currently active reuse sites, along with their acreage, start-up dates, applications, and quantities of recycled water used for FY 10-11 are presented chronologically in Table 7. A chronology of significant events in the Sanitation Districts' reuse programs is presented at the end of this report in Appendix A. Final effluent quality for each of the Sanitation Districts' tertiary WRPs is presented in Appendix B.

TABLE 7
SUMMARY OF FISCAL YEAR 10-11 RECYCLED WATER USAGE
(PAGE 1 OF 12)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Water Replenishment District (WNWRP)	Aug 62	--	R	6.141	6,881
La Ca□ada-Flintridge Country Club (La Ca□ada)	Oct 62	105	L,P	0.095	106
Apollo Lakes Community Regional Park (Lancaster)	Jun 69	56	L,P	0.184	206
Water Replenishment District (SJCWRP)	Jun 71	--	R	28.015	33,933
Cal Poly, Pomona-Kellogg (Pomona)	Dec 73	500	AG,L,O,P,AF	0.469	526
Lanterman Hospital (Pomona)	Dec 73	100	AG	0	0
South Campus Drive Parkway (Pomona)	Dec 73	8	L	0.010	11
Route 57 and 10 Freeways (Pomona)	May 75	18	L	0.020	23
Bonelli Regional County Park (San Dimas)	Apr 77	789	L	0.660	740
California Country Club (Industry)	Jun 78	120	L,P	0.378	423
Ironwood 9 Golf Course (Cerritos)	Nov 78	25	L,P	0.083	93
Caruthers Park (Bellflower)	Nov 78	5	L	0.038	42
El Dorado Park West (Long Beach)	Aug 80	135	L	0.128	144
El Dorado Golf Course (Long Beach)	Aug 80	150	L	0.223	249
Suzanne Park (Walnut)	Oct 80	12	L	0.014	16
Route 71 and 10 Freeways (Pomona)	Apr 81	12	L	0.036	40
Piute Ponds (Lancaster)	May 81	400	E	7.150	8,012
Recreation Park (Long Beach)	Oct 82	26	L	0.042	47
Recreation Golf Course (Long Beach)	Oct 82	149	L	0.197	221
Norman□s Nursery (El Monte)	Mar 83	20.2	O	0.016	17
Whaley Park (Long Beach)	Jun 83	9	L	0.017	19
Industry Hills Recreation Area (Industry)	Aug 83	600	L,P	0.854	957
El Dorado Park East (Long Beach)	Jan 84	300	L	0.326	365
Nature Center (Long Beach)	Jan 84	60	L	0.058	64
605 Freeway at Wardlow (Long Beach)	Feb 84	50	L	0.028	32
Heartwell Park (Long Beach)	Feb 84	120	L	0.131	147
Skylinks Golf Course (Long Beach)	Apr 84	155	L,P	0.228	255
Douglas Park (Long Beach)	Apr 84	3	L	0.003	4
405 Freeway at Atherton (Long Beach)	May 84	5	L	0.00001	0.01
DeMille Junior High School (Long Beach)	Jun 84	5	AF,L	0.0004	0.4
Heartwell Golf Park (Long Beach)	Jun 84	30	L	0.060	68
Spadra Landfill landscape (Pomona)	Jul 84	53	L	0.240	269
Spadra Landfill dust control (Pomona)	Jul 84	--	I	0.010	11
Veterans Memorial Stadium (Long Beach)	Jan 85	6	AF	0.021	24
Harrington Farms Pistachio Orchard (Palmdale)	Apr 85	23	AG	0.082	92
Recreation Park Bowling Green (Long Beach)	Aug 85	3	L	0.004	5
California State University, Long Beach	Dec 85	52	AF,L	0.112	125
Long Beach City College (Long Beach)	Feb 86	15	AF,L	0.022	25
Recreation 9-Hole Golf Course (Long Beach)	Mar 86	37	L	0.059	66
Blair Field (Long Beach)	Apr 86	5	AF	0.010	12
Woodlands Park (Long Beach)	Apr 86	7	L	0.011	12
Colorado Lagoon Park (Long Beach)	Apr 86	4	L	0.003	4
Marina Vista Park (Long Beach)	Apr 86	30	L	0.027	30
Suzanne Middle School (Walnut)	May 86	4	AF,L	0.012	13
Walnut High School (Walnut)	May 86	15	AF,L	0.019	21
Vejar School (Walnut)	May 86	3	AF,L	0.010	11
Morris School (Walnut)	May 86	9	AF,L	0.009	10
Snow Creek Park (Walnut)	May 86	7	L	0.011	12
Snow Creek Landscape Maintenance Dist. (Walnut)	May 86	13.5	L	0.036	41
Lemon Creek Park (Walnut)	May 86	5	L	0.005	6
Friendship Park (West Covina)	May 86	6	L	0.007	8
Hollingworth School (West Covina)	May 86	3	AF,L	0.007	8
Lanesboro Park (West Covina)	May 86	2	L	0.007	7
Rincon Middle School (West Covina)	May 86	3	AF,L	0.008	9

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

Table 7
Summary of Fiscal Year 10-11 Recycled Water Usage
(Page 2 of 12)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Route 57 and 60 Freeways (Rowland Heights)	May 86	19.7	L	0.035	39
Rowland Heights Reg. Co. Park (Rowland Heights)	May 86	11	L	0.012	13
Rowland High School (Rowland Heights)	May 86	9	AF,L	0.020	23
Killian Elementary School (Rowland Heights)	May 86	3	AF,L	0.005	6
Walnut Elementary School (Walnut)	May 86	4	AF,L	0.001	1
WUSD Administrative Service Center (Walnut)	May 86	4	L	0.002	3
Walnut Ranch Park (Walnut)	Jun 86	26	L	0.019	22
Amar Road greenbelt (Walnut)	Jun 86	16	L	0.015	17
Diamond Bar Golf Course (Diamond Bar)	Jul 86	174	L,P	0.165	185
Walnut Ridge Landscape Maintenance Dist. (Walnut)	Mar 87	25.5	L	0.030	34
Morningside Park (Walnut)	Mar 87	4	L	0.004	4
Gateway Corporate Center (Diamond Bar)	Jun 87	45	L	0.045	51
Library Civic Center (Cerritos)	Dec 87	4	L	0.014	16
Olympic Natatorium (Cerritos)	Dec 87	6	L	0.016	18
Whitney Learning Center (Cerritos)	Dec 87	10	AF,L	0.019	21
Gonsalves Elementary School (Cerritos)	Dec 87	5	AF,L	0.014	16
Wittman Elementary School (Cerritos)	Dec 87	5	AF,L	0.009	10
Gahr High School (Cerritos)	Dec 87	28	AF,L	0.053	60
Area Development Project No. 2 (Cerritos)	Jan 88	11.5	L,P	0.055	61
Medians Parkways (Cerritos)	Jan 88	42.8	L	0.145	162
605 Freeway (Cerritos)	Jan 88	58.6	L	0.131	147
91 Freeway (Cerritos)	Jan 88	70	L	0.036	41
Frontier Park (Cerritos)	Jan 88	2.5	L	0.008	9
Carmenita Junior High School (Cerritos)	Jan 88	5	AF,L	0.017	19
Cerritos Elementary School (Cerritos)	Jan 88	6	AF,L	0.017	20
Stowers Elementary School (Cerritos)	Jan 88	6	AF,L	0.022	25
Kennedy Elementary School (Cerritos)	Jan 88	7	AF,L	0.021	24
City Park East (Cerritos)	Jan 88	18	L	0.040	45
Satellite Park (Cerritos)	Jan 88	2	L	0.005	5
Leal Elementary School (Cerritos)	Jan 88	6	AF,L	0.010	11
Cerritos High School (Cerritos)	Jan 88	20	AF,L	0.039	44
Elliott Elementary School (Cerritos)	Jan 88	7	AF,L	0.013	14
Carmenita Park (Cerritos)	Jan 88	4.5	L	0.012	14
Juarez Elementary School (Cerritos)	Jan 88	7	AF,L	0.019	21
ABC Adult School Office (Cerritos)	Jan 88	3	L	0.014	15
Tracy Education Center (Cerritos)	Jan 88	6	AF,L	0.003	3
Liberty Park (Cerritos)	Jan 88	20	L	0.069	77
Gridley Park (Cerritos)	Jan 88	9	L	0.019	21
Jacob Park (Cerritos)	Jan 88	4.5	L	0.012	13
Heritage Park (Cerritos)	Feb 88	12	L	0.034	38
Bragg Elementary School (Cerritos)	Feb 88	7	AF,L	0.023	26
Haskell Junior High School (Cerritos)	Feb 88	18	AF,L	0.039	44
Pat Nixon Elementary School(Cerritos)	Feb 88	5	AF,L	0.009	10
Cabrillo Lane Elementary School (Cerritos)	Feb 88	9	AF,L	0	0
Sunshine Park (Cerritos)	Feb 88	3.5	L	0.008	9
Friendship Park (Cerritos)	Feb 88	4	L	0.008	9
Bettencourt Park (Cerritos)	Feb 88	2	L	0.005	5
Brookhaven Park (Cerritos)	Feb 88	2	L	0.006	7
Saddleback Park (Cerritos)	Feb 88	2	L	0.005	5
Westgate Park (Cerritos)	Feb 88	4	L	0.007	8
Rainbow Park (Cerritos)	Mar 88	2.5	L	0.007	8
Bellflower Christian School (Cerritos)	Mar 88	31.4	AF,L	0.034	38
Cerritos Community College (Cerritos)	Mar 88	55	AF,L	0.074	83
Cerritos Regional County Park (Cerritos)	Apr 88	59	L	0.109	122

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

TABLE 7
SUMMARY OF FISCAL YEAR 10-11 RECYCLED WATER USAGE
(PAGE 3 OF 12)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Artesia Cemetery District (Cerritos)	Apr 88	10.9	L	0.022	24
Rosewood Park (Cerritos)	Apr 88	2.7	L	0.008	9
20659 E. Valley Blvd. (Walnut)	May 88	7	O	0.0001	0.01
Nebeker Ranch (Lancaster)	Jun 88	600	AG	3.668	4,111
Lakewood 1st Presbyterian Church (Long Beach)	Sep 88	1	L	0.001	1
Westhoff Elementary School (Walnut)	Sep 88	8	AF,L	0.006	6
Tree Farm (Palmdale)	Feb 89	46	O	0.012	13
Virginia Country Club (Long Beach)	Mar 89	135	L,P	0.077	86
Lakewood Golf Course (Long Beach)	Mar 89	128	L,P	0.272	305
Scherer Park (Long Beach)	Mar 89	24	L	0.031	35
Sports Complex (Cerritos)	Mar 89	25	AF,L	0.045	51
Sunnyside Memorial Park (Long Beach)	Apr 89	35	L	0.071	79
All Soul's Cemetery (Long Beach)	Apr 89	40	L	0.104	116
Cherry Avenue Park (Long Beach)	May 89	10	L	0.011	13
River (Rynerson) Park (Lakewood)	Aug 89	40	L	0.064	72
Monte Verde Park (Lakewood)	Aug 89	4	L	0.051	58
Mae Boyer Park (Lakewood)	Aug 89	8	L	0.032	35
Jose Del Valle Park(Lakewood)	Aug 89	12	L	0.026	29
Jose San Martin Park (Lakewood)	Aug 89	9.3	L	0.021	23
City Water Yard (Lakewood)	Aug 89	1	L	0.010	11
Woodruff Avenue greenbelt (Lakewood)	Aug 89	4.1	L	0.011	12
South Street greenbelt (Lakewood)	Aug 89	3.3	L	0.009	10
Mayfair Park (Lakewood)	Dec 89	18	L	0.039	44
Shoemaker On/Off Ramp - 91 Freeway (Cerritos)	Dec 89	4.6	L	0.013	14
Temple Avenue greenbelt (Walnut)	Jan 90	1	L	0.001	1
Transpacific Development Co. (Cerritos)	Feb 90	6.9	L	0.010	11
Automated Data Processing (Cerritos)	Feb 90	0.7	L	0.004	4
Sheraton Hotel (Cerritos)	Mar 90	0.6	L	0.003	4
Walnut Tech Business Center (Walnut)	Apr 90	1	L	0.002	2
Cerritos Pontiac/GMC Truck (Cerritos)	May 90	0.5	L	0.001	1
Moothart Chrysler (Cerritos)	May 90	0.4	L	0.005	6
St. Joseph Parish School (Lakewood)	Aug 90	3.5	AF,L	0.010	11
Foster Elementary School (Lakewood)	Sep 90	6	AF,L	0.016	18
Windjammer Off Ramp - 91 Freeway	Sep 90	0.8	L	0.002	2
Browning Oldsmobile (Cerritos)	Sep 90	0.1	L	0.001	1
Civic Center Way and City Hall	Nov 90	2.8	L	0.014	16
Los Coyotes Diagonal(Long Beach)	Mar 91	1	L	0.001	1
City Water Truck (Cerritos)	May 91	--	L	0.0003	0.4
Private Haulers (Cerritos)	May 91	--	I	0	0
Parkside Condominiums (Cerritos)	May 91	1.8	L	0.006	6
Mayfair High School (Lakewood)	May 91	36.5	AF,L	0.041	46
Wilson High School	Jun 91	5	AF,L	0.022	24
Concordia Church (Cerritos)	Jun 91	4	L	0.005	6
Church of the Nazarene (Cerritos)	Aug 91	1	L	0.003	4
B&B Stables (Cerritos)	Aug 91	18	I	0.005	5
Lemon Avenue greenbelt (Walnut)	Sep 91	4.3	L	0.006	7
Lindstrom Elementary School (Lakewood)	Sep 91	12	AF,L	0.014	15
Lakewood High School (Lakewood)	Sep 91	25	AF,L	0.024	27
Shadow Park Homeowner's Association (Cerritos)	Nov 91	6	L	0.014	16
South Coast AQMD Headquarters (Diamond Bar)	Nov 91	2	L	0.005	5
Long Beach Water Department office	Jan 92	2	L	0.002	2
Reservoir Park (Signal Hill)	Feb 92	2	L	0.009	10
Burroughs Elementary School (Signal Hill)	Feb 92	4	AF,L	0.003	3
Andy's Nursery (Bellflower)	Feb 92	9	O	0	0

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

TABLE 7
SUMMARY OF FISCAL YEAR 10-11 RECYCLED WATER USAGE
(PAGE 4 OF 12)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Lake Center Park (Santa Fe Springs)	Mar 92	8	L	0.018	20
Lake Center School (Santa Fe Springs)	Mar 92	8	AF,L	0.016	18
Clarkman Walkway (Santa Fe Springs)	Mar 92	0.1	L	0.0003	0.3
Hughes Middle School (Long Beach)	Apr 92	3	AF,L	0.013	15
405 Freeway at Walnut (Long Beach)	Apr 92	9	L	0.008	9
Area Development Project No. 6 (Cerritos)	Apr 92	9	L	0.056	63
Towne Center Walkway (Santa Fe Springs)	Apr 92	0.1	L	0.0003	0.3
Lakeview Child Care (Santa Fe Springs)	May 92	0.2	L	0.001	2
Orr □ Day Road medians (Santa Fe Springs)	May 92	0.1	L	0.00002	0.03
Somerset Park (Long Beach)	May 92	3	L	0.001	1
Longfellow Elementary School (Long Beach)	May 92	1	AF,L	0	0
Granada Park Homeowners Association (Cerritos)	May 92	3.8	L	0.013	15
Walnut Valley Water Dist. reservoir (Diamond Bar)	May 92	1	L	0.005	6
Florence Avenue medians (Santa Fe Springs)	Jun 92	3	L	0.005	6
Gauldin Elementary School (Downey)	Jun 92	8.4	AF,L	0.005	5
Rio San Gabriel School (Downey	Jun 92	14.8	AF,L	0.014	16
Bellflower High School (Bellflower)	Jul 92	28.4	AF,L	0.063	70
Ernie Pyle Elementary School (Bellflower)	Aug 92	4.9	AF,L	0.012	13
Telegraph Road medians (Santa Fe Springs)	Aug 92	0.5	L	0.003	3
Lakeview Park (Santa Fe Springs)	Aug 92	6.7	L	0.011	12
Clark Estate (Santa Fe Springs)	Aug 92	4.3	L	0.005	5
Towne Center Green (Santa Fe Springs)	Aug 92	2.3	L	0.006	7
Pioneer Road medians (Santa Fe Springs)	Sep 92	0.4	L	0.030	34
Police Station (Santa Fe Springs)	Sep 92	0.2	L	0.001	1
Aquatic Center (Santa Fe Springs)	Sep 92	0.5	L	0.004	4
Lewis School (Downey)	Nov 92	4.6	AF,L	0.005	6
Wilderness Park (Downey)	Nov 92	24	L	0.092	103
First Chinese Baptist Church (Walnut)	Dec 92	0.3	L	0.002	2
605 Freeway at Foster (Bellflower)	Jan 93	14	L	0	0
Promenade Walkway (Santa Fe Springs)	Jan 93	0.3	L	0.001	1
Rio San Gabriel Park (Downey)	Jan 93	6.4	L	0.032	36
East Middle School (Downey)	Jan 93	26	AF,L	0.017	19
Zinn Park (Bellflower)	Jan 93	1.7	L	0.003	4
Cerritos Post Office (Cerritos)	Feb 93	0.7	L	0.005	6
605□105 Interchange (Bellflower)	Feb 93	22	L	0.0001	0.1
Hollywood Sports Center (Bellflower)	Feb 93	22.5	L	0.002	2
Santa Fe Springs High School (Santa Fe Springs)	Feb 93	14.5	AF,L	0.023	25
605□5 Freeway at Florence (Santa Fe Springs)	Feb 93	17	L	0.0002	0.2
Center for the Performing Arts (Cerritos)	Mar 93	1	L	0.004	4
Old Downey Cemetery (Downey)	Apr 93	7.5	L	0.026	30
Thompson Park (Bellflower)	Apr 93	15	L	0.014	16
105 Freeway at Bellflower (Downey)	May 93	17.9	L	0.009	10
Palms Park (Lakewood)	May 93	20	L	0.003	3
Crawford Park (Downey)	Jul 93	2.1	L	0.006	7
Humedo Nursery (Downey)	Aug 93	11	O	0.005	6
105 Freeway at Lakewood (Downey)	Sep 93	25	L	0.003	4
Shaw Industries Carpet Mill (Santa Fe Springs)	Sep 93	--	I	0.076	85
Palms Elementary School (Lakewood)	Sep 93	3.5	AF,L	0.012	13
Artesia High School (Lakewood)	Sep 93	20.9	AF,L	0.033	37
West Middle School (Downey)	Oct 93	19.5	AF,L	0.015	17
Circle Park (South Gate)	Oct 93	4	L	0.013	15
Burger King restaurant (Diamond Bar)	Oct 93	0.2	L	0.001	1
Majestic Mgmt., 19850 E. Business Pkwy (Walnut)	Nov 93	0.8	L	0.004	4
General Electric, 19705 E. Business Pkwy. (Walnut)	Nov 93	1.6	L	0.006	7

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

TABLE 7
SUMMARY OF FISCAL YEAR 10-11 RECYCLED WATER USAGE
(PAGE 5 OF 12)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Hollydale Park (South Gate)	Nov 93	46	L	0.112	126
Delta Dental (Cerritos)	Nov 93	1.8	L	0.002	2
Cal Poly LandLab (Pomona)	Nov 93	2.5	AG,L	0.013	15
Rodeo Ridge Estates (Walnut)	Dec 93	6.3	L	0.005	6
Robertson's Ready-Mix (Santa Fe Springs)	Dec 93	--	I	0.005	5
710/105 Interchange (Paramount)	Dec 93	18.5	L	0	0
Downey/Contreras greenbelt (Paramount)	Dec 93	0.1	L	0.0003	0.3
Compton Golf Course (Paramount)	Dec 93	13	L	0.021	24
Alondra Junior High School (Paramount)	Dec 93	14	AF,L	0.012	14
Mokler Elementary School (Paramount)	Dec 93	10	AF,L	0.009	11
Los Cerritos Elementary School (Paramount)	Dec 93	8	AF,L	0.011	12
Wirtz Elementary School (Paramount)	Dec 93	9	AF,L	0.011	12
Keppel Elementary School (Paramount)	Dec 93	4	AF,L	0.002	3
Billy Lee Nursery (Paramount)	Dec 93	2.5	O	0.008	9
Golden Springs Drive medians (Diamond Bar)	Jan 94	1.3	L	0.005	6
105 Freeway at Wright (Lynwood)	Jan 94	19.6	L	0.001	2
710 Freeway at M.L. King (Lynwood)	Jan 94	15.5	L	0	0
710 Freeway at Rosecrans (Compton)	Jan 94	24.2	L	0.007	8
Independence Park (Downey)	Feb 94	10.4	L	0.011	13
Paramount Park (Paramount)	Feb 94	9	L	0.022	24
Paramount High School (Paramount)	Feb 94	19	AF,L	0.021	23
Southern California Edison nursery (Cerritos)	Mar 94	3.5	O	0.004	5
Walnut Hills Village Shopping Center (Walnut)	Mar 94	2.4	L	0.004	5
Rosecrans/Paramount medians (Paramount)	Mar 94	0.2	L	0.002	2
Somerset medians (Paramount)	Apr 94	0.9	L	0.005	6
Rio Hondo Golf Course (Downey)	Apr 94	92.4	L	0.193	216
Zimmerman Park (Norwalk)	Apr 94	9.5	L	0.015	17
Vista Verde Park (Norwalk)	Apr 94	6.5	L	0.012	14
Gerdes Park (Norwalk)	Apr 94	8.6	L	0.015	17
Clearwater Junior High School (Paramount)	Apr 94	4	AF,L	0.031	35
Vestar Development (Cerritos)	Jun 94	9.6	L	0.035	39
Steam Engine Park (Paramount)	Jun 94	0.6	L	0.001	1
5 Freeway at Shoemaker/Firestone (Norwalk)	Jul 94	0.8	L	0.003	4
Spane Park (Paramount)	Jul 94	5	L	0.008	9
Orange/Cortland Parkway (Paramount)	Jul 94	1.3	L	0.002	3
Carpenter School (Downey)	Aug 94	7.4	AF,L	0.007	7
Brookside Equestrian Center (Walnut)	Aug 94	13.6	L	0.003	3
Field, S/W corner Norwalk/Telegraph (S.F. Springs)	Aug 94	5.2	L	0.010	11
Washington Elementary School (Whittier)	Sep 94	5	AF,L	0.007	3
605 Freeway at Beverly (Whittier)	Sep 94	30	L	0.044	50
John Anson Ford Park (Bell Gardens)	Sep 94	45	L	0.054	60
Ramona Park (Norwalk)	Oct 94	4.8	L	0.004	4
Alondra median (Paramount)	Oct 94	0.6	L	0.007	8
Imperial/Wright Road medians (Lynwood)	Oct 94	0.2	L	0.001	1
Walnut Valley Water District Office (Walnut)	Oct 94	0.2	L	0.002	2
Cattelus Development (Walnut)	Oct 94	18.9	L	0.016	18
Circuit City, 501 Cheryl Lane (Walnut)	Oct 94	1	L	0.007	8
Dreyer's Grand Ice Cream, 351 Cheryl Lane (Walnut)	Oct 94	0.6	L	0.003	3
Sorenson Elementary School (Whittier)	Oct 94	4	AF,L	0.006	7
Palm Park West (Whittier)	Nov 94	5	L	0.008	8
Metrolink Station (Industry)	Nov 94	0.6	L	0.002	3
Little Lake Park (Santa Fe Springs)	Dec 94	18	L	0.033	36
Sundance Condominiums (Cerritos)	Jan 95	9	L	0.028	32
Del Paso High School (Walnut)	Jan 95	3	AF,L	0.003	3

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TABLE 7
SUMMARY OF FISCAL YEAR 10-11 RECYCLED WATER USAGE
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Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Dow Corning, 20832 Currier Road (Walnut)	Jan 95	0.1	L	0.0001	0.1
John Anson Ford Park (Bell Gardens)	Sep 94	45	L	0.054	60
Circuit City Headquarters, Currier/Lemon (Walnut)	Apr 95	1.1	L	0.005	6
Sysco Food Service, 20701 Currier Road (Walnut)	Apr 95	2.3	L	0.012	13
Tung Hsin Trading, 20420 E. Business Pkwy (Walnut)	Apr 95	0.8	L	0.003	4
Amergence Tech. Inc., 20480 E. Bus. Pkwy (Walnut)	Apr 95	0.9	L	0.003	3
Dura Freight Lines, 515-525 S. Lemon (Walnut)	Apr 95	0.5	L	0.001	1
S/W-S/E Corner Lemon/Bus. Parkway (Walnut)	Apr 95	0.2	L	0.004	4
Dura Freight Lines , 20275 Bus. Parkway (Walnut)	Apr 95	1.3	L	0.003	3
Coaster Co. of America, 20300 Bus. Parkway (Walnut)	Apr 95	0.7	L	0.003	3
Dura Freight Lines, 20405 Bus. Parkway (Walnut)	Apr 95	1	L	0.003	3
Dura Freight Lines, 20595 E. Business Pkwy (Walnut)	Apr 95	0.8	L	0.001	2
Dura Freight Lines, 20445 E. Business Pkwy (Walnut)	Apr 95	0.7	L	0.001	2
Orange Grove School (Whittier)	Apr 95	6.6	AF,L	0.004	5
South Middle School (Downey)	May 95	15.8	AF,L	0.007	8
Nuffer Elementary School (Norwalk)	Jun 95	10.4	AF,L	0.007	8
Lampton Middle School (Norwalk)	Jun 95	9.5	AF,L	0.009	10
THUMS (Long Beach)	Jun 95	8	I	1.035	1,160
820 Fairway Drive medians (Industry)	Jun 95	0.1	L	0.002	2
Spencer N Enterprises, Inc., 435 S. Lemon (Walnut)	Jun 95	0.5	L	0.001	1
General Electric, 19805 E Business Pkwy (Walnut)	Jun 95	1.1	L	0.005	6
Menlo Logistics, 20002 E. Business Pkwy (Walnut)	Jun 95	4	L	0.006	7
General Electric, 20005 E. Business Parkway (Walnut)	Jun 95	6.7	L	0.010	11
Hargitt Middle School (Norwalk)	Jul 95	9.5	AF,L	0.025	28
Norwalk Adult School (Norwalk)	Jul 95	17.2	AF,L	0.026	29
John Glenn High School (Norwalk)	Jul 95	38.8	AF,L	0.039	44
Ramona Elementary School (Norwalk)	Jul 95	6.8	AF,L	0.004	4
New River Elementary School (Norwalk)	Jul 95	10.3	AF,L	0.008	9
Morrison Elementary School (Norwalk)	Sep 95	7.7	AF,L	0.003	4
Katherine Edwards Middle School (Whittier)	Sep 95	19	AF,L	0.022	24
Longfellow Elementary School (Whittier)	Sep 95	4.5	AF,L	0.004	5
Walter Dexter Middle School (Whittier)	Sep 95	15.5	AF,L	0.007	8
D.D. Johnston Elementary School (Norwalk)	Sep 95	8.9	AF,L	0.006	7
Corvallis Middle School (Norwalk)	Sep 95	16.9	AF,L	0.030	34
Norwalk High School (Norwalk)	Sep 95	35.1	AF,L	0.033	37
Heritage Park (Santa Fe Springs)	Oct 95	9.2	L	0.009	10
Belloso Farm Nursery (Paramount)	Oct 95	2.5	O	0.002	2
Robertson's Ready-Mix (Paramount)	Nov 95	--	I	0.007	8
Cerritos Nursery (Cerritos)	Dec 95	3	O	0.006	7
Spadra Gas-to-Energy Plant	Dec 95	--	I	0.049	55
Founders Memorial Park (Whittier) (13)	Jan 96	4	L	0.008	9
Los Nietos Park (Santa Fe Springs)	Jan 96	11.2	L	0.014	15
Bell Gardens Soccer Field (Bell Gardens)	Feb 96	2.6	AF	0.004	5
Jersey Ave. School/city athl. fields (S.F. Springs)	Mar 96	8	AF	0.004	5
Salt Lake Municipal Park (Huntington Park) (14)	Apr 96	20.9	L	0.040	45
Sorenson Park (Whittier) (15)	May 96	10.7	L	0.016	18
Sorenson Library (Whittier) (16)	May 96	0.4	L	0	0
Encore Maintenance-Warmington Homes (Cerritos)	May 96	1.1	L	0.002	3
Bellflower Blvd. medians (Bellflower)	Jul 96	0.3	L	0.002	3
Alta Produce (Paramount)	Aug 96	4	AG	0.003	2
Artesia Off Ramp - 91 Freeway (Cerritos)	Aug 96	3.3	L	0.005	6
Ping Ting Hsu, 20701 Currier Road (Walnut)	Aug 96	0.1	L	0.001	1
Belloso Farm Nursery (South Gate)	Sep 96	2.5	O	0.001	1
Temple Park (Downey)	Oct 96	1	L	0.001	1

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TABLE 7
SUMMARY OF FISCAL YEAR 10-11 RECYCLED WATER USAGE
(PAGE 7 OF 12)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Woodruff Avenue medians (Bellflower)	Oct 96	0.8	L	0.005	5
Lawrence Allen □ Assoc., 20822 Currier Rd. (Walnut)	Oct 96	0.1	L	0.0001	0.1
Fairway Business Cntr., 19700 Bus. Parkway (Walnut)	Nov 96	0.4	L	0.002	2
Joe Rodgers Park (Long Beach)	Nov 96	4.5	L	0.007	7
Ham Park (Lynwood)	Dec 96	10	L	0	0
Jauregui Nursery (Paramount)	Dec 96	2	O	0.005	6
Heritage Corporate Center (Santa Fe Springs)	Jan 97	29.9	L	0.027	30
Belloso Farm Nursery (Bellflower)	Jan 97	8	O	0	0
Foster Road medians (Norwalk)	Jan 97	0.3	L	0.002	2
Rowland Heights Christian Church (Rowland Heights)	Feb 97	0.5	L	0.001	1
Rosecrans Avenue medians (Paramount)	Mar 97	0.2	L	0.008	9
Texaco□Somerset medians (Paramount)	Mar 97	0.2	L	0.001	1
McLane Mowers (Paramount)	Mar 97	0.6	L	0	0
ABC Nursery (Paramount)	Mar 97	16	O	0	0
L.A. Co. Vector Control Bldg. (S.F. Springs)	Mar 97	3.8	L	0.003	4
Greenstone Warehouse (Santa Fe Springs)	Apr 97	0.4	L	0.002	2
Viewsonic, 510 Cheryl□455 Brea Canyon (Walnut)	Jul 97	1.8	L	0.011	12
Jauregui Nursery (Long Beach)	Jul 97	5	O	0.029	33
McNab Avenue medians (Bellflower)	Jul 97	0.1	L	0.0004	0.5
Foster Road□Premier Ave. medians (Downey)	Aug 97	0.1	L	0.001	1
Palm Growers Nursery (Downey)	Oct 97	7.3	O	0	0
Alondra Blvd medians @ SGR (Bellflower)	Oct 97	0.1	L	0.0002	0.2
Puente Hills Landfill irrigation (Industry)	Nov 97	320	L	0.764	856
Puente Hills Landfill dust control (Industry)	Nov 97	130	I	0.133	149
Puente Hills Gas-to-Energy Facility (Industry)	Nov 97	--	I	0.607	680
Midway International (Cerritos)	Feb 98	0.3	L	0.001	1
Countryside Suites (Diamond Bar)	Mar 98	1.4	L	0.003	3
Lugo Park (Cudahy)	Apr 98	7	L	0.005	5
Rose Hills Memorial Park □upper area (Whittier)	Jun 98	298	L	0.373	418
El Dorado Lakes Condominiums (Long Beach)	Aug 98	11	L	0.025	28
Bloomfield Associates, 17871 Park Plaza Dr. (Cerritos)	Sep 98	0.5	L	0.001	1
Maruichi American building (Santa Fe Springs)	Oct 98	0.4	L	0.001	1
Diamond Crest Homeowners Assn. (Diamond Bar)	Oct 98	14	L	0.018	20
Norm Ashley Park (Walnut)	Nov 98	0.2	L	0.0005	1
Play Hut, 368 Cheryl Lane (Walnut)	Nov 98	0.8	L	0.003	3
Waterfall Estates (Rowland Heights)	Dec 98	1.2	L	0.004	5
WalMart (Long Beach)	Dec 98	3	L	0.014	16
Norwalk Golf Course (Norwalk)	Jan 99	8	L	0.022	25
Vestar Development (Long Beach)	Feb 99	8	L	0.035	39
Soco-Lynch Corp. building (Santa Fe Springs)	Feb 99	1	L	0.002	3
183rd Street On Ramp - 91 Freeway (Cerritos)	Feb 99	0.6	L	0.001	1
MC□C building (Santa Fe Springs)	Mar 99	0.7	L	0.007	7
Lakewood Blvd. medians (Paramount)	Mar 99	0.2	L	0.002	2
Progress Park (Paramount)	Mar 99	6.2	L	0.012	14
Garfield Avenue medians (Paramount)	Apr 99	0.1	L	0.001	1
Calvary Chapel (Diamond Bar)	Apr 99	1	L	0.014	16
B□B Pallet Co. (South Gate)	May 99	--	I	0	0
Hi-Tek Warehouse, 20851 Currier Road (Walnut)	Jun 99	0.2	L	0.001	1
Garcia□s Nursery (Bellflower)	Jun 99	6	O	0	0
Campus Group Inc, 319 Cheryl Road (Walnut)	Jul 99	0.1	L	0	0
Wind River Homeowners Assn. (Rowland Heights)	Jul 99	12.6	L	0.031	35
AT□T building, 12900 Park Plaza Drive (Cerritos)	Aug 99	0.9	L	0.010	11
Orange Avenue medians (Paramount)	Aug 99	0.1	L	0.003	3
Metropolitan State Hospital (Norwalk)	Sep 99	80	L	0	0

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TABLE 7
SUMMARY OF FISCAL YEAR 10-11 RECYCLED WATER USAGE
(PAGE 8 OF 12)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Moffit School (Norwalk)	Sep 99	1.6	AF,L	0.005	5
L.A. Fitness Inter., 20801 Golden Springs (Industry)	Sep 99	1.2	L	0.001	2
Comtop Enterprises, 268 Benton Court (Industry)	Sep 99	0.3	L	0.001	1
Gemini Foods Corp., 251 Benton Court (Industry)	Sep 99	0.6	L	0.001	1
Tri-Net Technology, 21709 Ferraro Parkway (Industry)	Sep 99	0.3	L	0.001	1
Hupa International, 21717 Ferraro Parkway (Industry)	Oct 99	0.3	L	0.0003	0.3
Nu-Health Products, 20875-85-95 Currier (Walnut)	Oct 99	0.1	L	0	0
Rio Hondo Channel (Downey)	Nov 99	0.8	L	0.001	1
Simms Park (Bellflower)	Dec 99	12.5	L	0.014	15
Lemon Avenue medians (Industry)	Dec 99	0.1	L	0.0003	0.4
Prudential Insurance Co., 21558 Ferraro. (Walnut)	Jan 00	3.5	L	0.008	9
Foster Road Greenbelt (Norwalk)	Mar 00	3.3	L	0.003	3
McDonald□s Restaurant (Diamond Bar)	Mar 00	0.1	L	0.001	1
San Luis Street @ flood channel (Paramount)	Apr 00	3	L	0.005	1
J□L Footwear, 250 Benton Court (Industry)	Jul 00	0.6	L	0.001	1
Jefferson School (Paramount)	Jul 00	0.5	AF,L	0.003	3
Columbus High School (Downey)	Aug 00	25	AF,L	0.015	17
Triangle Park (South Gate)	Nov 00	0.4	L	0.002	2
Markwins Inter. Corp., 22067 Ferraro (Industry)	Nov 00	1.9	L	0.004	4
Lee Wang LLC, 21901 Ferraro Parkway (Industry)	Nov 00	2	L	0.005	6
Sun Yin USA, 280 Maclin Court (Industry)	Nov 00	0.8	L	0.001	2
SL Investment Group LLC, 218 Maclin Ct. (Industry)	Nov 00	1.5	L	0.002	2
Morrow Meadows, 231 Benton Court (Industry)	Apr 01	0.9	L	0.002	2
Golden Springs Business Park (Santa Fe Springs)	Apr 01	31.4	L	0.113	126
The Cross Schools of Education (Walnut)	May 01	0.6	AF,L	0.001	1
Bellflower Storage (Bellflower)	Jun 01	3	L	0.002	2
Railroad Beautification (Paramount)	Jul 01	0.5	L	0	0
Rio Hondo Channel (Bell Gardens)	Jul 01	0.3	L	0.003	3
Bank of the West (Rowland Heights)	Sep 01	0.1	L	0.0004	0.4
Gym□Teen Center (Walnut)	Sep 01	0.6	L	0.001	2
CDM building (Santa Fe Springs)	Oct 01	0.1	L	0.002	2
Laskey-Weil building, 13101 Moore Street (Cerritos)	Oct 01	0.4	L	0.002	2
Willow Street medians (Long Beach)	Dec 01	2.4	L	0.003	3
Yellow Box Corp., 19835 Walnut Drive (Walnut)	Dec 01	0.3	L	0.002	2
Harvard Estates (Rowland Heights)	Dec 01	2	L	0.002	3
L.A. Co. Recorder□s Office (Norwalk)	Jan 02	2.7	L	0.014	15
Tays Cool Fuel (Paramount)	Feb 02	0.2	L	0.003	3
Walnut Nazarene Church (Walnut)	Feb 02	0.8	L	0.0003	0.3
Antelope Valley Farms (Palmdale)	Mar 02	2,100	AG	7.038	7,887
L.A. River landscaping (South Gate)	Mar 02	2.5	L	0.001	1
Majestic Mgmt., 168-188 Brea Canyon Rd. (Walnut)	Apr 02	0.6	L	0.002	2
Synnex, 108-118 Brea Canyon Rd. (Walnut)	Apr 02	0.7	L	0.002	3
Majestic Management, 108-288 Mayo Drive (Walnut)	Apr 02	0.1	L	0.005	5
Holiday Inn Express (Walnut)	May 02	0.4	L	0.002	2
Lemon Avenue Investments (Walnut)	Jun 02	0.6	L	0.002	3
Magnolia at Snow Creek (Walnut)	Jul 02	5.4	L	0.018	21
Lakewood-Adoree medians to 105 Fwy. (Downey)	Jul 02	3.4	L	0.031	35
River Ridge Golf Course (Pico Rivera)	Jul 02	21.3	L	0.021	24
Long Beach Water Dept. Impoundment (Long Beach)	Jul 02	--	I	0.001	1
Everbright Management, 1163 Fairway (Industry)	Sep 02	0.6	L	0.003	4
Everbright Management, 1169 Fairway (Industry)	Sep 02	0.2	L	0.001	1
Kelly Paper, 228 Brea Canyon Road (Walnut)	Sep 02	1.2	L	0.0004	0.4
V-Tec Automotive, 19677 Valley Blvd. (Walnut)	Sep 02	0.1	L	0.0001	0.2
Grand and Valley landscaping (Walnut)	Sep 02	0.1	L	0.005	6

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TABLE 7
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Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Extra Space Storage (Walnut)	Oct 02	0.8	L	0.001	1
Latter Days Saints Church (Walnut)	Oct 02	0.9	L	0.003	3
Nogales and Killian landscaping (Rowland Heights)	Oct 02	0.1	L	0.001	1
A□R West Family LLC, 20855 Golden Sprgs. (D. Bar)	Nov 02	0.2	L	0.001	1
Chancellor Village Senior Housing (Cerritos)	Nov 02	0.9	L	0.002	2
Simon Trucking (Santa Fe Springs)	Nov 02	0.9	L	0.001	1
Foster□Coldbrook medians (Bellflower)	Nov 02	0.1	L	0.0003	0.4
L.A. County Library (Norwalk)	Nov 02	0.9	L	0.005	6
Metro State□Wheelabrator (Norwalk)	Jan 03	B	I	0.248	278
Alamitos Seawater Intrusion Barrier (Long Beach)	Feb 03	--	R	2.116	2,372
Boeing (Long Beach)	Mar 03	52	L	0.013	14
Brea Canyon Rd.□Old Ranch Road medians (Industry)	May 03	0.1	L	0.0002	0.2
CLT Computers, Inc., 20153 Paseo del Prado (Walnut)	May 03	0.6	L	0.002	2
Rio Hondo College (Whittier)	Jun 03	85	AF,L	0.023	26
Mill Elementary School (Whittier)	Jun 03	15	AF,L	0.008	9
Del Amo Blvd. Greenbelt (Lakewood)	Jul 03	0.3	L	0.002	3
Imperial Equestrian (South Gate)	Jul 03	1.5	L	0.004	4
Norwalk Walkway□Parking (Santa Fe Springs)	Jul 03	1	L	0.003	4
Tournament Players Club (Santa Clarita)	Aug 03	120	L	0.277	311
The Old Road medians, 26840-27236 (Santa Clarita)	Aug 03	5.8	L	0.020	22
Autosmart Intl., 19885 Harrison Ave. (Industry)	Aug 03	0.2	L	0.001	1
Broadway.com, 19715 Harrison Ave. (Industry)	Aug 03	0.5	L	0.002	2
Bayharbor-Harrison Assn., 19901 Harrison (Industry)	Aug 03	0.8	L	0.003	4
J Pack International, 19789 Harrison Ave. (Industry)	Aug 03	0.5	L	0.001	1
Ziprint Image Corp., 19805 Harrison Ave. (Industry)	Aug 03	0.2	L	0.001	1
San Malone Enterprises, 19865 Harrison (Industry)	Aug 03	0.3	L	0.002	3
Shinetec Group, Inc., 19685 Harrison Ave. (Industry)	Aug 03	0.4	L	0.001	1
Majestic Realty, Grand Ave.□Village Staples (Walnut)	Aug 03	1.6	L	0.005	6
Orange Grove Services, Lemon□La Puente (Walnut)	Sep 03	0.4	L	0.003	3
Max Property LLC, 21401 Ferraro Pkwy. (Industry)	Sep 03	0.7	L	0.004	5
NP 21301 Ferraro Pkwy., 21301 Ferraro (Industry)	Sep 03	0.8	L	0.002	2
568 TriNet Court (Walnut)	Oct 03	0.3	L	0.001	1
Steve Horn Way□Bellflower medians (Downey)	Nov 03	0.3	L	0.015	17
Walnut City Hall (Walnut)	Dec 03	0.6	L	0.001	1
Walnut Senior Center (Walnut)	Dec 03	0.5	L	0.001	1
Hill□s Pet Nutrition, 318 Brea Canyon Rd. (Walnut)	Dec 03	2.6	L	0.006	7
Young Hoon Cho, 1709 Nogales St. (Rowland Heights)	Mar 04	0.1	L	0.0003	0.4
Shell Station, 21103 Golden Springs Dr. (Diamond Bar)	Mar 04	0.1	L	0.0003	0.4
Ferraro□Grand East ramp (Industry)	Apr 04	3.8	L	0.005	6
Hing Wa Lee Plaza, 1569 Fairway Dr. (Walnut)	May 04	0.1	L	0.001	1
Tucker Elementary School (Long Beach)	May 04	3	AF, L	0.005	6
Southcoast Cabinet, 20625 Lycoming St. (Walnut)	Jun 04	0.3	L	0.001	1
APL Logistics, 408 Brea Canyon Rd. (Walnut)	Jun 04	2.1	L	0.006	7
Alamitos Hill Reservoir landscaping (Long Beach)	Jul 04	8.6	L	0.002	2
Adnoff Family Trust, 20801 Currier Rd. (Walnut)	Jul 04	0.1	L	0.001	1
Sentous Valley LLC, 2889 Valley Blvd. (Walnut)	Aug 04	0.1	L	0.0004	0.4
Pro Growers Nursery (Norwalk)	Sep 04	11.3	O	0.040	45
Kaiser Administration building (Downey)	Oct 04	2.5	L	0.005	6
Downey Studios (Downey)	Oct 04	1	L	0.004	5
Community Day School (Walnut)	Nov 04	0.1	AF,L	0.0004	0.5
Majestic Mgmt., Bldg. 25 on Mayo Dr. (Walnut)	Jan 05	0.1	L	0.0003	0.3
Gateway Pointe (Whittier)	Jan 05	8	L	0.016	18
Puente Hills Materials Recovery Facility (Industry)	Feb 05	2.4	L	0.005	5
Sy Develop. condos, 20118-20138 Colima, (Walnut)	Jun 05	0.1	L	0.00001	0.01

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TABLE 7
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(PAGE 10 OF 12)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Dills Park (Paramount)	Jul 05	12.5	L	0.030	34
N□E corner Cheryl Lane□Baker Parkway (Industry)	Aug 05	3.3	L	0.014	16
Jakk□s Pacific, Inc. 21733-21749 Baker (Industry)	Aug 05	1.2	L	0.004	4
20813 Valley Blvd. medians (Walnut)	Sep 05	0.4	L	0.001	1
20265 Valley Blvd. medians (Walnut)	Sep 05	0.4	L	0.001	1
19849 Valley Blvd. medians (Walnut)	Sep 05	0.4	L	0.001	1
Kohl□s Center (Walnut)	Sep 05	2	L	0.009	10
Hollydale Elementary (South Gate)	Sep 05	3	AF,L	0.001	1
Malburg Generation Station (Vernon)	Oct 05	B	I	0.597	668
Phoenix Private Schools (Rowland Heights)	Dec 05	0.1	AF,L	0.0002	0.2
The Home Depot, 21535-21651 Baker (Industry)	Jan 06	2.8	L	0.009	10
Industry East Land LLC, 21415 Baker (Industry)	Jan 06	2.3	L	0.006	7
Stuart and Gray medians (Downey)	Dec 05	0.4	L	0.006	7
Woodruff and Maple medians (Bellflower)	Mar 06	0.1	L	0.0001	0.1
Charles Hailong Cui, 350 Cheryl Lane (Walnut)	Apr 06	0.7	L	0.004	5
LA Sanchez Nursery (Industry)	Apr 06	5	O	0.010	12
Sculpture Garden (Santa Fe Springs)	May 06	0.6	L	0	0
Fairway median@ Brea Canyon (Walnut)	Jun 06	0.3	L	0.001	1
Grand Avenue Crossing (Industry)	Jul 06	18.5	L	0.019	21
22002 Valley Blvd. (Industry)	Jul 06	1.6	L	0.003	4
Foster Road medians (Santa Fe Springs)	Jul 06	1	L	0.009	11
Rose Hills Memorial Park □lower area (Whittier)	Aug 06	275	L	0.438	491
Christian Chapel of Walnut Valley (Walnut)	Aug 06	2.2	L	0.006	6
Target Store T-2179, 747 Grand Ave. (Walnut)	Sep 06	3.9	L	0.006	6
Whittier Narrows Recreation Area (South El Monte)	Sep 06	568	L	0.712	798
Leg Avenue, 19601 E. Walnut Dr. (Walnut)	Oct 06	0.5	L	0.003	3
LandRover (Cerritos)	Dec. 06	0.3	L	0.003	3
Harold M. Pitman Co., 21908-21958 Baker (Industry)	Jan 07	0.8	L	0.002	2
Eastern Agricultural Site (Lancaster)	Feb 07	696	AG	0.845	947
Williams-Sonoma, 21508-21662 Baker (Industry)	Apr 07	4.8	L	0.012	14
FedEx Ground, 200 Old Ranch Road (Walnut)	May 07	28	L	0.012	13
Currier Road Devel. Inc., 20819 Currier Rd. (Walnut)	May 07	0.3	L	0.001	1
Bluff Park (Long Beach)	Jul 07	25.8	L	0.016	17
Stearns Park (Long Beach)	Jul 07	21	L	0.021	24
Bixby Park (Long Beach)	Jul 07	12.5	L	0.013	14
South El Monte High School (South El Monte)	Aug 07	16.1	AF, L	0.062	69
Williams-Sonoma, 21700 Baker (Industry)	Aug 07	2	L	0.006	6
Douglas Park development (Long Beach)	Nov 07	2.1	L	0.062	70
21350 Valley Blvd. (Industry)	Feb 08	0.4	L	0.001	1
Grand Avenue Venture, 21508 Ferraro Pkwy (Walnut)	Apr 08	3.5	L	0.003	4
Space Learning Center (Downey)	Apr 08	10.5	L	0.024	27
Surgical Center, Carmenita □ 166th (Cerritos)	May 08	0.1	L	0.0003	0.4
UPS Parking Structure, 13150 Moore (Cerritos)	May 08	0.5	L	0.001	1
Grand Avenue□Baker Parkway medians (Industry)	May 08	6.7	L	0.013	14
Majestic Management, 21530-21590 Baker (Industry)	May 08	2	L	0.008	9
Cornerstone Commerce Center (Downey)	Jun 08	0.8	L	0.006	7
Gomez Upholstery, 19935 Valley Blvd. (Walnut)	Jul 08	2	L	0	0
Susann Sutseng Lee, 1335-1337 Otterbein (Rowland)	Jul 08	0.1	L	0.0004	0.4
Golden Springs Plaza (20657 Golden Sprgs (Dia. Bar)	Aug 08	0.4	L	0.002	2
Chili□s Restaurant, Golden Springs Dr. (Diamond Bar)	Sep 08	0.01	L	0.001	1
Majestic Management, 21808 Garcia Ln. (Industry)	Sep 08	0.5	L	0.001	2
Majestic Management, 21858 Garcia Ln. (Industry)	Sep 08	0.4	L	0.001	2
Majestic Management, 21912 Garcia Ln. (Industry)	Sep 08	0.3	L	0.001	1
Majestic Management, 21760-21788 Garcia (Industry)	Sep 08	0.4	L	0.001	2

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

TABLE 7
SUMMARY OF FISCAL YEAR 10-11 RECYCLED WATER USAGE
(PAGE 11 OF 12)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
CFT Development, Golden Springs Dr. (Diamond Bar)	Oct 08	0.01	L	0.001	1
Mora Drive medians (Santa Fe Springs)	Oct 08		L	0.004	5
Jenny Hsieh, 20125 Valley Blvd. (Walnut)	Nov 08	0.03	L	0.00003	0.03
UPS Main Building, 13233 Moore (Cerritos)	Nov 08	4.4	L	0.012	13
Fountain Walk Senior, 18310 Carmenita (Cerritos)	Nov 08	0.1	L	0.0004	0.4
Public Works Dept. sewer flushing (Lancaster)	Jan 09	--	I	0.001	1
Public Works Dept. street sweeping (Lancaster)	Feb 09	--	I	0.0004	0.4
ASCIP Building, 16550 Bloomfield (Cerritos)	Feb 09	0.1	L	0.0004	1
Tincher Elementary School (Long Beach)	Feb 09	1.5	AF, L	0.004	5
Firestone Blvd. medians (Downey)	Feb 09	0.1	L	0.0004	0.4
Citibank, 8764 Firestone Blvd. (Downey)	Feb 09	0.1	L	0.001	1
Brea Canyon Rd./Currier Road median (Walnut)	Feb 09	2	L	0.005	5
Cardinal Capital Partners, Currier/Lemon (Walnut)	Mar 09	2.5	L	0	0
Family Property Holdings, 20888 Amar Rd. (Walnut)	May 09	0.04	L	0.0004	0.5
KW Global Inc., 293 Brea Canyon Drive (Walnut)	May 09	0.3	L	0.001	2
Steve Horn Pkwy. medians @ Kaiser (Downey)	May 09	1.4	L	0.023	26
Walgreens/Big Lots, 9018 Firestone (Downey)	May 09	0.4	L	0.003	4
Lancaster University Center (Lancaster)	May 09	2	L	0	0
12800 Center Court (Cerritos)	Jul 09	0.4	L	0.002	2
Pacific Alloy Casting (South Gate)	Jul 09	--	I	0.016	18
Sunshine Park (L.A. County)	Jul 09 (May 86)	4	L	0.002	3
Rowland Elementary School (Rowland Heights)	Jul 09 (May 86)	3	AF,L	0.002	2
Farjardo School (Rowland Heights)	Jul 09 (May 86)	4	AF,L	0.0005	1
Farjardo Park (Rowland Heights)	Jul 09 (May 86)	4	L	0.001	2
Nogales High School (L.A. County)	Jul 09 (Jun 86)	11	AF,L	0.005	6
Queen of Heaven Cemetery (Rowland Hts.)	Jul 09 (Jun 86)	35	L	0.003	3
Schabarum Regional County Park (L.A. County)	Jul 09 (Sep 86)	233	L	0.020	22
Pepperbrook Park (Hacienda Heights)	Jul 09	4.4	L	0.002	2
Countrywood Park (Hacienda Heights)	Jul 09	5.4	L	0.002	2
Rowland Heights Golf Center (Rowland Heights)	Jul 09	8	L	0.002	3
Medians at 755 Nogales (Industry)	Jul 09	0.1	L	0.0001	0.1
Medians at 4115-1/2 Nogales (West Covina)	Jul 09	0.1	L	0.001	2
Medians at 2654-1/2 Valley (West Covina)	Jul 09	0.2	L	0.00003	0.03
Bu Sha Temple, 4111 Nogales (West Covina)	Jul 09	0.5	L	0.0001	0.1
Megan Racing, 788 Phillips (Industry)	Jul 09	0.1	L	0.0004	0.4
JJ Plaza, 18253 Colima (Rowland Heights)	Jul 09	0.1	L	0.0001	0.1
New World RTCI-LP, 18958 Daisetta (Rowland Hts.)	Jul 09	0.1	L	0.00001	0.02
Battery Technology, 16651 Johnson (Industry)	Jul 09	0.1	L	0.0001	0.1
FTH Group Inc., 16685 Johnson (Industry)	Jul 09	0.1	L	0.0001	0.1
Ancillary Provider 16664 Johnson (Industry)	Jul 09	0.1	L	0.0001	0.1
Ancillary Provider 16666 Johnson (Industry)	Jul 09	0.2	L	0.0002	0.3
Pan American, 16610 Gale Ave. (Industry)	Jul 09	0.2	L	0.0002	0.2
Blue Pacific, 1354 Marion Ct. (Industry)	Jul 09	0.2	L	0.0003	0.3
Romano's Macaroni Grill, 17603 Colima (Rowland)	Jul 09	0.1	L	0.001	1
Acosta Growers, 16412 Wedgeworth Dr. (Industry)	Jul 09	5	O	0.001	1
Wedgeworth Elementary School (Hacienda Heights)	Aug 09	2.5	AF,L	0.001	1
Wilson High School (Hacienda Heights)	Aug 09	18.3	AF,L	0.006	7
Light of America, Inc. (20722 Currier Rd.) (Walnut)	Sep 09	0.1	L	0.0003	0.3
Ybarra Elementary School (Rowland Heights)	Sep 09	5.6	AF,L	0.008	9
Bixby Elementary School (Hacienda Heights)	Sep 09	6.1	AF,L	0.002	2
Jade Fashion, 1350 Bixby (Industry)	Sep 09	0.1	L	0.0002	0.3
Gutierrez Nursery, 16411 Wedgeworth (Industry)	Sep 09	4	O	0.001	1
Robertson's Ready-Mix	Oct 09	--	I	0.006	7
MTA Bike Trail (Bellflower)	Nov 09	0.1	L	0.001	1

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

Whittier Narrows Golf Course (South El Monte)	Dec 09	260	L	0.504	565
Frank Raper, 1215 Bixby (Industry)	Dec 09	0.1	L	0.0001	0.2
Laido International, 16710-12 Johnson (Industry)	Dec 09	0.1	L	0.0002	0.2
Bolt Products, 16725 Johnson Dr. (Industry)	Dec 09	0.1	L	0.0001	0.1
Ily Enterprise, 783 Phillips (Industry)	Jan 10	0.1	L	0.0003	0.3
Superior Profiles, 1325 Bixby (Industry)	Jan 10	0.2	L	0.0002	0.2
60 Fwy., Countrywood □ Fullerton (Industry)	Jan 10	5	L	0.003	3
Camacho Strawberries (Industry)	Jan 10	3	O	0.0001	0.1
Advanced Media, 881 Azusa (Industry)	Jan 10	0.1	L	0.001	1
East Group Prop., 855 Anaheim-Puente (Industry)	Mar 10	0.6	L	0.0003	0.4
So.Cal. Air Condition, 16950 Chestnut (Industry)	Mar 10	2	L	0.0003	0.3
USACD, 17101 Chestnut (Industry)	Mar 10	0.3	L	0.0003	0.3
Azusa Blvd Medians (Industry)	Mar 10	0.2	L	0.0001	0.1
Acosta Growers, 17101 Chestnut (Industry)	Mar 10	2.4	O	0.0002	0.2
Paramount Blvd. Medians (Paramount)	Mar 10		L	0.004	4
L.A. Co. ISD bldg., 16610 Chestnut (Industry)	Apr 10	0.5	L	0.0003	0.3
Azusa Property Co., 885 Azusa (Industry)	Apr 10	0.2	L	0.0002	0.2
Golden West Footwear, 16750 Chestnut (Industry)	Apr 10	0.3	L	0.0002	0.2
Teledyne Instruments, 16830 Chestnut (Industry)	Apr 10	0.4	L	0.0004	0.4
Medians, 18927 Daisetta (Rowland Heights)	Apr 10	0.2	L	0.0001	0.1
Colima Medians (L.A. County)	Apr 10	0.1	L	0.0002	0.2
Medians, 1442 Fullerton (Industry)	Apr 10	0.3	L	0.00004	0.05
Teledyne Picco, 16800 Chestnut (Industry)	May 10	0.4	L	0.0003	0.3
Hou Yi Mao Nursery, 18002 Colima (Rowland Hts.)	May 10	1.3	O	0.0002	0.3
East Group Prop., 16700 Chestnut (Industry)	Jun 10	0.6	L	0.001	1
Pro Motion Distribution, 883 Azusa (Industry)	Jun 10	0.1	L	0.0001	0.1
New Age Kaleidoscope, 7 Colima (Industry)	Jun 10	0.6	L	0.001	1
Min Maw Intl. Inc., 18350 San Jose (Industry)	Jun 10	0.7	L	0.001	1
Hot Topic, 18350 San Jose Ave. (Industry)	Jul 10	0.6	L	0.001	1
FedEx, 18305 San Jose Ave. (Industry)	Jul 10	0.6	L	0.001	1
Long Beach DPW sewer flushing (Long Beach)	Aug 10	--	I	0.001	1
Long Beach DPW street sweeping (Long Beach)	Aug 10	--	I	0.0003	0.3
Los Amigos Golf Course (L.A. County)	Aug 10	110	L	0.004	4
Public Works Dept. dust control (Lancaster)	Sep 10	--	I	0.00001	0.01
Donald Miller, 19803 Valley (Walnut)	Sep 10	0.1	L	0.0001	0.3
Hudd Distribution, 18215 Rowland St. (Industry)	Sep 10	0.6	L	0.0003	0.4
New Age Kaleidoscope, 5 Stoner Creek (Industry)	Oct 10	1.4	L	0.0003	0.4
Perrin Manufacturing, 1020 Bixby (Industry)	Oct 10	0.1	L	0.0001	0.2
Centro Watt Operating, 17518A Colima (Industry)	Oct 10	0.4	L	0.00003	0.03
Centro Watt Operating, 17414 Colima (Industry)	Oct 10	0.5	L	0.0001	0.1
717 Nogales LLC, 717 Nogales (Industry)	Oct 10	0.5	L	0.0001	0.1
The Old Road□Magic Mtn. Pkwy medians (Snt. Clarita)	Nov 10	2.8	L	0.003	4
Walgreens, 18308 Colima (Industry)	Dec 10	0.1	L	0.0001	0.1
RWD Office, 3021 S. Fullerton (Industry)	Dec 10	0.3	L	0.0001	0.1
Bell Memorial Church, 1747 Nogales (Rowland Hts.)	Dec 10	0.3	L	0.0002	0.3
Atlantic Ave. medians (South Gate)	Mar 11	16.3	L	0.107	120
Pathfinder Park (Rowland Heights) (Industry)	May 11	29	L	0.00001	0.01
USGVMWD site, 401 Nogales St. (Industry)	May 11	0.5	L	0.0000003	0.0003
East Group Prop., 18551 Arenth Ave. (Industry)	May 11	0.7	L	0.000003	0.003
717 Nogales LLC, 18961 Arenth Ave. (Industry)	May 11	0.5	L	0.000003	0.003
Kimco Realty, 17100 Colima Rd. (Industry)	May 11	3	L	0.000003	0.003
Acme Trading Group, 18501 Arenth (Industry)	May 11	0.9	L	0.00001	0.01
Third Party Enterprises, 18501 Arenth (Industry)	May 11	0.6	L	0.000001	0.001
Floria International 18701 Arenth (Industry)	May 11	0.4	L	0.000003	0.003

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

2. LOS ANGELES BASIN

The treatment plants operated by the Sanitation Districts in the Los Angeles Basin area are the Joint Water Pollution Control Plant (JWPCP) with ocean disposal, and six water reclamation plants (WRPs): La Cañada, Long Beach, Los Coyotes, Pomona, San Jose Creek, and Whittier Narrows. These facilities and the associated trunk sewers comprise the Joint Outfall System (JOS) and together produced 402.46 MGD (450,980 AFY) of effluent in FY 10-11, a decrease of 0.6% from the preceding fiscal year. This decrease was due to the on-going effects of water conservation in response to the 2006-2009 drought and to the lingering effects of the recent nationwide economic recession. This level of flow is equal to that first seen in 1971 and again during the 1976-77 drought. Of the total amount of effluent produced, 123.95 MGD (138,891 AFY), or 30.8%, was recycled water available for reuse, a slight decrease of 0.1% in total flow from the preceding fiscal year. During FY 10-11, 56.97 MGD (63,842 AFY) was actively reused, a 15.3% decrease from the preceding fiscal year, due mainly to above average rainfall during that year that reduced the use of recycled water for groundwater replenishment. This quantity was 46.0% of the recycled water available and 14.2% of the total effluent produced in the JOS (both percentages decreasing somewhat from the preceding year).

2.1 La Cañada WRP

LA CAÑADA WRP FACTS	
Plant capacity:	0.2 MGD
Water produced and reused:	0.095 MGD 106 AFY 0.9% FY decrease
FY10-11 O&M:	$2,805/AF
No. of reuse sites:	1 105 acres

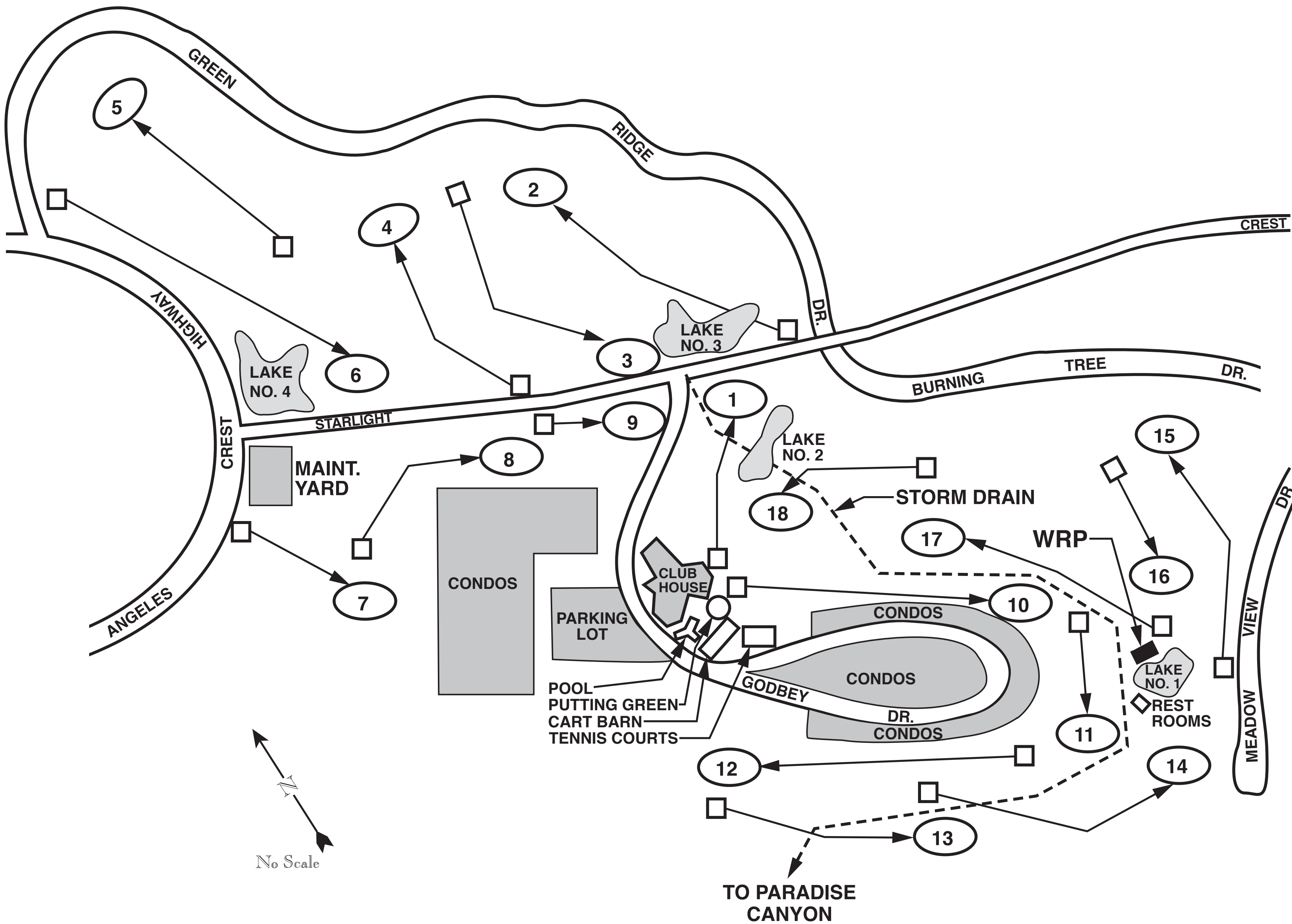
This treatment facility, completed in 1962 and expanded in 1971, is the smallest one operated by the Sanitation Districts and is located on the site of the La Cañada-Flintridge Country Club (Figure 6), at 533 Meadowview Drive, La Cañada, CA 91011. In February 1996, an outfall trunk sewer (for waste activated sludge disposal and excess storm flows) was completed that connected this plant with the main sewer system in the Los Angeles Basin, officially making this plant a JOS facility. The plant, which produces disinfected secondary (activated sludge) effluent, has a capacity of 0.2 MGD; however, it only treated an average of 0.095 MGD (106 AFY) of wastewater generated by the 425 homes surrounding the country club in FY 10-11 (0.02% of the effluent produced in the JOS). This flow rate represents a 0.9% decrease in average daily flows over the preceding fiscal year. The operation and maintenance (O&M) cost in FY 10-11 to produce this water was approximately $2,805/AF.

Use of recycled water from this facility is permitted under California Regional Water Quality Control Board, Los Angeles Region (LARWQCB) Order No. 00-099. All of the disinfected secondary effluent from the plant is conveyed to four lakes on the 105-acre golf course. Lake water (augmented by potable water during the summer) is used for landscape irrigation of the golf course. The developers of the country club and neighboring homes financed the construction of the treatment plant, which was later sold to the Sanitation Districts for $77,268, and the homeowners in District No. 28 finance the plant O&M costs. The operators of the country club are required to use all of the recycled water produced at this facility for irrigation.

2.2 Long Beach WRP

This treatment facility, located at 7400 East Willow Street, Long Beach, CA 90815, was completed in 1973 and was expanded in 1984 to its current design capacity of 25 MGD. However, it produced only 18.79 MGD (21,052 AFY) of coagulated, filtered, disinfected tertiary recycled water in FY 10-11 (4.7% of the effluent

FIGURE 6
LA CANADA-FLINTRIDGE COUNTRY CLUB



LONG BEACH WRP FACTS

Plant capacity:	25 MGD
Water produced:	18.79 MGD 21,052 AFY 2.7% FY increase
FY10-11 O&M:	$254/AF
Water reused:	5.736 MGD 6,428 AFY 1.9% FY decrease 30.5% of production
Delivery systems:	2 176,630 ft. of pipe
No. of reuse sites:	58 1,928.3 acres

produced in the JOS), which was a 2.7% increase over the preceding fiscal year, at an O&M cost of approximately $254/AF. The increase in recycled water production was the result of completed upgrades to the secondary treatment process facilities.

Recycled water quality for FY 10-11 is presented in Table B-1 of Appendix B. An average of 5.736 MGD (6,428 AFY), or 30.5% of the recycled water produced at this plant was delivered for reuse during FY 10-11. This represents a 1.9% decrease from the preceding fiscal year. Use of recycled water from this facility during this fiscal year was permitted under LARWQCB Order Nos. 87-47 and 97-072 (for direct, non-potable reuse), R4-2009-0049 (for non-irrigation uses), and R4-2005-0061 (for seawater intrusion barrier injection).

2.2.1 LONG BEACH WATER DEPARTMENT

Beginning in 1980, the City of Long Beach Water Department (LBWD) embarked on a multi-phase program to distribute recycled water throughout the city, mainly for landscape irrigation (Figure 7). (Note: All recycled water produced at this plant goes to LBWD in exchange for the land on which the Sanitation Districts built the Long Beach WRP.) Recycled water service for use in repressurization of the oil-bearing strata, initially constructed in 1971, was restored to the THUMS project on Island White in June 1995. A narrative description of the layout of LBWD's recycled water distribution system is contained in Appendix C. Table 8 lists the users of the LBWD system as of the end of FY 10-11.

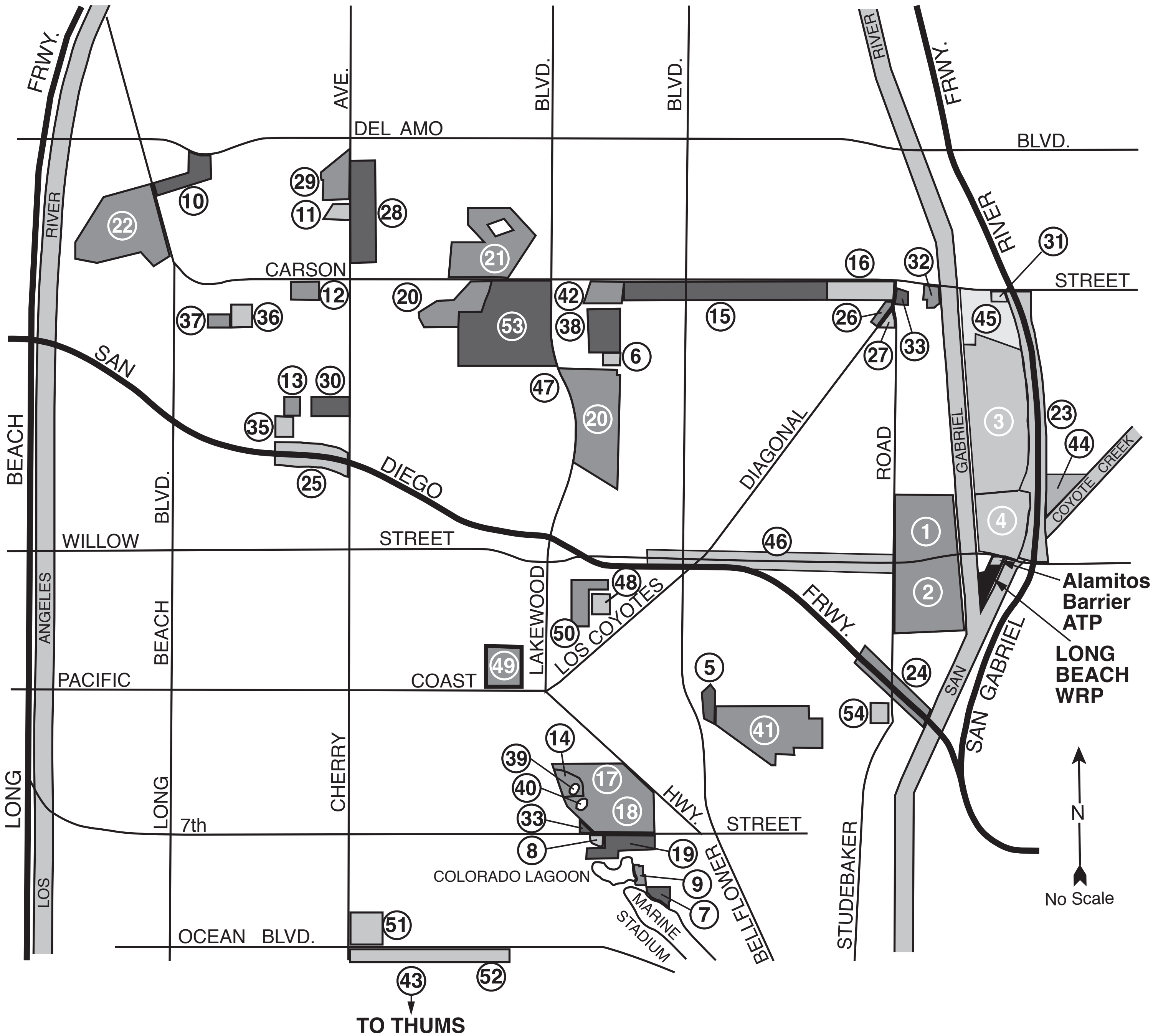
During FY 10-11, LBWD served 3.620 MGD (4,056 AFY), or 19.2% of the recycled water produced at this plant, through approximately 176,630 feet of pipeline (6- to 24-inches in diameter) to 57 direct, non-potable reuse sites encompassing 1,928 acres (additional recycled water was delivered by LBWD to the Alamitos Seawater Intrusion Barrier project, see Section 2.2.2, below). This was a 5.1% decrease from the preceding fiscal year. In August 2010, truck hauling of recycled water from LBWD's recycled water distribution system began for street sweeping and sewer flushing as allowed under the non-irrigation use permit.

LBWD sells the recycled water at a rate of $744.00/AF for peak demand (nighttime) usage or $531.43/AF for off-peak demand (daytime) usage, or between 50-70% of the potable water rate of $1,062.43/AF.

2.2.2 ALAMITOS SEAWATER INTRUSION BARRIER

Due to over-drafting of the Central Basin aquifer, which underlies and supplies water to the Metropolitan Los Angeles area, the groundwater level in that basin dropped below sea level by the 1950's. This condition allowed salt water to move inland into the aquifer at various points along the coastline leading to contamination of the groundwater supplies. In response, the Los Angeles County Department of Public Works (LACDPW) constructed engineered, freshwater injection barriers in front of the advancing seawater at three locations in Los Angeles County in an effort to stem the landward movement of seawater. One of these barrier projects, the Alamitos Seawater Intrusion Barrier (Alamitos Barrier) is two miles south of the Long Beach WRP, straddling the San Gabriel River and the Los Angeles/Orange County line and creating a pressure ridge in five aquifers across the Alamitos Gap. Historically, between 4,000 and 7,000 AFY of non-interruptible imported water

FIGURE 7
LONG BEACH WATER DEPARTMENT REUSE SITES



1 El Dorado Park West
2 El Dorado Golf Course
3 El Dorado Park East
4 Nature Center
5 Whaley Park
6 Douglas Park
7 Marina Vista Park
8 Woodlands Park
9 Colorado Lagoon Park
10 Scherer Park
11 Cherry Ave. Park
12 Somerset Park
13 Reservoir Park
14 Joe Rodgers Park
15 Heartwell Park
16 Heartwell Golf Course
17 Recreation Park
18 Recreation Golf Course
19 Recreation 9-Hole Golf Course
20 Skylinks Golf Course
21 Lakewood Golf Course
22 Virginia Country Course
23 Cal Trans - 605 Frwy. @ Warlow, Pioneer, Spring
24 Cal Trans - 405 Frwy. @ Atherton
25 Cal Trans - 405 Frwy.@ Walnut
26 Los Coyotes Diagonal greenbelt
27 Lakewood 1st Presbyterian Church
28 All Souls Cemetery
29 Sunnyside Memorial Park
30 Long Beach Water Dept. Office
31 WalMart
32 Sunrise Growers Nursery
33 DeMille Junior High School
34 Wilson High School
35 Burroughs Elementary School
36 Hughes Middle School
37 Longfellow Elementary School
38 Veteran's Memorial Stadium
39 Recreation Park Bowling Green
40 Blair Field
41 Cal State University, Long Beach
42 Long Beach City College
43 THUMS
44 El Dorado Lakes Condominiums
45 Vestar Development (Towne Centre)
46 Willow Street medians
47 Boeing
48 Tucker Elementary School
49 Alamitos Hill Reservoir
50 Stearns Park
51 Bixby Park
52 Bluff Park
53 Douglas Park Development
54 Tincher Elementary School

TABLE 8
SUMMARY OF FISCAL YEAR 10-11 RECYCLED WATER USAGE
LONG BEACH WATER DEPARTMENT
(PAGE 1 OF 2)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
El Dorado Park West	Aug 80	135	L	0.128	144
El Dorado Golf Course	Aug 80	150	L	0.223	249
Recreation Park	Oct 82	26	L	0.042	47
Recreation Golf Course	Oct 82	149	L	0.197	221
Whaley Park	Jun 83	9	L	0.017	19
El Dorado Park East	Jan 84	300	L	0.326	365
Nature Center	Jan 84	60	L	0.058	64
605 Freeway at Wardlow	Feb 84	50	L	0.028	32
Heartwell Park	Feb 84	120	L	0.131	147
Skylinks Golf Course	Apr 84	155	L,P	0.228	255
Douglas Park	Apr 84	3	L	0.003	4
405 Freeway at Atherton	May 84	5	L	0.00001	0.01
DeMille Junior High School	Jun 84	5	AF,L	0.0004	0.4
Heartwell Golf Park	Jun 84	30	L	0.060	68
Veterans Memorial Stadium	Jan 85	6	AF	0.021	24
Recreation Park Bowling Green	Aug 85	3	L	0.004	5
California State University, Long Beach	Dec 85	52	AF,L	0.112	125
Long Beach City College	Feb 86	15	AF,L	0.022	25
Recreation 9-Hole Golf Course	Mar 86	37	L	0.059	66
Blair Field	Apr 86	5	AF	0.010	12
Woodlands Park	Apr 86	7	L	0.011	12
Colorado Lagoon Park	Apr 86	4	L	0.003	4
Marina Vista Park	Apr 86	30	L	0.027	30
Lakewood 1st Presbyterian Church	Sep 88	1	L	0.001	1
Virginia Country Club	Mar 89	135	L,P	0.077	86
Lakewood Golf Course	Mar 89	128	L,P	0.272	305
Scherer Park	Mar 89	24	L	0.031	35
Sunnyside Memorial Park	Apr 89	35	L	0.071	79
All Soul□s Cemetery	Apr 89	40	L	0.104	116
Cherry Avenue Park	May 89	10	L	0.011	13
Los Coyotes Diagonal	Mar 91	1	L	0.001	1
Wilson High School	Jun 91	5	AF,L	0.022	24
Long Beach Water Department office	Jan 92	2	L	0.002	2
Reservoir Park (Signal Hill)	Feb 92	2	L	0.009	10
Burroughs Elementary School (Signal Hill)	Feb 92	4	AF,L	0.003	3
Hughes Middle School	Apr 92	3	AF,L	0.013	15
405 Freeway at Walnut	Apr 92	9	L	0.008	9
Somerset Park	May 92	3	L	0.001	1
Longfellow Elementary School	May 92	1	AF,L	0	0
THUMS	Jun 95	8	I	1.035	1,160
Joe Rodgers Park	Nov 96	4.5	L	0.007	7
Jauregui Nursery	Jul 97	5	O	0.029	33
El Dorado Lakes Condominiums	Aug 98	11	L	0.025	28
WalMart	Dec 98	3	L	0.014	16
Vestar Development	Feb 99	8	L	0.035	39
Willow Street medians	Dec 01	2.4	L	0.003	3
Long Beach Water Department Impoundment	Jul 02	--	I	0.001	1
Alamitos Seawater Intrusion Barrier (WRD)	Feb 03	--	R	2.116	2,372
Boeing	Mar 03	52	L	0.013	14
Tucker Elementary School	May 04	3	AF, L	0.005	6
Alamitos Hill Reservoir landscaping	Jul 04	8.6	L	0.002	2
Bluff Park	Jul 07	25.8	L	0.016	17
Stearns Park	Jul 07	21	L	0.021	24

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

TABLE 8
SUMMARY OF FISCAL YEAR 10-11 RECYCLED WATER USAGE
LONG BEACH WATER DEPARTMENT
(PAGE 2 OF 2)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Bixby Park	Jul 07	12.5	L	0.013	14
Douglas Park residential/commercial development	Nov 07	2.1	L	0.062	70
Tincher Elementary School	Feb 09	1.5	AF, L	0.004	5
Long Beach Public Works sewer flushing	Aug 10	--	I	0.001	1
Long Beach Public Works street sweeping	Aug 10	--	I	0.0003	0.3
TOTALS		**1,928.3**		**5.736**	**6,428**

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

jointly purchased from the Metropolitan Water District of Southern California (MWD) by the Water Replenishment District of Southern California (WRD) and the Orange County Water District (OCWD) was injected into the Alamitos Barrier. In 1993, additional injection wells were constructed, and have increased the freshwater injection capacity at the Alamitos Barrier to 7,500 AFY.

Originally conceived of in the late 1980's, the Leo J. Vander Lans Advanced Water Treatment Facility (LVLAWTF) treats tertiary effluent from the Long Beach WRP with microfiltration and reverse osmosis (MF/RO), followed by application of ultraviolet light (UV) for the destruction of NDMA. The advanced treated product water is then blended with MWD supplies for injection into the seawater intrusion barrier. This project uses the existing 27-inch MWD supply line to the Alamitos Barrier. Construction of the treatment processes on four acres of land directly north of the Long Beach WRP began in late 2001 and was completed in early 2003. After equipment testing and permit adoption by the LARWQCB, actual recycled water deliveries for injection began in October 2005. The approximate $15 million cost for the LVLAWTF was funded in part by MWD's Local Resource Program and the federal government.

During FY 10-11, the LVLAWTF produced 2.116 MGD (2,372 AFY) of advanced treated recycled water that was injected into the Alamitos Barrier, or 11.3% of the effluent produced at the Long Beach WRP. This was a 4.1% increase in the amount of recycled water used for this application from the preceding fiscal year, although still below the production capacity of the LVLAWTF.

2.3 LOS COYOTES WRP

LOS COYOTES WRP FACTS	
Plant capacity:	37.5 MGD
Water produced:	20.87 MGD 23,388 AFY 13.6% FY decrease
FY10-11 O&M:	$319/AF
Water reused:	5.012 MGD 5,617 AFY 4.1% FY decrease 24.0% of production
Delivery systems:	4 465,300 ft. of pipe
No. of reuse sites:	275 2,471.5 acres

This treatment facility, located at 16515 Piuma Avenue, Cerritos, CA 90703, was completed in 1970 and was expanded in 1975 to its current design capacity of 37.5 MGD. This plant produced an average of 20.87 MGD (23,388 AFY) of coagulated, filtered, disinfected tertiary recycled water during FY10-11 (5.2% of the effluent produced in the JOS), which was a decrease of 13.6% from the preceding fiscal year, at an O&M cost of approximately $319/AF. Effluent water quality for FY 10-11 is presented in Table B-2 of Appendix B.

Through three contracts, an average of 5.012 MGD (5,617 AFY), or 24.0% of the recycled water produced at this plant was delivered during FY 10-11 for use in the cities of Bellflower, Bell Gardens, Cerritos, Compton, Downey, Lakewood, Lynwood, Norwalk, Paramount, Santa Fe Springs, South Gate, and Vernon. This represents a 4.1% decrease in reuse flows from the preceding fiscal year. Since the majority of reuse from this plant is for landscape irrigation, the decrease in use is directly attributable to the significant increase in rainfall from the preceding fiscal year. Use of recycled water from this facility is permitted under LARWQCB Order Nos. 87-51 and 97-072.

2.3.1 CITY OF BELLFLOWER

Recycled water deliveries to a single, 5-acre site (Ruth B. Caruthers Park) in this city began in November 1978. During FY 10-11, an average of 0.038 MGD (42 AFY), or about 0.2% of the recycled water produced at this plant, was used at this site for landscape irrigation. This was a 19.2% decrease from the preceding fiscal year.

A 30 HP pump at the end of the plant's effluent forebay supplies recycled water to the park through 1,900 feet of 4-inch pipe that crosses the San Gabriel River along a footbridge.

2.3.2 City of Cerritos

Initial deliveries to this city also began in November 1978 and consisted of landscape irrigation and ornamental lake supply at the 25-acre Ironwood Nine Golf Course next to the Los Coyotes WRP. Recycled water was supplied to this site by means of a 50 HP pump at the plant's effluent forebay (next to the City of Bellflower pump) and 75 feet of 6-inch pipe. This system was abandoned in May 1988 when the City of Cerritos completed its citywide distribution system, including 142,600 feet of pipeline (Figure 8). A narrative description of the layout of the City of Cerritos' recycled water distribution system is contained in Appendix D. Table 9 lists all of the users of recycled water on the City of Cerritos distribution system as of the end of FY 10-11.

No new users of recycled water were added to the City of Cerritos distribution system during FY 10-11. During FY 10-11, the City of Cerritos used 1.627 MGD (1,823 AFY), or 7.8% of the recycled water produced at the Los Coyotes WRP, for landscape irrigation and impoundments on 755.4 acres at 83 individual sites. This was a decrease of 2.6% from the preceding fiscal year. City trucks also hauled a small amount of recycled water for landscape irrigation. No private water trucks hauled recycled water during this fiscal year. In FY 10-11, the City of Cerritos charged its recycled water customers $326.70/AF, or 53% of the potable water rate of $614.20/AF.

2.3.3 City of Lakewood

In August 1989, the City of Lakewood connected to two of the stub-outs provided in the City of Cerritos recycled water distribution system to supply their own distribution system. In 1989, this system consisted of 28,300 feet of pipelines that initially served eight sites. Nine other sites have been connected since then. All of the users of recycled water from the City of Lakewood distribution system, as of the end of FY 10-11, are shown in Figure 9 and listed in Table 10. A narrative description of the layout of the City of Lakewood's recycled water distribution system is contained in Appendix E.

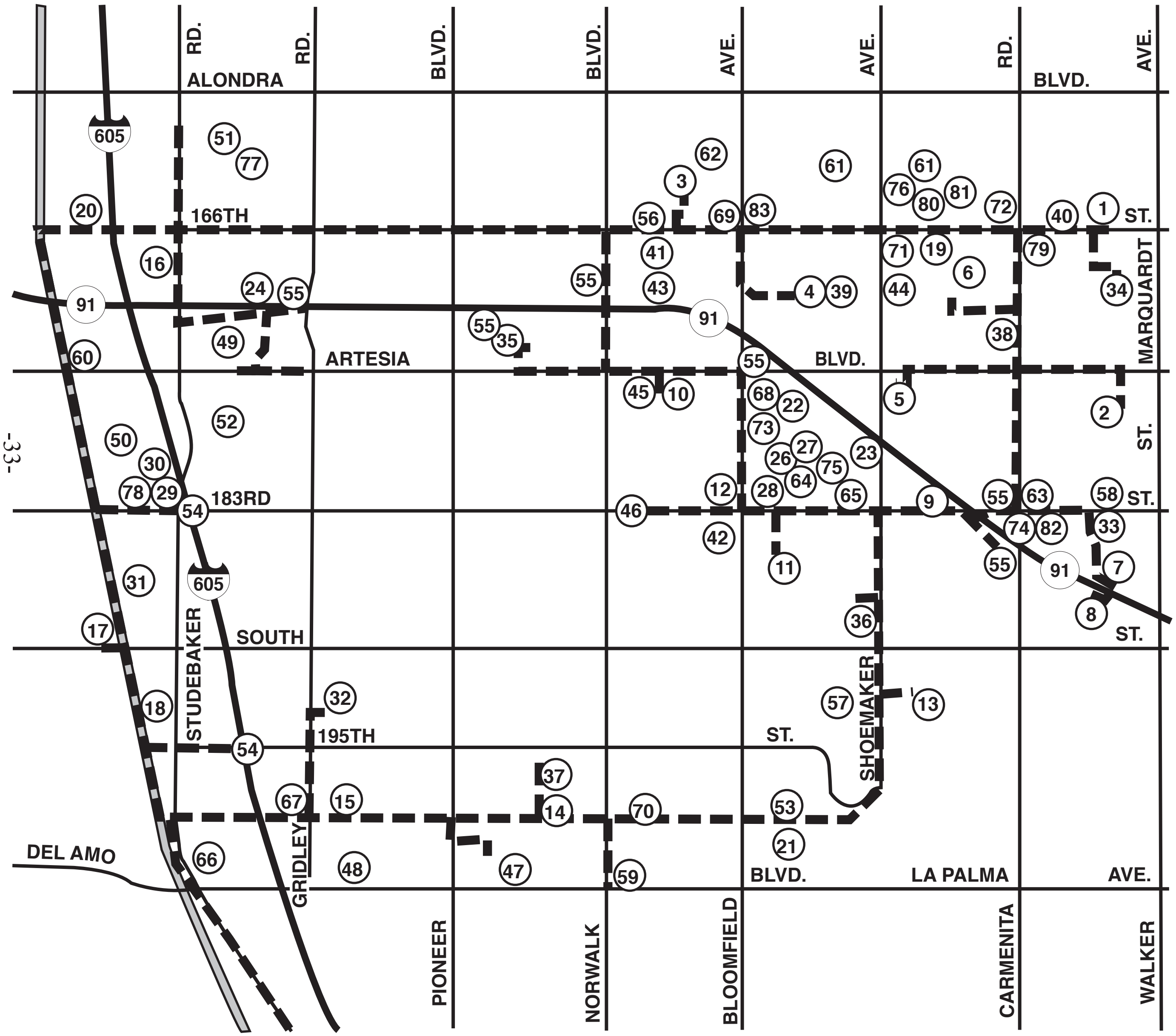
During FY 10-11, the City of Lakewood used 0.395 MGD (443 AFY), or 1.9% of recycled water produced at the Los Coyotes WRP, for irrigation of landscaping, athletic fields, and vegetables on approximately 191 acres at 17 individual sites. This was a slight decrease of 0.2% from the preceding fiscal year. No new reuse sites were added to City's recycled water distribution system in FY 10-11.

The City of Lakewood was charged $435.60/AF by the City of Cerritos during FY 10-11. The City of Lakewood, in turn, retailed the recycled water to its customers for $444.31/AF, or 47% of its potable rate of $945.25/AF. However, it is the City's policy to reimburse its recycled water customers for their capital expenditures to convert their on-site facilities to accept recycled water.

2.3.4 Central Basin Municipal Water District (Century System)

Central Basin Municipal Water District (CBMWD), a regional wholesale water purveyor and member agency of MWD, is the lead agency in developing the regional Century recycled water distribution system that serves the cities of Bellflower, Bell Gardens, Compton, Downey, Lakewood, Lynwood, Norwalk, Paramount, Santa Fe Springs, and South Gate. The $15 million project initially consisted of 26 miles of pipeline connected to one of the 24-inch distribution lines coming from the City of Cerritos pump station, and now has 189,800 feet of pipeline. The backbone of the distribution system is a 30-inch pipeline paralleling the San Gabriel River.

FIGURE 8
CITY OF CERRITOS RECLAIMED WATER DISTRIBUTION SYSTEM



1. Carmentia Park
2. Friendship Park
3. Satellite Park
4. Frontier Park
5. Saddleback Park
6. City Park West
7. Rainbow Park
8. Bettencourt Park
9. Brookhaven Park
10. Rosewood Park
11. Heritage Park
12. Library/Civic Center
13. Sunshine Park
14. Jacob Park
15. Gridley Park
16. Reservoir Hill Park
17. Westgate Park
18. Liberty Park
19. Olympic Natatorium
20. Ironwood 9 Golf Course
21. Sports Complex
22. ADP No. 2
23. Shoemaker on/off ramp
24. Windjammer off-ramp
25. Medians/Parkways
26. Transpacific Devel. Co.
27. Sheraton Hotel
28. Automated Data Proc.
29. Cerritos Pontiac/GMC
30. Moothart Chrysler
31. Browning Olsmobile
32. Bragg Elementary
33. Cerritos Elementary
34. Gonsalves Elementary
35. Juarez Elementary
36. Leal Elementary
37. Pat Nixon Elementary
38. Stowers Elementary
39. Whittman Elementary
40. Carmenita Junior High
41. ABC Adult School/Office
42. Cerritos High School
43. Tracy Education Center
44. Whitney Learning Center
45. Kennedy Elementary
46. Elliott Elementary
47. Cabrillo Lane Elementary
48. Haskell Junior High
49. Gahr High School
50. Bellflower Christian School
51. Cerritos Community College
52. Artesia Cemetery Dist.
53. Cerritos Reg. Co. Park
54. CalTrans 605 Freeway
55. CalTrans 91 Freeway
56. Parkside Condominiums
57. Shadow Park HOA
58. Concordia Church
59. Church of Nazarene
60. B&B Stables
61. ADP No. 6
62. Granada Park HOA
63. Cerritos Post Office
64. Performing Arts Center
65. Delta Dental
66. Orange County Nursery
67. SCE Nursery
68. Vestar Development
69. Sundance Condos
70. Cerritos Nursery
71. Warmington Homes
72. Midway International
73. Bloomfield Associates
74. 183rd St. on-ramp
75. AT&T Headquarters
76. Laskey-Weil
77. Chancellor Village
78. Land Rover
79. Surgical Center
80. UPS parking structure
81. UPS main building
82. Fountain Walk Senior Housing
83. ASCIP Building

N

No Scale

1 REUSE SITES

TRANSMISSION LINE

TABLE 9
SUMMARY OF FISCAL YEAR 10-11 RECYCLED WATER USAGE
CITY OF CERRITOS
(PAGE 1 OF 2)

Reuse Site	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Ironwood 9 Golf Course	Nov 78	25	L,P	0.083	93
Library/Civic Center	Dec 87	4	L	0.014	16
Olympic Natatorium	Dec 87	6	L	0.016	18
Whitney Learning Center	Dec 87	10	AF,L	0.019	21
Gonsalves Elementary School	Dec 87	5	AF,L	0.014	16
Wittman Elementary School	Dec 87	5	AF,L	0.009	10
Gahr High School	Dec 87	28	AF,L	0.053	60
Area Development Project No. 2	Jan 88	11.5	L,P	0.055	61
Medians/Parkways	Jan 88	42.8	L	0.145	162
605 Freeway	Jan 88	58.6	L	0.131	147
91 Freeway	Jan 88	70	L	0.036	41
Frontier Park	Jan 88	2.5	L	0.008	9
Carmenita Junior High School	Jan 88	5	AF,L	0.017	19
Cerritos Elementary School	Jan 88	6	AF,L	0.017	20
Stowers Elementary School	Jan 88	6	AF,L	0.022	25
Kennedy Elementary School	Jan 88	7	AF,L	0.021	24
City Park East	Jan 88	18	L	0.040	45
Satellite Park	Jan 88	2	L	0.005	5
Leal Elementary School	Jan 88	6	AF,L	0.010	11
Cerritos High School	Jan 88	20	AF,L	0.039	44
Elliott Elementary School	Jan 88	7	AF,L	0.013	14
Carmenita Park	Jan 88	4.5	L	0.012	14
Juarez Elementary School	Jan 88	7	AF,L	0.019	21
ABC Adult School - Office	Jan 88	3	L	0.014	15
Tracy Education Center	Jan 88	6	AF,L	0.003	3
Liberty Park	Jan 88	20	L	0.069	77
Gridley Park	Jan 88	9	L	0.019	21
Jacob Park	Jan 88	4.5	L	0.012	13
Heritage Park	Feb 88	12	L	0.034	38
Bragg Elementary School	Feb 88	7	AF,L	0.023	26
Haskell Junior High School	Feb 88	18	AF,L	0.039	44
Pat Nixon Elementary School	Feb 88	5	AF,L	0.009	10
Cabrillo Lane Elementary School	Feb 88	9	AF,L	0	0
Sunshine Park	Feb 88	3.5	L	0.008	9
Friendship Park	Feb 88	4	L	0.008	9
Bettencourt Park	Feb 88	2	L	0.005	5
Brookhaven Park	Feb 88	2	L	0.006	7
Saddleback Park	Feb 88	2	L	0.005	5
Westgate Park	Feb 88	4	L	0.007	8
Rainbow Park	Mar 88	2.5	L	0.007	8
Bellflower Christian School	Mar 88	31.4	AF,L	0.034	38
Cerritos Community College	Mar 88	55	AF,L	0.074	83
Cerritos Regional County Park	Apr 88	59	L	0.109	122
Artesia Cemetery District	Apr 88	10.9	L	0.022	24
Rosewood Park	Apr 88	2.7	L	0.008	9
Sports Complex	Mar 89	25	AF,L	0.045	51
Shoemaker On/Off Ramp - 91 Freeway	Dec 89	4.6	L	0.013	14
Transpacific Development Co.	Feb 90	6.9	L	0.010	11
Automated Data Processing	Feb 90	0.7	L	0.004	4
Sheraton Hotel	Mar 90	0.6	L	0.003	4
Cerritos Pontiac/GMC Truck	May 90	0.5	L	0.001	1
Moothart Chrysler	May 90	0.4	L	0.005	6
Windjammer Off Ramp - 91 Freeway	Sep 90	0.8	L	0.002	2

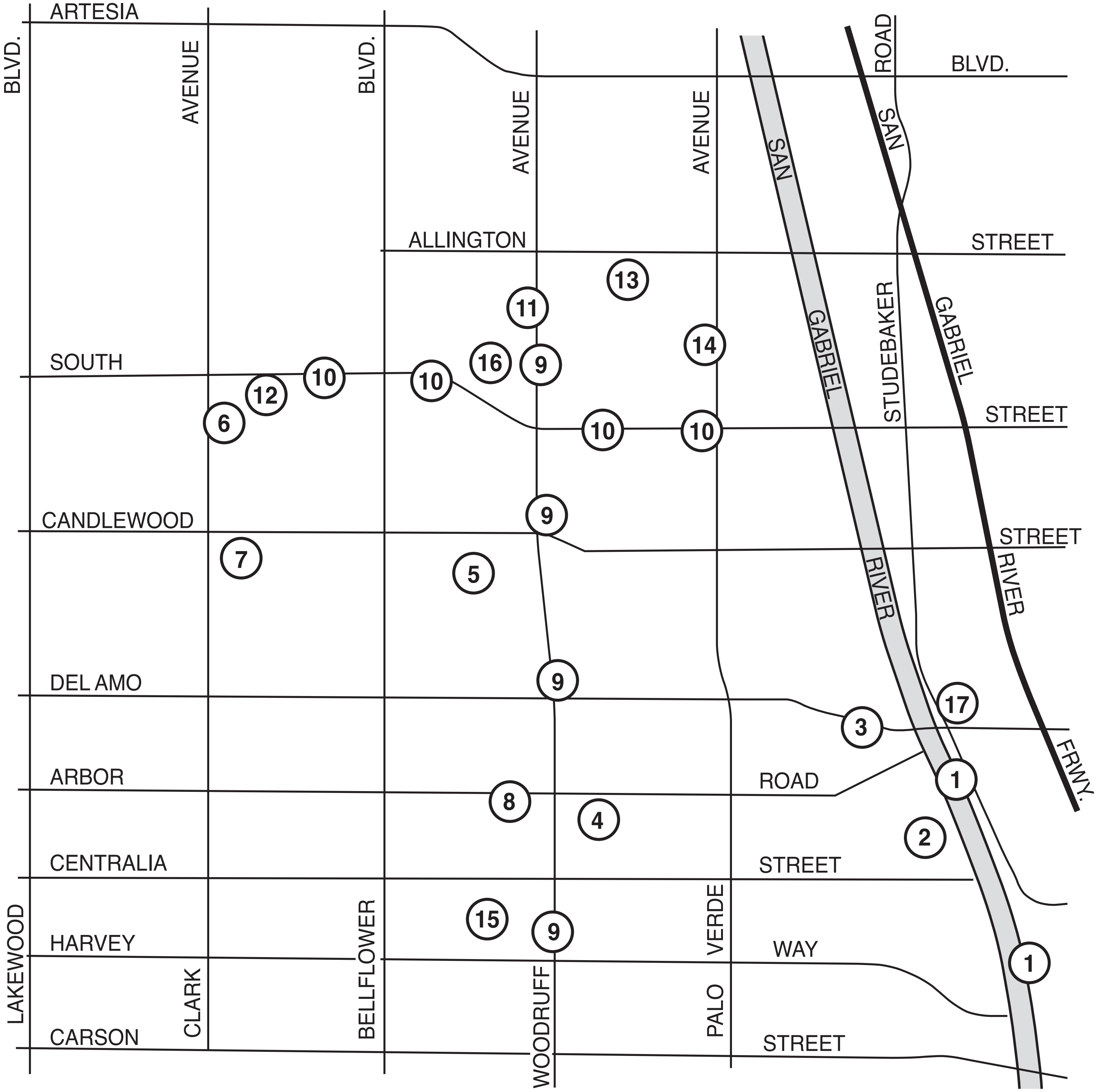
NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

TABLE 9
SUMMARY OF FISCAL YEAR 10-11 RECYCLED WATER USAGE
CITY OF CERRITOS
(PAGE 2 OF 2)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Browning Oldsmobile	Sep 90	0.1	L	0.001	1
City Water Truck	May 91	--	L	0.0003	0.4
Private Haulers	May 91	--	I	0	0
Parkside Condominiums	May 91	1.8	L	0.006	6
Concordia Church	Jun 91	4	L	0.005	6
Church of the Nazarene	Aug 91	1	L	0.003	4
B□B Stables	Aug 91	18	I	0.005	5
Shadow Park Homeowner□s Association	Nov 91	6	L	0.014	16
Area Development Project No. 6	Apr 92	9	L	0.056	63
Granada Park Homeowners Association	May 92	3.8	L	0.013	15
Cerritos Post Office	Feb 93	0.7	L	0.005	6
Center for the Performing Arts	Mar 93	1	L	0.004	4
Delta Dental	Nov 93	1.8	L	0.002	2
Southern California Edison nursery	Mar 94	3.5	O	0.004	5
Vestar Development	Jun 94	9.6	L	0.035	39
Sundance Condominiums	Jan 95	9	L	0.028	32
Cerritos Nursery	Dec 95	3	O	0.006	7
Encore Maintenance-Warmington Homes	May 96	1.1	L	0.002	3
Artesia Off Ramp - 91 Freeway	Aug 96	3.3	L	0.005	6
Midway International	Feb 98	0.3	L	0.001	1
Bloomfield Associates, 17871 Park Plaza Drive	Sep 98	0.5	L	0.001	1
183rd Street On Ramp - 91 Freeway	Feb 99	0.6	L	0.001	1
AT□T building, 12900 Park Plaza Drive	Aug 99	0.9	L	0.010	11
Laskey-Weil building, 13101 Moore Street	Oct 01	0.4	L	0.002	2
Chancellor Village Senior Housing	Nov 02	0.9	L	0.002	2
LandRover	Dec. 06	0.3	L	0.003	3
Surgical Center, Carmenita □ 166th	May 08	0.1	L	0.0003	0.4
UPS Parking Structure, 13150 Moore	May 08	0.5	L	0.001	1
UPS Main Building, 13233 Moore	Nov 08	4.4	L	0.012	13
Fountain Walk Senior Housing, 18310 Carmenita	Nov 08	0.1	L	0.0004	0.4
ASCIP Building, 16550 Bloomfield	Feb 09	0.1	L	0.0004	1
12800 Center Court	Jul 09	0.4	L	0.002	2
TOTALS		**755.4**		**1.627**	**1,823**

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

FIGURE 9
CITY OF LAKEWOOD REUSE SITES



1. RIVER (RYNERSON) PARK
2. MONTE VERDE PARK
3. MAE BOYER PARK
4. JOSE DEL VALLE PARK
5. JOSE SAN MARTIN PARK
6. MAYFAIR PARK
7. CIVIC CENTER WAY & CITY HALL
8. CITY WATER YARD
9. WOODRUFF AVENUE GREENBELT
10. SOUTH STREET GREENBELT
11. ST. JOSEPH'S PARISH SCHOOL
12. FOSTER ELEMENTARY SCHOOL
13. MAYFAIR HIGH SCHOOL
14. LINDSTROM ELEMENTARY SCHOOL
15. LAKEWOOD HIGH SCHOOL
16. MY HOA FARM
17. DEL AMO BLVD. MEDIANS

N

No Scale

TABLE 10
SUMMARY OF FISCAL YEAR 10-11 RECYCLED WATER USAGE
CITY OF LAKEWOOD

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
River (Rynerson) Park	Aug 89	40	L	0.064	72
Monte Verde Park	Aug 89	4	L	0.051	58
Mae Boyer Park	Aug 89	8	L	0.032	35
Jose Del Valle Park	Aug 89	12	L	0.026	29
Jose San Martin Park	Aug 89	9.3	L	0.021	23
City Water Yard	Aug 89	1	L	0.010	11
Woodruff Avenue greenbelt	Aug 89	4.1	L	0.011	12
South Street greenbelt	Aug 89	3.3	L	0.009	10
Mayfair Park	Dec 89	18	L	0.039	44
St. Joseph Parish School	Aug 90	3.5	AF,L	0.010	11
Foster Elementary School	Sep 90	6	AF,L	0.016	18
Civic Center Way and City Hall	Nov 90	2.8	L	0.014	16
Mayfair High School	May 91	36.5	AF,L	0.041	46
Lindstrom Elementary School	Sep 91	12	AF,L	0.014	15
Lakewood High School	Sep 91	25	AF,L	0.024	27
My Hoa Farm	May 93	5	AG	0.011	13
Del Amo Blvd. greenbelt	Jul 03	0.3	L	0.002	3
TOTALS		**190.8**		**0.395**	**443**

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

Construction of the initial system was completed in 1992, with the delivery of recycled water for applications such as landscape irrigation of parks, schools, and freeway slopes, nursery stock irrigation, and various industrial applications. To ensure reliable and efficient delivery of recycled water to the City of Vernon's Malburg Electrical Generation Station, along with existing and future Sanitation Districts' customers, CBMWD worked with the City of South Gate to construct a booster pump at the City's Hollydale Park in November 2004. The Hollydale Pump Station has improved the overall water pressure and supply reliability for CBMWD's recycled water customers in various local cities, including the cities of South Gate, Lynwood, Huntington Park, and Vernon.

This system was also connected in 1994 to the completed portions of the Rio Hondo recycled water distribution system, as detailed in Section 2.5.6 below. Both the Century and Rio Hondo distribution systems can be partially supplied with recycled water from either the Los Coyotes or San Jose Creek WRPs individually or in combination. Most of the recycled water delivered through the Century distribution system actually originated at the San Jose Creek WRP. However, the usage is still reported from the Los Coyotes WRP, as there is no way to differentiate which reuse sites receive which recycled water. Therefore, for the sake of consistency, recycled water usage along the Century facilities is reported in the water reuse reports as coming from the Los Coyotes WRP, and along the Rio Hondo facilities as coming from the San Jose Creek WRP. Figure 10 shows all of the pipelines for both distribution systems, as well as all of the current recycled water use sites. A narrative description of the layout of the Century recycled water distribution system is contained in Appendix F. Table 11 lists all of the recycled water use sites connected to the Century distribution system through FY 10-11.

CBMWD has constructed the delivery facilities right up to the end user; however, the local retail water purveyor is the entity actually supplying the recycled water. Over the past few years, three of the retail purveyors, the cities of Downey, Santa Fe Springs and Lynwood, constructed an additional 20,800 feet of pipelines connecting to the CBMWD distribution system. During FY 10-11, two new sites were added to the Century recycled water distribution system. In August 2010, Los Amigos Golf Course was connected. In March 2011, the medians along Atlantic Blvd in South Gate were connected.

During FY 10-11, CBMWD delivered 2.953 MGD (3,309 AFY) of recycled water), or 14.1% of recycled water produced at the Los Coyotes WRP, through 11 retail water purveyors to 172 individual sites for landscape and athletic field irrigation on approximately 1,504 acres and for industrial process water. This was a decrease of 5.1% from the preceding fiscal year.

In FY 10-11, CBMWD sold the recycled water on a wholesale basis to its retail water purveyor customers on a monthly use, tiered rate schedule of $506 for the first 50 AF, and $460 for anything above 50 AF. This price is between 57% and 62% of the rate of $805/AF it charges for Tier 1 non-interruptible potable water supplied by MWD, and between 50% and 55% of the rate of $915/AF it charges for Tier 2 supplies. Recycled water delivered outside of CBMWD's service area was subject to a $20/AF surcharge for each of the two tiers. Recycled water deliveries to the Malburg power plant in Vernon received an industrial use rate of $357 for the first 25 AF, $332 for the next 25 AF, $308 for the next 50 AF, and $283 for anything above 100 AF. Once they receive recycled water from CBMWD, the retail purveyors then set their own rates for the recycled water delivered to individual customers.

2.4 POMONA WRP

Several treatment plants serving the east San Gabriel Valley were constructed and operated by other agencies as early as 1927. The current Pomona WRP, located at 295 Humane Way, Pomona, CA 91766, was completed in 1966 and most recently expanded in 1991, allowing the plant to treat up to 15 MGD. In FY 10-11, the plant

FIGURE 10
CENTRAL BASIN MUNICIPAL WATER DISTRICT
RECLAIMED WATER DISTRIBUTION SYSTEM

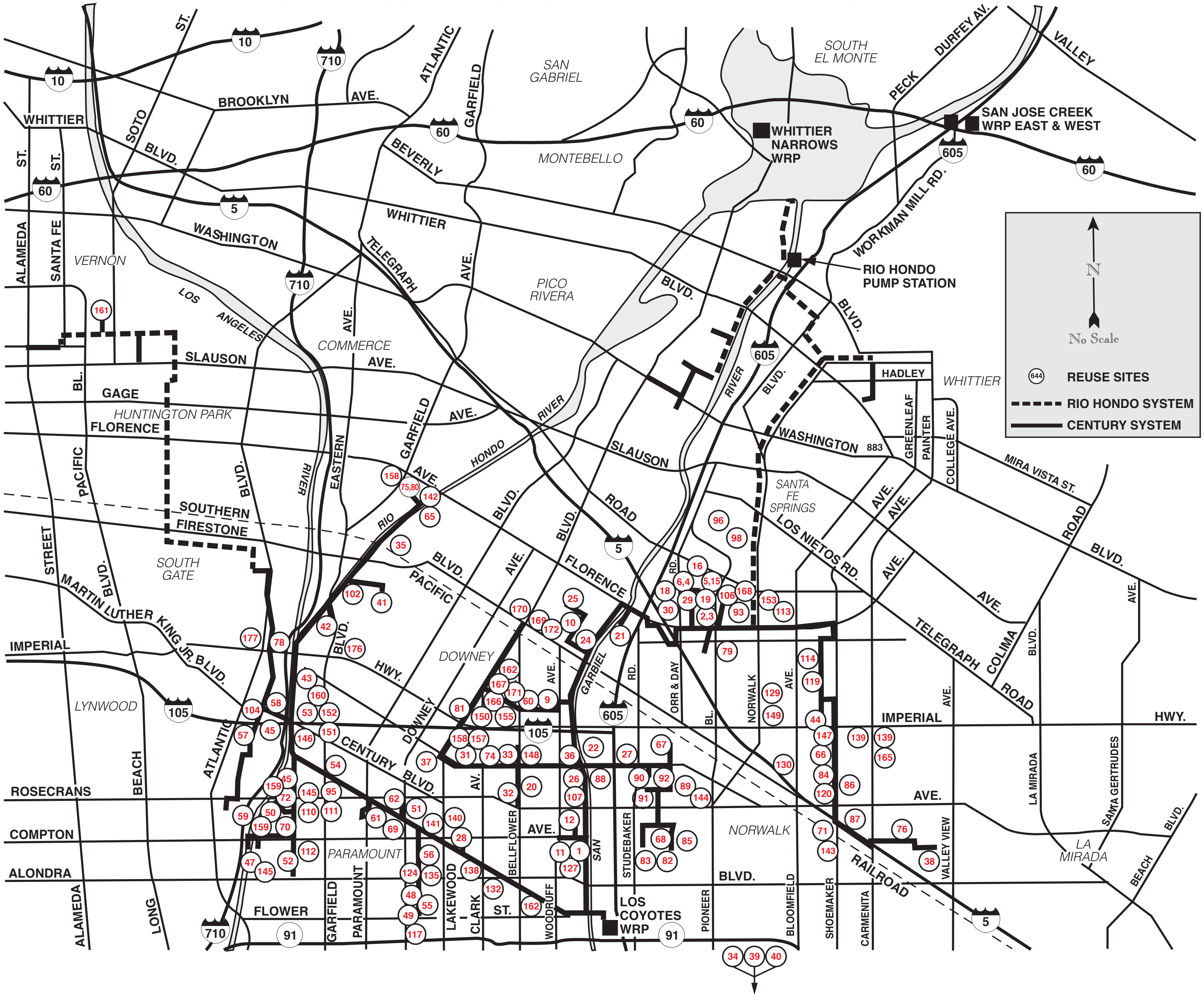


Table 11
Summary of Fiscal Year 10-11 Recycled Water Usage
Century Distribution System
(Page 1 of 4)

Reuse Site (City) (Map No.)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Andy's Nursery (Bellflower) (1)	Feb 92	9	O	0	0
Lake Center Park (Santa Fe Springs) (2)	Mar 92	8	L	0.018	20
Lake Center School (Santa Fe Springs) (3)	Mar 92	8	AF,L	0.016	18
Clarkman Walkway (Santa Fe Springs) (4)	Mar 92	0.1	L	0.0003	0.3
Towne Center Walkway (Santa Fe Springs) (5)	Apr 92	0.1	L	0.0003	0.3
Lakeview Child Care (Santa Fe Springs) (6)	May 92	0.2	L	0.001	2
Orr & Day Road medians (Santa Fe Springs) (7)	May 92	0.1	L	0.00002	0.03
Florence Avenue medians (Santa Fe Springs) (8)	Jun 92	3	L	0.005	6
Gauldin Elementary School (Downey) (9)	Jun 92	8.4	AF,L	0.005	5
Rio San Gabriel School (Downey) (10)	Jun 92	14.8	AF,L	0.014	16
Bellflower High School (Bellflower) (11)	Jul 92	28.4	AF,L	0.063	70
Ernie Pyle Elementary School (Bellflower) (12)	Aug 92	4.9	AF,L	0.012	13
Telegraph Road medians (Santa Fe Springs) (13)	Aug 92	0.5	L	0.003	3
Lakeview Park (Santa Fe Springs) (14)	Aug 92	6.7	L	0.011	12
Clark Estate (Santa Fe Springs) (15)	Aug 92	4.3	L	0.005	5
Towne Center Green (Santa Fe Springs) (16)	Aug 92	2.3	L	0.006	7
Pioneer Road medians (Santa Fe Springs) (17)	Sep 92	0.4	L	0.030	34
Police Station (Santa Fe Springs) (18)	Sep 92	0.2	L	0.001	1
Aquatic Center (Santa Fe Springs) (19)	Sep 92	0.5	L	0.004	4
Lewis School (Downey) (20)	Nov 92	4.6	AF,L	0.005	6
Wilderness Park (Downey) (21)	Nov 92	24	L	0.092	103
605 Freeway at Foster (Bellflower) (22)	Jan 93	14	L	0	0
Promenade Walkway (Santa Fe Springs) (23)	Jan 93	0.3	L	0.001	1
Rio San Gabriel Park (Downey) (24)	Jan 93	6.4	L	0.032	36
East Middle School (Downey) (25)	Jan 93	26	AF,L	0.017	19
Zinn Park (Bellflower) (26)	Jan 93	1.7	L	0.003	4
605/105 Interchange (Bellflower) (27)	Feb 93	22	L	0.0001	0.1
Hollywood Sports Center (Bellflower) (28)	Feb 93	22.5	L	0.002	2
Santa Fe Springs High School (Santa Fe Springs) (29)	Feb 93	14.5	AF,L	0.023	25
605/5 Freeway at Florence (Santa Fe Springs) (30)	Feb 93	17	L	0.0002	0.2
Old Downey Cemetery (Downey) (31)	Apr 93	7.5	L	0.026	30
Thompson Park (Bellflower) (32)	Apr 93	15	L	0.014	16
105 Freeway at Bellflower (Downey) (33)	May 93	17.9	L	0.009	10
Palms Park (Lakewood) (34)	May 93	20	L	0.003	3
Crawford Park (Downey) (35)	Jul 93	2.1	L	0.006	7
Humedo Nursery (Downey) (36)	Aug 93	11	O	0.005	6
105 Freeway at Lakewood (Downey) (37)	Sep 93	25	L	0.003	4
Shaw Industries Carpet Mill (Santa Fe Springs) (38)	Sep 93	--	I	0.076	85
Palms Elementary School (Lakewood) (39)	Sep 93	3.5	AF,L	0.012	13
Artesia High School (Lakewood) (40)	Sep 93	20.9	AF,L	0.033	37
West Middle School (Downey) (41)	Oct 93	19.5	AF,L	0.015	17
Circle Park (South Gate) (42)	Oct 93	4	L	0.013	15
Hollydale Park (South Gate) (43)	Nov 93	46	L	0.112	126
Robertson's Ready-Mix (Santa Fe Springs) (44)	Dec 93	--	I	0.005	5
710/105 Interchange (Paramount) (45)	Dec 93	18.5	L	0	0
Downey/Contreras greenbelt (Paramount) (46)	Dec 93	0.1	L	0.0003	0.3
Compton Golf Course (Paramount) (47)	Dec 93	13	L	0.021	24
Alondra Junior High School (Paramount) (48)	Dec 93	14	AF,L	0.012	14
Mokler Elementary School (Paramount) (49)	Dec 93	10	AF,L	0.009	11
Los Cerritos Elementary School (Paramount) (50)	Dec 93	8	AF,L	0.011	12
Wirtz Elementary School (Paramount) (51)	Dec 93	9	AF,L	0.011	12
Keppel Elementary School (Paramount) (52)	Dec 93	4	AF,L	0.002	3
Billy Lee Nursery (Paramount) (56)	Dec 93	2.5	O	0.008	9

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

TABLE 11
SUMMARY OF FISCAL YEAR 10-11 RECYCLED WATER USAGE
CENTURY DISTRIBUTION SYSTEM
(PAGE 2 OF 4)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	(AFY)
105 Freeway at Wright (Lynwood) (57)	Jan 94	19.6	L	0.001	2
710 Freeway at M.L. King (Lynwood) (58)	Jan 94	15.5	L	0	0
710 Freeway at Rosecrans (Compton) (59)	Jan 94	24.2	L	0.007	8
Independence Park (Downey) (60)	Feb 94	10.4	L	0.011	13
Paramount Park (Paramount) (61)	Feb 94	9	L	0.022	24
Paramount High School (Paramount) (62)	Feb 94	19	AF,L	0.021	23
Rosecrans/Paramount medians (Paramount) (63)	Mar 94	0.2	L	0.002	2
Somerset medians (Paramount) (64)	Apr 94	0.9	L	0.005	6
Rio Hondo Golf Course (Downey) (65)	Apr 94	92.4	L	0.193	216
Zimmerman Park (Norwalk) (66)	Apr 94	9.5	L	0.015	17
Vista Verde Park (Norwalk) (67)	Apr 94	6.5	L	0.012	14
Gerdes Park (Norwalk) (68)	Apr 94	8.6	L	0.015	17
Clearwater Junior High School (Paramount) (69)	Apr 94	4	AF,L	0.031	35
Steam Engine Park (Paramount) (70)	Jun 94	0.6	L	0.001	1
5 Freeway at Shoemaker/Firestone (Norwalk) (71)	Jul 94	0.8	L	0.003	4
Spane Park (Paramount) (72)	Jul 94	5	L	0.008	9
Orange/Cortland Parkway (Paramount) (73)	Jul 94	1.3	L	0.002	3
Carpenter School (Downey) (74)	Aug 94	7.4	AF,L	0.007	7
John Anson Ford Park (Bell Gardens) (75)	Sep 94	45	L	0.054	60
Ramona Park (Norwalk) (76)	Oct 94	4.8	L	0.004	4
Alondra median (Paramount) (77)	Oct 94	0.6	L	0.007	8
Imperial/Wright Road medians (Lynwood) (78)	Oct 94	0.2	L	0.001	1
Little Lake Park (Santa Fe Springs) (79)	Dec 94	18	L	0.033	36
John Anson Ford Golf Course (Bell Gardens) (80)	Feb 95	13.6	L	--	--
South Middle School (Downey) (81)	May 95	15.8	AF,L	0.007	8
Nuffer Elementary School (Norwalk) (82)	Jun 95	10.4	AF,L	0.007	8
Lampton Middle School (Norwalk) (83)	Jun 95	9.5	AF,L	0.009	10
Hargitt Middle School (Norwalk) (84)	Jul 95	9.5	AF,L	0.025	28
Norwalk Adult School (Norwalk) (85)	Jul 95	17.2	AF,L	0.026	29
John Glenn High School (Norwalk) (86)	Jul 95	38.8	AF,L	0.039	44
Ramona Elementary School (Norwalk) (87)	Jul 95	6.8	AF,L	0.004	4
New River Elementary School (Norwalk) (88)	Jul 95	10.3	AF,L	0.008	9
Morrison Elementary School (Norwalk) (89)	Sep 95	7.7	AF,L	0.003	4
D.D. Johnston Elementary School (Norwalk) (90)	Sep 95	8.9	AF,L	0.006	7
Corvallis Middle School (Norwalk) (91)	Sep 95	16.9	AF,L	0.030	34
Norwalk High School (Norwalk) (92)	Sep 95	35.1	AF,L	0.033	37
Heritage Park (Santa Fe Springs) (93)	Oct 95	9.2	L	0.009	10
Belloso Farm Nursery (Paramount) (94)	Oct 95	2.5	O	0.002	2
Robertson's Ready-Mix (Paramount) (95)	Nov 95	--	I	0.007	8
Los Nietos Park (Santa Fe Springs) (96)	Jan 96	11.2	L	0.014	15
Bell Gardens Soccer Field (Bell Gardens) (97)	Feb 96	2.6	AF	0.004	5
Jersey Ave. School/city athl. fields (S.F. Springs) (98)	Mar 96	8	AF	0.004	5
Bellflower Blvd. medians (Bellflower) (99)	Jul 96	0.3	L	0.002	3
Alta Produce (Paramount) (100)	Aug 96	4	AG	0.003	2
Belloso Farm Nursery (South Gate) (101)	Sep 96	2.5	O	0.001	1
Temple Park (Downey) (102)	Oct 96	1	L	0.001	1
Woodruff Avenue medians (Bellflower) (103)	Oct 96	0.8	L	0.005	5
Ham Park (Lynwood) (104)	Dec 96	10	L	0	0
Jauregui Nursery (Paramount) (105)	Dec 96	2	O	0.005	6
Heritage Corporate Center (Santa Fe Springs) (106)	Jan 97	29.9	L	0.027	30
Belloso Farm Nursery (Bellflower) (107)	Jan 97	8	O	0	0
Foster Road medians (Norwalk) (108)	Jan 97	0.3	L	0.002	2
Rosecrans Avenue medians (Paramount) (109)	Mar 97	0.2	L	0.008	9

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

TABLE 11
SUMMARY OF FISCAL YEAR 10-11 RECYCLED WATER USAGE
CENTURY DISTRIBUTION SYSTEM
(PAGE 3 OF 4)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Texaco□Somerset medians (Paramount) (110)	Mar 97	0.2	L	0.001	1
McLane Mowers (Paramount) (111)	Mar 97	0.6	L	0	0
ABC Nursery (Paramount) (112)	Mar 97	16	O	0	0
L.A. Co. Vector Control Bldg. (S.F. Springs) (113)	Mar 97	3.8	L	0.003	4
Greenstone Warehouse (Santa Fe Springs) (114)	Apr 97	0.4	L	0.002	2
McNab Avenue medians (Bellflower) (115)	Jul 97	0.1	L	0.0004	0.5
Foster Road□Premier Ave. medians (Downey) (116)	Aug 97	0.1	L	0.001	1
Palm Growers Nursery (Downey) (117)	Oct 97	7.3	O	0	0
Alondra Blvd medians @ SGR (Bellflower) (118)	Oct 97	0.1	L	0.0002	0.2
Maruichi American building (Santa Fe Springs) (119)	Oct 98	0.4	L	0.001	1
Norwalk Golf Course (Norwalk) (120)	Jan 99	8	L	0.022	25
Soco-Lynch Corp. building (Santa Fe Springs) (121)	Feb 99	1	L	0.002	3
MC□□C building (Santa Fe Springs) (122)	Mar 99	0.7	L	0.007	7
Lakewood Blvd. medians (Paramount) (123)	Mar 99	0.2	L	0.002	2
Progress Park (Paramount) (124)	Mar 99	6.2	L	0.012	14
Garfield Avenue medians (Paramount) (125)	Apr 99	0.1	L	0.001	1
B□□B Pallet Co. (South Gate) (126)	May 99	--	I	0	0
Garcia□s Nursery (Bellflower) (127)	Jun 99	6	O	0	0
Orange Avenue medians (Paramount) (128)	Aug 99	0.1	L	0.003	3
Metropolitan State Hospital (Norwalk) (129)	Sep 99	80	L	0	0
Moffit School (Norwalk) (130)	Sep 99	1.6	AF,L	0.005	5
Rio Hondo Channel (Downey) (131)	Nov 99	0.8	L	0.001	1
Simms Park (Bellflower) (132)	Dec 99	12.5	L	0.014	15
Foster Road Greenbelt (Norwalk) (133)	Mar 00	3.3	L	0.003	3
San Luis Street @ flood channel (Paramount) (134)	Apr 00	3	L	0.005	1
Jefferson School (Paramount) (135)	Jul 00	0.5	AF,L	0.003	3
Columbus High School (Downey) (136)	Aug 00	25	AF,L	0.015	17
Triangle Park (South Gate) (137)	Nov 00	0.4	L	0.002	2
Golden Springs Business Park (Santa Fe Springs) (139)	Apr 01	31.4	L	0.113	126
Bellflower Storage (Bellflower) (140)	Jun 01	3	L	0.002	2
Railroad Beautification (Paramount) (141)	Jul 01	0.5	L	0	0
Rio Hondo Channel (Bell Gardens) (142)	Jul 01	0.3	L	0.003	3
CDM building (Santa Fe Springs) (143)	Oct 01	0.1	L	0.002	2
L.A. Co. Recorder□s Office (Norwalk) (144)	Jan 02	2.7	L	0.014	15
Tays Cool Fuel (Paramount) (145)	Feb 02	0.2	L	0.003	3
L.A. River landscaping (South Gate) (146)	Mar 02	2.5	L	0.001	1
Lakewood-Adoree medians (Downey) (150)	Jul 02	3.4	L	0.031	35
Simon Trucking (Santa Fe Springs) (147)	Nov 02	0.9	L	0.001	1
Foster□Coldbrook medians (Bellflower) (148)	Nov 02	0.1	L	0.0003	0.4
L.A. County Library (Norwalk) (149)	Nov 02	0.9	L	0.005	6
Metro State□Wheelabrator (Norwalk) (129)	Jan 03	B	I	0.248	278
Imperial Equestrian (South Gate) (152)	Jul 03	1.5	L	0.004	4
Norwalk Walkway□Parking (Santa Fe Springs) (153)	Jul 03	1	L	0.003	4
Steve Horn Way□Bellflower medians (Downey) (155)	Nov 03	0.3	L	0.015	17
Pro Growers Nursery (Norwalk) (156)	Sep 04	11.3	O	0.040	45
Kaiser Administration building (Downey) (157)	Oct 04	2.5	L	0.005	6
Downey Studios (Downey) (158)	Oct 04	1	L	0.004	5
Dills Park (Paramount) (159)	Jul 05	12.5	L	0.030	34
Hollydale Elementary (South Gate) (160)	Sep 05	3	AF,L	0.001	1
Malburg Generation Station (Vernon) (161)	Oct 05	B	I	0.597	668
Stuart and Gray medians (Downey) (162)	Dec 05	0.4	L	0.006	7
Woodruff and Maple medians (Bellflower) (163)	Mar 06	0.1	L	0.0001	0.1
Sculpture Garden (Santa Fe Springs) (164)	May 06	0.6	L	0	0

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

Table 11
Summary of Fiscal Year 10-11 Recycled Water Usage
Century Distribution System
(Page 4 of 4)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Foster Road medians (Santa Fe Springs) (165)	Jul 06	1	L	0.009	11
Space Learning Center (Downey) (166)	Apr 08	10.5	L	0.024	27
Cornerstone Commerce Center (Downey) (167)	Jun 08	0.8	L	0.006	7
Mora Drive medians (Santa Fe Springs) (168)	Oct 08		L	0.004	5
Firestone Blvd. medians (Downey) (169)	Feb 09	0.1	L	0.0004	0.4
Citibank, 8764 Firestone Blvd. (Downey) (170)	Feb 09	0.1	L	0.001	1
Steve Horn Pkwy. medians @ Kaiser (Downey) (171)	May 09	1.4	L	0.023	26
Walgreens Big Lots, 9018 Firestone (Downey) (172)	May 09	0.4	L	0.003	4
Pacific Alloy Casting (South Gate) (173)	Jul 09	--	I	0.016	18
MTA Bike Trail (Bellflower) (174)	Nov 09	0.1	L	0.001	1
Paramount Blvd. Medians (Paramount) (175)	Mar 10		L	0.004	4
Los Amigos Golf Course (L.A. County) (176)	Aug 10	110	L	0.004	4
Atlantic Ave. medians (South Gate) (177)	Mar 11	16.3	L	0.107	120
TOTALS		**1,520.3**		**2.953**	**3,309**

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

POMONA WRP FACTS

Plant capacity:	15 MGD
Water produced:	9.00 MGD 10,089 AFY 7.4% FY increase
FY10-11 O&M:	$299/AF
Water reused: (excluding recharge)	2.557 MGD 2,865 AFY 18.2% FY decrease 28.4% of production
Delivery systems:	2 190,100 ft. of pipe
No. of reuse sites:	192 2,192.5 acres

produced 9.00 MGD (10,089 AFY) of coagulated, filtered, disinfected tertiary recycled water (2.2% of the effluent produced in the JOS), which was a 7.4% increase over the preceding fiscal year, at a FY 10-11 O&M cost of approximately $299/AF. Recycled water quality for FY 10-11 is presented in Table B-3 of Appendix B.

Two agencies, the Pomona Water Department (PWD) and the Walnut Valley Water District (WVWD), along with the Sanitation Districts' Spadra Landfill, together used 2.557 MGD (2,865 AFY) or 28.4% of the plant's total production. This was an 18.2% decrease from the preceding fiscal year. A third purveyor, Rowland Water District (RWD), took over operation of that portion of the WVWD recycled water distribution system that ran through its service area and has connected to the City of Industry system which gets its recycled water from the San Jose Creek WRP (Section 2.5.3).

The remaining recycled water is discharged to south fork of San Jose Creek, which is tributary to the unlined portion of the San Gabriel River. Therefore, nearly 100% of the recycled water produced at this plant is reused, since most of the river discharge percolates into the underlying groundwater. Use of recycled water from this facility is permitted by the LARWQCB under Order Nos. 81-34 and 97-072 for direct, non-potable applications, and No. 91-100 for groundwater replenishment.

2.4.1 POMONA WATER DEPARTMENT

Documented use of recycled water in the Pomona area goes as far back as 1904 when effluents treated to various levels were used on the many farms and ranches in the area. The PWD began using recycled water from the Sanitation Districts' current treatment facility in December 1973 when agricultural irrigation at California State Polytechnic University, Pomona (Cal Poly) and its occasional satellite farming operation at Lanterman State Hospital, and landscape irrigation along South Campus Drive Parkway were connected to a recycled water distribution system.

The distribution system consists of a 490 HP, 9,000 gpm pump station that feeds two, 21-inch pipelines. One 21-inch line runs east along Pomona Boulevard and Vernon Avenue. The other 21-inch line runs north along Ridgeway Street to a T-section at South Campus Drive and the 71 Freeway. From this point, an 18-inch line continues north along Ridgeway, then east along Murchison Avenue for a short distance before it terminates at a 4.5 million gallon storage reservoir in Bonelli Park. At the T-section, a 16-inch line runs west along South Campus Drive, serving the parkway, Cal Poly, and the 57 and 71 Freeways. Lanterman Hospital had been served by a 21-inch unreinforced concrete gravity line from the Pomona WRP that currently serves the former Landfill site and the WVWD pump station (discussed in Sections 2.4.2 and 2.4.3, below).

During FY 10-11, the PWD delivered 1.251 MGD (1,347 AFY), or 13.4% of the recycled water from the Pomona WRP though 37,000 feet of pipeline, to seven retail customers on 1,427 acres as shown in Figure 11. This was a 28.3% decrease from the preceding fiscal year. Table 12 lists the users of the PWD system as of the end of FY 10-11. No new users were added during this fiscal year.

FIGURE 11
POMONA WATER DEPARTMENT AND SPADRA LANDFILL REUSE SITES

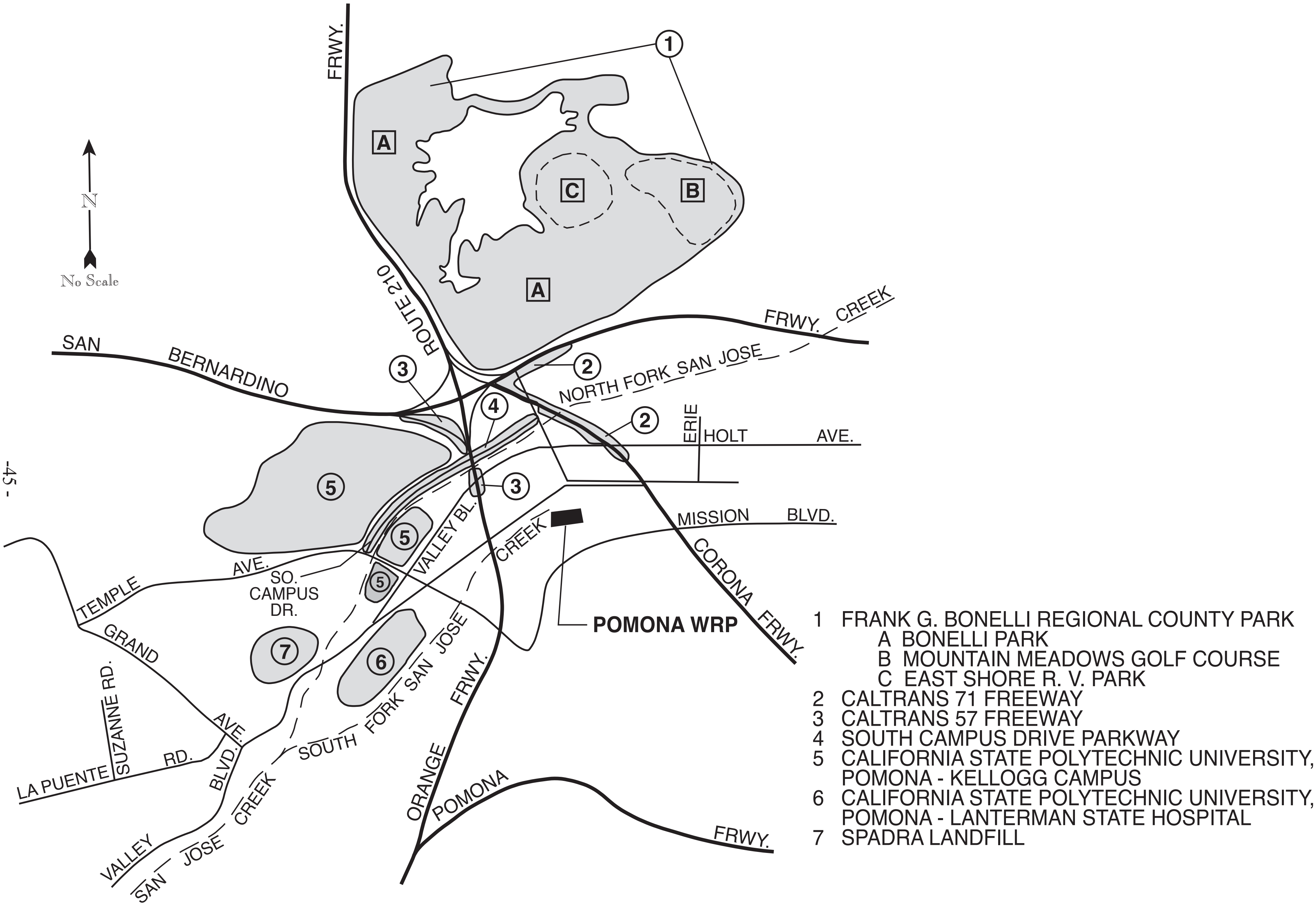


Table 12
Summary of Fiscal Year 10-11 Recycled Water Usage
Pomona Water Department & Sanitation Districts' Spadra Site

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Cal Poly, Pomona-Kellogg	Dec 73	500	AG,L,O,P,AF	0.469	526
Lanterman Hospital	Dec 73	100	AG	0	0
South Campus Drive Parkway	Dec 73	8	L	0.010	11
Route 57 and 10 Freeways	May 75	18	L	0.020	23
Bonelli Regional County Park	Apr 77	789	L	0.660	740
Route 71 and 10 Freeways	Apr 81	12	L	0.036	40
Spadra Landfill landscape	Jul 84	53	L	0.240	269
Spadra Landfill dust control	Jul 84	--	I	0.010	11
Cal Poly LandLab	Nov 93	2.5	AG,L	0.013	15
Spadra Gas-to-Energy Plant	Dec 95	--	I	0.049	55
Robertson's Ready-Mix	Oct 09	--	I	0.006	7
TOTALS		**1,482.5**		**1.514**	**1,697**

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

During FY 10-11, the PWD sold the recycled water to its customers from its pressure system at a rate of $521.67/AF. This is 54% of its potable water rate of $962.68/AF.

2.4.2 SPADRA LANDFILL SITE

The Sanitation Districts' Spadra Landfill began receiving recycled water from the Pomona WRP in July 1984 from the 21-inch unreinforced concrete gravity line from the plant. A pressure-sustaining valve on the line at the landfill site provides enough static head in the pipeline for the pumps of the landfill to operate. Cal Poly's LandLab project began receiving recycled water from the landfill site in November 1993, and the Spadra Gas-to-Energy (SGE) Facility began using recycled water in its cooling towers in December 1995. These sites are shown in Figure 11 and are also listed in Table 12 along with the users of the Pomona Water Department system.

During FY 10-11, 0.312 MGD (350 AFY), or 3.5% of the recycled water from the Pomona WRP, was used on approximately 56 acres at the former Spadra Landfill site, the SGE Facility, and Cal Poly's LandLab. This was a 9.1% decrease from the preceding fiscal year.

2.4.3 WALNUT VALLEY WATER DISTRICT

In March 1986, WVWD completed the initial construction of its recycled water distribution system. This system consists of a 3,500 gpm pump station and an 8,000 gallon wet well at the end of the 21-inch concrete gravity line from the Pomona WRP, approximately 166,320 feet of pipeline, and a 2 million gallon reservoir. A second, 2 million gallon reservoir was constructed in mid-1992 to provide more storage for the nighttime peak demands. The distribution system is supplemented during the peak summer demand periods with non-potable water from a well located next to the recycled water line on Fairway Avenue and with imported water from MWD at the pump station. Initially, 26 individual sites were served following completion of the distribution system. In January 2003, the RWD assumed operation of the 29,280 feet of the WVWD recycled water system pipeline serving seven reuse sites in RWD's service area which was connected to the City of Industry main recycled transmission line in July 2009 (see Section 2.5.3 below). Figure 12 and Table 13 present the users of the WVWD system as of the end of FY 10-11. A narrative description of the layout of the WVWD recycled water distribution system is contained in Appendix G.

In FY 10-11, two new sites were added to the WVWD distribution system. In September 2010, the landscaping at the Donald Miller building (19803 Valley Blvd.) was connected. In December 2010, the landscaping around Bell Memorial Church (1747 Nogales St.) was connected.

During FY 10-11, WVWD delivered 1.043 MGD (1,168 AFY), or 11.6% of the recycled water produced at the Pomona WRP, a decrease of 5.6% from the preceding fiscal year. WVWD received the recycled water directly from the Sanitation Districts and retailed it to its 183 customers (which irrigate approximately 708.5 acres) at 64% of its potable water rate of $1,019.30/AF, or $649.04/AF.

2.5 SAN JOSE CREEK WRP

This treatment facility, located at 1965 Workman Mill Road, Whittier, CA 90601, was first built in 1971 with a design capacity of 37.5 MGD. The 25 MGD Stage II expansion was completed in 1982, and the 37.5 MGD Stage III expansion was completed in 1993. The facility currently has a design capacity of 100 MGD, with enough space for a future 25 MGD Stage IV expansion (however, there is no set schedule for this project). During FY 10-11, Stages I & II (east side) produced 46.00 MGD (51,547 AFY) and Stage III (west side) produced 21.42 MGD (24,008 AFY), at O&M costs of $248/AF and $221/AF, respectively. The entire facility,

FIGURE 12
WALNUT VALLEY WATER DISTRICT RECLAIMED WATER DISTRIBUTION SYSTEM

1. Walnut Ranch LMD
2. Snow Creek Park & LMD
3. Suzanne Park
4. Suzanne Middle School
5. Walnut High School
6. Vejar Elementary School
7. Morris Elementary School
8. Lemon Creek Park
9. Friendship Park
10. Hollingsworth Elem. School
11. Lanesboro Park
12. Nogales High School
13. Rincon Middle School
14. Sunshine Park
15. Schabarum Park
16. Queen of Heaven Cemetery
17. Rowland Elementary School
18. Farjardo Elementary School
19. CalTrans
20. Rowland Heights County Park
21. Rowland High School
22. Killian Elementary School
23. Walnut Elementary School
24. WVUSD Admin. Service Center
25. Diamond Bar Golf Course
26. Gateway Corporate Center (multiple)
27. Walnut Ridge LMD & Morningside Park
28. Sunshine Growers Nursery
29. Temple Avenue Medians
30. Valley Business Center
31. Lemon Avenue Medians
32. Fajardo Park
33. Walnut Ranch Park
34. Westhoff Elementary School
35. Grand Crossing (multiple)
36. SCAQMD Headquarters
37. Recycled Water Reservoirs
38. First Chinese Baptist Church
39. Valley Blvd. Medians
40. Rodeo Ridge Estates
41. Brookside Equestrian Center
42. Grand Avenue Medians
43. Burger King Restaurant
44. Business Parkway Center (multiple)
45. Catellus Commerce Center (multiple)
46. WVWD Offices
47. Dreyers Grand Ice Cream
48. Walnut Hills Village Shopping Center
49. Golden Springs Dr. Medians
50. West Golden Springs Dr. Medians
51. Calvary Chapel Church
52. Rowland Heights Comm. Church
53. Fairway Medians
54. Sysco
55. Del Paso High School
56. Circuit City
57. Metrolink Station
58. Countryside Suites
59. Diamond Crest HOA
60. Norm Ashley Park
61. Waterfall Estates
62. Koll Plantation (multiple)
63. McDonalds Restaurant
64. Prudential Insurance
65. Cross School of Education
66. Bank of the West
67. Gym/Teen Center
68. Harvard Estates
69. Wind River HOA
70. Walnut Nazarene Church
71. Holiday Inn Express
72. Lemon Avenue Investments
73. Everbright Management
74. V-Tec Automotive
75. ExtraSpace Storage
76. Latter-Day Saints Church
78. Magnolia Homes
79. Signal-Walnut Partnership
80. Brea Cyn./Old Ranch Rd. Med.
81. CLT Computers
82. Tri Net Court
83. Walnut City Hall
84. Walnut Senior Center
85. Community Day Sch./Kandyland
86. Sentous Valley LLC
87. Southcoast Cabinets
88. Shell Station
89. Hing Wa Lee Plaza
90. Sy Development Condos
91. Industry East Land LLC
92. Valley Blvd. Medians
93. Kohl's Center
94. Target
95. Christian Chapel of Walnut Valley
96. Home Depot
97. FedEx
98. Grand Avenue Venture
99. Currier Road Development
100. Chili's Restaurant
101. Brea Cyn/Currier median
102. Ybarra Elementary School
103. Bell Memorial Church

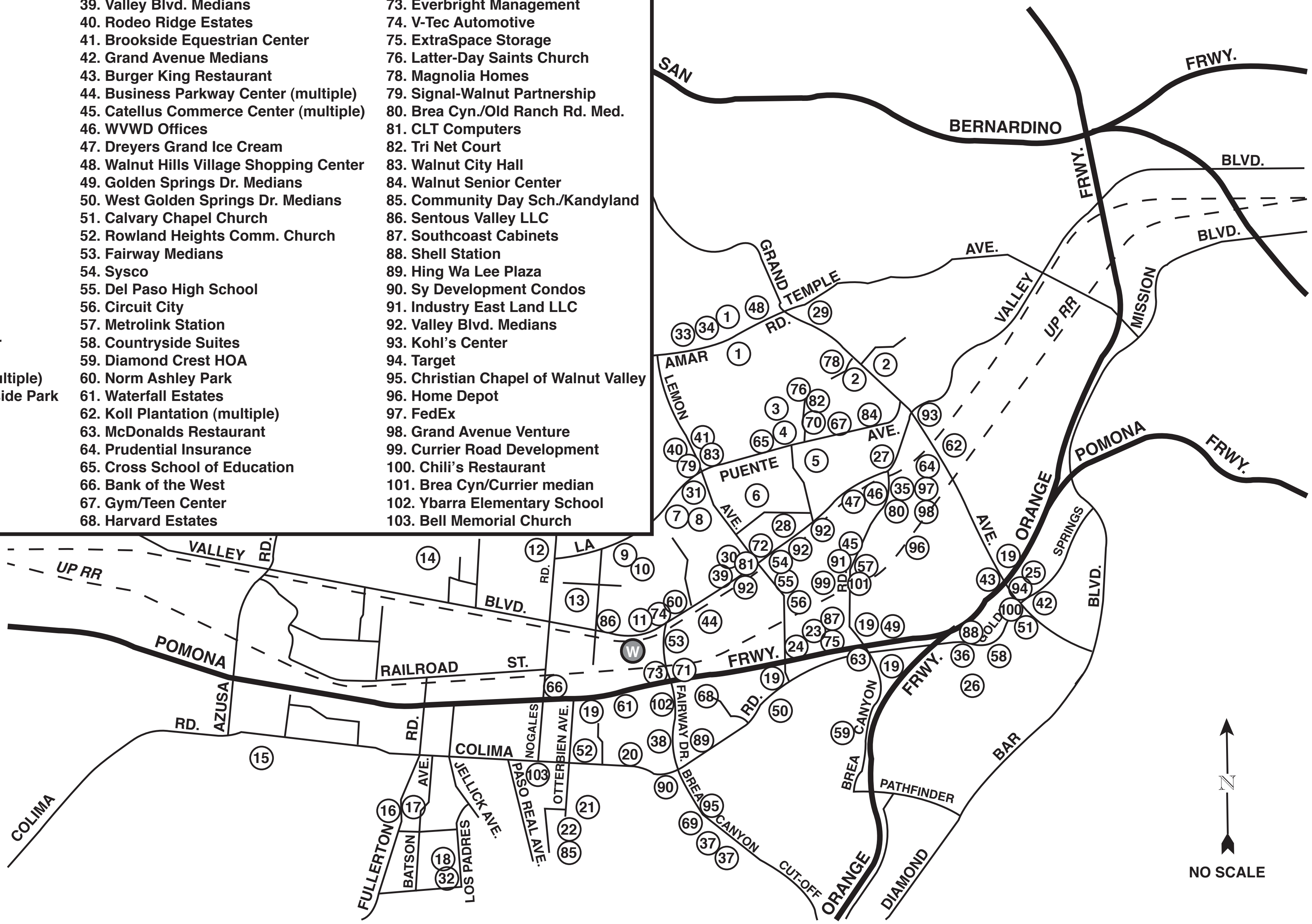


TABLE 13
SUMMARY OF FISCAL YEAR 10-11 RECYCLED WATER USAGE
WALNUT VALLEY WATER DISTRICT
(PAGE 1 OF 4)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Suzanne Park (Walnut)	Oct 80	12	L	0.014	16
Suzanne Middle School (Walnut)	May 86	4	AF,L	0.012	13
Walnut High School (Walnut)	May 86	15	AF,L	0.019	21
Vejar School (Walnut)	May 86	3	AF,L	0.010	11
Morris School (Walnut)	May 86	9	AF,L	0.009	10
Snow Creek Park (Walnut)	May 86	7	L	0.011	12
Snow Creek Landscape Maintenance Dist. (Walnut)	May 86	13.5	L	0.036	41
Lemon Creek Park (Walnut)	May 86	5	L	0.005	6
Friendship Park (West Covina)	May 86	6	L	0.007	8
Hollingworth School (West Covina)	May 86	3	AF,L	0.007	8
Lanesboro Park (West Covina)	May 86	2	L	0.007	7
Rincon Middle School (West Covina)	May 86	3	AF,L	0.008	9
Route 57 and 60 Freeways (Rowland Heights)	May 86	19.7	L	0.035	39
Rowland Heights Reg. Co. Park (Rowland Heights)	May 86	11	L	0.012	13
Rowland High School (Rowland Heights)	May 86	9	AF,L	0.020	23
Killian Elementary School (Rowland Heights)	May 86	3	AF,L	0.005	6
Walnut Elementary School (Walnut)	May 86	4	AF,L	0.001	1
WUSD Administrative Service Center (Walnut)	May 86	4	L	0.002	3
Walnut Ranch Park (Walnut)	Jun 86	26	L	0.019	22
Amar Road greenbelt (Walnut)	Jun 86	16	L	0.015	17
Diamond Bar Golf Course (Diamond Bar)	Jul 86	174	L,P	0.165	185
Walnut Ridge Landscape Maintenance Dist. (Walnut)	Mar 87	25.5	L	0.030	34
Morningside Park (Walnut)	Mar 87	4	L	0.004	4
Gateway Corporate Center (Diamond Bar)	Jun 87	45	L	0.045	51
20659 E. Valley Blvd. (Walnut)	May 88	7	O	0.0001	0.01
Westhoff Elementary School (Walnut)	Sep 88	8	AF,L	0.006	6
Temple Avenue greenbelt (Walnut)	Jan 90	1	L	0.001	1
Walnut Tech Business Center (Walnut)	Apr 90	1	L	0.002	2
Lemon Avenue greenbelt (Walnut)	Sep 91	4.3	L	0.006	7
South Coast AQMD Headquarters (Diamond Bar)	Nov 91	2	L	0.005	5
WVWD reservoir (Diamond Bar)	May 92	1	L	0.005	6
First Chinese Baptist Church (Walnut)	Dec 92	0.3	L	0.002	2
Burger King restaurant (Diamond Bar)	Oct 93	0.2	L	0.001	1
Majestic Mgmt., 19850 E. Business Pkwy (Walnut)	Nov 93	0.8	L	0.004	4
General Electric, 19705 E. Business Pkwy (Walnut)	Nov 93	1.6	L	0.006	7
Rodeo Ridge Estates (Walnut)	Dec 93	6.3	L	0.005	6
Golden Springs Drive medians (Diamond Bar)	Jan 94	1.3	L	0.005	6
Walnut Hills Village Shopping Center (Walnut)	Mar 94	2.4	L	0.004	5
Brookside Equestrian Center (Walnut)	Aug 94	13.6	L	0.003	3
WVWD Office (Walnut)	Oct 94	0.2	L	0.002	2
Cattelus Development (Walnut)	Oct 94	18.9	L	0.016	18
Circuit City, 501 Cheryl Lane (Walnut)	Oct 94	1	L	0.007	8
Dreyer's Grand Ice Cream, 351 Cheryl Lane (Walnut)	Oct 94	0.6	L	0.003	3
Metrolink Station (Industry)	Nov 94	0.6	L	0.002	3
Del Paso High School (Walnut)	Jan 95	3	AF,L	0.003	3
Dow Corning, 20832 Currier Road (Walnut)	Jan 95	0.1	L	0.0001	0.1
Circuit City Headquarters, Currier/Lemon (Walnut)	Apr 95	1.1	L	0.005	6
Sysco Food Service, 20701 Currier Road (Walnut)	Apr 95	2.3	L	0.012	13
Tung Hsin Trading, 20420 E. Business Pkwy (Walnut)	Apr 95	0.8	L	0.003	4
Amergence Tech. Inc., 20480 E. Bus. Pkwy (Walnut)	Apr 95	0.9	L	0.003	3
Dura Freight Lines, 515-525 S. Lemon (Walnut)	Apr 95	0.5	L	0.001	1
S/W-S/E Corner Lemon/Bus. Parkway (Walnut)	Apr 95	0.2	L	0.004	4
Dura Freight Lines , 20275 Bus. Parkway (Walnut)	Apr 95	1.3	L	0.003	3

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

TABLE 13
SUMMARY OF FISCAL YEAR 10-11 RECYCLED WATER USAGE
WALNUT VALLEY WATER DISTRICT
(PAGE 2 OF 4)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Coaster Co. of America, 20300 Bus. Parkway (Walnut)	Apr 95	0.7	L	0.003	3
Dura Freight Lines, 20405 Bus. Parkway (Walnut)	Apr 95	1	L	0.003	3
Dura Freight Lines, 20595 E. Business Pkwy (Walnut)	Apr 95	0.8	L	0.001	2
Dura Freight Lines, 20445 E. Business Pkwy (Walnut)	Apr 95	0.7	L	0.001	2
820 Fairway Drive medians (Industry)	Jun 95	0.1	L	0.002	2
Spencer N Enterprises, Inc., 435 S. Lemon (Walnut)	Jun 95	0.5	L	0.001	1
General Electric, 19805 E Business Pkwy (Walnut)	Jun 95	1.1	L	0.005	6
Menlo Logistics, 20002 E. Business Pkwy (Walnut)	Jun 95	4	L	0.006	7
General Electric, 20005 E. Business Parkway (Walnut)	Jun 95	6.7	L	0.010	11
Ping Ting Hsu, 20701 Currier Road (Walnut)	Aug 96	0.1	L	0.001	1
Lawrence Allen □ Assoc., 20822 Currier Rd. (Walnut)	Oct 96	0.1	L	0.0001	0.1
Fairway Business Cntr., 19700 Bus. Parkway (Walnut)	Nov 96	0.4	L	0.002	2
Rowland Heights Christian Church (Rowland Hghts.)	Feb 97	0.5	L	0.001	1
Viewsonic, 510 Cheryl□455 Brea Canyon (Walnut)	Jul 97	1.8	L	0.011	12
Countryside Suites (Diamond Bar)	Mar 98	1.4	L	0.003	3
Diamond Crest Homeowners Assn. (Diamond Bar)	Oct 98	14	L	0.018	20
Norm Ashley Park (Walnut)	Nov 98	0.2	L	0.0005	1
Play Hut, 368 Cheryl Lane (Walnut)	Nov 98	0.8	L	0.003	3
Waterfall Estates (Rowland Heights)	Dec 98	1.2	L	0.004	5
Calvary Chapel (Diamond Bar)	Apr 99	1	L	0.014	16
Hi-Tek Warehouse, 20851 Currier Road (Walnut)	Jun 99	0.2	L	0.001	1
Campus Group Inc, 319 Cheryl Road (Walnut)	Jul 99	0.1	L	0	0
Wind River Homeowners Assn. (Rowland Heights)	Jul 99	12.6	L	0.031	35
L.A. Fitness Inter., 20801 Golden Springs (Industry)	Sep 99	1.2	L	0.001	2
Comtop Enterprises, 268 Benton Court (Industry)	Sep 99	0.3	L	0.001	1
Gemini Foods Corp., 251 Benton Court (Industry)	Sep 99	0.6	L	0.001	1
Tri-Net Technology, 21709 Ferraro Parkway (Industry)	Sep 99	0.3	L	0.001	1
Hupa International, 21717 Ferraro Parkway (Industry)	Oct 99	0.3	L	0.0003	0.3
Nu-Health Products, 20875-85-95 Currier (Walnut)	Oct 99	0.1	L	0	0
Lemon Avenue medians (Industry)	Dec 99	0.1	L	0.0003	0.4
Prudential Insurance Co., 21558 Ferraro. (Walnut)	Jan 00	3.5	L	0.008	9
McDonald□s Restaurant (Diamond Bar)	Mar 00	0.1	L	0.001	1
J□L Footwear, 250 Benton Court (Industry)	Jul 00	0.6	L	0.001	1
Markwins Inter. Corp., 22067 Ferraro (Industry)	Nov 00	1.9	L	0.004	4
Lee Wang LLC, 21901 Ferraro Parkway (Industry)	Nov 00	2	L	0.005	6
Sun Yin USA, 280 Maclin Court (Industry)	Nov 00	0.8	L	0.001	2
SL Investment Group LLC, 218 Maclin Ct. (Industry)	Nov 00	1.5	L	0.002	2
Morrow Meadows, 231 Benton Court (Industry)	Apr 01	0.9	L	0.002	2
The Cross Schools of Education (Walnut)	May 01	0.6	AF,L	0.001	1
Bank of the West (Rowland Heights)	Sep 01	0.1	L	0.0004	0.4
Gym□Teen Center (Walnut)	Sep 01	0.6	L	0.001	2
Yellow Box Corp., 19835 Walnut Drive (Walnut)	Dec 01	0.3	L	0.002	2
Harvard Estates (Rowland Heights)	Dec 01	2	L	0.002	3
Walnut Nazarene Church (Walnut)	Feb 02	0.8	L	0.0003	0.3
Majestic Mgmt., 168-188 Brea Canyon Rd. (Walnut)	Apr 02	0.6	L	0.002	2
Synnex, 108-118 Brea Canyon Rd. (Walnut)	Apr 02	0.7	L	0.002	3
Majestic Management, 108-288 Mayo Drive (Walnut)	Apr 02	0.1	L	0.005	5
Holiday Inn Express (Walnut)	May 02	0.4	L	0.002	2
Lemon Avenue Investments (Walnut)	Jun 02	0.6	L	0.002	3
Magnolia at Snow Creek (Walnut)	Jul 02	5.4	L	0.018	21
Everbright Management, 1163 Fairway (Industry)	Sep 02	0.6	L	0.003	4
Everbright Management, 1169 Fairway (Industry)	Sep 02	0.2	L	0.001	1
Kelly Paper, 228 Brea Canyon Road (Walnut)	Sep 02	1.2	L	0.0004	0.4

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

Table 13
Summary of Fiscal Year 10-11 Recycled Water Usage
Walnut Valley Water District
(Page 3 of 4)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
V-Tec Automotive, 19677 Valley Blvd. (Walnut)	Sep 02	0.1	L	0.0001	0.2
Grand and Valley landscaping (Walnut)	Sep 02	0.1	L	0.005	6
Extra Space Storage (Walnut)	Oct 02	0.8	L	0.001	1
Latter Days Saints Church (Walnut)	Oct 02	0.9	L	0.003	3
Nogales and Killian landscaping (Rowland Heights)	Oct 02	0.1	L	0.001	1
A□R West Family LLC, 20855 Golden Sprgs (D. Bar)	Nov 02	0.2	L	0.001	1
Brea Canyon Rd.□Old Ranch Road medians (Industry)	May 03	0.1	L	0.0002	0.2
CLT Computers, Inc., 20153 Paseo del Prado (Walnut)	May 03	0.6	L	0.002	2
Autosmart Intl., 19885 Harrison Ave. (Industry)	Aug 03	0.2	L	0.001	1
Broadway.com, 19715 Harrison Ave. (Industry)	Aug 03	0.5	L	0.002	2
Bayharbor-Harrison Assn., 19901 Harrison (Industry)	Aug 03	0.8	L	0.003	4
J Pack International, 19789 Harrison Ave. (Industry)	Aug 03	0.5	L	0.001	1
Ziprint Image Corp., 19805 Harrison Ave. (Industry)	Aug 03	0.2	L	0.001	1
San Malone Enterprises, 19865 Harrison (Industry)	Aug 03	0.3	L	0.002	3
Shinetec Group, Inc., 19685 Harrison Ave. (Industry)	Aug 03	0.4	L	0.001	1
Majestic Realty, Grand Ave.□Village Staples (Walnut)	Aug 03	1.6	L	0.005	6
Orange Grove Services, Lemon□La Puente (Walnut)	Sep 03	0.4	L	0.003	3
Max Property LLC, 21401 Ferraro Pkwy. (Industry)	Sep 03	0.7	L	0.004	5
NP 21301 Ferraro Pkwy., 21301 Ferraro (Industry)	Sep 03	0.8	L	0.002	2
568 TriNet Court (Walnut)	Oct 03	0.3	L	0.001	1
Walnut City Hall (Walnut)	Dec 03	0.6	L	0.001	1
Walnut Senior Center (Walnut)	Dec 03	0.5	L	0.001	1
Hill□s Pet Nutrition, 318 Brea Canyon Rd. (Walnut)	Dec 03	2.6	L	0.006	7
Young Hoon Cho, 1709 Nogales St. (Rowland Heights)	Mar 04	0.1	L	0.0003	0.4
Shell Station, 21103 Golden Springs Dr. (Diamond Bar)	Mar 04	0.1	L	0.0003	0.4
Ferraro□Grand East ramp (Industry)	Apr 04	3.8	L	0.005	6
Hing Wa Lee Plaza, 1569 Fairway Dr. (Walnut)	May 04	0.1	L	0.001	1
Southcoast Cabinet, 20625 Lycoming St. (Walnut)	Jun 04	0.3	L	0.001	1
APL Logistics, 408 Brea Canyon Rd. (Walnut)	Jun 04	2.1	L	0.006	7
Adnoff Family Trust, 20801 Currier Rd. (Walnut)	Jul 04	0.1	L	0.001	1
Sentous Valley LLC, 2889 Valley Blvd. (Walnut)	Aug 04	0.1	L	0.0004	0.4
Community Day School (Walnut)	Nov 04	0.1	AF,L	0.0004	0.5
Majestic Mgmt., Bldg. 25 on Mayo Dr. (Walnut)	Jan 05	0.1	L	0.0003	0.3
Sy Develop. condos, 20118-20138 Colima, (Walnut)	Jun 05	0.1	L	0.00001	0.01
N□E corner Cheryl Lane□Baker Parkway (Industry)	Aug 05	3.3	L	0.014	16
Jakk□s Pacific, Inc. 21733-21749 Baker (Industry)	Aug 05	1.2	L	0.004	4
20813 Valley Blvd. medians (Walnut)	Sep 05	0.4	L	0.001	1
20265 Valley Blvd. medians (Walnut)	Sep 05	0.4	L	0.001	1
19849 Valley Blvd. medians (Walnut)	Sep 05	0.4	L	0.001	1
Kohl□s Center (Walnut)	Sep 05	2	L	0.009	10
Phoenix Private Schools (Rowland Heights)	Dec 05	0.1	AF,L	0.0002	0.2
The Home Depot, 21535-21651 Baker (Industry)	Jan 06	2.8	L	0.009	10
Industry East Land LLC, 21415 Baker (Industry)	Jan 06	2.3	L	0.006	7
Charles Hailong Cui, 350 Cheryl Lane (Walnut)	Apr 06	0.7	L	0.004	5
Fairway median@ Brea Canyon (Walnut)	Jun 06	0.3	L	0.001	1
Grand Avenue Crossing (Industry)	Jul 06	18.5	L	0.019	21
22002 Valley Blvd. (Industry)	Jul 06	1.6	L	0.003	4
Christian Chapel of Walnut Valley (Walnut)	Aug 06	2.2	L	0.006	6
Target Store T-2179, 747 Grand Ave. (Walnut)	Sep 06	3.9	L	0.006	6
Leg Avenue, 19601 E. Walnut Dr. (Walnut)	Oct 06	0.5	L	0.003	3
Harold M. Pitman Co., 21908-21958 Baker (Industry)	Jan 07	0.8	L	0.002	2
Williams-Sonoma, 21508-21662 Baker (Industry)	Apr 07	4.8	L	0.012	14
FedEx Ground, 200 Old Ranch Road (Walnut)	May 07	28	L	0.012	13

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

Table 13
Summary of Fiscal Year 10-11 Recycled Water Usage
Walnut Valley Water District
(Page 4 of 4)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Currier Road Devel. Inc., 20819 Currier Rd. (Walnut)	May 07	0.3	L	0.001	1
Williams-Sonoma, 21700 Baker (Industry)	Aug 07	2	L	0.006	6
21350 Valley Blvd. (Industry)	Feb 08	0.4	L	0.001	1
Grand Avenue Venture, 21508 Ferraro Pkwy (Walnut)	Apr 08	3.5	L	0.003	4
Grand Avenue/Baker Parkway medians (Industry)	May 08	6.7	L	0.013	14
Majestic Management, 21530-21590 Baker (Industry)	May 08	2	L	0.008	9
Gomez Upholstery, 19935 Valley Blvd. (Walnut)	Jul 08	2	L	0	0
Susann Sutseng Lee, 1335-1337 Otterbein (Row. Hts.)	Jul 08	0.1	L	0.0004	0.4
Golden Springs Plaza (20657 Golden Sprgs (Dia. Bar)	Aug 08	0.4	L	0.002	2
Chili's Restaurant, Golden Springs Dr. (Diamond Bar)	Sep 08	0.01	L	0.001	1
Majestic Management, 21808 Garcia Ln. (Industry)	Sep 08	0.5	L	0.001	2
Majestic Management, 21858 Garcia Ln. (Industry)	Sep 08	0.4	L	0.001	2
Majestic Management, 21912 Garcia Ln. (Industry)	Sep 08	0.3	L	0.001	1
Majestic Management, 21760-21788 Garcia (Industry)	Sep 08	0.4	L	0.001	2
CFT Development, Golden Springs Dr. (Diamond Bar)	Oct 08	0.01	L	0.001	1
Jenny Hsieh, 20125 Valley Blvd. (Walnut)	Nov 08	0.03	L	0.00003	0.03
Brea Canyon Rd./Currier Road median (Walnut)	Feb 09	2	L	0.005	5
Cardinal Capital Partners, Currier/Lemon (Walnut)	Mar 09	2.5	L	0	0
Family Property Holdings, 20888 Amar Rd. (Walnut)	May 09	0.04	L	0.0004	0.5
KW Global Inc., 293 Brea Canyon Drive (Walnut)	May 09	0.3	L	0.001	2
Light of America, Inc. (20722 Currier Rd.) (Walnut)	Sep 09	0.1	L	0.0003	0.3
Ybarra Elementary School (Rowland Heights)	Sep 09	5.6	AF,L	0.008	9
Donald Miller, 19803 Valley (Walnut)	Sep 10	0.1	L	0.0001	0.3
Bell Memorial Church, 1747 Nogales (Rowland Hts.)	Dec 10	0.3	L	0.0002	0.3
TOTALS		**708.5**		**1.043**	**1,168**

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

therefore, produced a total of 67.43 MGD (75,555 AFY) of coagulated, filtered, disinfected tertiary recycled water (16.8% of the effluent produced in the JOS), a 1.7% decrease from the preceding fiscal year.

Recycled water quality from both the east and west sides of the plant for FY 10-11 is presented in Tables B-4 and B-5, respectively, of Appendix B. Of the total amount of recycled water produced, 31.895 MGD (35,740 AFY), or 47.3% of the plant's combined production, was actively reused, a 27.5% decrease from the preceding fiscal year. This increase was mainly due to above average rainfall that greatly reduced the amount of recycled water used for groundwater replenishment during this fiscal year.

The remaining effluent was discharged to the concrete-lined portion of the San Gabriel River below Firestone Boulevard where it flows to the ocean. Recycled water from this plant is used at 101 sites (not including recharge) shown in Figure 13 and listed in Table 14. Use of recycled water from this facility is permitted under LARWQCB Order Nos. 87-50 and 97-072 for direct, non-potable applications, and Nos. 91-100 and R4-2009-0048 for groundwater replenishment.

SAN JOSE CREEK WRP FACTS

Plant capacity:	100 MGD
Water produced:	67.43 MGD 75,555 AFY 1.7% FY decrease
FY10-11 O&M:	$248/AF (east) $221/AF (west)
Water reused:	31.895 MGD 35,740 AFY 27.5% FY decrease 47.3% of production
Delivery systems:	7 300,850 ft. of pipe
No. of reuse sites:	101 2,881.3 acres

2.5.1 WATER REPLENISHMENT DISTRICT OF SOUTHERN CALIFORNIA

The great majority (87.8%) of recycled water actively used from the San Jose Creek WRP goes to recharge the Central Basin groundwater aquifer, which in FY 10-11 was 28.015 MGD (31,393 AFY), a 29.4% decrease from the preceding fiscal year and 41.5% of the recycled water produced by this plant. In FY 10-11, 20.467 MGD (22,935 AFY) was directed either to the San Gabriel Coastal Spreading Grounds or to the Rio Hondo Spreading Grounds via the plant's discharge point from the east side to the San Jose Creek channel (88.9%). Another 0.108 MGD (121 AFY), or 0.5%, was discharged from the west side into the San Gabriel River upstream of the Zone 1 Ditch. Deliveries of recycled through the plant's 66-inch outfall pipe directly to the San Gabriel Coastal Spreading Grounds turnout resumed in March 2009 as the diversion gate began to be incrementally opened to the spreading grounds. This was done slowly as to determine the impact on non-native fish that have colonized the lined portion of the San Gabriel River downstream of the Outfall's discharge point. The partial opening of the diversion gate will allow for much greater amounts of recycled water to be delivered directly to the spreading grounds for recharge in the future. However, only 2.444 MGD (2,738 AFY), or 10.6%, was able to be recharged directly during this fiscal year, as excess storm water being conserved from the river prevented the release of recycled water from the Outfall.

Of the total amount of recycled water delivered from the San Jose Creek WRP, 6.776 MGD (7,593 AFY), or 23.3%, went to the Rio Hondo Spreading Grounds and 21.775 MGD (24,400 AFY), or 74.9%, went to the San Gabriel Coastal Spreading Grounds. Another 0.536 MGD (601 AFY), or 1.8% of the recycled water delivered, was bypassed around the spreading grounds and lost to the ocean during December 2010 and January and March 2011. Any discrepancy between the total amount discharged and the totals recharged and bypassed is attributed to differences in metering between the Sanitation Districts and the LACDPW.

The groundwater recharge operation with recycled water had been limited by its 1991 permit to a three-year running total of 150,000 AFY, with no more than 35% recycled water being recharged (with maximums of

FIGURE 13
SAN JOSE CREEK WRP REUSE SITES

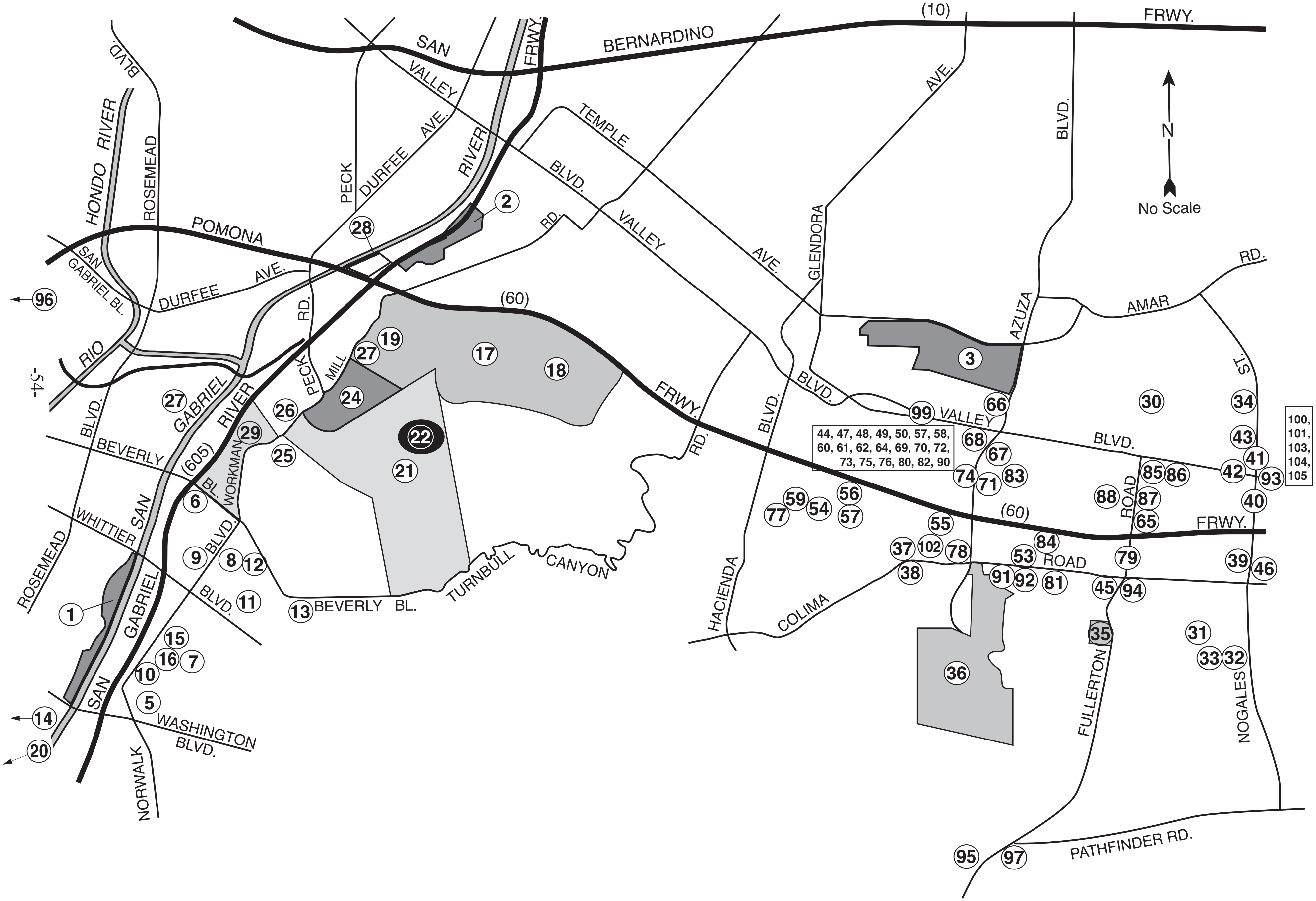


Table 14
Summary of Fiscal Year 10-11 Recycled Water Usage
San Jose Creek WRP
(Page 1 of 2)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Water Replenishment District (1)	Jun 71	--	R	28.015	33,393
California Country Club (Industry) (2)	Jun 78	120	L,P	0.378	423
Industry Hills Recreation Area (Industry) (3)	Aug 83	600	L,P	0.854	957
Field, S/W corner Norwalk/Telegraph (S.F. Spgs.) (4)	Aug 94	5.2	L	0.010	11
Washington Elementary School (Whittier) (5)	Sep 94	5	AF,L	0.007	3
605 Freeway at Beverly (Whittier) (6)	Sep 94	30	L	0.044	50
Sorenson Elementary School (Whittier) (7)	Oct 94	4	AF,L	0.006	7
Palm Park West (Whittier) (8)	Nov 94	5	L	0.008	8
Orange Grove School (Whittier) (9)	Apr 95	6.6	AF,L	0.004	5
Katherine Edwards Middle School (Whittier) (10)	Sep 95	19	AF,L	0.022	24
Longfellow Elementary School (Whittier) (11)	Sep 95	4.5	AF,L	0.004	5
Walter Dexter Middle School (Whittier) (12)	Sep 95	15.5	AF,L	0.007	8
Founders Memorial Park (Whittier) (13)	Jan 96	4	L	0.008	9
Salt Lake Municipal Park (Huntington Park) (14)	Apr 96	20.9	L	0.040	45
Sorenson Park (Whittier) (15)	May 96	10.7	L	0.016	18
Sorenson Library (Whittier) (16)	May 96	0.4	L	0	0
Puente Hills Landfill irrigation (Industry) (17)	Nov 97	320	L	0.764	856
Puente Hills Landfill dust control (Industry) (18)	Nov 97	130	I	0.133	149
Puente Hills Gas-to-Energy Facility (Industry) (19)	Nov 97	--	I	0.607	680
Lugo Park (Cudahy) (20)	Apr 98	7	L	0.005	5
Rose Hills Memorial Park – upper area (Whittier) (21)	Jun 98	298	L	0.373	418
River Ridge Golf Course (Pico Rivera) (23)	Jul 02	21.3	L	0.021	24
Rio Hondo College (Whittier) (24)	Jun 03	85	AF,L	0.023	26
Mill Elementary School (Whittier) (25)	Jun 03	15	AF,L	0.008	9
Gateway Pointe (Whittier) (26)	Jan 05	8	L	0.016	18
Puente Hill Materials Recovery Facility (Industry) (27)	Feb 05	2.4	L	0.005	5
LA Sanchez Nursery (Industry) (28)	Apr 06	5	O	0.010	12
Rose Hills Memorial Park – lower area (Whittier) (29)	Aug 06	275	L	0.438	491
Sunshine Park (L.A. County) (30)	Jul 09 (May 86)	4	L	0.002	3
Rowland Elementary School (Rowland Hts.) (31)	Jul 09 (May 86)	3	AF,L	0.002	2
Farjardo School (Rowland Heights) (32)	Jul 09 (May 86)	4	AF,L	0.0005	1
Farjardo Park (Rowland Heights) (33)	Jul 09 (May 86)	4	L	0.001	2
Nogales High School (L.A. Co.) (34)	Jul 09 (Jun 86)	11	AF,L	0.005	6
Queen of Heaven Cemetery (Rowland Hts.) (35)	Jul 09 (Jun 86)	35	L	0.003	3
Schabarum Regional County Park (L.A. Co.) (36)	Jul 09 (Sep 86)	233	L	0.020	22
Pepperbrook Park (Hacienda Heights) (37)	Jul 09	4.4	L	0.002	2
Countrywood Park (Hacienda Heights) (38)	Jul 09	5.4	L	0.002	2
Rowland Heights Golf Center (Rowland Heights) (39)	Jul 09	8	L	0.002	3
Medians at 755 Nogales (Industry) (40)	Jul 09	0.1	L	0.0001	0.1
Medians at 4115-1/2 Nogales (West Covina) (41)	Jul 09	0.1	L	0.001	2
Medians at 2654-1/2 Valley (West Covina) (42)	Jul 09	0.2	L	0.00003	0.03
Bu Sha Temple, 4111 Nogales (West Covina) (43)	Jul 09	0.5	L	0.0001	0.1
Megan Racing, 788 Phillips (Industry) (44)	Jul 09	0.1	L	0.0004	0.4
JJ Plaza, 18253 Colima (Rowland Heights) (45)	Jul 09	0.1	L	0.0001	0.1
New World RTCI-LP, 18958 Daisetta (Row. Hts.) (46)	Jul 09	0.1	L	0.00001	0.02
Battery Technology, 16651 Johnson (Industry) (47)	Jul 09	0.1	L	0.0001	0.1
FTH Group Inc., 16685 Johnson (Industry) (48)	Jul 09	0.1	L	0.0001	0.1
Ancillary Provider 16664 Johnson (Industry) (49)	Jul 09	0.1	L	0.0001	0.1
Ancillary Provider 16666 Johnson (Industry) (50)	Jul 09	0.2	L	0.0002	0.3
Pan American, 16610 Gale Ave. (Industry) (51)	Jul 09	0.2	L	0.0002	0.2
Blue Pacific, 1354 Marion Ct. (Industry) (52)	Jul 09	0.2	L	0.0003	0.3
Romano's Macaroni Grill, 17603 Colima (R. Hts.) (53)	Jul 09	0.1	L	0.001	1
Acosta Growers, 16412 Wedgeworth Dr. (Industry) (54)	Jul 09	5	O	0.001	1

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

TABLE 14
SUMMARY OF FISCAL YEAR 10-11 RECYCLED WATER USAGE
SAN JOSE CREEK WRP
(PAGE 2 OF 2)

Wedgeworth Elementary School (Hacienda Hts.) (55)	Aug 09	2.5	AF,L	0.001	1
Wilson High School (Hacienda Heights) (56)	Aug 09	18.3	AF,L	0.006	7
Bixby Elementary School (Hacienda Heights) (57)	Sep 09	6.1	AF,L	0.002	2
Jade Fashion, 1350 Bixby (Industry) (58)	Sep 09	0.1	L	0.0002	0.3
Gutierrez Nursery, 16411 Wedgeworth (Industry) (59)	Sep 09	4	O	0.001	1
Frank Raper, 1215 Bixby (Industry) (60)	Dec 09	0.1	L	0.0001	0.2
Laido International, 16710-12 Johnson (Industry) (61)	Dec 09	0.1	L	0.0002	0.2
Bolt Products, 16725 Johnson Dr. (Industry) (62)	Dec 09	0.1	L	0.0001	0.1
Ily Enterprise, 783 Phillips (Industry) (63)	Jan 10	0.1	L	0.0003	0.3
Superior Profiles, 1325 Bixby (Industry) (64)	Jan 10	0.2	L	0.0002	0.2
60 Fwy., Countrywood □ Fullerton (Industry) (65)	Jan 10	5	L	0.003	3
Camacho Strawberries (Industry) (66)	Jan 10	3	O	0.0001	0.1
Advanced Media, 881 Azusa (Industry) (67)	Jan 10	0.1	L	0.001	1
East Group Prop., 855 Anaheim-Puente (Industry) (68)	Mar 10	0.6	L	0.0003	0.4
So.Cal. Air Condition, 16950 Chestnut (Industry) (69)	Mar 10	2	L	0.0003	0.3
USACD, 17101 Chestnut (Industry) (70)	Mar 10	0.3	L	0.0003	0.3
Azusa Blvd Medians (Industry) (71)	Mar 10	0.2	L	0.0001	0.1
Acosta Growers, 17101 Chestnut (Industry) (72)	Mar 10	2.4	O	0.0002	0.2
L.A. Co. ISD bldg., 16610 Chestnut (Industry) (73)	Apr 10	0.5	L	0.0003	0.3
Azusa Property Co., 885 Azusa (Industry) (74)	Apr 10	0.2	L	0.0002	0.2
Golden West Footwear, 16750 Chestnut (Industry) (75)	Apr 10	0.3	L	0.0002	0.2
Teledyne Instruments, 16830 Chestnut (Industry) (76)	Apr 10	0.4	L	0.0004	0.4
Medians, 18927 Daisetta (Rowland Heights) (77)	Apr 10	0.2	L	0.0001	0.1
Colima Medians (L.A. County) (78)	Apr 10	0.1	L	0.0002	0.2
Medians, 1442 Fullerton (Industry) (79)	Apr 10	0.3	L	0.00004	0.05
Teledyne Picco, 16800 Chestnut (Industry) (80)	May 10	0.4	L	0.0003	0.3
Hou Yi Mao Nursery, 18002 Colima (Row. Hts.) (81)	May 10	1.3	O	0.0002	0.3
East Group Prop., 16700 Chestnut (Industry) (82)	Jun 10	0.6	L	0.001	1
Pro Motion Distribution, 883 Azusa (Industry) (83)	Jun 10	0.1	L	0.0001	0.1
New Age Kaleidoscope, 7 Colima (Industry) (84)	Jun 10	0.6	L	0.001	1
Min Maw Intl. Inc., 18350 San Jose (Industry) (85)	Jun 10	0.7	L	0.001	1
Hot Topic, 18350 San Jose Ave. (Industry) (86)	Jul 10	0.6	L	0.001	1
FedEx, 18305 San Jose Ave. (Industry) (87)	Jul 10	0.6	L	0.001	1
Hudd Distribution, 18215 Rowland St. (Industry)(88)	Sep 10	0.6	L	0.0003	0.4
New Age Kaleidoscope, 5 Stoner Creek (Industry) (89)	Oct 10	1.4	L	0.0003	0.4
Perrin Manufacturing, 1020 Bixby (Industry) (90)	Oct 10	0.1	L	0.0001	0.2
Centro Watt Operating, 17518A Colima (Industry) (91)	Oct 10	0.4	L	0.00003	0.03
Centro Watt Operating, 17414 Colima (Industry) (92)	Oct 10	0.5	L	0.0001	0.1
717 Nogales LLC, 717 Nogales (Industry) (93)	Oct 10	0.5	L	0.0001	0.1
Walgreens, 18308 Colima (Industry) (94)	Dec 10	0.1	L	0.0001	0.1
RWD Office, 3021 S. Fullerton (Industry) (95)	Dec 10	0.3	L	0.0001	0.1
Pathfinder Park (Rowland Heights) (Industry) (97)	May 11	29	L	0.00001	0.01
USGVMWD site, 401 Nogales St. (Industry) (98)	May 11	0.5	L	0.0000003	0.0003
East Group Prop., 18551 Arenth Ave. (Industry) (100)	May 11	0.7	L	0.000003	0.003
717 Nogales LLC, 18961 Arenth Ave. (Industry) (101)	May 11	0.5	L	0.000003	0.003
Kimco Realty, 17100 Colima Rd. (Industry) (102)	May 11	3	L	0.000003	0.003
Acme Trading Group, 18501 Arenth (Industry) (103)	May 11	0.9	L	0.00001	0.01
Third Party Enterprises, 18501 Arenth (Industry) (104)	May 11	0.6	L	0.000001	0.001
Floria International 18701 Arenth (Industry) (105)	May 11	0.4	L	0.000003	0.003
TOTALS		**2,881.3**		**31.895**	**35,740**

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

60,000 AFY and 50% in any one year). To allow the use of more recycled water, WRD requested that the LARWQCB revise the 1991 recharge permit to eliminate the existing annual and three-year total quantity limits (60,000 and 150,000 AF, respectively), and rely on a running 5-year average recycled water contribution of 35%. This permit modification was supported by State DPH staff and was adopted by the LARWQCB in April 2009. Sampling and analysis for TOC at the spreading grounds shallow monitoring wells has been increased from bimonthly to weekly during the first year of operation. Assuming there is sufficient dilution water, this change would allow approximately 5,000 AFY more of recycled water to be recharged.

2.5.2 City of Industry

In August 1983, the City of Industry completed a recycled water distribution system to serve the Industry Hills Recreation and Conservation Area. This system includes a 7,100 gpm pump station at the San Jose Creek WRP, 36,960 feet of 36-inch pipe following the San Jose Creek Channel, and a 2 million gallon reservoir with a 3,400 gpm booster pump station at Anaheim-Puente Road. From this point, a 16-inch pipe with a second, 3,300 gpm booster pump station brings recycled water into the 600-acre reuse site for landscape irrigation of two 18-hole golf courses and an equestrian center, and as a source of supply for eight ornamental lakes and storage impoundments. During FY 10-11, 0.854 MGD (957 AFY), or 1.3% of recycled water produced at this plant, was delivered through a total of 44,350 feet of pipeline and used at this site, an 18.9% decrease from the preceding fiscal year. While no new sites were directly connected to the Industry distribution system, RWD did, however, continue connecting sites to its own extension off the Industry system throughout the fiscal year. This system is discussed in the following section.

2.5.3 Rowland Water District

In July 2009, RWD began recycled water deliveries through a new distribution system that branched off the City of Industry pipeline. In FY 10-11, RWD connected 18 new reuse sites to its distribution system: In July 2010, the landscaping around Hot Topic (18350 San Jose Ave.) and FedEx (18305 San Jose Ave.) was connected. In September 2010, the landscaping around Hudd Distribution (18215 Rowland St.) was connected. In October 2010, the landscaping around New Age Kaleidoscope (5 Stoner Creek Rd.), Perrin Manufacturing (1020 Bixby), Centro Watt Operating (17518A and 17414 Colima Rd.), and 717 Nogales LLC (717 Nogales) was connected. In December 2010, the landscaping around the Walgreens (18308 Colima Rd.) and the Rowland Water District Office (3021 S. Fullerton) was connected. In May, Pathfinder Park and the landscaping around the Upper San Gabriel Valley Municipal Water District (USGVMWD) site at 401 Nogales St., East Group Properties (18551 Arenth Ave.), 717 Nogales LLC (18961 Arenth Ave.), Kimco Realty (17100 Colima Rd.), Acme Trading Group (18501 Arenth Ave.), Third Party Enterprises (18501 Arenth Ave.), and Floria International Inc. (18701 Arenth Ave.) were connected.

During FY 10-11, RWD delivered 0.067 MGD (75 AFY), or 0.1% of the recycled water produced at the San Jose Creek WRP to 74 sites listed in Table 14 and shown in Figure 13. This was an 8.7% increase over the preceding fiscal year. RWD purchased the recycled water from the City of Industry, retailing it at 63% of its potable rate of $1,010.59/AF (for "Zone I" elevation), or $635.98/AF.

2.5.4 California Country Club

In June 1978, deliveries of recycled water began to this 120-acre golf course located directly across the San Jose Creek Channel from the San Jose Creek WRP. An 8-inch polypropylene line inside a 24-inch reinforced concrete pipe siphon under the channel delivers chlorinated recycled water from the plant's "foam spray" system to the golf course's 0.75-acre lake No. 2. The golf course irrigation system is supplied by two pumps that can deliver a maximum of 1,800 gallons per minute (gpm) of recycled water from the lake. During FY 10-

11, 0.378 MGD (423 AFY), or 0.6% of recycled water produced at this plant, was delivered to this site, a decrease of 10.2% from the preceding fiscal year.

2.5.5 San Gabriel Valley Water Company - LA Sanchez Nursery

This nursery has signed a lease with Los Angeles Department of Water and Power (LADWP) for the property immediately adjacent to San Jose Creek WRP West formerly occupied by Arbor, Chuy's, J□E's and Ortiz's nurseries. During FY 10-11, 0.010 MGD (12 AFY), or □0.02% of recycled water produced at this plant, was delivered to this site for the irrigation of ornamental plants for commercial resale. This was essentially the same amount that was delivered during the preceding fiscal year. Contract No. 3286 with the San Gabriel Valley Water Company (SGVWC) replaced the old contract for the sale of recycled water directly to this nursery's predecessor (Contract No. 2835) beginning in September 1994. SGVWC resold the recycled water to the nursery for $473.28/AF, a 47% discount from its corresponding potable water rate of $899.95/AF.

2.5.6 Central Basin Municipal Water District (Rio Hondo System)

CBMWD continues to develop its second regional distribution system to deliver an estimated 5,000 to 10,000 AFY of recycled water from the San Jose Creek WRP to sites in the upper portion of its service area in the cities of Montebello, Pico Rivera, Commerce, Cudahy, Huntington Park, Bell Gardens, Vernon, Santa Fe Springs, and Whittier. This project is patterned after the regional concept of the "Century Project" described previously in Section 2.3.4. Interconnections with the Century distribution system originating from the Los Coyotes WRP will allow for a looped system (once the western connection is completed, see Section 5.4.4) served by both treatment plants for additional reliability and system pressures. Both the Century and Rio Hondo distribution systems can be partially supplied with recycled water from either the Los Coyotes WRP or either side of the San Jose Creek WRP individually or in combination. However, for the sake of consistency, recycled water usage at the Rio Hondo facilities is reported in water reuse reports as coming from the San Jose Creek WRP, and at the Century facilities as coming from the Los Coyotes WRP, as there is no way to differentiate which reuse sites receive which recycled water. Recycled water is used at 15 sites shown in Figure 13 and listed in Table 14. A narrative description of the layout of the Rio Hondo recycled water distribution system is contained in Appendix H. The layout of the pipelines for both the Century and Rio Hondo distribution systems is shown in Figure 10.

During FY 10-11, CBMWD delivered 0.203 MGD (227 AFY), or 0.3% of the recycled water produced at this plant, through 95,000 feet of pipeline to six water purveyors (SGVWC and the cities of Whittier, Cudahy, Huntington Park, Pico Rivera, and Santa Fe Springs) for landscape and athletic field irrigation on approximately 159 acres at the 15 sites. This represents a 8.6% increase over the preceding fiscal year. CBMWD has constructed the delivery facilities right up to the end user; however, the local retail water purveyor is the entity actually supplying the recycled water. No new sites were connected to the Rio Hondo recycled water distribution system during FY 10-11.

In FY 10-11, CBMWD wholesaled the recycled water to its customers, the retail water purveyors, on a monthly use, tiered rate schedule ($506 for the first 50 AF, and $460 for anything above 50 AF). This is between 57% and 62% of the rate of $805/AF it charges for Tier 1 non-interruptible potable water supplied by MWD, and between 50% and 55% of the rate of $915/AF it charges for Tier 2 supplies. Recycled water delivered outside of CBMWD's service area was subject to a $20/AF surcharge on each of the two tiers. Recycled water deliveries to the Malburg power plant in Vernon received an industrial use rate ($357 for the first 25 AF, $332 for the next 25 AF, $308 for the next 50 AF, and $283 for anything above 100 AF). The retail purveyors then set their own rates for the recycled water.

2.5.7 PUENTE HILLS/ROSE HILLS

A distribution system was constructed to deliver recycled water from the San Jose Creek WRP to the Sanitation Districts' nearby Puente Hills Landfill, Materials Recovery Facility (MRF), Puente Hills Energy Recovery from Landfill Gas (PERG) Facility, and to Rose Hills Memorial Park. These sites are shown in Figure 13 and listed in Table 14.

This project was conceived of as far back as 1978 as a means of reducing the Landfill's $20,000 per month water bill; however, various impediments stalled this project over the years. Not the least of these impediments was the claim of "duplication of services" by the local water company that had served domestic water to the Puente Hills Landfill. To resolve this, Senate Bill 778 was passed and became law on January 1, 1995. This legislation allowed the Sanitation Districts to deliver their own recycled water to their landfill, without having to pay the water company for lost revenues, only for the physical facilities that would be rendered less useful.

Recycled water deliveries to the Puente Hills Landfill and the PERG Facility began in November 1997, while deliveries to Rose Hills began in June 1998 and to the MRF began in February 2005.The total project cost was approximately $7.2 million and was funded by a low-interest State water reclamation loan. In order to serve the eastern portions of the Landfill and the upper areas of the cemetery, $4 million of additional on-site distribution facilities were completed in mid-2001. A narrative description of the layout of the Puente Hills/Rose Hills recycled water distribution system is contained in Appendix I.

During FY 10-11, the Puente Hills/Rose Hills distribution system delivered 1.882 MGD (2,109 AFY), or 2.8% of the recycled water produced at this plant, through 8,900 feet of pipeline to five users on approximately 855 acres, a decrease of 6.2% from the preceding fiscal year. Recycled water is used for landscape irrigation of slopes and for dust control on the working deck at the Puente Hills Landfill and MRF, for cooling tower supply at the PERG Facility, and for landscape irrigation and impoundments at Rose Hills Memorial Park. The irrigation of strawberries by J&M Farming, which had leased cemetery property from Rose Hills, ended in July 2010.

2.5.8 UPPER SAN GABRIEL VALLEY MUNICIPAL WATER DISTRICT (PHASE I EXTENSION)

A distribution system has been completed that transports water from CBMWD's Rio Hondo distribution system to the Upper San Gabriel Valley Municipal Water District's (USGVMWD's) service area, referred to by this agency as its Phase I Extension. This system will ultimately deliver approximately 1,800 AFY from the San Jose Creek WRP to a number of sites. Rio Hondo College and Mill Elementary School were both connected in June 2003 and the Gateway Pointe commercial development was connected in January 2005. In August 2006, recycled water deliveries to 275 acres of the lower, older portion of Rose Hills Memorial Park began (acreage was erroneously reported as 858 previously). Due to the age of its irrigation system, Rose Hills required extensive retrofitting, mainly consisting of the installation of a separate domestic water system to serve hose bibbs for visitor use (i.e., vase filling). These sites are shown in Figure 13 and listed in Table 14.

From the existing Whittier Connector Unit on CBMWD's Rio Hondo distribution system (Section 2.5.5 above), a 36-inch distribution pipeline located at intersection of Strong Avenue and Pioneer Avenue, USGVMWD installed a tee connecting to a 16-inch steel pipeline, which extends north along Pioneer Avenue to Workman Mill Road. Approximately 200 feet north of the intersection of Workman Mill Road and Mill Road, a 6-inch service lateral provides service to Mill Elementary School. The 16-inch steel pipeline continues north along Workman Mill Road and terminates approximately 50 feet south of the main entrance of Rio Hondo College in a 10-inch service connection to the college.

During FY 10-11, the USGVMWD distribution system delivered 0.486 MGD (544 AFY), or 0.7% of the recycled water produced at this plant, through 11,020 feet of pipeline to four users on 383 acres, a decrease of 12.4% from the preceding fiscal year. SGVWC, the retail purveyor for this system, resold the recycled water to three of its customers at its tariff rate of $771.62/AF, or 86% of its corresponding potable water rate of $899.95/AF. Since Rose Hills Memorial Park is not a part of SGVWC's service area, it received recycled water at a contract rate of $220/AF.

2.6 WHITTIER NARROWS WRP

WHITTIER NARROWS WRP FACTS

Plant capacity:	15 MGD
Water produced:	7.76 MGD 8,701 AFY 64.1% FY increase
FY10-11 O&M:	$398/AF
Water reused:	7.434 MGD 8,330 AFY 57.1% FY increase 95.7% of production
Delivery systems:	1 18,900 ft. of pipe
No. of reuse sites:	3 604.3 acres

This treatment facility, located at 301 North Rosemead Boulevard, El Monte, CA 91733, was the first activated sludge water reclamation plant built by the Sanitation Districts and was completed in 1962 with a design capacity of 15 MGD. Of the 7.76 MGD (8,701 AFY) of coagulated, filtered, disinfected tertiary recycled water produced during FY 10-11 (1.9% of the effluent produced in the JOS), at an O&M cost of $398/AF, 7.434 MGD (8,330 AFY) was actively reused. The amount produced was a 64.1% increase in recycled water production over the preceding fiscal year, while the amount reused was a 57.1% increase, both as a result of completion of the plant's conversion to the NDN secondary treatment process. (Note: The entire treatment plant had been completely shut down for this conversion between August 17 and November 2 of the preceding year).

Recycled water quality for FY 10-11 is presented in Table B-6 of Appendix B. Recycled water from this plant is used at two direct, non-potable reuse sites and for groundwater recharge of the Central Basin, as shown on Figure 14 and listed in Table 15. Use of recycled water from this facility is permitted under LARWQCB Order Nos. 88-107 and 97-072 for direct, non-potable applications, and Nos. 91-100 and R4-2009-0048 for groundwater replenishment (see Section 2.5.1 for a discussion on the amended groundwater recharge permit).

2.6.1 WATER REPLENISHMENT DISTRICT OF SOUTHERN CALIFORNIA

The majority (82.6%) of recycled water actively used from this plant went to recharge the Central Basin aquifer. In FY 10-11, 6.141 MGD (6,881 AFY) was used to replenish the groundwater supply, a 49.1% increase over the preceding fiscal year. In FY 10-11, 3.617 MGD (4,053 AFY) was delivered to the Rio Hondo Spreading Grounds via the plant's main discharge point to the Rio Hondo (56.0%), with another 2.174 MGD (2,436 AFY), or 33.6%, being directed to the San Gabriel Coastal Spreading Grounds via the plant's 45-inch outfall pipe. The third discharge point, the Zone 1 Ditch leading to the Rio Hondo Spreading Grounds, received the remaining 0.674 MGD (755 AFY), or 10.4%, of the recycled during the fiscal year.

Of the total amount of recycled water delivered from the Whittier Narrows WRP, 4.280 MGD (4,797 AFY), or 63.1%, went to the Rio Hondo Spreading Grounds and 2.181 MGD (2,444 AFY), or 32.2%, went to the San Gabriel Coastal Spreading Grounds. Another 0.321 MGD (359 AFY), or 4.7% of the recycled water delivered, was bypassed around the spreading grounds and lost to the ocean during November 2010 through March 2011 as a result of heavy rainfall runoff. Any discrepancy between the total amount discharged and the totals

FIGURE 14
WHITTIER NARROWS WRP REUSE SITES

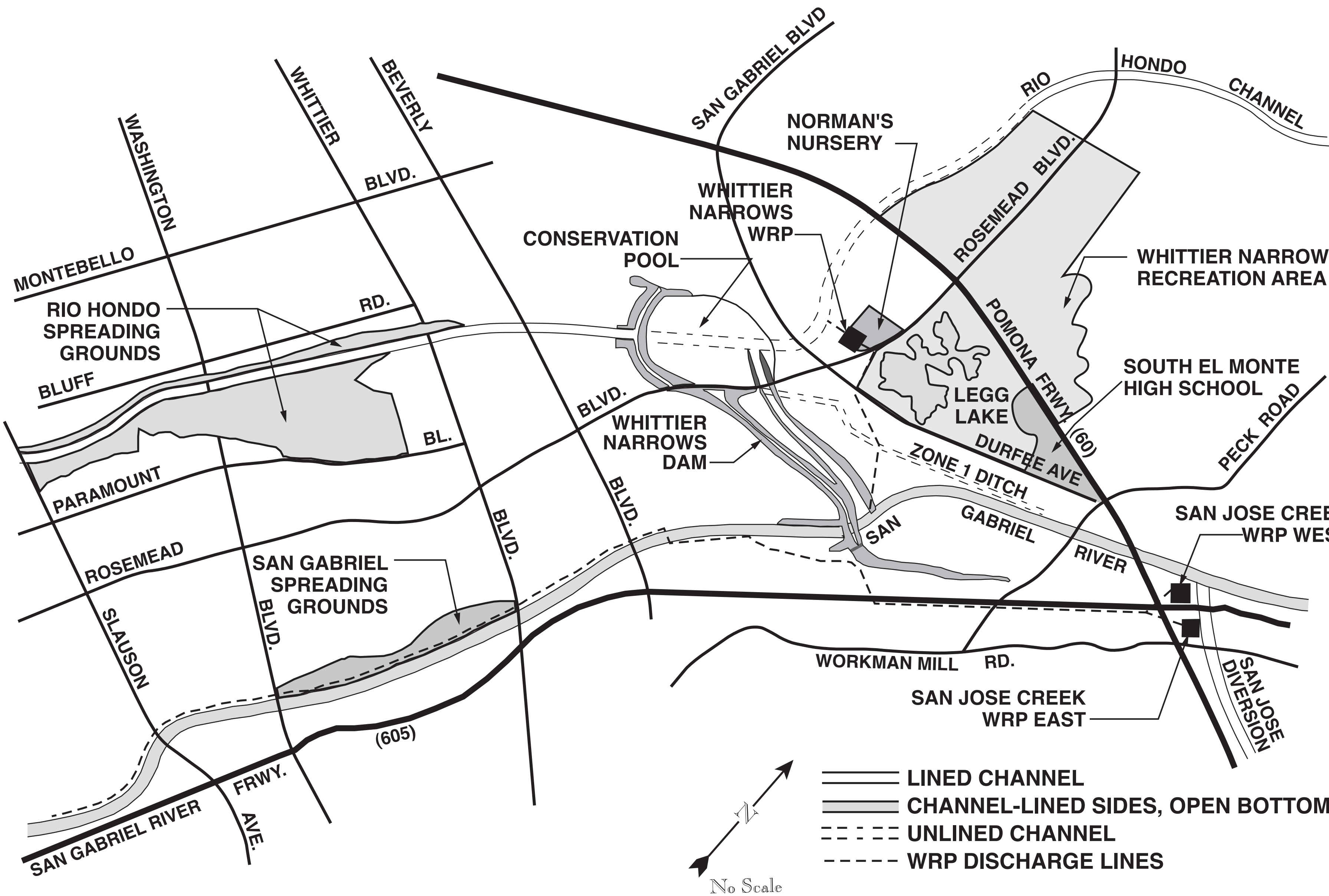


Table 15
Summary of Fiscal Year 10-11 Recycled Water Usage
Whittier Narrows WRP

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Water Replenishment District	Aug 62	--	R	6.141	6,881
Norman's Nursery	Mar 83	20.2	O	0.016	17
Whittier Narrows Recreation Area	Sep 06	568	L	0.712	798
South El Monte High School	Aug 07	16.1	AF, L	0.062	69
Whittier Narrows Golf Course	Dec 09	260	L	0.504	565
TOTALS		**864.3**		**7.434**	**8,330**

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

recharged and bypassed is attributed to differences in metering between the Sanitation Districts and the LACDPW.

2.6.2 San Gabriel Valley Water Company - F.L. Norman's Nursery

In March 1983, Flora Nursery leased from the Sanitation Districts the 17-acre parcel known as the arboretum site northwest of the junction of the 60 and 605 Freeways adjacent to the San Jose Creek WRP, and contracted for the purchase of recycled water from this plant for the irrigation of nursery stock. F.L. Norman's Nursery purchased this operation in March 1986. The Stage III expansion of the San Jose Creek WRP required the relocation of the nursery operations from the arboretum site to land owned by the Sanitation Districts and the Army Corps of Engineers next to the Whittier Narrows WRP. This relocation began in December 1988 and was completed in May 1989. Recycled water is supplied to the nursery operation directly from the plant's chlorine contact tanks through the nursery's own pump. During FY 10-11, 0.016 MGD (17 AFY), or 0.2% of the recycled water produced at this plant, was delivered to this 20.2-acre site for the irrigation of ornamental plants for commercial resale, a 29.2% decrease from the preceding fiscal year. This company ceased nursery operations at this site and deliveries of recycled water ended in April 2011.

Contract No. 3286 with SGVWC replaced the old contract for the sale of recycled water directly to the nursery (Contract No. 2835) beginning in September 1994. SGVWC resold the recycled water to the nursery at its contract rate of $473.28/AF, a 47% discount from its corresponding potable water rate of $899.95/AF.

2.6.3 Upper San Gabriel Valley Municipal Water District (Phase II-A Extension) – Whittier Narrows Recreation Area

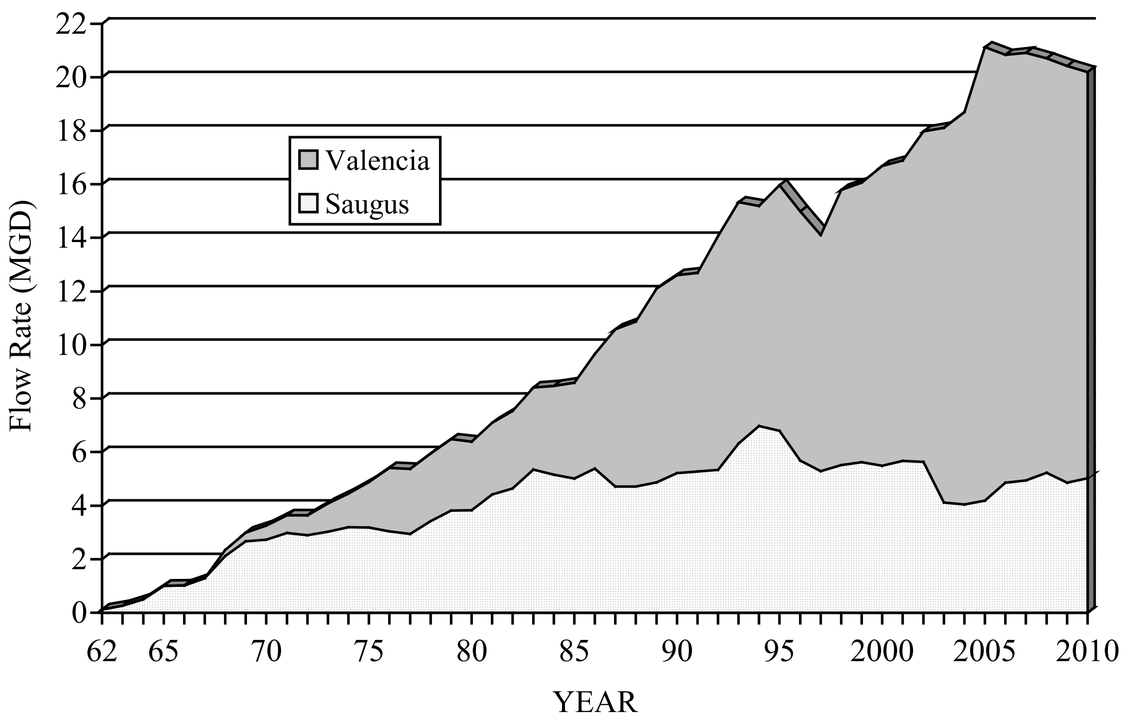
This project (designated Phase II-A by USGVMWD) was completed in September 2006, at which time deliveries of recycled water began to the Los Angeles County Department of Parks and Recreation's (LACDPR's) Whittier Narrows Recreation Area, located adjacent to the Whittier Narrows WRP. The athletic fields and landscaping at South El Monte High School were connected in July 2007. Construction of a pipeline to the adjacent Golf Course was completed and the golf course connected in December 2009. The $9 million project was constructed with the help of a $2.1 million Prop. 50 grant from the SWRCB and utilizes the plant's existing chlorine contact tanks, which will no longer be regularly needed for effluent disinfection after the plant is converted from sodium hypochlorite to UV disinfection.

During FY 10-11, the USGVMWD distribution system delivered 1.278 MGD (1,432 AFY) through 18,900 feet of pipeline for use on 864 acres. This was 16.5% of the recycled water produced at this plant and a 149.0% increase over the preceding fiscal year. This increase was primarily due to the plant shutdown during the previous fiscal year for construction, followed by increased flows during the current fiscal year making more recycled water available. No new sites were added to the system during FY 10-11, although construction of the Rosemead extension to this system was completed (see Section 5.5.1).

USGVMWD wholesaled the recycled water to SGVWC, the retail purveyor for this system, who then resold the recycled water to the LACDPR at a contract rate of $696.00/AF, or 77% of its corresponding potable water rate of $899.95/AF. LACDPR then leases a portion of its groundwater pumping rights to SGVWC in exchange, resulting in a lower effective rate for the recycled water. The golf course and high school were charged their tariff rate of $726.23/AF, 81% of the potable water rate.

This area, which includes the City of Santa Clarita, is located northwest of the City of Los Angeles. The Valencia and Saugus WRPs together make up the Santa Clarita Valley Joint Sewerage System (SCVJSS) and have a design capacity of 28.1 MGD (31,487 AFY). During FY 10-11, these plants produced 19.96 MGD (22,365 AFY) of recycled water available for reuse, a 1.8□ decrease from the preceding fiscal year. Figure 15 illustrates the growth of recycled water production from Valencia and Saugus WRPs from 1962 through the end of 2010. During most of the history of these plants, only occasional reuse via water truck hauling occurred. The use of recycled water through a permanent distribution system began during FY 03-04, with 0.300 MGD (336 AFY), or 1.5□ of the total amount of recycled water produced in the SCVJSS, being delivered from the Valencia WRP during FY 10-11. This was a 9.4□ decrease from the preceding fiscal year.

FIGURE 15
SANTA CLARITA VALLEY JOINT SEWERAGE SYSTEM RECYCLED WATER PRODUCTION
1962-2010



3.1 VALENCIA WRP

The Valencia WRP, located at 28185 The Old Road, Valencia, CA 91355, was completed in 1967. Following several expansions, the construction of a 4.4 million gallon flow equalization tank in February 1995, a solids handling expansion in August 2002, and the construction of additional aeration tanks for NDN in May 2003, the Valencia WRP now has a capacity of 21.6 MGD. In FY 10-11, the plant produced an average of 14.95 MGD (16,749 AFY) of recycled water, a 3.9□ decrease from the preceding fiscal year. The FY 10-11 O□M cost to produce this water was approximately □623□AF, which includes solids processing for both the Saugus and Valencia WRPs. Recycled water quality for FY 10-11 is presented in Table B-7 of Appendix B.

Use of recycled water from this facility is permitted under Los Angeles RWQCB Order Nos. 87-48 and 97-072. During FY 10-11, 0.300 MGD (337 AF), or 2.0% of the recycled water produced was actively reused, a 9.4% decrease from the preceding year.

VALENCIA WRP FACTS

Plant capacity:	21.6 MGD
Water produced:	14.95 MGD 16,749 AFY 3.9% FY decrease
FY10-11 O&M:	$623/AF
Water reused:	0.300 MGD 337 AFY 2.0% of production 9.4% FY decrease
Delivery systems:	1
No. of reuse sites:	3 129 acres

3.1.1 *Castaic Lake Water Agency*

The Castaic Lake Water Agency (CLWA), the regional importer and wholesaler of State Project water in the Santa Clarita Valley, has begun the implementation of a recycled water distribution system. In spring 1998, Kennedy/Jenks completed design of a 10,000 gpm pump station located adjacent to the Valencia WRP's chlorine contact tanks, with enough pipeline to go through the plant site to the street, with construction being completed in 1999. Construction of a 20- and 24-inch pipeline southerly along The Old Road to Valencia Boulevard was completed in May 2002. Recycled water deliveries for hydrostatic testing of the storage reservoir constructed at the Westridge Development reuse site as a part of this project began in August 2003, with irrigation of the Tournament Players Club golf course beginning the following month. These facilities are shown in Figure 16 and listed in Table 16.

During FY 10-11, 0.300 MGD (337 AF), or 2.0% of the recycled water produced at the Valencia WRP was delivered through 16,490 feet of pipeline, a 9.4% decrease over the preceding fiscal year. In FY 10-11, 2.8 acres of landscaping at the intersection of The Old Road and Magic Mountain Parkway were connected.

Valencia Water Company, the retail purveyor for this system, purchased the recycled water from CLWA for $486.24/AF and resold it at its tariff rate of $511.83/AF, or 84% of its corresponding potable water rate of $609.40/AF.

3.2 Saugus WRP

SAUGUS WRP FACTS

Plant capacity:	6.5 MGD
Water produced:	5.01 MGD 5,616 AFY 5.0% FY increase
FY10-11 O&M:	$499/AF
Water reused:	none

The Saugus WRP, located at 26200 Springbrook Avenue, Saugus, CA 91350, was completed in 1962. Three subsequent expansions in 1964, 1965, and 1968 and flow equalization facilities in 1991 brought its current design capacity to 6.5 MGD. The treatment process was upgraded to tertiary with the addition of dual-media pressure filters in 1987. No future conventional expansions are possible due to space limitations on the site; any increase in plant capacity would have to be in some form of compact treatment technology, such as membrane bioreactors (MBRs). In FY 10-11, the plant produced an average of 5.01 MGD (5,616 AFY) of recycled water, which was a 5.0% increase over the preceding fiscal year, at an O&M cost of $499/AF. Recycled water quality for FY 10-11 is presented in Table B-8 of Appendix B. Use of recycled water from this facility is permitted under LARWQCB Order Nos. 87-49 and 97-072; however, no recycled water was used from this facility in FY 09-10.

FIGURE 16
CASTAIC LAKE WATER AGENCY
RECLAIMED WATER DISTRIBUTION SYSTEM

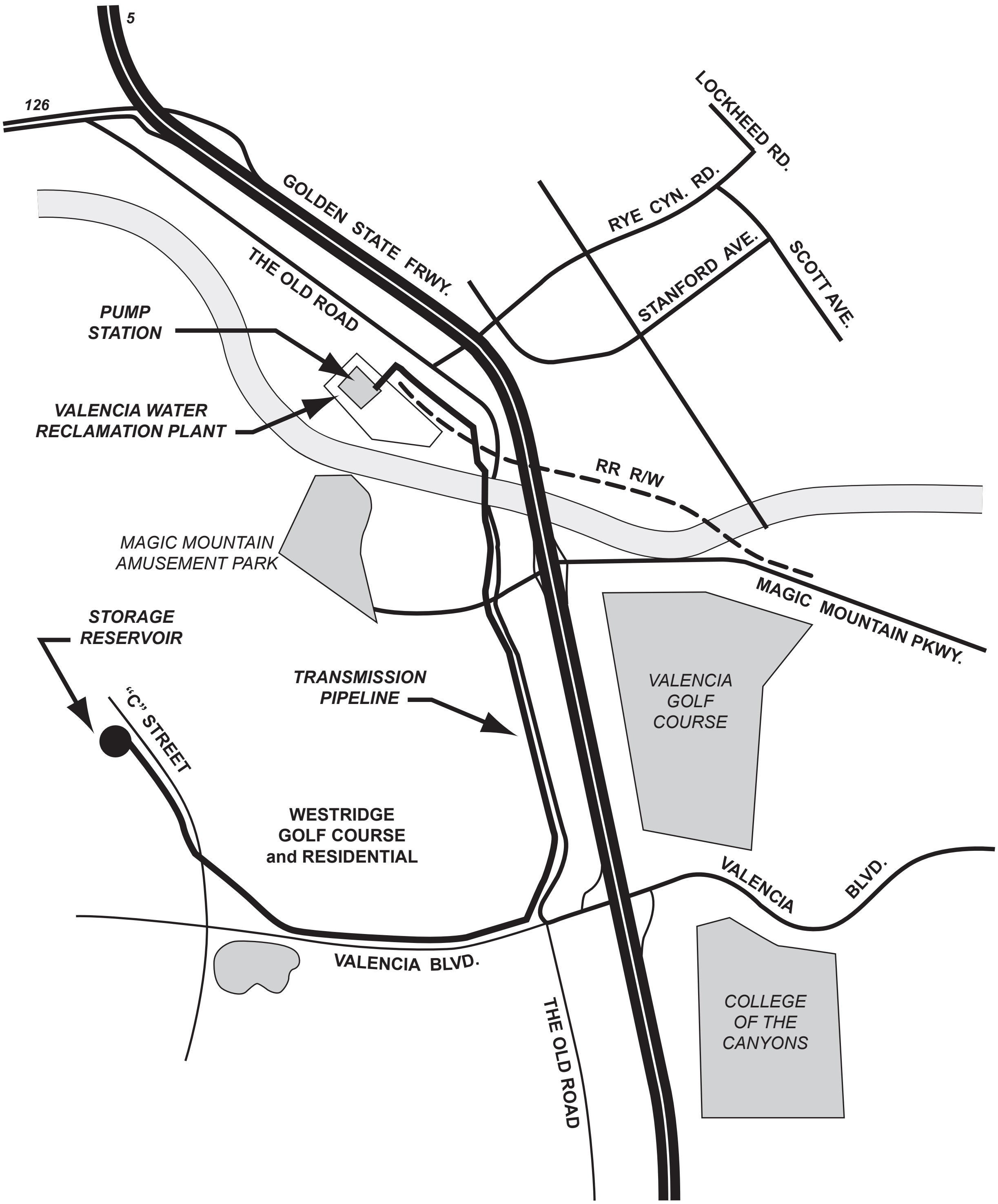


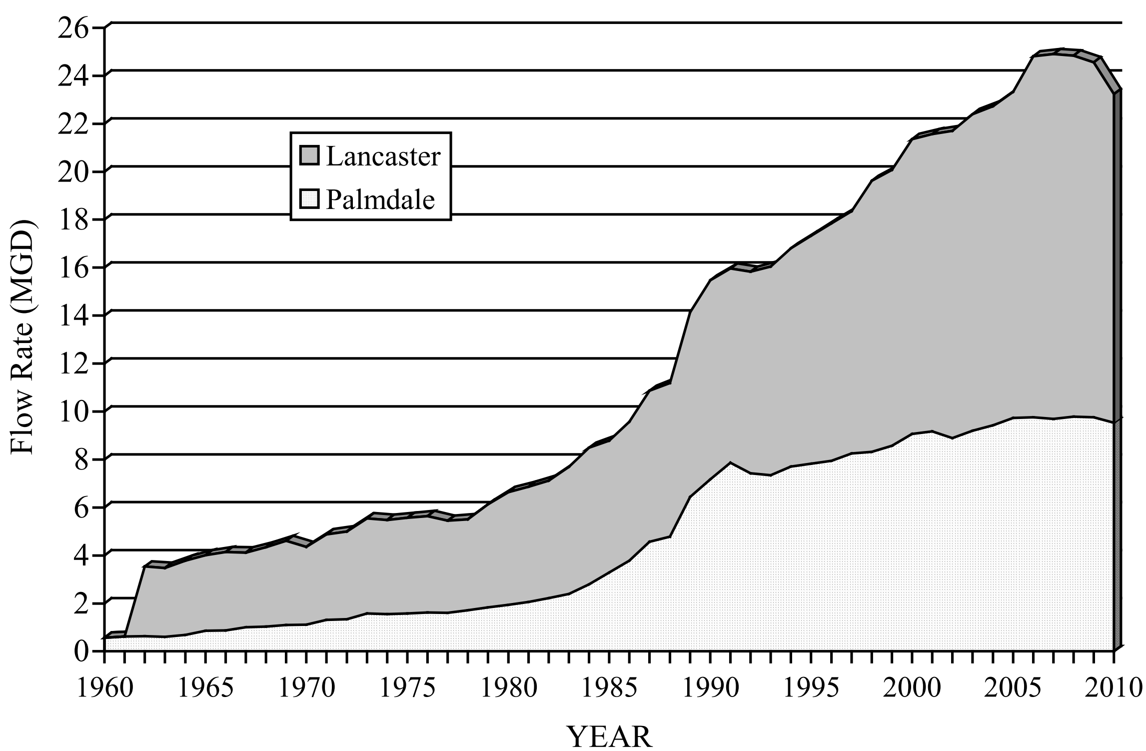
TABLE 16
SUMMARY OF FISCAL YEAR 10-11 RECYCLED WATER USAGE
VALENCIA WRP

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Tournament Players Club at Valencia	Aug 03	120	L	0.277	311
The Old Road medians, (26840-27236 The Old Road)	Aug 03	5.8	L	0.020	22
The Old Road□Magic Mtn. Pkwy medians	Nov 10	2.8	L	0.003	4
TOTALS		**128.6**		**0.300**	**337**

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

Two treatment plants serve the communities of the Antelope Valley, one each in the cities of Lancaster and Palmdale. Both WRPs produce secondary effluent by means of oxidation ponds followed by disinfection with chlorine, both use anaerobic digesters and drying beds for solids processing and both are in the process of being converted to activated sludge with tertiary filtration and disinfection (the conversion of the Palmdale WRP actually completed in December 2011). Together, during FY 10-11 the two WRPs treated approximately 23.10 MGD of wastewater to produce 20.01 MGD (22,421 AFY) of effluent available for reuse, an increase of 3.5% over the preceding fiscal year. Figure 17 illustrates the growth of influent flows at the Lancaster and Palmdale WRPs from 1960 through the end of 2010. In this case, influent is a more accurate gauge of plant flows because the actual amount of effluent is variable from month to month, as water is either lost in the oxidation ponds by evaporation/percolation or gained by rainfall. From this graph, it appears from the decrease in influent flows over the past few years that water conservation and the economic slowdown have finally outweighed population growth in regard to wastewater generation in the Antelope Valley. During FY 10-11, 18.98 MGD (21,270 AFY), or 94.9% of the recycled water produced, was actively reused, a 1.1% decrease from the preceding fiscal year. Reuse flows from both WRPs are presented in Table 17.

FIGURE 17
ANTELOPE VALLEY WRPS INFLUENT FLOW
1960-2010



4.1 LANCASTER WRP

The existing treatment facility, located at 1865 West Avenue D, Lancaster, CA 93534, began operation in 1959, replacing an earlier treatment plant that had begun operation in 1941. The plant's capacity was expanded

Table 17
Summary of Fiscal Year 10-11 Recycled Water Usage
Lancaster and Palmdale WRPs

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Apollo Lakes Community Regional Park (Lancaster)	Jun 69	56	L,P	0.184	206
Piute Ponds (Lancaster)	May 81	400	E	7.150	8,012
Harrington Farms Pistachio Orchard (Palmdale)	Apr 85	23	AG	0.082	92
Nebeker Ranch (Lancaster)	Jun 88	600	AG	3.668	4,111
Tree Farm (Palmdale)	Feb 89	46	O	0.012	13
Antelope Valley Farms (Palmdale)	Mar 02	2,100	AG	7.038	7,887
Eastern Agricultural Site (Lancaster)	Feb 07	696	AG	0.845	947
Public Works Dept. sewer flushing (Lancaster)	Jan 09	--	I	0.001	1
Public Works Dept. street sweeping (Lancaster)	Feb 09	--	I	0.0004	0.4
Lancaster University Center (Lancaster)	May 09	2	L	0	0
Public Works Dept. dust control (Lancaster)	Sep 10		I	0.00001	0.01
TOTALS		**3,920**		**18.981**	**21,270**

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

LANCASTER WRP FACTS

Plant capacity:	17 MGD
Water produced	11.89 MGD 13,323 AFY 2.0% FY increase
FY10-11 O&M:	$387/AF
Water reused:	11.85 MGD 13,277 AFY 99.7% of production 1.6% FY increase
Delivery systems:	5
No. of reuse sites:	7 1,752 acres

in 1989 to 8 MGD, with 460 million gallons (1,400 AF) of storage ponds to capture excess winter flows. The Stage III expansion increased plant capacity to 10 MGD in December 1992. The Stage IV expansion, consisting of a flow equalization basin, two sedimentation tanks and additional aeration equipment in the oxidation ponds, increased the plant's secondary treatment capacity to 16 MGD in May 1997. The MBR plant that went into operation in February 2007 raised the total plant treatment capacity to 17 MGD. In June 1969, the Antelope Valley Tertiary Treatment Plant (AVTTP) was placed in operation with the ability to treat 0.6 MGD of Lancaster WRP secondary effluent to tertiary quality. This plant completed its conversion to full tertiary treatment in mid-2012.

This plant treated an average of 13.51 MGD in FY 10-11, utilizing oxidation ponds to produce 11.89 MGD (13,323 AFY) of recycled water, or a 2.0% increase over the preceding fiscal year. Approximately 8.9% of the production is tertiary effluent being produced by both the AVTTP and the MBR plant (1.057 MGD, 1,184 AFY), with the remainder being secondary effluent. A portion of the wastewater entering the plant is lost due to evaporation from the oxidation and storage ponds during the summer, while additional flows are gained by precipitation during the winter. The FY 10-11 O&M cost to produce secondary effluent (based on influent flow) was approximately $387/AF (including solids processing). Besides a small amount of tertiary effluent used for on-site irrigation and construction at the WRP, all of the recycled leaving the plant was reused at four sites shown in Figure 18, and presented in Table 17.

4.1.1 *PIUTE PONDS*

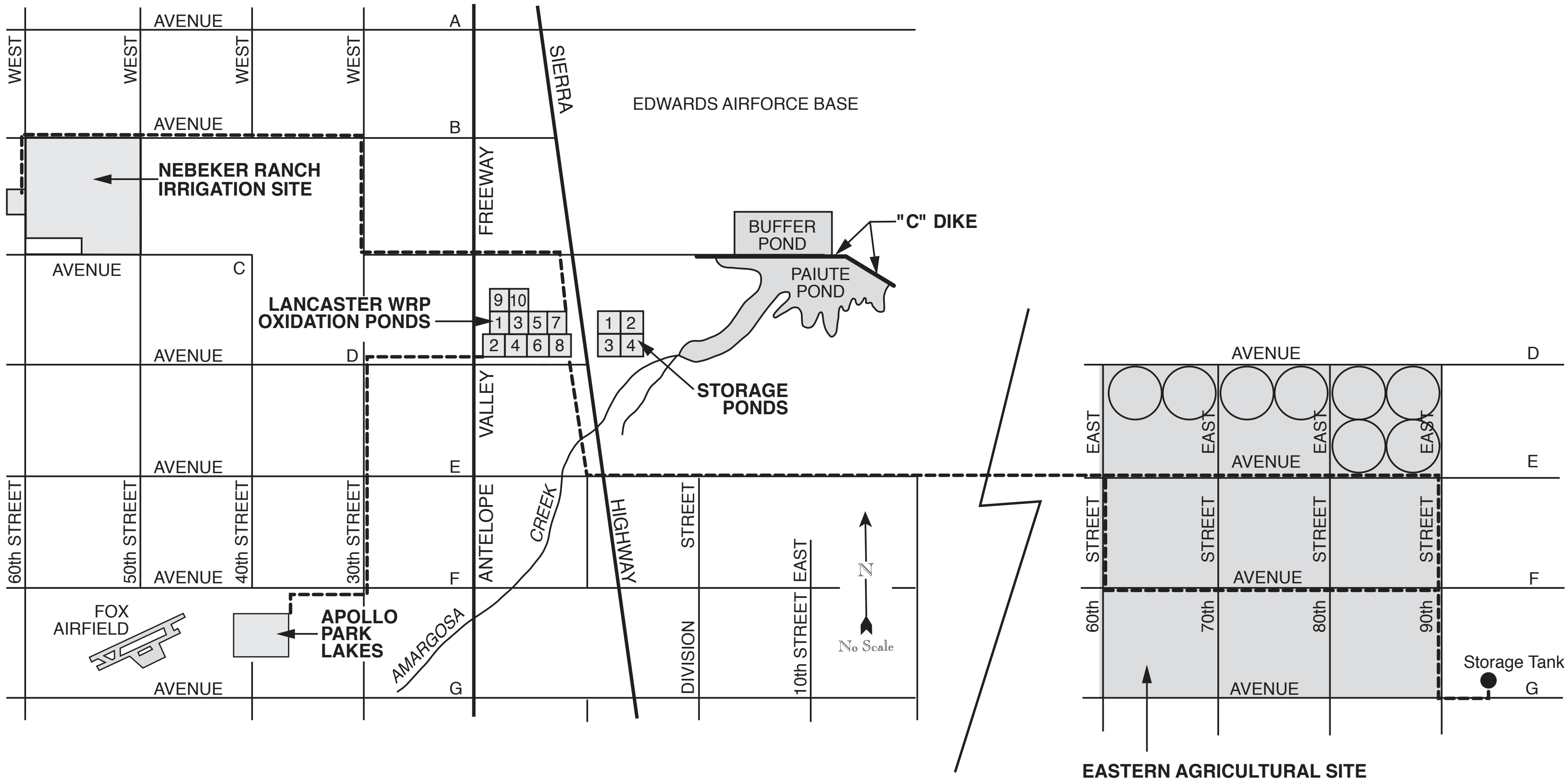
The initial discharge point for disposal of effluent from the Lancaster WRP had been to Amargosa Creek that then flowed onto Rosamond Dry Lake. In order to prevent flooding of the dry lakebed (which is located within the boundaries of Edwards Air Force Base), a 1-⅓ mile long dike was constructed in 1960 to impound the effluent. Approximately 200 acres of wetlands formed, becoming an important migratory stopover for ducks along the Pacific Flyway. In a memorandum of understanding signed in 1981 with Edwards Air Force Base and the California Department of Fish and Game, the Sanitation Districts agreed to maintain at least 200 acres of wetlands with recycled water in order to preserve Piute Ponds as a wildlife refuge. The secondary effluent is disinfected with chlorine in order to protect the health of Air Force officers who use this area as a duck-hunting club.

In FY 10-11, 7.150 MGD (8,012 AFY) was delivered to Piute Ponds, an increase of 4.1% over the preceding fiscal year. This reuse constitutes 60.1% of the recycled water produced at this facility.

4.1.2 *NEBEKER RANCH*

The dike constructed by the Air Force did not completely eliminate the flow of recycled water onto Rosamond Dry Lake during winter when evaporation was at a minimum and additional rainfall runoff entered Piute Ponds. Five hundred million gallons of storage capacity were added in 1988 to collect excess recycled water produced during the winter for delivery to the 680-acre (approximately 600 acres cultivated) Nebeker Ranch,

FIGURE 18
LANCASTER WATER RECLAMATION PLANT FACILITIES



an alfalfa farm located approximately three miles northwest of the treatment plant. The ranch is served by a pump station and 15,900 feet of 24-inch force main.

During FY 10-11, 3.668 MGD (4,111 AFY) of recycled water was used for agricultural irrigation at this site, a decrease of 1.9□ from the preceding fiscal year. This reuse constitutes 30.9□ of the recycled water produced at this plant. Deliveries of recycled water to this site will cease in the near future following the upgrade of the Lancaster WRP to full tertiary treatment and the full utilization of recycled water by the Eastern Agricultural site (Section 4.1.4) and the planned recycled water distribution systems by the City of Lancaster (Section 4.1.5) and the Los Angeles County Waterworks (Section 5.8.1).

4.1.3 APOLLO COMMUNITY REGIONAL PARK

In 1962, the then Los Angeles County Engineer devised and developed an aquatic recreation area next to the General William J. Fox Airfield in the City of Lancaster. The source of water is an advanced treatment plant located at the Sanitation Districts□Lancaster WRP that consists of chemical coagulation (for the reduction of phosphate to inhibit algal growth), sedimentation, dual-media filtration, and chlorination. The Antelope Valley Tertiary Treatment Plant (AVTTP) was placed in operation in June 1969 with a capacity of 0.6 MGD. Recycled water from the AVTTP is delivered by means of a 12-inch force main for construction of the 56-acre Apollo Community Regional Park (formerly known as Apollo Lakes County Park), which was opened to the public in November 1972.

In FY 10-11, 0.184 MGD (206 AFY) of recycled water was delivered through 23,800 feet of pipeline to maintain 26 acres (80 million gallon) of lakes at the park to make up for evaporative losses and for irrigation water withdrawn from the lakes for use on the park, an increase of 5.1□ over the preceding fiscal year. This reuse constitutes 1.5□ of the recycled water produced at this plant. The three lakes in the park, named Aldrin, Armstrong, and Collins, are stocked with trout and catfish for public fishing, although no swimming is allowed. Contract No. 1601 specifies that the County of Los Angeles reimburse the Sanitation Districts for all of the O□M costs incurred in operating the AVTTP. The upgrade of the Lancaster WRP to tertiary treatment may render the AVTTP superfluous if nutrients can be managed.

4.1.4 EASTERN AGRICULTURAL SITE DEVELOPMENT AND STORAGE PROJECT

In order to prevent unauthorized overflows of effluent from Piute Ponds onto Rosamond Dry Lake and to handle future increases in effluent flow, the 2020 Facilities Plan for the Lancaster WRP identified new treatment processes (conventional NDN activated sludge replacing oxidation ponds, followed by tertiary filtration and disinfection) and treatment capacity expansion (18 MGD in 2010, with an ultimate capacity of 26 MGD by 2020). This plant expansion is currently under construction. Additionally, since demand for recycled water is seasonal and weather dependent, approximately 4,000 AF of storage ponds have been constructed in advance of startup of the new treatment facilities.

There has been an increased interest in the recycled water that will be produced by the new plant. Agreements for the purchase of recycled water have been executed with Los Angeles County Waterworks District 40 (13,500 AFY), City of Lancaster (950 AFY), and City of Palmdale (2,000 AFY). These agreements allow recycled water to be provided from the Lancaster and□or Palmdale WRPs. Since many industrial□municipal reuse projects and the required infrastructure are still in their early development stages, the Eastern Agricultural Site was developed to immediately utilize the water. In February 2006, construction of the 18.3-mile distribution pipeline was completed. A narrative description of the layout of this system is included in Appendix K.

In the interim, while the new treatment facilities are being designed and constructed, a 1 MGD MBR pilot plant (with a temporary chlorine disinfection system and ultimately a UV disinfection system) was installed and put into operation in February 2007. The effluent from this plant is being delivered to the first agricultural area consisting of eight center pivot irrigation systems in the area bounded by 70th and 90th Streets East and Avenues D and E, which is being operated by Harrington Farms under contract to the Sanitation Districts. During FY 10-11, 0.845 MGD (947 AFY) of recycled water was used at this site for the irrigation of Sudan grass and a combination of barley, oats, and wheat, as well as for maintenance activities such as construction, dust control, and pipeline testing. Reuse at this site constitutes 7.1% of the recycled water produced at this plant, and a decrease of 3.2% from the preceding fiscal year.

4.1.5 City of Lancaster – Division Street Corridor

A contract for the sale of recycled water produced at the Lancaster and Palmdale WRPs to the City of Lancaster was signed in March 2008 for deliveries of up to 950 AFY. Recycled water deliveries from the Lancaster WRP to the City's Division Street Corridor Recycled Water Project (Division Street Corridor) began in January 2009. The City, in collaboration with the U.S. Army Corps of Engineers, has begun construction of distribution system that will eventually deliver recycled water from the Lancaster WRP following its upgrade to tertiary treatment. Through the Sanitation Districts' Supplementary Environmental Project Fund, $1 million was contributed to the construction of this system. The remaining financing consisted of City and American Recovery and Reinvestment Act funds. During FY 10-11, a total of 0.001 MGD (1 AFY) was delivered through 29,800 feet of pipeline, a 90% decrease from the preceding fiscal year. For the time being, production from the MBR plant is being delivered to the following reuse sites: the City's Public Works Department used 0.001 MGD (1 AFY) for sewer flushing, 0.0004 MGD (0.4 AFY) for street sweeping of 2,125 curb-miles of roadways and parking lots and 0.00001 MGD (0.01 AFY) for dust control. Lancaster University Center and the short-term Northeast Gateway demolition site were no longer using recycled water. The City has an existing storage reservoir to serve their planned system, and a permanent pump station is under development.

4.2 Palmdale WRP

This treatment facility, located at 39300 30th Street East, Palmdale, CA 93550, began operation in 1953 as 0.75 MGD plant, with subsequent expansions in 1958 (2.5 MGD), 1972 (3.1 MGD), 1989 (6.5 MGD), 1993 (8 MGD), and 1996 (15 MGD). This plant completed its conversion to full tertiary treatment in December 2011.

This plant treated an average of 9.59 MGD in FY 10-11 using oxidation ponds to produce 8.12 MGD (9,099 AFY) of secondary effluent, or a 6.5% increase over the preceding fiscal year. The O&M cost to produce this water (based on influent flow) was approximately $372/AF (including solids processing).

During FY 10-11, 7.133 MGD (7,993 AFY), or 87.8% of the plant's production, was actively reused on 2,069 acres at three sites. All reuse occurred on property owned by the City of Los Angeles World Airports (LAWA) but now under long-term lease to the Sanitation Districts. This usage represents a 5.2% decrease in reuse from the preceding fiscal year. The area

PALMDALE WRP FACTS

Plant capacity:	15 MGD
Water produced:	8.12 MGD 9,099 AFY 6.5% FY increase
FY10-11 O&M:	$372/AF
Water reused:	7.133 MGD 7,993 AFY 5.2% FY decrease 87.8% of production
Delivery systems:	1
No. of reuse sites:	3 2,069 acres

receiving recycled water is shown in Figure 19. The reuse sites are listed in Table 16 along with the reuse flows from the Lancaster WRP.

4.2.1 City of Los Angeles World Airports Lease

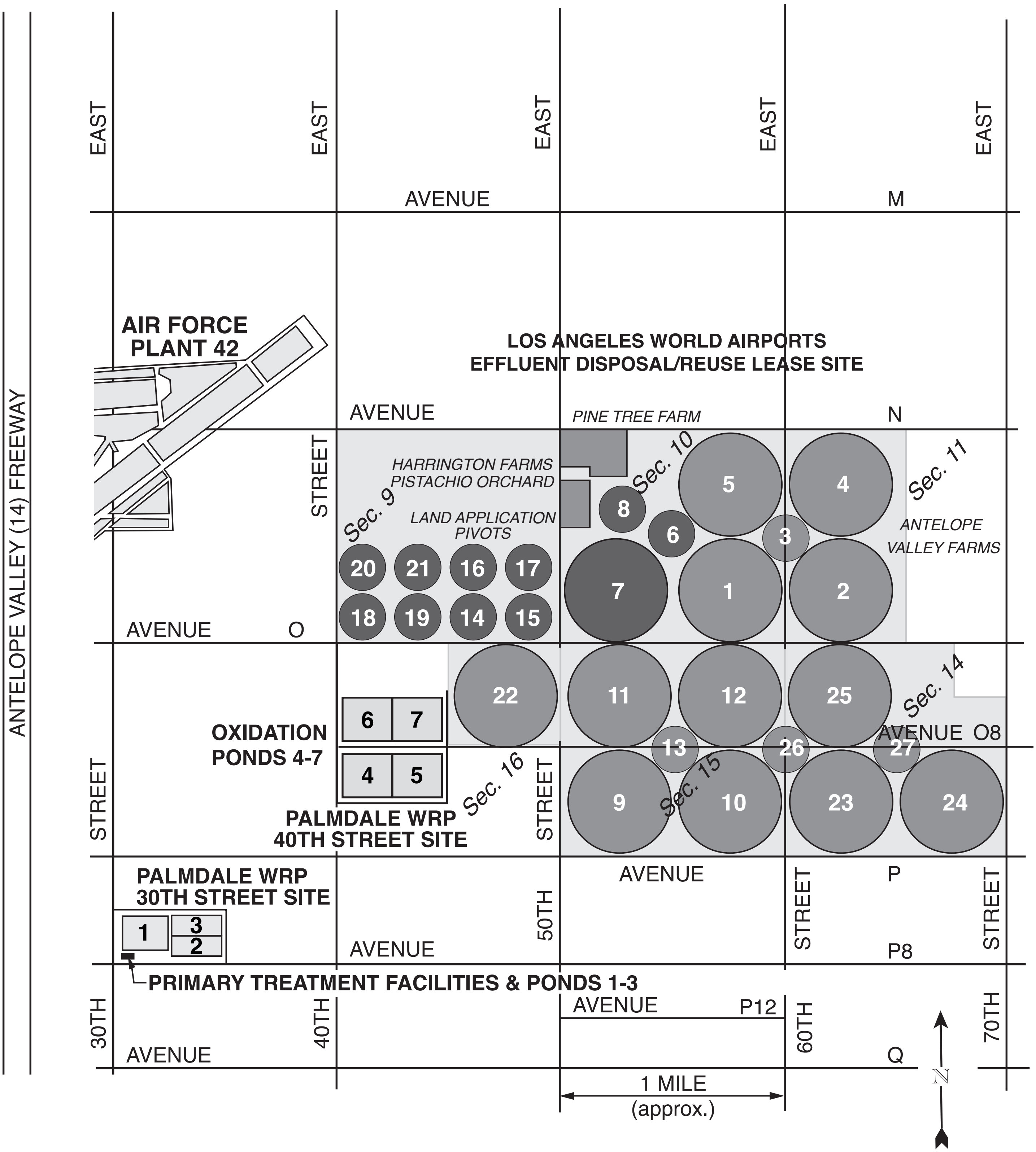
Recycled water from the Palmdale WRP has been sold to a series of local farmers since 1959. However, since the recycled water produced at the Palmdale WRP was historically secondary effluent, its applications have been limited. In January 1981, the Sanitation Districts signed Contract No. 2474 for the delivery of all the plant's effluent to City of Los Angeles World Airports (LAWA) (formerly known as the Department of Airports, or DOA), who had purchased much of the land in the area in anticipation of the construction of Palmdale International Airport. LAWA had planned to lease out the land that they owned to farmers until the airport could be built, and would resell the recycled water to these farmers, with the excess water being spread on uncultivated land. However, since LAWA was unable to find tenants to buy the recycled water, a second contract (No. 3013) was signed in 1989 allowing the Sanitation Districts to land apply all water from the Palmdale WRP on LAWA land at no charge to either party.

In January 2001, in accordance with the plant's Waste Discharge Requirements (WDRs), the Sanitation Districts submitted a Farm Management Plan (FMP), an Effluent Disposal Plan, and a Corrective Action Plan for the Palmdale WRP. The three documents provide an integrated solution for meeting the revised WDR established in the permit, Order No. 6-00-57. As a means of implementing the FMP, the Sanitation Districts signed a long-term lease with LAWA for four square miles of land to allow for the development of an integrated reuse system for water produced by the Palmdale WRP. As the master leaseholder, the Sanitation Districts are directly responsible for all land application and reuse activities at the site and, accordingly, have implemented agricultural management measures to minimize impacts to groundwater quality in land application areas. In March 2009, the Sanitation Districts eliminated land application and maximized reuse activities.

Recycled water is delivered to the Sanitation Districts' LAWA-leased property through 13,200 feet of 36-inch DIP force main. An average of 0.082 MGD (92 AFY) was used during FY 10-11 to irrigate 23 acres of the Pistachio Orchard (previously planted and maintained by LAWA). Another 0.012 MGD (13 AFY) was used at a 46-acre Sanitation Districts-operated tree farm (formerly operated by Tree Mover). The Pistachio Orchard and Tree Farm are leased from the Sanitation Districts by Harrington Farms.

As part of the FMP implemention, the Sanitation Districts embarked on the Palmdale Agricultural Effluent Reuse Project, submitting an Engineering Report for the Demonstration Phase to the Lahontan RWQCB in October 2001. In March 2002, this project officially began with Antelope Valley Farms installing two center-pivot irrigation systems (125 acres each) on land leased by the Sanitation Districts from LAWA. The only cost to the farmer was the capital costs for the irrigation systems and the O&M and energy costs for the booster pumps. By the end of FY 10-11, a total of 13 center pivots and 14 mini-pivots had been installed. Previously, the pivots were used primarily for land application of effluent on crops (i.e., above agronomic rates) and were not considered as "reuse." However, all application of recycled water began meeting agronomic rates in March 2009, therefore is now counted as reuse. During FY 10-11, this 2,000-acre site used 7.038 MGD (7,887 AFY), or 86.7% of the recycled water produced by the Palmdale WRP to grow livestock feed (first oats and later alfalfa). This was a 4.8% decrease from the preceding fiscal year.

FIGURE 19
PALMDALE WATER RECLAMATION PLANT FACILITIES



5. FUTURE WATER RECYCLING PROJECTS

Several recycled water distribution projects throughout the Sanitation Districts□service area are in various stages of development to make use of up to an estimated 61,220 AFY of the remaining recycled water currently produced but not yet beneficially reused, with the possibility of another 16,000 AFY of effluent from JWPCP receiving additional treatment prior to reuse. These projects are listed in Table 17 along with the WRP that would supply the recycled water, the estimated quantities of recycled water, and the anticipated completion date. Unsecured funding, institutional concerns, and lack of regulatory approval make the anticipated completion dates for several projects uncertain. In addition to the projects listed in Table 18, there are a number of other potential reuse projects that are much more conceptual at this time that are described in Section 5.8 below.

TABLE 18

SUMMARY OF FUTURE WATER RECYCLING PROJECTS

Project Name	Recycled Water Source	Quantity (AFY)	Anticipated Completion
Long Beach Water Department	Long Beach WRP	4,510	TBD
City of Lakewood	Los Coyotes WRP	160	TBD
Walnut Valley Water District	Pomona WRP	4,550	TBD
City of Pomona Master Plan (recommended)	Pomona WRP	1,500	2030
Groundwater Reliability Improvement Program	San Jose Creek WRP	21,000	TBD
East San Gabriel Valley Regional	San Jose Creek WRP	1,710	2012
La Puente Valley County Water District	San Jose Creek WRP	280	TBD
Southeast Water Reliability Project	San Jose Creek WRP	1,000	2013
CBMWD La Mirada Extension	San Jose Creek WRP	1,200	TBD
USGVMWD II-a Rosemead Extension	Whittier Narrows WRP	270	Spring 2011
City of Arcadia	Whittier Narrows WRP	740	2013
West Basin Municipal Water District	JWPCP	16,600	2020-25
Castaic Lake Water Agency	Valencia □ Saugus WRPs	17,400	2030
County Waterworks □Backbone System	Palmdale or Lancaster WRP	4,300	Early 2012
City of Palmdale	Palmdale or Lancaster WRP	2,000	TBD
TOTAL		77,220	
TBD = to be determined			

5.1 LONG BEACH WRP

5.1.1 LONG BEACH WATER DEPARTMENT MASTER PLAN

In August 2010, the LBWD, with the assistance of Montgomery-Watson-Harza (MWH) and in conjunction with WRD, released a draft update of its recycled water Master Plan. MWH identified an additional 49 irrigation and industrial potable water customers with a demand of approximately 4,510 AFY that could be converted to recycled water, including the Haynes and AES power plants and the Southeast Resource Recovery

Facility (SERRF), a number of residential developments, several industrial users and commercial laundries, and numerous greenbelts (schools, parks, golf courses, commercial nurseries, etc.). The revised Master Plan also took into consideration the expansion of the LVLAWTF for increased seawater intrusion barrier injection and recommended the construction of two, 3.3 MG storage tanks at the Alamitos Reservoir site. Seventeen of these customers with a demand of 2,505 AFY have been identified as the □most probable□for conversion to recycled water in the near term, as they are either located near an existing recycled water line or have expressed interest in conversion.

Eleven alternative construction projects were identified, with six being recommended for implementation:

Alternative 8 □A 6-inch pipeline west along Anaheim St. and north on Orizaba Ave. at a capital cost of □240,000 to serve 102 AFY to American Textile Maintenance Company (laundry).

Alternative 4 □A 4-inch pipeline north on Palo Verde Avenue at a capital cost of □320,000 to serve 39 AFY to Millikan High School.

Alternative 7 □A 16-inch pipeline beginning at the intersection of Vuelte Grand Ave. and Atherton St. at a capital cost of □7 million to serve 1,000 AFY to the Haynes Generating Station.

Alternative 6 □A 4-inch pipeline west on Spring St. at a capital cost of □250,000 to serve 20 AFY to Long Beach Airport Marriott Hotel.

Alternative 1A □6- and 12-inch pipelines beginning at the intersection of 46th St. and Atlantic Ave. at a capital cost of □750,000 to serve 52 AFY to Los Angeles County Community Development (residential).

Alternative 9 □Sub-project 9A will begin at the intersection of 11th St. and Obispo Ave. and run to the intersection of Pico Ave. and Ocean Blvd. to serve 93 AFY to the Hyatt Regency Hotel, Rainbow Harbor Esplanade, Long Beach Shoreline Marina and Cesar Chavez Elementary School. Sub-projects 9B, 9C and 9D all require Subproject 9A to be built, although they each can be constructed individually. Sub-project 9B will serve 488 AFY to TOPKO and Montenay Pacific Power Corp. Sub-project 9C will serve 797 AFY to Nation Gypsum and BP West Coast Products. Sub-project 9D will serve 628 AFY for industrial uses at THUMS Long Beach and TOPKO. The four sub-projects will use 6- to 20-inch pipelines and are projected to have a capital cost of □32.9 million.

Alternative 4 has already been implemented by LBWD, as recycled water deliveries to Millikan High School began in October 2011. There is currently no time schedule for implementation of the other projects.

5.2 Los Coyotes WRP

5.2.1 City of Lakewood Master Plan

The City of Lakewood commissioned Wildan and Associates to conduct a study to determine the feasibility of expanding its recycled water distribution system westward. This potential expansion could serve an additional 159 AFY to city parks (e.g., Bolivar and Biscailuz Parks), numerous medians and parkways, and a number of public and private schools (e.g., Craig William and Lakewood Elementary Schools, the Intensive Learning Center, St. Pancratius School, and Hoover Junior High School). Such an extension would require about 7.7 miles of pipeline to be built in five phases and could cost as much as □7.25 million. This study was completed in July 2010; however, there is no implementation schedule as funding is currently unavailable.

5.3 POMONA WRP

5.3.1 WALNUT VALLEY WATER DISTRICT

WVWD contracts directly with the Sanitation Districts for the purchase of recycled water, instead of receiving recycled water through the City of Pomona. In conjunction with the Sanitation Districts, WVWD has already begun the process of repairing/replacing the gravity line that serves both it and the Sanitation Districts' Spadra Landfill. Approximately half of the gravity line between the Pomona WRP and the Spadra site has already been replaced with 24-inch mortar-lined and coated steel pipe. Also in the future, WVWD and the Sanitation Districts may jointly construct a storage reservoir at or near the Spadra site to serve both agencies and make use of Pomona WRP recycled that is currently lost to the river.

WVWD contracted with Cathcart Garcia von Langen Engineers to develop a master plan for the future orderly expansion of its recycled water distribution system by up to an estimated 4,550 AFY, although the currently proposed additional reuse sites have an expected demand of 1,676 AFY. This master plan detailed the potential for expansion, primarily into the City of Diamond Bar and the Walnut Village annexation into the City of Walnut and determined what new infrastructure and facilities would be required. In addition to pipelines (ranging from 6- to 24-inch), seven pump stations, five new reservoirs, three reservoir conversions, and four back-up wells would need to be added to the recycled water distribution system to accommodate the expansion. Completion of this $24 million system expansion is contingent upon the construction of a storage reservoir, as there are insufficient flows in the gravity distribution system as currently configured. In addition to its continued use of recycled water from the Pomona WRP, WVWD is expected to connect to the East San Gabriel Regional Recycled Water System detailed in Section 5.4.2.

5.3.2 CITY OF POMONA MASTER PLAN

The City's consultant, Carollo Engineers, completed a master plan for expanding their recycled water distribution system in November 2009. The additional demand for their entire potential customer base was estimated at 6,150 AFY. However, the estimated maximum daily demand would be 11.6 MGD, which is not available to the City from the Pomona WRP. Therefore, additional sources of water would be required if all the potential reuse sites were connected. These water sources include potable water, non-potable groundwater from existing or rehabilitated wells, increased sewage flow to the Pomona WRP (i.e., process optimization/flow equalization), and recycled water from the Inland Empire Utilities Agency (although this agency has stated that it will not be delivering recycled water to the City within the Master Plan's time horizon of 2030).

The proposed expansion of the City's recycled water distribution system was divided into 10 segments serving an ultimate demand of 2,981 AFY. Because of the high, anticipated cost of implementing the entire proposed expansion (in addition to new distribution lines, eight new pump stations, five new storage reservoirs, and four additional pumps were needed), the Master Plan recommended that only three segments be built at this time, as they were the most cost effective and could be served by the existing recycled water supply from the Pomona WRP. This recommended project would be built in four phases from 2010 to 2030 and would yield an additional 1,497 AFY at an estimated capital cost of $20.7 million. The Master Plan also recommended replacing the existing pumps at the Pomona WRP with variable frequency drives prior to construction of the third segment so that more of the WRP's production could be beneficially reused with less discharge to the San Jose Creek channel. The seven remaining segments, if built, would be constructed in two phases after 2030, serving an additional 1,484 AFY of demand at an estimated capital cost of $52 million.

Independent work has already begun on the delivery of recycled water from Cal Poly to Forest Lawn's Covina Hills cemetery. A potable water standby agreement has negotiated with Golden State Water Company that will allow recycled water irrigation use at this site. As part of an amendment to their recycled water agreement, Forest Lawn will construct a pump station and piping to lift recycled water from Cal Poly's recycled water reservoir up to Forest Lawn's irrigation water tanks, and the Cal Poly irrigation water lift station will be upgraded to increase maximum flow rate from 3,000 to 4,000 gpm to accommodate the cemetery's demands. Forest Lawn expects to begin using 300 AFY of recycled water in 2013, which will increase gradually until the final build-out of the cemetery occurs in the year 2160, with an ultimate projected irrigation demand of 900 AFY.

5.4 San Jose Creek WRP

5.4.1 *Groundwater Recharge Program*

USGVMWD and its partner, the San Gabriel Valley Municipal Water District (SGVMWD), had been developing a plan to replace imported State Project water (purchased either through MWD or directly) with a like amount of recycled water from the Sanitation Districts' San Jose Creek WRP West to prevent long-term groundwater overdraft of the basin. The initial proposal was for transmission line running north along the San Gabriel River to the Santa Fe Spreading Grounds to deliver a long-term average of 16,000 AFY (maximum of 25,000 AFY) of tertiary treated recycled water.

Because of opposition from a local brewery and a California Environmental Quality Act (CEQA) lawsuit, a compromise "demonstration" recharge project was proposed that would use a of maximum of 10,000 AFY of recycled water for recharge downstream of the Santa Fe Dam at five concrete drop structures in the San Gabriel River. The five, new discharge points in the San Gabriel River that would be the recharge locations for this project were identified in the June 2009 NPDES permit for the San Jose Creek WRP. Contracts for the sale of recycled water from the Sanitation Districts to USGVMWD and SGVMWD were executed in August and September 1998, respectively. However, permit action was delayed when LARWQCB staff proposed that this groundwater recharge project immediately comply with surface water human health-based criteria (California Toxics Rule, or CTR) for water bodies (i.e., the unlined San Gabriel River) that are existing or potential drinking water sources. CTR criteria for some constituents are significantly lower than Title 22 drinking water standards and are not attainable with current conventional tertiary treatment. Since that time, the designation as an existing or potential drinking water source has been removed from a number of water bodies in the Los Angeles Basin, including this portion of the San Gabriel River. CTR human health criteria for non-drinking water sources and criteria for aquatic life and all other applicable Basin Plan Objectives would be applied to the recycled water at the point of discharge to the San Gabriel River. Subsequently raised concerns about the disinfection by-product, NDMA, in recycled water had continued to prevent this project from moving forward. As such, the only way to obtain compliance with these requirements would be by the addition of advanced treatment to that portion of the recycled water to be recharged. Because of the substantial additional cost that would be incurred, the project had been indefinitely postponed.

Interest in this project was rekindled following MWD's May 2007 cessation of all deliveries of imported water for spreading. USGVMWD, WRD and the Sanitation Districts entered into a Memorandum of Understanding (MOU) on September 24, 2008 to develop the Groundwater Reliability Improvement Program (GRIP). As envisioned, Phase I of GRIP would consist of an advanced treatment plant (MF/RO/advanced oxidation) located at or adjacent to San Jose Creek WRP West that would produce 18,000 AFY for recharge in both the Main San Gabriel and Central groundwater basins. Phase II would increase production capacity to 46,000 AFY. In November 2010, a Joint Powers Authority was formed by USGVMWD, WRD, and the Sanitation Districts to proceed with the project. However, despite initial progress, the USGVMWD Board of Directors voted in March 2011 to remove their agency from the Joint Powers Authority due to shifting replenishment needs and cost concerns. Instead, USGVMWD has received a $150,000 grant from USBR to conduct a feasibility study to offset current interruptible imported supplies with 10,000 AFY of locally supplied recycled water within the next 8 to 13 years. The feasibility study will evaluate multiple sources of recycled water and compare these alternatives against a "no project" alternative in order to determine the best method for replenishment for the study area. WRD and the Sanitation Districts are moving forward with GRIP as a 21,000 AFY project focused on replenishment at the Montebello Forebay. The two agencies have begun working on the preliminary engineering to support the environmental documentation for the project (CEQA/NEPA) and anticipate that CEQA/NEPA work will begin in 2013.

5.4.2 East San Gabriel Valley Regional Recycled Water System

For a number of years, the City of Industry has been planning to extend its recycled water distribution system, since the demand at its single reuse site (Industry Hills Recreation Area) only uses a small portion of the capacity of the City's 36-inch distribution line coming from the Sanitation Districts' San Jose Creek WRP. The proposed expansion involved several alternatives over the years, including the possibility of locating a 10,000 AF open reservoir in the Tres Hermanos area of the City of Diamond Bar for seasonal storage of recycled water. In 2000, an MOU to develop a regional distribution system was signed by the City of Industry, Suburban Water Systems (SWS, which had purchased the City of West Covina's water system), BKK Landfill, RWD, and WVWD. A revised contract between the Sanitation Districts and City of Industry was negotiated to include the additional quantities of recycled water, and was signed on September 27, 2000. Because of anticipated higher recycled water demands, the City of Industry has requested an adjusted supply contract with the Sanitation Districts to support these needs. This regional system is expected to utilize 1,710 AFY more, and will be developed in two separate portions: one serving the City of Industry and RWD, and the other developed by USGVMWD to serve SWS, BKK Landfill, and WVWD. These are discussed separately below.

City of Industry/RWD – The City and its recycled water system operator, RWD, have completed a new pump station and 2.1 MG reservoir at Anaheim-Puente Road. In addition, construction has begun on an expansion of the City's pump station at San Jose Creek WRP East. This project will include addition of a fourth pump, replacement of the existing three pumps, installation of a larger surge tank, new control panels, and a new, separate power supply from SCE. The contract was awarded to Pacific Hydrotech in December 2010, construction began in August 2011, and completion will be mid-2012. RWD continues to expand its recycled water distribution system, adding new customers on a regular basis (discussed in Section 2.5.3 above). Construction of Mission Energy's Walnut Creek Energy Park 500 MW plant in the City of Industry has begun and deliveries of an estimated annual average 485 AFY (maximum estimated annual demand of 1,385 AFY) of recycled water for cooling tower use and landscape irrigation of the site are expected to begin in May 2013.

USGVMWD – USGVMWD's portion of the system is called the "Phase II-B Expansion" and will serve 1,315 AFY to 34 customers. This system is being constructed in four packages, consisting of a pump station, storage reservoir and approximately 15.1 miles of 6- to 24-inch pipeline. The first package pipeline was completed in December 2010 and connects to the City's existing 36-inch pipeline at the intersection of Azusa Avenue and Temple Avenue. The pipeline extends to the Big League Dreams Development/BKK landfill entrance and continues east to Nogales Street. A new reservoir was built as part of this package, with completion occurring in December 2011. The second package pipeline was completed in August 2011 and continues north along Azusa Avenue to the South Hills Country Club, a proposed recycled water customer. Site connections for both sub-phases are anticipated to be completed by June 2012.

The third package consists of approximately 3.8 miles of pipeline ranging in size from 4- to 12-inches in diameter. The pipelines are located in the City of West Covina and branch off of the Package 2 recycled water main installed in Azusa Avenue and Vine Avenue. The fourth package consists of approximately 3.4 miles of pipeline ranging in size from 4- to 12-inches in diameter. The pipelines are located in the cities of West Covina and Walnut along Shadow Oak Drive, Gemini Street, Stephanie Drive, Woodgate Drive and other local side streets. Construction of these packages is expected to be completed in September and October 2012, respectively, with retrofits of the recycled water customers expected in April 2013.

5.4.3 La Puente Valley County Water District Master Plan

The La Puente Valley County Water District (LPVCWD) hired MWH to produce a recycled water master plan for that agency, which completed the task in May 2011. LPVCWD□s potable water source is groundwater and it currently pumps over its annual allotment by approximately 40□, thereby requiring them to pay replenishment fees to the basin Watermaster. A total of 74 reuse sites with a demand of 375 AFY in and adjacent to its service area within the City of Industry were identified. The most cost effective of the four alternatives evaluated has LPVCWD tapping into the City of Industry□s recycled water distribution line along the San Jose Creek Channel at Hacienda Blvd., with a smaller connection to the City of Industry transmission line on Azusa Ave., serving a total of approximately 280 AFY through a new pump station at an estimated cost of □9.1 million. The LPVCWD Board of Directors has yet to finalize this document. According to the LPVCWD General Manager, the cost of recycled water for this project will be too high to allow for its construction in the foreseeable future without outside funding. However, this project could possibly be included as part of the USGVMWD Phase II-B Expansion detailed in Section 5.4.2, above.

5.4.4 Southeast Water Reliability Project

CBMWD is proceeding with this system expansion that will loop the Rio Hondo (Torres) and Century (Ibbetson) systems for flow reliability and system pressure and to aid in chlorination. The ultimate capacity for the combined, looped systems is projected to be 15,000 AFY. The selected option is now called the Southeast Water Reliability Project. This will consist of approximately 11.4 miles of 30-inch cement mortar lined and coated steel pipeline to be built from the City of Pico Rivera, through the cities of Montebello, Commerce, and East Los Angeles, to the City of Vernon. This extension would serve the Montebello Golf Course and other irrigation sites and a second proposed power plant in the City of Vernon, as well as other industrial users. (However, the City of Vernon has officially cancelled its plans for this facility.) Letters of intent to serve recycled water have been received by the cities of Pico Rivera and Montebello, and the City of Vernon has already adopted a recycled water rate. Construction on the first phase from Pico Rivera to the Montebello Golf Course was completed in the fall of 2011and several sites have already been connected. Approximately 400-500 AFY of the 1,000 AFY of identified demand will begin using recycled water almost immediately. Construction of the Phase 2 from Montebello to Vernon will depend on funding, securing a customer base and other outstanding institutional issues.

In addition, CBMWD had planned to construct a four million gallon recycled water storage reservoir at its Rio Hondo pump station that would provide daily operational storage. In the meantime, a potable water back-up system was installed at the pump station in 2001. Construction on the tank had been put on hold due to financial considerations, but is expected to be a part of the first phase of the SWRP expansion. The site of the storage tank may be relocated to the Montebello Hills to take advantage of elevation for gravity feed of the system.

In 2008, CBMWD was approached by the LADPW regarding the possibility of constructing a new 8-inch recycled water pipeline on Mines Avenue in the City of Pico Rivera that could deliver recycled water for landscape irrigation to multiple sites on or near Mines Avenue. The □Pico Rivera Recycled Water Project □ Phase I□is a sub-project to LADPW□s □San Gabriel River Coastal Basin Spreading Grounds Pump Station and Pipeline□project, a 78-inch pipeline that will act as conduit for moving storm water, imported water, or recycled water between the San Gabriel and Rio Hondo spreading grounds. After much discussion with LADPW staff and the City of Pico Rivera, and with the support of Congresswoman Grace Napolitano, the recycled water pipeline was added to LADPW□s Request for Proposals (RFP) for the 78-inch conduit. The agreement stipulates who is the lead agency and what percentage of funding each agency responsible for. The agreement divided the Pico Rivera Recycled Water Project into two phases:

Phase I – Phase I is a 1-mile long, 8-inch recycled water pipeline placed in the same trench used for the larger 78-inch conduit project. LADPW is the lead agency for the 8-inch recycled water pipeline and will be responsible for all construction and construction management. CBMWD's role is to provide a pipeline design. Because this project is important to all three agencies, final project costs will be equally split three ways.

Phase II – The second phase in the agreement is a project that will connect the Mines Avenue pipeline to CBMWD's existing recycled water system and the service laterals that will provide recycled water to the individual sites along the Mines Avenue corridor. CBMWD will be the lead agency on this portion of the Pico Rivera Recycled Water Project. Project costs will be split evenly with the City of Pico Rivera. Customer connections began in the summer of 2011.

With the assistance from Congresswoman Napolitano's office, CBMWD applied for funding through the United States Bureau of Reclamation's (USBR's) Title XVI program. The Title XVI program provides for cost recovery on 25% of all construction costs. If CBMWD receives federal funding, the grant will be applied equally to everyone's share. Since construction costs will be shared with LADPW (Phase I) and the City of Pico Rivera (Phase I and II), the impact to CBMWD will be greatly reduced. Federal funding, if approved, will further reduce impacts to CBMWD. Finally, construction bids are coming in much lower than anticipated in the engineer's estimates, so this will result in additional savings to CBMWD. All construction costs will be covered through pay-go funds.

As part of its 2008 Recycled Water Master Plan, CBMWD envisioned that additional connections would be made to the SWRP line to supply recycled water into the USGVMWD service area. No further action has been taken by either agency on this potential extension. CBMWD has had a consultant start on an update of their recycled water Master Plan, with a final report expected by the end of July 2012.

5.4.5 City of La Mirada Extension

CBMWD has just begun looking at a new recycled water trunk line from the City of Santa Fe Springs to serve an identified 1,200 AFY of demand in the City of La Mirada. Both the City and the local purveyor, Suburban Water Company, are extremely interested in getting recycled water. CBMWD is currently in the planning process and is looking at potential pipeline routes, customer base, booster pump location, etc. CBMWD expects to begin serious work on this project in the fall of 2012.

5.5 Whittier Narrows WRP

5.5.1 USGVMWD Phase II-A Rosemead Extension

USGVMWD will be adding approximately 270 AFY of additional recycled water demand at 17 new sites (schools, parks, commercial and office buildings, and street medians) for landscape irrigation and cooling towers. A mitigated Negative Declaration was adopted in April 2009, with construction beginning in the fall of 2009 on 14,467 linear feet of pipeline from their recycled water system serving the Whittier Narrows Recreation Area. The extension will begin with 3,633 feet of 12-inch line running west along Garvey Ave. between River Ave. and Earle Ave., with two, short 6-inch laterals running north on Willard Ave. and Earle Ave (761 and 822 feet, respectively). A 6,393 foot, 8-inch line will Tee off of the 12-inch line on Garvey and run south on Walnut Grove Ave. to a point just north of Cameta Dr. From this 8-inch line, a 180 foot, 4-inch lateral will branch off to the west at Gravalia Ave., a 1,440 foot, 6-inch lateral will branch off to the east on Klingerman St., and a 1,258 foot, 6-inch line will branch off to the west on Rush St. All of the pipeline had been installed by the end of 2010, with retrofits and connections to be completed by early 2012.

5.5.2 *City of Arcadia (USGVMWD Phase III Extension)*

The City of Arcadia, along with USGVMWD, commissioned Stetson Engineers to examine the feasibility of supplying recycled water to various sites within the city. A draft report was completed in December 2006 identifying an extension of USGVMWD's distribution system from the Whittier Narrows WRP as the most feasible alternative compared with obtaining recycled water from the San Jose Creek WRP or LADWP's LA-Glendale WRP. The proposed project consists of approximately 64,100 feet of 14- and 16-inch distribution lines, a 900 HP booster pump station, an existing 1.5 million gallon storage reservoir for an estimated cost of $7.6 million. The pipeline route is proposed to run east on Rush Street, north on Santa Anita Avenue, north along the Rio Hondo, west on Live Oak Avenue, then north again on Santa Anita to Foothill Blvd. Within the main part of Arcadia, the pipeline would form a loop going west on Foothill/Colorado Blvd., then south on Michillinda Avenue, then east on Huntington Drive back to Santa Anita. This system would provide recycled water to 23 potential customers with a total annual recycled water demand of approximately 644 AFY and a peak demand of 4.3 MGD. Another 23 sites with a total annual demand of 96 AFY were identified in the vicinity, although not adjacent to the proposed pipeline route, and would require the investment in additional service laterals. The four largest sites, Santa Anita Racetrack, the Los Angeles County Arboretum, Arcadia County Park, and Santa Anita Golf Course, make up 56% of the total identified demand for water. This study did not include any potential reuse sites that might be located along the pipeline route outside of the City of Acadia. The completion of the project was initially estimated to be approximately 2013, although no specific timetable has been set for implementation. This project has been designated Phase III by USGVMWD.

5.6 **Joint Water Pollution Control Plant**

5.6.1 *West Basin Municipal Water District*

The WBMWD's June 2009 Master Plan envisions the expansion of their recycled water system deliveries to 70,000 AFY by 2020 and to 83,000 AFY by 2030, including expansion of their Carson Regional Water Recycling Facility (CRWRF) from 6 to 23 MGD. Their study of the options found that both their pump station at the City of Los Angeles' Hyperion treatment plant that supplies their effluent for recycling and their distribution system would require extensive expansion in order to handle the additional flows from their El Segundo water recycling facility needed to serve reuse sites in the Carson and Palos Verdes areas. A more cost effective option would be to supply 20% of their future needs, or up to approximately 16,600 AFY, from the Sanitation Districts JWPCP. This option would also help WBMWD meet its contractual obligation of using recycled water of Sanitation Districts' origin for future expansions in exchange for capacity in the JWPCP ocean outfall for disposal of brine from the CRWRF. The recommended option was a new $187.8 million, 26 MGD treatment plant at JWPCP to augment WBMWD's Title 22 distribution system and supply advanced treated recycled water to such large reuse customers at the Dominguez Gap Seawater Intrusion Barrier and the bp Carson refinery expansion, as well as for the Amoco and Watson cogeneration facilities. The option of using JWPCP effluent is expected to save WBMWD approximately $25 million in capital costs. The location of this new treatment plant could be at JWPCP, the CRWRF, or along the transmission line route between the two facilities. According to the Master Plan's recommended CIP, acquisition of land for the new treatment plant is scheduled to occur in FY11-12; however, construction of the new treatment facilities is not scheduled until FY20-25.

5.7 VALENCIA AND SAUGUS WRPS

5.7.1 CASTAIC LAKE WATER AGENCY

In 2002, CLWA, the regional importer and wholesaler of State Water Project water in the Santa Clarita Valley, developed the Recycled Water Master Plan for the use of 17,400 AFY of recycled water produced at both the Sanitation District's Valencia and Saugus WRPs by the year 2030. CLWA requires an update of the 2002 Recycled Water Master Plan in order to compile the latest information with regard to potential recycled water users, design of infrastructure and the availability of recycled water to serve them. In March 2012, CLWA submitted an Integrated Regional Water Management planning grant application to the DWR for the development of the Master Plan and subsequent Environmental Impact Report (EIR). CLWA is expected to enter into a new contract with the Sanitation District the purchase and sale of recycled water to support the updated Master Plan, when completed. Implementation of the Master Plan has been delayed since the first phase of the distribution system went on line in 2003 for a number of reasons: lack of funding for infrastructure, concern with potential permitting requirements, uncertainty related to salinity issues in the Santa Clara River, and less than expected growth resulting in slower recycled water flow increases. In 2012, CLWA, along with the local purveyor Valencia Water Company, were awarded grant funding for the next phase of their recycled water system, Phase 2C, which is expected to deliver up to 900 AFY of recycled water.

In June 2009, CLWA began investigating the feasibility of delivering recycled water from the Sanitation Districts' Saugus WRP. This Phase 2A of the Master Plan consists of a 4,500 gpm booster pump station, 12,000 linear feet of transmission pipeline, 17,000 linear feet of lateral lines and a 1.75 MG storage reservoir. This system would deliver and estimated 511 AFY of recycled water from the Saugus WRP to the 80 acre Central Park, the River Village and Bridgeport developments and assorted city landscaping. CLWA released a draft Mitigated Negative Declaration–Environmental Assessment and Finding of No Significant Impact for this project on May 4, 2011. CLWA has indicated the construction of the project is delayed approximately five years.

5.8 LANCASTER AND PALMDALE WRPS

5.8.1 ANTELOPE VALLEY REGIONAL RECYCLED WATER DISTRIBUTION PROJECT

Sanitation Districts staff continue to work with the cities of Lancaster and Palmdale and Los Angeles County Waterworks District 40, Antelope Valley, (Waterworks) to develop a regional recycled water distribution system ("backbone system") for municipal and industrial users. The proposed North Los Angeles–Kern County Regional Recycled Water Project (AV Backbone) includes facilities for the primary distribution system to provide disinfected tertiary recycled water produced from the Sanitation Districts' Palmdale and Lancaster WRPs and from Rosamond Community Services District's Rosamond WRP to end users in the Antelope Valley Region. The Project is being built in phases and one segment, the Division Street Corridor, is already constructed and implemented in the City of Lancaster using tertiary treated recycled water produced by the Lancaster WRP (detailed in Section 4.1.5).

The City of Palmdale and Waterworks have entered an agreement to design, construct and implement a southern segment of the AV Backbone. The main backbone pipeline will originate at the Palmdale WRP, travel west down Rancho Vista Blvd., then north on 10th St. East, west on Avenue O-8 and north along Sierra Highway, terminating at Columbia Way and connecting to an extension of the Division Street Corridor (described below in Section 5.2.15). A lateral would run east along Columbia Way to serve the proposed Palmdale Hybrid Power Plant (PHPP), a 570-megawatt electric generating facility currently in the permitting process. Another portion of the main backbone pipeline will head west from Sierra Highway, along Avenue O, to the Amargosa Creek, and roughly parallel the creek to reach the Waterworks District's tank site facility next to the Antelope Valley Freeway, at 10th St. West and Avenue O-12. Facilities will also include the pump station and forebay tank to be located at the Palmdale WRP. And a storage tank at the Waterworks' tank site next to the Antelope Valley Freeway. This segment of the backbone system is currently in the design phase and approximately 80 percent complete. The plan is for this portion of the AV Backbone to be completed at nearly the same time as the completion of the PHPP, whose funding will also finance the recycled water pipeline. The PHPP was approved by the California Energy Commission in August 2011. The City of Palmdale will need to secure a developer and funding for the PHPP. Construction of the PHPP is estimated to take about 30 months once initiated. The PHPP is projected to use up to 4,300 AFY of recycled water, which will be distributed by Waterworks by means of a new pump station (plans for this pump station are awaiting final approval and funding of the PHPP. A contract for the sale of up to 13,500 AFY of recycled water produced at the Lancaster and Palmdale WRPs to Waterworks was signed in January 2008.

5.8.2 City of Palmdale

The City of Palmdale signed a contract with the Sanitation Districts in July 2009 for the purchase of up to 2,000 AFY of recycled water from the Palmdale and Lancaster WRPs. The City is initially planning on installing a recycled water distribution line along 30th St. East, south to Avenue R-8 then east until 55th St. East with laterals to five parks: McAdam, Palmdale Oasis, Yellen, Joshua Hills, and Domenic Massari. These parks are expected to use approximately 1,000 to 1,200 AFY. The City also plans on using recycled water on the numerous (150 to 200) Landscape Maintenance Districts (LMDs) and five elementary schools along the route of the recycled water line. In addition, any schools or businesses that are easily accessible to this water will also be connected. The City and Los Angeles County Waterworks are currently planning for the portion of the Backbone project that will connect the Palmdale WRP to the proposed PHPP (discussed in Section 5.7.1, above). The City is installing a temporary pump station to deliver recycled water to McAdam Park by the fall of 2012.

5.9 Conceptual Water Recycling Projects

The most recent statewide water crisis that ran from 2006-09 spurred numerous entities into giving more serious consideration to water recycling in their service areas. This sense of urgency was further stimulated by the passage of SB 7 in 2009 that requires urban water agencies to reduce per capita water consumption by 20 percent by the year 2020 (commonly referred to as the "20 x 2020 Plan"). And while the water supply situation in the State has improved considerably of late, several ambitious, large-scale water recycling projects involving groundwater replenishment continue to be investigated. The list of conceptual projects below is not meant to be exhaustive. Rather it is a listing of the most likely or ambitious projects the Sanitation Districts are currently tracking.

5.9.1 MWD Advanced Treatment Plant at JWPCP

In FY 09-10, JWPCP provided primary and secondary treatment to approximately 280.5 MGD (314,284 AFY) of wastewater prior to discharge through outfall tunnels to the Pacific Ocean, with water recycling at the facility being limited to in-plant uses. MWD and the Sanitation Districts have partnered to study the potential for a regional, indirect potable reuse program to advance treat as much as 200 MGD (224,110 AFY) of treated wastewater that is currently discharged to the Pacific Ocean. Implementation of such a large-scale regional reuse program could provide MWD with a significant supply of reliable, drought-resistant water to supplement imported raw water supplies and would be consistent with the enhanced regional approach currently being considered in their Integrated Resources Plan (IRP). Such a project would involve complex interagency agreements, extensive regulatory approvals, public outreach, and considerable capital costs.

From a technical standpoint, this project would require new advanced treatment facilities (e.g., MF/RO/UV), a regional distribution system to groundwater basins (e.g., Montebello Forebay and/or the Main San Gabriel Basin), and injection and extraction wells, modeled somewhat after the Groundwater Replenishment System in Orange County. No estimates of capital costs or timeline for implementation for such a project have been made at this time. Nevertheless, pilot scale testing of treatment systems is currently underway, facilitated by a $330,000 grant from the USBR.

5.9.2 DOWNEY/CERRITOS ADVANCED TREATMENT PLANT FOR RECHARGE

The cities of Downey and Cerritos are jointly investigating a potential project to take 7.1 MGD (8,000 AFY) of effluent from the Los Coyotes WRP, treat it to an advanced level (MF/RO/UV), and pipe approximately 6,000 AFY (after brine losses) north to the Montebello Forebay where it will be stored underground for the exclusive use by those cities. In addition to technical, financial and permitting obstacles, implementation of this project would require that the existing Basin Adjudication would need to be significantly revised.

5.9.3 SCALPING PLANTS

The siting of various scalping plants throughout Los Angeles County, including the foothill communities and the Palos Verdes Peninsula, has been proposed. The intent of the scalping plants is to provide a localize supply of recycled water, primarily for groundwater replenishment, but also for limited direct use. In general, the siting of such small facilities is contrary to the goals of the Sanitation Districts' recycled water planning efforts. The Sanitation Districts prioritize full utilization of the existing WRPs and regional distribution projects because they are generally much more cost effective. Nevertheless, the Sanitation Districts have supported various agencies evaluations into scalping plants in the event one can be demonstrated to be cost effective.

The Foothill Municipal Water District (FMWD), a member of the Foothill Water Coalition (FWC), is investigating the potential of recharging groundwater with tertiary MBR effluent. The project would consist of several small (0.25-1 MGD) scalping plants that would take raw sewage and treat it using MBR technology. The FMWD is in the process of applying for grants to help fund this project, however, there are other obstacles to overcome, such as permitting and siting. In addition, construction of scalping plants will decrease the amount of water available at the already constructed downstream WRPs. This poses a problem because recycled water has already been contracted for at these downstream WRPs.

The Three Valleys Municipal Water District (TVMWD), also a member of the FWC, is similarly investigating construction of an upstream scalping plant that would take raw sewage and treat it using MBR technology. Many of the same technical, financial, and permitting obstacles that exist for the FMWD also apply to TVMWD.

The Sanitation Districts began investigating the potential for locating a 2 MGD, flow equalized MBR plant in the Rancho Palos Verdes area that would recycle wastewater tributary to the Abalone Cove Pumping Plant. This driving force behind this project is the maintenance cost and potential for sewage spill of the Joint Outfall "J" Unit 1F force main, which is subject to landslides in the Abalone Cove and Portuguese Bend areas. While four alternatives (including a sub-alternative) were identified, all required significant capital and O&M costs, rendering them all less desirable than reconstruction of the existing sewer line.

LIST OF ABBREVIATIONS

AF	acre-foot
AFY	acre-foot per year
AVTTP	Antelope Valley Tertiary Treatment Plant
AWWARF	American Water Works Association Research Foundation
BOD	biological oxygen demand
CBMWD	Central Basin Municipal Water District
CDM	Camp Dresser McKee
CEQA	California Environmental Quality Act
CLWA	Castaic Lake Water Agency
COD	chemical oxygen demand
CTR	California Toxics Rule
DIP	ductile iron pipe
DPH	State Department of Public Health (formerly Health Services)
EIR	Environmental Impact Report
EPA	United States Environmental Protection Agency
FMP	Farm Management Plan
FMWD	Foothill Municipal Water District
FWC	Foothill Water Coalition
FY	fiscal year
GAC	granular activated carbon
gpm	gallons per minute
HP	horsepower
JOS	Joint Outfall System
JWPCP	Joint Water Pollution Control Plant
LACDPR	Los Angeles County Department of Parks and Recreation
LACDPW	Los Angeles County Department of Public Works
LADWP	City of Los Angeles Department of Water and Power
LAWA	Los Angeles World Airports
LBWD	Long Beach Water Department
LPVCWD	La Puente Valley County Water District
LVLAWTF	Leo Vander Lans Advanced Water Treatment Facility
MBR	membrane bioreactor

MF/RO	microfiltration/reverse osmosis
MGD	million gallons per day
MRF	Materials Recovery Facility
MTA	Metropolitan Transportation Authority
MWD	Metropolitan Water District of Southern California
MWH	Montgomery-Watson-Harza
NDMA	N-nitrosodimethylamine
NDN	nitrification-denitrification
O&M	operation and maintenance
OCWD	Orange County Water District
PERG	Puente Hills Energy Recovery from Landfill Gas Facility
PHPP	Palmdale Hybrid Power Plant
PVC	polyvinyl chloride
PWD	Pomona Water Department
RWD	Rowland Water District
RWQCB	Regional Water Quality Control Board
SCE	Southern California Edison
SCVJSS	Santa Clarita Valley Joint Sewerage System
SJCWRP	San Jose Creek Water Reclamation Plant
SGVMWD	San Gabriel Valley Municipal Water District
SGVWC	San Gabriel Valley Water Company
SRF	State Revolving Funds
SWS	Suburban Water Systems
THUMS	Texaco, Humboldt, Union, Mobil, Shell
TOC	total organic carbon
TVMWD	Three Valleys Municipal Water District
USBR	United States Bureau of Reclamation
USGS	United States Geologic Survey
USGVMWD	Upper San Gabriel Valley Municipal Water District
UV	ultraviolet light disinfection
WDR	waste discharge requirements
WRD	Water Replenishment District of Southern California
WRP	water reclamation plant
WVWD	Walnut Valley Water District

APPENDIX A

CHRONOLOGY OF SANITATION DISTRICTS' REUSE ACTIVITIES

July 1927	The Tri-City Plant serving the cities of Pomona, Claremont, and La Verne is placed into service and the effluent is used for irrigation of crop and pasture land by the Diamond Bar Ranch Company and the Northside Water Company.
December 1941	The 0.36 MGD Lancaster WRP is placed into operation.
April 1949	Sanitation Districts' Report upon the Reclamation of Water from Sewage and Industrial Wastes in Los Angeles County, California is published which demonstrated the feasibility of water reclamation and eventual reuse.
January 1952	The Lancaster WRP is expanded from 0.36 to 1.35 MGD.
September 1953	The 0.75 MGD Palmdale WRP is placed into operation.
September 1954	Sanitation Districts assumes operations of Tri-City Plant.
November 1958	The Palmdale WRP is expanded from 0.75 to 2.5 MGD.
November 1958	Sanitation Districts' A Report Upon the Potential Reclamation of Sewage Now Wasting to the Ocean in Los Angeles County outlining the financing and construction of the Whittier Narrows WRP is published.
May 1959	The first direct deliveries of effluent from the Palmdale WRP for alfalfa irrigation begin.
October 1959	The new 6.5 MGD Lancaster WRP is constructed and placed into operation. The original plant ceased operation two months later.
1960	Edwards Air Force Base constructs "C" dike on Rosamond Dry Lake to impound effluent from the Lancaster WRP, forming Piute Pond.
July 1962	The 15 MGD Whittier Narrows WRP is placed into operation, becoming first of the "upstream" treatment plants in the Sanitation Districts' JOS.
July 1962	The 0.25 MGD Saugus WRP is placed into operation, with effluent being discharged into the Santa Clarita River.
August 1962	The first deliveries of recycled water from the Whittier Narrows WRP begin for groundwater replenishment in the Montebello Forebay of the Central Basin.
November 1962	The Angeles Crest Development Company completes the 0.1 MGD La Cañada WRP on the site of the La Cañada-Flintridge Country Club to treat wastewater produced by the homes surrounding the golf course. Recycled water produced by this facility is still used as a source of supply for the lakes and the irrigation system on the golf course.

July 1963	The Sanitation Districts produce A Plan for Water Re-use that studied the reclamation potential for the entire JOS and proposed the construction of 11 water reclamation facilities. However, this plan was only partially implemented.
August 1964	The Saugus WRP is expanded from 0.25 to 0.75 MGD.
October 1965	The Saugus WRP is expanded from 0.75 to 1.5 MGD.
June 1966	The 4 MGD Pomona WRP is constructed to replace Tri-City Plant.
September 1966	The La Ca□ada WRP is purchased by the Sanitation Districts.
July 1967	The 1.5 MGD Valencia WRP is placed into operation, with effluent begin discharged into the Santa Clarita River.
February 1968	The Saugus WRP is expanded from 1.5 to 5 MGD.
May 1968	The Central and West Basin Water Replenishment District (now the Water Replenishment District of Southern California, or WRD) contracts for the purchase of recycled water from the proposed San Jose Creek WRP.
June 1969	The County of Los Angeles constructs the 0.6 MGD Antelope Valley Tertiary Treatment Plant (AVTTP) to further treat Lancaster WRP effluent for use at Apollo Lakes Regional County Park, which opened in November 1972.
March 1970	The Pomona WRP is expanded from 4 to 10 MGD.
October 1970	The 12.5 MGD Los Coyotes WRP is placed into operation.
May 1971	The La Ca□ada WRP is expanded from 0.1 to 0.2 MGD.
June 1971	The 37.5 MGD San Jose Creek WRP is placed into operation.
September 1972	The Palmdale WRP is expanded from 2.5 to 3.1 MGD.
May 1973	The 12.5 MGD Long Beach WRP is placed into operation.
December 1973	The first direct deliveries of recycled water from the Pomona WRP begin through the Pomona Water Department (PWD) to Cal Poly Pomona.
June 1975	The Los Coyotes WRP is expanded from 12.5 to 37.5 MGD.
April 1976	The Valencia WRP is expanded from 1.5 to 4.5 MGD.
February 1977	The Sanitation Districts□Pomona Virus Study final report is published, demonstrating that direct filtration (adding coagulant just prior to inert media filters) was as effective at removing virus from secondary effluent as coagulation followed by a separate flocculation basin and then filtration. This led to the construction of effluent filters at the upstream WRPs in the late 1970□s. The WRPs were then classified as tertiary treatment facilities.

June 1978	The first direct deliveries of recycled water from the San Jose Creek WRP begin with the adjacent California Country Club.
October 1978	Revised wastewater reclamation regulations are adopted by the California Department of Health Services (now California Department of Public Health, or CDPH) as Title 22 of the California Code of Regulations. The effluent from the Sanitation Districts' tertiary treatment plants can be used for all of the approved applications contained in these regulations.
November 1978	The first direct deliveries of recycled water from the Los Coyotes WRP begin through the cities of Cerritos and Bellflower with the Ironwood 9 Golf Course and Caruthers Park, respectively.
October 1979	The first industrial use of recycled water occurs as Garden State Paper (later Blue Heron Paper Company) begins to use more than 3 MGD of Pomona WRP effluent for recycling old newspapers.
August 1980	The first direct deliveries of recycled water from the Long Beach WRP begin through the City of Long Beach Water Department (LBWD) with El Dorado Park West and El Dorado Golf Course.
January 1981	Contract signed with City of Los Angeles Department of Airports (now Los Angeles World Airports, or LAWA) for the use of recycled water from the Palmdale WRP for tree irrigation and effluent disposal.
May 1981	Agreement is signed requiring the maintenance of 200 acres of wetlands at Piute Pond for use by waterfowl migrating along the Pacific Flyway migratory route.
April 1982	The <u>Orange and Los Angeles Counties (OLAC) Water Reuse Study</u> is published, which detailed numerous potential recycled water distribution system projects, many of which were subsequently constructed in the Sanitation Districts' service area and elsewhere.
October 1982	The San Jose Creek WRP is expanded from 37.5 to 62.5 MGD.
August 1983	The City of Industry completes its 7,100 gpm recycled water pump station at the San Jose Creek WRP and begins deliveries of recycled water to the Industry Hills Recreation Area.
January 1984	LBWD's North Long Beach recycled water distribution system is completed.
March 1984	The Sanitation Districts publish the <u>Health Effects Study</u>. This study determined that the recharge of recycled water into the groundwater drinking supply of the Central Basin did not adversely affect in a statistically significant way the health of people ingesting up to 15% recycled water in regards to gastrointestinal disease and cancers or birth defects. It also determined that recharge with recycled water was not adversely affecting the groundwater quality of the Central Basin.
May 1984	Daily average reuse flows in the Sanitation Districts' service area exceed 70 MGD for the first time.
June 1984	The Long Beach WRP is expanded from 12.5 to 25 MGD.
March 1986	LBWD's South Long Beach recycled water distribution system is completed.

May 1986	Deliveries of recycled water from the Pomona WRP begin to Walnut Valley Water District (WVWD) (purchased from PWD).
January 1987	The Saugus WRP's treatment process is upgraded to tertiary with the addition of dual-media pressure filters.
March 1987	The Los Angeles RWQCB adopts Board Order No. 87-40, which permits the increase in the use of recycled water for groundwater recharge in the Montebello Forebay from 32,700 to 50,000 acre-feet per year (AFY).
December 1987	The City of Cerritos completes its 14,800 gpm pump station at the Los Coyotes WRP and expands delivery of recycled water throughout the city.
May 1988	Daily average reuse flows in the Sanitation Districts' service area exceed 80 MGD for the first time.
June 1988	Deliveries of recycled water from the Lancaster WRP begin to Nebeker Ranch for alfalfa irrigation.
September 1988	The Valencia WRP is expanded from 4.5 to 7.5 MGD.
December 1988	Norman's Nursery moves from the site of the Stage III expansion of the San Jose Creek WRP to a site next to the Whittier Narrows WRP, using recycled water from the latter facility.
February 1989	The Palmdale WRP is expanded from 3.1 to 6.5 MGD.
June 1989	Daily average reuse flows in the Sanitation Districts' service area exceed 90 MGD for the first time, and the running 12-month average daily reuse flows exceed 60 MGD.
August 1989	Deliveries of recycled water from the Los Coyotes WRP begin to the City of Lakewood through the City of Cerritos' recycled water distribution system.
November 1989	The Lancaster WRP is expanded from 6.5 to 8 MGD.
June 1991	The Pomona WRP is expanded from 10 to 15 MGD.
September 1991	The Los Angeles RWQCB adopts Board Order No. 91-100, which increases the amount of recycled water for groundwater recharge in the Montebello Forebay up to 60,000 AFY in any one year (150,000 acre-feet (AF) in any three-year period).
October 1991	The Saugus WRP is expanded from 5 to 6.5 MGD with the completion of flow equalization facilities.
February 1992	Central Basin Municipal Water District (CBMWD) constructs its Century (E. Thornton Ibbetson) recycled water distribution system (Century System) and begins delivery of recycled water from the Los Coyotes WRP through the City of Cerritos pump station.
December 1992	The Lancaster WRP is expanded from 8 to 10 MGD.

January 1993	The San Jose Creek WRP is expanded from 62.5 to 100 MGD with the completion of the Stage III expansion.
July 1993	The Palmdale WRP is expanded from 6.5 to 8 MGD.
August 1993	Daily average reuse flows in the Sanitation Districts' service area exceed 100 MGD for the first time, setting a record at 113 MGD.
February 1994	The running 12-month daily average reuse flows exceed 70 MGD for the first time.
April 1994	The running 12-month daily average reuse flows exceed 75 MGD for the first time.
May 1994	The running 12-month daily average reuse flows exceed 80 MGD for the first time.
July 1994	CBMWD constructs the Rio Hondo (Esteban Torres) recycled water pump station and distribution system (Rio Hondo System), which was interconnected to the CBMWD Century System. For the first time, two different WRPs (Los Coyotes and San Jose Creek) are used to supply recycled water to the same regional distribution system.
November 1994	Deliveries of recycled water from the Valencia WRP begin to the City of Santa Clarita via water trucks for irrigation of city-owned trees and parkways. This activity is extended to the Saugus WRP in March 1995; however, this practice ends in September 1995.
December 1994	The Valencia WRP is expanded from 7.5 to 11 MGD
June 1995	LBWD restores recycled water service to the THUMS project on Island White for oil field repressurization.
December 1995	Sanitation Districts complete the Plan for Beneficial Use of Recycled Water, which identifies impediments to expanding water reuse, along with solutions and potential new users.
December 1995	Deliveries of recycled water from the Pomona WRP begin to the Spadra Landfill and the adjacent Gas-to-Energy Facility (SPERG).
February 1996	An outfall trunk sewer for waste activated sludge disposal and excess storm flows was completed that connected the La Cañada WRP with the main sewer system in the Los Angeles Basin, officially making this plant a JOS facility.
June 1996	The Valencia WRP is expanded from 11 to 13.5 MGD
July 1996	The Palmdale WRP is expanded from 8 to 15 MGD.
December 1996	RAND Corporation publishes its first epidemiological study, commissioned by WRD, of the health effects associated with the consumption of recycled water that had been used to augment the surface recharge of the Central Basin aquifer. There was no statistical evidence that indicated that recycled water consumed in this manner adversely impacted human health in regards to certain cancers and gastrointestinal diseases.
May 1997	The Lancaster WRP is expanded from 10 to 16 MGD.

May 1997	The Los Angeles RWQCB readopts all of the Sanitation Districts’ reuse permits that had been previously issued in the 1980’s.
November 1997	Following years of delays, recycled water deliveries finally begin from the San Jose Creek WRP to the Puente Hills Landfill and the adjacent Gas-to-Energy Facility (PERG).
June 1998	Rose Hills Memorial Park begins receiving recycled water from the San Jose Creek WRP through the Puente Hills distribution system.
October 1999	RAND Corporation publishes its second epidemiological study, commissioned by the WRD, of the health effects associated with the consumption of Central Basin groundwater that had been augmented by the surface recharge of recycled water. There was no statistical evidence indicating that recycled water consumed in this manner adversely impacted human health in regards to certain birth outcomes.
December 2000	CDPH adopts revised Title 22 Water Recycling Criteria that contains an expanded list of approved uses of recycled water.
June 2001	The San Jose Creek WRP produces over 100,000 AF of recycled water during a fiscal year for the first time.
March 2002	Antelope Valley Farms begins installing center pivot irrigation systems in order to make commercial use of Palmdale WRP effluent on land leased from LAWA by Sanitation Districts.
January 2003	Rowland Water District (RWD) takes over that portion of WVWD’s recycled water distribution system that lies within the RWD service area.
February 2003	WRD completes construction of the Leo J. Vander Lans Treatment Facility and begins using Long Beach WRP effluent for process testing.
May 2003	The Valencia WRP is expanded from 13.5 to 17 MGD with the completion of additional aeration tanks.
June 2003	The Upper San Gabriel Valley Municipal Water District (USGVMWD) begins delivery of recycled water from the San Jose Creek WRP through the CBMWD Rio Hondo System.
August 2003	The first direct deliveries of recycled water from the Valencia WRP begin through the Castaic Lake Water Agency (CLWA) with the Tournament Players Club golf course. This is the first permanently plumbed reuse site in the Santa Clarita Valley.
February 2005	Deliveries of recycled water begin from the San Jose Creek WRP to the Puente Hills Materials Recovery Facility (MRF).
May 2005	The Valencia WRP is expanded from 17 to 21.6 MGD with the completion of the Stage V expansion.
October 2005	Recycled water deliveries through the CBMWD’s Century System are extended to the City of Vernon with the start-up of the Malburg Generation Station power plant.

October 2005	Deliveries of recycled water begin from the Leo J. Vander Lans Treatment Facility to the Alamitos Seawater Intrusion Barrier for injection.
August 2006	After extensive retrofitting, a large section of the lower portion of Rose Hills Memorial Park is connected to the USGVMWD recycled water distribution system, making this site one of the largest direct users of the Sanitation Districts' recycled water.
September 2006	USGVMWD begins deliveries of recycled water from the Whittier Narrows WRP to the Whittier Narrows Recreation Area.
February 2007	A 1 MGD pilot membrane bioreactor (MBR) plant begins operation at the Lancaster WRP, supplying tertiary treated effluent to the Sanitation Districts' Eastern Agricultural Site.
February 2007	The Sanitation Districts adopt the last of its Water Recycling Ordinances for its various service areas that allow it to govern the use of its recycled water supplies.
March 2007	One of the Sanitation Districts' largest non-potable users, Blue Heron Newsprint, ceases operations and stops receiving its usual 3 MGD of recycled water from the Pomona WRP.
May 2007	MWD ceases all deliveries of imported water for groundwater replenishment, increasing the demand for recycled water.
November 2007	The Sanitation Districts and the WVWD sign an agreement for the direct sale of recycled water from the Pomona WRP.
January 2008	The Sanitation Districts and Los Angeles County Waterworks District No. 40 sign an agreement for the sale of 13,500 AFY of recycled water from the Lancaster and Palmdale WRPs.
March 2008	The Sanitation Districts and the City of Lancaster sign an agreement for the sale of 950 AFY of recycled water from the Lancaster WRP.
July 2008	The Sanitation Districts adopt "Rules and Regulations" to regulate the use of its recycled water supplies.
August 2008	The Sanitation Districts initiate the Reuse Site Supervisor Training Program.
September 2008	The Sanitation Districts, USGVMWD, and WRD sign a Memorandum of Understanding to contract with MWH to study the feasibility of advanced treatment at the San Jose Creek WRP for increased groundwater recharge in both the Central and Main San Gabriel basins.
January 2009	Deliveries of tertiary treated recycled water from the Lancaster WRP begin to the City of Lancaster.
April 2009	The Los Angeles RWQCB adopts a general reuse permit allowing for the use of recycled water for non-irrigation purposes.
April 2009	A 24-inch valve was installed between chlorine contact chambers nos. 2 and 3 at the Long Beach WRP to increase recycled water supply to LBWD.

April 2009	LARWQCB revises the 1991 Montebello Forebay recharge permit to eliminate the existing annual and three-year total quantity limits (60,000 and 150,000 AF, respectively), and rely on a running 5-year average recycled water contribution of 35%. This change is expected to allow for approximately 5,000 AFY more of recycled water to be recharged.
July 2009	Deliveries of recycled water from the San Jose Creek WRP begin to RWD through the City of Industry distribution system.
August 2010	The City of Long Beach Department of Public Works began using recycled water this month for street sweeping and sewer flushing under the RWQCB's new, region-wide non-irrigation reuse permit.

APPENDIX B

RECYCLED WATER QUALITY FROM SANITATION DISTRICTS' TERTIARY WRPs

TABLE B-1
LONG BEACH WATER RECLAMATION PLANT
RECYCLED WATER QUALITY, FY 2010-11

Constituent	Units	Mean	Maximum	Minimum
pH		7.58	7.6	6.7
Turbidity	NTU	0.7	2.2	0.4
Total Coliform	org./100 ml	<1	2	<1
Fecal Coliform	org./100 ml	<1	1	<1
Temperature	deg. F	76	84	68
Suspended Solids	mg/L	<2.5	7.7	<2.5
Settleable Solids	ml/L	<0.1	<0.1	<0.1
Total Dissolved Solids	mg/L	631	771	534
Total COD	mg/L	<25	40	<25
Total BOD	mg/L	<3	<3	<3
Ammonia Nitrogen	mg/L	1.12	1.96	0.697
Organic Nitrogen	mg/L	2.24	2.99	0.609
Nitrate Nitrogen	mg/L	6.34	7.38	5.14
Nitrite Nitrogen	mg/L	0.163	0.383	0.042
Fluoride	mg/L	0.824	1.04	0.629
Boron	mg/L	0.34	0.37	0.32
Cyanide	µg/L	<4.3	<5.0	2.3
Chloride	mg/L	123	136	114
Sulfate	mg/L	101	154	67.9
Total Hardness	mg/L	185	272	148
Total Alkalinity	mg/L	203	281	170
Antimony	µg/L	0.43	0.47	0.4
Arsenic	µg/L	2.93	3.51	2.51
Barium	µg/L	57.3	86.3	43.8
Beryllium	µg/L	<0.25	<0.25	<0.25
Cadmium	µg/L	<0.11	<0.2	<0.02
Total Chromium	µg/L	0.27	0.35	0.22
Hexavalent Chromium	µg/L	0.9	1.5	0.5
Copper	µg/L	2.17	2.85	1.55
Lead	µg/L	0.11	0.13	0.09
Mercury	µg/L	0.000736	0.0014	0.0000611
Nickel	µg/L	1.22	1.49	1.12
Selenium	µg/L	0.58	0.92	0.30
Silver	µg/L	<0.20	<0.20	<0.20
Thallium	µg/L	<0.25	<0.25	<0.25
Zinc	µg/L	34.6	40.3	30.6
Detergents (MBAS)	mg/L	<0.10	<0.10	<0.10
Oil and Grease	mg/L	<4.6	<5.3	<4.3
Conductivity	µmhos/cm	1093	1390	960

TABLE B-2
LOS COYOTES WATER RECLAMATION PLANT
RECYCLED WATER QUALITY, FY 2010-11

Constituent	Units	Mean	Maximum	Minimum
pH		7.18	7.7	6.7
Turbidity	NTU	0.6	3.6	0.3
Total Coliform	org.□100 ml	□1	2	□1
Fecal Coliform	org.□100 ml	□1	1	□1
Temperature	deg. F	77	85	70
Suspended Solids	mg□L	□2.5	13.1	□2.5
Settleable Solids	ml□L	□0.1	□0.1	□0.1
Total Dissolved Solids	mg□L	735	978	508
Total COD	mg□L	□25	36	□25
Total BOD	mg□L	□3	□3	□3
Ammonia Nitrogen	mg□L	1.151	3.52	0.818
Organic Nitrogen	mg□L	0.837	1.31	0.267
Nitrate Nitrogen	mg□L	7.11	7.95	5.74
Nitrite Nitrogen	mg□L	□0.027	0.073	□0.02
Total Phosphate (PO4)	mg□L	0.421	1.81	0.157
Fluoride	mg□L	0.425	0.497	0.356
Boron	mg□L	0.41	0.49	0.34
Cyanide	mg□L	□2.80	□5.0	1.57
Chloride	mg□L	164	207	105
Sulfate	mg□L	148	196	100
Total Hardness	mg□L	272	315	250
Total Alkalinity	mg□L	197	247	175
Antimony	µg/L	2.02	2.64	1.44
Arsenic	µg/L	1.05	1.25	0.89
Barium	µg/L	51.6	55.7	47.7
Beryllium	µg/L	□0.25	□0.25	□0.25
Cadmium	µg/L	□0.07	□0.20	0.02
Total Chromium	µg/L	0.88	1.81	0.56
Hexavalent Chromium	µg/L	1.1	2.0	0.5
Copper	µg/L	2.45	3.57	1.55
Lead	µg/L	0.26	0.33	0.20
Mercury	µg/L	0.00167	0.00219	0.00147
Nickel	µg/L	4.38	5.30	3.33
Selenium	µg/L	0.63	0.76	0.39
Silver	µg/L	□0.16	□0.2	0.02
Sodium	mg□L	213	223	203
Thallium	µg/L	□0.25	□0.25	□0.25
Zinc	µg/L	46.7	59.7	35.2
Detergents (MBAS)	mg□L	□0.10	□0.10	□0.10
Oil and Grease	mg□L	□4.6	□4.9	□4.3
Conductivity	µmhos/cm	1424	1570	1250

TABLE B-3
POMONA WATER RECLAMATION PLANT
RECYCLED WATER QUALITY, FY 2010-11

Constituent	Units	Mean	Maximum	Minimum
pH		7.38	7.8	6.74
Turbidity	NTU	0.7	1.4	0.4
Total Coliform	org./100 ml	<1	68	<1
Fecal Coliform	org./100 ml	<1	<1	<1
Temperature	deg. F	77	86	68
Suspended Solids	mg/L	<2.5	<2.5	<2.5
Settleable Solids	ml/L	<0.1	<0.1	<0.1
Total Dissolved Solids	mg/L	548	618	520
Total COD	mg/L	<26	52	<25
Total BOD	mg/L	<3	11	<3
Total Organic Carbon	mg/L	6.42	7.41	5.92
Ammonia Nitrogen	mg/L	1.46	1.96	0.987
Organic Nitrogen	mg/L	1.21	2.68	0.72
Nitrate Nitrogen	mg/L	6.56	8.85	5.10
Nitrite Nitrogen	mg/L	0.293	0.839	0.053
Fluoride	mg/L	0.343	0.372	0.289
Boron	mg/L	0.26	0.30	0.21
Cyanide	µg/L	1.96	2.70	1.40
Chloride	mg/L	129	144	117
Sulfate	mg/L	59.7	70.1	52.3
Total Alkalinity	mg/L	170	189	152
Total Hardness	mg/L	209	228	190
Calcium	mg/L	63.7	67.3	60.4
Magnesium	mg/L	13.8	14.7	12.8
Antimony	µg/L	0.37	0.42	0.30
Arsenic	µg/L	0.93	1.18	0.77
Barium	µg/L	35.3	39.9	29.1
Beryllium	µg/L	<0.25	<0.25	<0.25
Cadmium	µg/L	0.05	0.08	0.03
Total Chromium	µg/L	0.89	1.12	0.69
Hexavalent Chromium	µg/L	<4.1	<10	0.7
Copper	µg/L	5.47	8.12	4.00
Iron	mg/L	0.030	0.036	0.024
Lead	µg/L	0.40	0.57	0.30
Manganese	µg/L	5.93	8.84	3.25
Mercury	µg/L	0.00152	0.00217	0.000533
Nickel	µg/L	1.82	1.27	3.03
Potassium	mg/L	13.7	14.8	12.6
Selenium	µg/L	0.35	0.45	0.28
Silver	µg/L	<0.12	<0.2	0.04
Sodium	mg/L	103	117	91.6
Thallium	µg/L	<0.25	<0.25	<0.25
Zinc	µg/L	62.7	66.8	59.9
Detergents (MBAS)	mg/L	<0.10	0.10	<0.10
Oil and Grease	mg/L	<4.4	<4.6	<4.3
Conductivity	µmhos/cm	920	982	852

TABLE B-4
SAN JOSE CREEK WATER RECLAMATION PLANT EAST
RECYCLED WATER QUALITY, FY 2010-11

Constituent	Units	Mean	Maximum	Minimum
pH		7.04	7.34	6.65
Turbidity	NTU	0.7	1.8	0.4
Total Coliform	org./100 ml	<1	4	<1
Fecal Coliform	org./100 ml	<1	1	<1
Temperature	deg. F	79	86	69
Suspended Solids	mg/L	<2.5	2.7	<2.5
Settleable Solids	ml/L	<0.1	<0.1	<0.1
Total Dissolved Solids	mg/L	611	648	558
Total COD	mg/L	<25	33	<25
Total BOD	mg/L	<3	3	<3
Total Organic Carbon	mg/L	5.73	6.52	5.11
Ammonia Nitrogen	mg/L	0.934	1.09	0.685
Organic Nitrogen	mg/L	1.67	2.65	0.956
Nitrate Nitrogen	mg/L	4.54	6.30	2.80
Nitrite Nitrogen	mg/L	<0.038	0.091	<0.03
Fluoride	mg/L	0.447	0.489	0.374
Boron	mg/L	0.31	0.34	0.27
Cyanide	µg/L	<5	<5	<5
Chloride	mg/L	143	158	128
Sulfate	mg/L	96.6	109	83.0
Total Alkalinity	mg/L	167	192	153
Total Hardness	mg/L	220	282	192
Calcium	mg/L	62.2	64.8	60.1
Magnesium	mg/L	18.6	21.8	16.6
Antimony	µg/L	0.56	0.64	0.46
Arsenic	µg/L	0.92	1.07	0.69
Barium	µg/L	61.3	66.6	50.0
Beryllium	µg/L	<0.25	<0.25	<0.25
Cadmium	µg/L	<0.06	<0.2	0.02
Total Chromium	µg/L	0.74	0.88	0.50
Hexavalent Chromium	µg/L	<4.5	<10	0.3
Copper	µg/L	2.89	3.68	2.00
Iron	mg/L	0.063	0.087	0.043
Lead	µg/L	0.23	0.43	0.13
Manganese	µg/L	22.9	27.4	19.2
Mercury	µg/L	0.0013	0.0015	0.0009
Nickel	µg/L	4.83	6.01	3.17
Potassium	mg/L	16.7	17.4	15.2
Selenium	µg/L	0.41	0.66	0.23
Silver	µg/L	<0.02	<0.02	<0.01
Sodium	mg/L	121	139	104
Thallium	µg/L	<0.25	<0.25	<0.25
Zinc	µg/L	49.2	62.5	39.9
Detergents (MBAS)	mg/L	<0.10	<0.10	<0.10
Oil and Grease	mg/L	<4.3	<4.6	<4.1
Conductivity	µmhos/cm	1016	1170	885

TABLE B-5
SAN JOSE CREEK WATER RECLAMATION PLANT WEST
RECYCLED WATER QUALITY, FY 2010-11

Constituent	Units	Mean	Maximum	Minimum
pH		7.05	7.36	6.70
Turbidity	NTU	0.6	2.8	0.4
Total Coliform	org./100 ml	<1	2	<1
Fecal Coliform	org./100 ml	<1	1	<1
Temperature	deg. F	78	86	69
Suspended Solids	mg/L	<2.5	6.0	<2.5
Settleable Solids	ml/L	<0.1	<0.1	<0.1
Total Dissolved Solids	mg/L	546	586	492
Total COD	mg/L	<25	30	<25
Total BOD	mg/L	<3	5	<3
Total Organic Carbon	mg/L	4.85	5.26	4.55
Ammonia Nitrogen	mg/L	0.827	1.46	0.539
Organic Nitrogen	mg/L	<0.631	1.24	<0.20
Nitrate Nitrogen	mg/L	8.95	12.7	5.31
Nitrite Nitrogen	mg/L	<0.031	0.043	<0.03
Fluoride	mg/L	0.695	0.732	0.644
Boron	mg/L	0.34	0.39	0.32
Cyanide	mg/L	<5	<5	<5
Chloride	mg/L	118	135	108
Sulfate	mg/L	77.5	88.4	68.5
Total Alkalinity	mg/L	146	189	113
Total Hardness	mg/L	191	225	169
Calcium	mg/L	55.0	57.9	52.3
Magnesium	mg/L	15.4	16.1	15.1
Antimony	µg/L	0.45	0.49	0.37
Arsenic	µg/L	0.93	1.33	0.50
Barium	µg/L	29.3	33.7	24.4
Beryllium	µg/L	<0.25	<0.25	<0.25
Cadmium	µg/L	0.03	0.05	0.02
Total Chromium	µg/L	0.79	1.10	0.60
Hexavalent Chromium	µg/L	<2.9	<10.0	0.5
Copper	µg/L	5.31	6.36	4.34
Iron	mg/L	0.051	0.068	0.034
Lead	µg/L	0.16	<0.25	0.11
Manganese	µg/L	24.9	46.6	11.9
Mercury	µg/L	0.00111	0.0013	0.00078
Nickel	µg/L	2.75	4.19	1.57
Potassium	mg/L	14.6	15.3	13.9
Selenium	µg/L	<0.36	<1.0	0.22
Silver	µg/L	<0.14	<0.2	0.02
Sodium	mg/L	105	113	94.7
Thallium	µg/L	<0.25	<0.25	<0.25
Zinc	µg/L	44.9	54.0	30.8
Detergents (MBAS)	mg/L	<0.10	<0.10	<0.10
Oil and Grease	mg/L	<4.4	<4.5	<4.1
Conductivity	µmhos/cm	907	1000	819

Table B-6
Whittier Narrows Water Reclamation Plant
Recycled Water Quality, FY 2010-11

Constituent	Units	Mean	Maximum	Minimum
pH		7.38	8.22	7.00
Turbidity	NTU	0.7	1.9	0.1
Total Coliform	org./100 ml	<1	1	<1
Fecal Coliform	org./100 ml	<1	1	<1
Temperature	deg. F	77	82	70
Suspended Solids	mg/L	<2.5	3.0	<2.5
Settleable Solids	ml/L	<0.1	<0.1	<0.1
Total Dissolved Solids	mg/L	564	612	526
Total COD	mg/L	<25	44	<25
Total BOD	mg/L	<2.5	8.0	<2.5
Total Organic Carbon	mg/L	5. 18	5.97	4.49
Ammonia Nitrogen	mg/L	0.450	0.845	0.250
Organic Nitrogen	mg/L	0.769	1.19	<0.200
Nitrate Nitrogen	mg/L	6.24	6.85	3.91
Nitrite Nitrogen	mg/L	<0.129	0.376	<0.022
Fluoride	mg/L	0.689	0.738	0.616
Boron	mg/L	0.26	0.29	0.24
Cyanide	µg/L	<2.55	<5	1.19
Chloride	mg/L	110	116	101
Sulfate	mg/L	97.6	133	80.4
Total Alkalinity	mg/L	161	188	147
Total Hardness	mg/L	194	228	159
Calcium	mg/L	55.0	56.8	52.7
Magnesium	mg/L	16.4	17.9	15.3
Antimony	µg/L	0.59	0.73	0.42
Arsenic	µg/L	1.11	1.18	0.98
Barium	µg/L	43.1	47.6	31.7
Beryllium	µg/L	<0.25	<0.25	<0.25
Cadmium	µg/L	0.04	0.11	0.02
Total Chromium	µg/L	1.05	1.14	0.84
Hexavalent Chromium	µg/L	<8	<10	1
Copper	µg/L	4.45	7.02	3.39
Iron	mg/L	0.023	0.027	0.020
Lead	µg/L	0.31	0.39	0.25
Manganese	µg/L	9.57	18.20	1.84
Mercury	µg/L	0.00246	0.00655	0.00108
Nickel	µg/L	8.90	13.8	3.45
Potassium	mg/L	13.5	14.1	12.9
Selenium	µg/L	0.43	0.49	0.37
Silver	µg/L	<0.14	<0.20	0.02
Sodium	mg/L	115	124	104
Thallium	µg/L	<0.25	<0.25	<0.25
Zinc	µg/L	55.2	63.2	48.3
Detergents (MBAS)	mg/L	<0.10	<0.10	<0.10
Oil and Grease	mg/L	<4.5	<4.7	<4.3
Conductivity	µmhos/cm	929	1010	808

TABLE B-7
VALENCIA WATER RECLAMATION PLANT
RECYCLED WATER QUALITY, FY 2010-11

Constituent	Units	Mean	Maximum	Minimum
pH		7.32	7.6	6.7
Turbidity	NTU	0.7	1.5	0.4
Total Coliform	org./100 ml	<1	3	<1
Fecal Coliform	org./100 ml	<1	<1	<1
Temperature	deg. F	78	82	70
Suspended Solids	mg/L	<2.5	3.0	<2.5
Settleable Solids	ml/L	<0.1	<0.1	<0.1
Total Dissolved Solids	mg/L	699	751	655
Total COD	mg/L	<25	<25	<25
Total BOD	mg/L	<2.5	3	<2.5
Ammonia Nitrogen	mg/L	1.010	1.13	0.885
Organic Nitrogen	mg/L	0.88	1.14	0.57
Nitrate Nitrogen	mg/L	2.57	3.50	2.03
Nitrite Nitrogen	mg/L	<0.031	0.039	<0.03
Fluoride	mg/L	0.335	0.345	0.320
Boron	mg/L	0.59	0.66	0.53
Cyanide	µg/L	3.8	4.4	2.9
Chloride	mg/L	126	135	119
Sulfate	mg/L	174	200	159
Total Alkalinity	mg/L	193	220	172
Total Hardness	mg/L	265	306	228
Antimony	µg/L	0.56	0.65	0.47
Arsenic	µg/L	0.89	1.31	0.65
Barium	µg/L	18.4	25.8	13.8
Beryllium	µg/L	<0.25	<0.25	<0.25
Cadmium	µg/L	0.04	0.06	0.03
Total Chromium	µg/L	0.31	0.53	0.22
Hexavalent Chromium	µg/L	5.8	<10	1.5
Copper	µg/L	5.98	8.78	3.01
Iron	µg/L	53.3	67.5	33
Lead	µg/L	0.07	0.12	0.05
Mercury	µg/L	0.000531	0.000973	0.000265
Nickel	µg/L	2.32	2.89	1.67
Selenium	µg/L	0.42	0.52	0.30
Silver	µg/L	<0.16	<0.2	0.02
Thallium	µg/L	<0.25	<0.25	<0.25
Zinc	µg/L	46.6	68.3	34.2
Detergents (MBAS)	mg/L	<0.10	<0.10	<0.10
Oil and Grease	mg/L	<4.7	<4.7	<4.6
Conductivity	µmhos/cm	1157	1200	1080

Table B-8
Saugus Water Reclamation Plant
Recycled Water Quality, FY 2010-11

Constituent	Units	Mean	Maximum	Minimum
pH		7.57	8.0	7.3
Turbidity	NTU	0.7	1.1	0.4
Total Coliform	org./100 ml	<1	157	<1
Fecal Coliform	org./100 ml	<1	<1	<1
Temperature	deg. F	76	83	68
Suspended Solids	mg/L	<2.5	2.5	<2.5
Settleable Solids	ml/L	<0.1	<0.1	<0.1
Total Dissolved Solids	mg/L	638	764	535
Total COD	mg/L	<25	<25	<25
Total BOD	mg/L	<2.5	<2.5	<2.5
Ammonia Nitrogen	mg/L	1.228	1.54	0.974
Organic Nitrogen	mg/L	1.606	3.79	0.542
Nitrate Nitrogen	mg/L	4.20	4.66	3.59
Nitrite Nitrogen	mg/L	<0.033	0.054	<0.03
Fluoride	mg/L	0.288	0.326	0.247
Boron	mg/L	0.67	0.86	0.54
Cyanide	mg/L	<2.1	<5	1
Chloride	mg/L	124	134	114
Sulfate	mg/L	126	163	104
Total Alkalinity	mg/L	207	279	167
Total Hardness	mg/L	242	334	185
Antimony	µg/L	0.43	0.50	0.37
Arsenic	µg/L	1.28	1.43	1.13
Barium	µg/L	43.5	52.6	36.2
Beryllium	µg/L	<0.25	<0.25	<0.25
Cadmium	µg/L	0.05	0.06	0.04
Total Chromium	µg/L	0.33	0.38	0.27
Hexavalent Chromium	µg/L	2.2	5.0	0.7
Copper	µg/L	6.51	7.30	5.79
Iron	µg/L	11	<20	9
Lead	µg/L	0.15	0.20	0.11
Mercury	µg/L	0.001095	0.002860	0.000426
Nickel	µg/L	1.12	1.31	0.93
Selenium	µg/L	0.61	0.76	0.52
Silver	µg/L	<0.2	<0.2	<0.2
Thallium	µg/L	<0.25	<0.25	<0.25
Zinc	µg/L	56.0	66.1	46.5
Detergents (MBAS)	mg/L	<0.10	<0.10	<0.10
Oil and Grease	mg/L	<4.6	<4.9	<4.5
Conductivity	µmhos/cm	1095	1320	982

LONG BEACH WATER DEPARTMENT

Phase 1 was completed in 1980 at a cost of □280,000. It consisted of a 200 HP, 2,500 gallon per minute (gpm) pump station, and 1,500 feet of 12-inch line that served El Dorado Park West and Golf Course.

Phase 2 made use of a previously constructed, but never used, 21-inch line between the Long Beach WRP and the Island White oil pumping facility in Long Beach Harbor. Recycled water travels through the 21-inch steel concrete-cylinder transmission line that runs south along Studebaker Road, west on Atherton Street, south on Clark Avenue, west on Anaheim Street, and then south on Park Avenue. At the intersection of Park Avenue and 11th Street, the 21-inch line turns west again, then south on Obispo Lane on its way to Island White. The line was capped at Obispo Lane and 2nd Street. This line was built in 1970 by the THUMS group (Texaco, Humboldt, Union, Mobil, and Shell) in the hope of using recycled water from the then under-construction Long Beach WRP to repressurize the oil-bearing zones that were being depleted. This project did not proceed at that time and the THUMS group deeded ownership of the pipeline to the city. In 1982, 520 feet of 12-inch line was installed to deliver recycled water to the Recreation Park and Golf Course, at a cost of □50,000.

Phase 3 was completed in 1983 at a total cost of □2,560,000. It consisted of a 750 HP, 8,500 gpm pump station (five variable speed, vertical turbine pumps producing 95 psi, with capacity for a sixth pump) connected to the adjacent Long Beach WRP effluent forebay through a 36-inch line, 25,685 feet of 20-inch pipe, and 4,130 feet of 12-inch pipe. The 20-inch main line runs north along the east bank of the San Gabriel River. Just south of Carson Street, the pipeline turns west and runs through a siphon under the river, then along Parkcrest Street. At Clark Avenue, the pipeline reduces to 12-inches, turns south and terminates at Wardlow Road. In 1983, the 200 HP 2,100 gpm pump located in El Dorado Park West was relocated to a spot next to the lake in El Dorado Park East where it serves to supply lake water to the recycled water system when recycled water may be unavailable.

Phase 4 was completed in 1986 and consisted of 3,760 feet of 8-inch pipe and 2,350 feet of 6-inch pipe at a cost of □410,000. At Park Avenue and 11th Street, an 8-inch steel line was connected to the 21-inch transmission line that had been built to serve the THUMS project. The 8-inch line runs south along Park Avenue, through Woodlands Park, then east along 6th Street, reducing to a 6-inches after serving the Recreation 9-Hole Golf Course. The 6-inch line turns south on Monrovia Avenue and terminates at the northern boundary of Marina Vista Park.

Phase 5 was completed in the first half of 1989 at a cost of □3,980,000. It consisted of 4,820 feet of 20-inch pipe, 5,917 feet of 14-inch pipe, 12,364 feet of 12-inch pipe, and 1,857 feet of 8-inch pipe. Also included in this project was a four pump, 500 HP, 105 psi, 3,000 gpm pump station at the south lake of the Lakewood Golf Course that had supplied recycled water, stored in the lake during the day peak supply period, to the distribution system during the peak nighttime demand period. From the end of the 20-inch Stage 3 line in Long Beach City College, a 20-inch ductile iron pipe (DIP) runs 300 feet north, where it turns west on Carson Street, and continues to the South Lake Pumping Plant. A 16-inch DIP continues westerly from the pumping plant along Carson Street, reducing to 14-inches. At Gardenia Avenue, the pipe turns north and runs to 45th Street where it reduces to 12-inches. The 12-inch line continues westerly along 45th Street, then north on Falcon Avenue, then southwest on San Antonio Drive, then northwest on East Goldfield Avenue, then southwest on 45th Way, then north on California Avenue, then west on 46th Street to its terminus at the Virginia Country Club.

The North Long Beach extension of Phase 5 was completed at the beginning of 1992 at a total cost of □627,000. This project connected to the 14-inch line at the intersection of Carson Street and Gardenia

Avenue with a 14-inch tapping sleeve expanding to a 20-inch DIP. This 20-inch line runs south to Marshall Place where it turns west and runs along Marshall Place to a T-section at Gaviota Avenue. This line turns south again from the T-section and runs along Gaviota Avenue to Wardlow Road. The line turns west again and runs along Wardlow Road to Walnut Avenue where it terminates in a T-section. From this T-section, an 8-inch DIP line runs south along Walnut Avenue to the 405 Freeway where it terminates in a 3-inch service for use by the California Department of Transportation. Approximately midway along this final stretch of pipe, at 33rd Street, a 2-inch service runs to the LBWD Service Center. In addition, several smaller lines branch off the main distribution line:

- At the intersection of Marshall Place and Gaviota Avenue, a 6-inch DIP line branches off the T-section and runs west to Walnut Avenue where it terminates in a T-section. From this point, the 6-inch line continues north another where it terminates at a 4-inch service to Somerset Park.

- At the intersection of Gaviota Avenue and Bixby Road there is a T-section, from where an 8-inch DIP runs west to a point just beyond Cerritos Avenue where it supplies a 4-inch service to Hughes Junior High School. The 8-inch line continues west to Myrtle Avenue where it terminates in a 2-inch service to Longfellow Elementary School.

- At the intersection of Gaviota Avenue and Wardlow Road, a 6-inch DIP branches off a T-section and runs east to a point just past Rose Avenue where it terminates in a two more 2-inch services to the LBWD Service Center.

- At the intersection of Walnut Avenue and 33rd Street, a 6-inch DIP branches off and runs west into the City of Signal Hill and to a 3-inch service to Burroughs Elementary School, where it terminates. In addition, the 6-inch lateral has a 6-inch T-section at Brayton Avenue that extends north and terminates in a 4-inch service to Reservoir Park.

Recycled water service was extended to the common areas of the El Dorado Lakes Condominiums in August 1998. From the 20-inch main line running north along the San Gabriel River, an 8-inch DIP branches off and runs east along Spring Street. This line reduces to a 4-inch DIP which runs to the condominiums located on the east side of the 605 Freeway.

The recycled water system was extended again as LBWD began implementing its Master Plan with the completion of Phase 1A in June 1999 at a cost of □1.4 million. LBWD□s potable water tanks nos. 21, 22 and 23 on Alamitos Hill were converted to recycled water storage. Each tank has its own new 20-inch discharge line connecting to a 36-inch DIP that runs north, then west along 20th Street to a T-section at Redondo Avenue. The north side of this T-section on Redondo Avenue serves a 24-inch line which was constructed in 2000 as Phase 1B. A 24-inch DIP continues westerly along 20th Street for 939 feet to a T-section at Obispo Lane. The line turns south on Obispo Lane, where it terminates in a new T-section installed in the existing 21-inch recycled water line on 11th Street. Along Obispo Lane, a 6-inch DIP branches off and runs east along 14th Street, allowing for future expansion and customer connections.

CITY OF CERRITOS

A 14,800 gpm pump station next to the north side of the Los Coyotes WRP effluent forebay delivers recycled water to reuse sites through 142,600 feet of pipe that loops through the city. Provisions were made so that neighboring cities could connect to this distribution system sometime in the future and make use of the ultimate system capacity of 4,000 AFY.

The pump station discharges into a 30-inch cement mortar-lined and coated steel line which branches into two, 24-inch concrete cylinder pipelines. One of these lines runs east through the north part of the city, while the other turns south along the San Gabriel River. The two lines ultimately meet and form a loop in the distribution system. Pipes greater than 12-inches are cement mortar-lined and coated steel, and the 4- to 10-inch pipes are PVC.

The 24-inch main line serving the northern part of the city runs east from the WRP past the Ironwood 9 Golf Course, then continues east under the 605 Freeway and along 166th Street. At Studebaker Road, a 6-inch line runs north to Cerritos College, and an 8-inch line runs south to Gahr High School. At the school, the line branches into a 4-inch line running north to the 91 Freeway, and a 6-inch line running to the Artesia Cemetery. The 24-inch northern line reduces to 20-inches at 166th Street and Studebaker Road, then continues east along 166th Street through the City of Norwalk. This line branches into two 16-inch lines at the intersection of 166th Street and Norwalk Boulevard.

- One 16-inch line runs south along Norwalk Boulevard to form the west side of a smaller loop in the distribution system. At Artesia Boulevard, a 6-inch line branches off and runs west to Juarez Elementary School and two sections of the 91 Freeway on Pioneer Boulevard. The 16-inch line turns east on Artesia and runs to Barnhill Avenue where a short 4-inch line branches off and runs south to Kennedy Elementary School and Loma Park. At this point, the 16-inch line reduces to 14-inches and continues east on Artesia Boulevard to Bloomfield Avenue before it continues south. At Bloomfield Avenue and 183rd Street, a 6-inch line branches off the 14-inch line and runs west to Cerritos High School. It reduces to a 4-inch line before continuing west to Elliot Elementary School where it terminates. Also at Bloomfield Avenue and 183rd Street, an 8-inch line runs east to Dina Place where it connects with a 10-inch line from the east half of the loop (described below). Also at this point, a short 6-inch line branches off and runs south to Heritage Park.

- The second 16-inch line at Norwalk Boulevard and 166th Street continues east. At Elm Park Drive, a 4-inch line runs north to Satellite Park, and the 16-inch line reduces to 14-inches before continuing east. At Bloomfield Avenue, a 6-inch line runs south to serve Frontier Park, Wittman Elementary School and a section of the 91 Freeway. The 14-inch line continues east to Carmenita Road, where a 6-inch line continues east along 166th Street into Carmenita Junior High School and then to Carmenita Park. A 4-inch line branches off the 6-inch line south on Stowers Avenue to Park Street, then east to Gonsalves Elementary School where it terminates. The 14-inch line on 166th reduces to 10-inches and turns south on Carmenita Road, forming the east side of the smaller loop. An 8-inch line branches off at Red Plum Street to City Park East at Ironbark Drive where it terminates. The 10-inch line also reduces to 8-inches at this point and it continues south toward Artesia Boulevard, at which point two 4-inch lines branch to the west and east to Saddleback Park and Friendship Park, respectively. When the 8-inch line on Carmenita Road reaches 183rd, a 6-inch line branches off and runs east then south on Stowers Avenue to Cerritos Elementary School, Rainbow Park and Bettencort Park. Also from the 8-inch line at Carmenita and 183rd, a 10-inch line runs west on 183rd Street, then runs south under the freeway to Brookhaven Street. At this point, a 4-inch line branches off southeast to serve another section of the 91 Freeway, and a second 4-inch line branches off to Brookhaven Park. At the intersection of Shoemaker Avenue and 183rd Street, the southern branch of the main loop (the second 24-inch line leaving the WRP) connects with the northern branch to complete the system.

From the WRP, the second 24-inch transmission line runs south along the San Gabriel River. At 183rd Street, a 6-inch line branches east through an Edison easement to the Bellflower Christian School and a section of the 605 Freeway. At South Street, a short 12-inch line branches off west past Westgate Park, providing a connection point for the City of Lakewood.

Approximately 1,000 feet south of 195th Street, the 24-inch line branches off into a 10-inch line to the south to provide a connection point for the City of Lakewood, and a 20-inch line to the east that follows a Southern California Edison (SCE) right-of-way. The 20-inch line passes the Orange County nursery and the SCE-operated nursery and at Gridley Road, a 4-inch line branches off north to Bragg Elementary School. At Pioneer Boulevard, a 6-inch line branches off south to Cabrillo Lane Elementary School. At Jacob Street, a 6-inch line branches off north to Pat Nixon Elementary School. At Norwalk Boulevard, a 6-inch line branches off south to provide the third connection point for the City of Lakewood.

At Norwalk Boulevard, the 20-inch line reduces to 16-inches and continues east to Bloomfield Avenue, where it enters Cerritos Regional County Park. The 16-inch line reduces to 8-inches (with a 16-inch stub out for future connections to other municipalities) and curves north onto Shoemaker Avenue. A 4-inch line at Espinheira Drive branches off to Sunshine Park, and a 4-inch line at Droxford Street branches off to Leal Elementary School. The 8-inch line connects with the rest of the transmission system loop at the intersection of Shoemaker Avenue and 183rd Street.

CITY OF LAKEWOOD

The City of Cerritos provided three stub-out locations on one of its 24-inch concrete mortar lined and coated steel distribution lines for connections to the City of Lakewood. Each of these stub-out locations is within the City of Lakewood. A 12-inch stub-out connection is located on South Street, on the west side of the San Gabriel River, and consists of two, 6-inch meters in a manifold structure with isolation valves. A 10-inch stub-out connection is located across Del Amo Boulevard into River Park, approximately 40 feet west of Studebaker Avenue and consists of a single, 6-inch meter. A 6-inch stub-out is located on Norwalk Boulevard, just south of Del Amo Boulevard and approximately 70 feet south of the City of Lakewood boundary. This last stub-out is not in use and currently there are no future plans for it.

From the first stub-out location on South Street, a 12-inch PVC line runs west to a T-section at Woodruff Avenue. From this T-section, a 10-inch PVC line continues west along South Street, ending in a T-section at the Los Cerritos Drainage Channel. There are smaller connections branching off the 10- and 12-inch transmission lines on South Street.

- Approximately 550 feet east of Woodruff Avenue, the 12-inch PVC line along South Street branches at a T-section to a 6-inch PVC line. This line follows Spahn Avenue north, turning west at Edgefield Street and continuing until it reaches Woodruff Avenue. At Woodruff Avenue, the 6-inch line heads north along Woodruff Avenue. There are two, 2-inch connections to parkway irrigation systems along this 6-inch line. A 4-inch connection approximately 600 feet north of Edgefield Street runs approximately 100 feet west to serve St. Joseph's Parish School. Approximately 120 feet north of Arabella Street, the 6-inch line connects to a 4-inch line serving Mayfair High School and Lindstrom Elementary School.

- Along the 12-inch PVC line on South Street there are five, 2-inch connections to parkway irrigation systems east of Woodruff Avenue. Approximately 1,700 feet east of Woodruff, 12-inch PVC line is flanged underground to 12-inch ductile iron pipe on either side of the Palo Verde storm drain. The iron pipe then runs above ground to be suspended over the 14-foot wide channel, with air release valves on either side of the channel.

- A 10-inch PVC line branches off the T-section on South Street at Woodruff Avenue and runs south along Woodruff Avenue, terminating in a T-section at Centralia Street. A 6-inch PVC line branches from the T-section at Centralia Street and runs west along Centralia Street to just past Eastbrook Avenue, where it turns south and feeds a 4-inch connection serving Lakewood High School. There is a 4-inch connection approximately 800 feet south of Arbor Road, to service Jose Del Valle Park. From this 4-inch line there is also a 2-inch connection to service parkway irrigation systems. A 4-inch PVC line branches off a T-section at Arbor Road. The 4-inch line runs west along Arbor Road, ending just before Radnor Avenue with a 4-inch service connection to the City of Lakewood Water Yard. Another 4-inch PVC line branches off a T-section at Dashwood Street. The line runs west along Dashwood, ending in a 4-inch connection on the west side of Ocana Avenue to service Jose San Martin Park. There are six, 2-inch connections to parkway irrigation systems from the 10-inch PVC line along Woodruff Avenue.

- Along the 10-inch PVC line on South Street (west of Woodruff Avenue), there are five 2-inch connections to parkway irrigation systems and one 4-inch PVC line approximately 570 feet east of the Los Cerritos Channel serving Foster Elementary School.

- A 6-inch PVC line branches off the T-section on South Street at Fidler Avenue at a 45-degree angle. The 6-inch line crosses Fidler Avenue at an angle until it reaches the edge of Mayfair Park. From there, the line turns directly south and follows the park's eastern boundary until it reaches Bigelow Street. A 4-inch line branches from a T-section at Bigelow Street and crosses over the Los Cerritos Channel. This 4-inch line serves the west side of Mayfair Park. From the T-section at Bigelow Street, a 6-inch line branches off at a 45-degree angle. The line heads southwest until it reaches the south end of Mayfair Park where it then heads directly south along the east side of the channel. At Candlewood Street, the 6-inch line ends with a T-section. From here, a 2-inch PVC line runs south to the Civic Center and a 6-inch line runs west crossing the channel. The line is flanged underground on either side of the channel to 6-inch ductile iron that runs aboveground to be suspended under a footbridge over the channel. After crossing the channel, the 6-inch line terminates in a T-section, from which a second 2-inch PVC line runs south to serve the Civic Center.

From the second stub-out location on Del Amo Boulevard, a 6-inch PVC line branches from a T-section and runs approximately 640 feet west terminating in a T-section at Mae Boyer Park. Another 10-inch PVC line branches from the T-section at the connection point, running south along the east side of the San Gabriel River channel for approximately 2,000 feet and ending with a 4-inch service connection to the River Park pump station. There are several smaller connections branching off the 6-inch and 10-inch transmission lines from the second connection point to the system.

- Approximately 1,200 feet south of Del Amo Boulevard, a 4-inch PVC line branches from the 10-inch line on the east side of the San Gabriel River. The line runs east, terminating at a T-section with a 2-inch service connection to Rynerson Park.

- A 4-inch PVC line branches from the 6-inch line at a T-section located on the west side of the San Gabriel River. The 4-inch line south, then turns west through the city yard, then south to Monte Verde Park.

- From the T-section at Mae Boyer Park, 4-inch lines run 85 feet under Del Amo Boulevard to either side of the road. These 4-inch lines feed service connections to Mae Boyer Park that is on both the north and south sides of Del Amo Boulevard.

Central Basin MWD – Century System

Construction of Phase I of the Century Reclamation Program began in March 1991 and was completed in February 1992. The facilities in this phase consist of the 30-inch concrete mortar-lined and coated steel □backbone□pipeline from the Los Coyotes WRP that crosses over the San Gabriel River and runs 18,900 feet north along the western bank to a point north of Firestone Boulevard, where the outfall from the San Jose Creek WRP discharges into the San Gabriel River. At this point, the line reduces to a 24-inch concrete mortar-lined and coated steel line that continues northerly to Florence Avenue, then easterly to Fairview Avenue, where it runs to Dollison Drive. The line then follows Dollison Drive southeasterly to Buell Street, where it crosses under the Santa Ana (5) Freeway to Orr □ Day Road. The line runs north on Orr □ Day back to Florence Avenue, then easterly to Jersey Avenue where it terminates. Several 6- and 8-inch PVC lines branch off the large diameter transmission lines at various points.

- At a point just south of Compton Boulevard, an 8-inch PVC line branches off the 30-inch line and runs northwesterly to Compton Boulevard, where it continues westerly to its terminus at Bellflower High School. A 6-inch PVC line branches off this line at McNab Avenue and runs northerly.
- At a point just north of Columbus High School, another 8-inch PVC line branches off the 30-inch line and runs westerly through an easement to Woodruff Avenue, where it turns south and runs to Everest Street. This line runs westerly to Benedict Avenue, then through Gauldin School to its terminus on Dunrobin Avenue at Independence Park.
- At a point north of Firestone Boulevard, a 6-inch PVC line branches off the 30-inch line and runs westerly through the Rio San Gabriel Park parking lot to Newville Avenue, where it turns north and runs northerly to La Villa Street. The line then runs westerly to Pangborn Avenue, where it turns north and runs to Buell Street. The line runs westerly to its terminus at Casanes Avenue.
- From the 24-inch line on Florence Avenue, a 6-inch PVC line branches off at Little Lake Road and runs southerly to its terminus at Little Lake Park and School.
- At the end of the 24-inch line at Florence Avenue and Jersey Avenue, an 8-inch PVC line runs north on along an easement to Jersey Avenue, then to Joslin Avenue. This line then runs westerly along Joslin Avenue and easterly to its terminus at Fallon Avenue.

In 2007, The City of Downey constructed additional pipelines connecting to the existing CBMWD distribution system at two points: on the 8-inch line on Dunrobin Avenue at Independence Park, and on another 8-inch line on Lakewood Boulevard at Donovan Street (see Construction Schedule 2 of Phase II below).

From the connection point on Lakewood Boulevard, a 12-inch line runs northeasterly along Lakewood Boulevard to its termination point at 5th Avenue. Three smaller lines branch off of this 12-inch line:

- At Firestone Boulevard, a 4-inch line runs west to its termination at Nash Avenue.
- At Stewart □ Gray Road, an 8-inch line runs east to a T-section at Bellflower Boulevard, then easterly to its termination at a point just east of Coldbrook Avenue.
- At Clark Avenue, an 8-inch line runs south along Clark to a newly constructed portion of Congressman

Steve Horn Way, where it turns east and continues to Bellflower Boulevard. There is a T-section at Steve Horn Way and Bellflower Boulevard where two more 8-inch lines branch off. The first line runs north along Bellflower Boulevard to Stewart & Gray Road where it connects to the T-section on the previously described 8-inch line in this street. The second line continues east along Steve Horn Way and through Independence Park where it connects to the existing CBMWD distribution system on Dunrobin Avenue.

Construction of Phase II began in March 1992 and was completed in June 1993. Four construction "schedules" provided for several pipelines to branch off the main 30-inch and 24-inch Phase I line.

Schedule 1: From the end of the 24-inch Phase I line in the City of Santa Fe Springs at Florence Avenue and Jersey Avenue, the Phase II 24-inch line continues east to Bloomfield Avenue, where it terminates in a 4-way X-section. From this point, the 24-inch line runs southerly to Lakeland Road, then easterly to Greenstone Avenue, where it terminates in a T-section. At this point, a 16-inch PVC pipe branches off and runs southerly to Sunshine Avenue, then easterly for to Shoemaker Avenue, then southerly to Leffingwell Avenue where the line jogs to the west into an easement parallel to Shoemaker Avenue. The 16-inch line then continues southerly to a point just south of the AT&SF railroad right-of-way where Shoemaker Avenue begins again. The line continues southerly along Shoemaker Avenue until it reaches Firestone Boulevard where the line turns southeasterly and runs to Excelsior Drive. At this point, the line continues east along Excelsior Drive until the dead-end at Marquardt Avenue. The 16-inch line then follows a storm drain easement easterly, where it was jacked under the Coyote Creek channel. On the east side of the channel, the line turns south and runs along the channel levee, then runs easterly to its terminus at Bona Vista Avenue. At this point, an 8-inch PVC line branches off south along Bona Vista Avenue to the end of the cul-de-sac. There are several other lines that branch off the 24- and 16-inch main line in this schedule.

- From the 24-inch line on Florence Avenue, a 6-inch PVC line branches off at Fulton Wells Avenue (between Pioneer and Norwalk) and runs southerly to Lakeland Road, where it turns west and runs to its terminus at Zeus Avenue.

- As the 16-inch line proceeds southwesterly along Firestone Boulevard, a 6-inch PVC line branches off at Dinard Avenue and runs north to Mapledale Street, where it turns easterly and runs to its terminus just east of Cabrillo Avenue.

- At the intersection of Excelsior Drive and Marquardt Avenue, a 6-inch PVC line branches off the 16-inch line and runs south along Marquardt Avenue to its terminus.

- At the four-way cross-section at Florence Avenue and Bloomfield Avenue, an 8-inch PVC line branches off the 24-inch line and runs south along Bloomfield Avenue to its terminus at Lakeland Avenue. This line was constructed by the City of Santa Fe Springs in 2008.

Schedule 2: This portion of the recycled water system branches off to the east and west from the 30-inch line at Foster Road. The east section begins as a 12-inch cement mortar-lined and coated steel pipe connected to the 30-inch line on the west side of the San Gabriel River, just north of Foster Road. This line crosses the river along the Foster Road Bikeway, then runs southerly back to Foster Road where it turns east again into the City of Norwalk. At Dalwood Avenue, a 6-inch PVC line branches off and runs south to Leffingwell Road where it terminates. The 12-inch line on Foster Road continues east to a T-section at McRae Avenue. From this point, one branch of the Tee, a 6-inch PVC line, runs northerly along McRae Avenue until it terminates at Ratliffe Street. From the T-section at Foster Road and McRae Avenue, a 12-inch steel line runs southerly to Leffingwell Road, then east to Gard Avenue where a T-section was installed. The 6-inch line on Leffingwell Road continues east until it terminates just east of Maidstone Avenue. From the T-section at Leffingwell Road and Gard Avenue, a 6-inch PVC line runs southerly along Gard Avenue to Taddy Street where it turns west and runs to Harvest Avenue where it turns south. The 6-inch line runs along Harvest Avenue to Mapledale Street where a T-section branches to the east and west. From this point, a 6-inch PVC line runs westerly along

Mapledale Street to Graystone Avenue where it turns south and runs to its terminus at Sibley Street. Also, from the Tee at Harvest Avenue and Mapledale Street, another 6-inch line runs easterly to Jersey Avenue. This line turns south and runs until it ends at Excelsior Drive.

The west section also begins as a 12-inch cement mortar-lined and coated steel pipe connected to the 30-inch line on the west side of the San Gabriel River, just south of Foster Road. This line jogs back onto Foster Road and runs westerly along this road, which forms the boundary between the cities of Downey and Bellflower. This line runs to Lakewood Boulevard where it turns north and reduces to 8 inches. The 8-inch line runs along Lakewood Boulevard until it terminates at Meadow Road, just north of Imperial Highway. Two other lines branch off the 12-inch line along Foster at Bellflower Boulevard.

! A 6-inch PVC line comes off a T-section in the middle of the intersection of Foster Road and Bellflower Boulevard and runs southerly until it terminates just south of Arthurdale Street.

! A second 6-inch PVC line comes off a T-section just to the west of the first T-section on Bellflower Boulevard and Foster Road and runs northerly until it terminates near Angell Street.

Schedule 3: In the City of Bellflower, a 24-inch line connects to the 30-inch main line just after it crosses the San Gabriel River from the Los Coyotes WRP. This line runs westerly along Flora Vista Street to an existing Metropolitan Transportation Authority (MTA) right-of-way. At this point the line runs northwesterly toward the Los Angeles River. At this point, an 8-inch branch runs southerly along an SCE right-of-way (just west of Texaco Avenue) to Alondra Boulevard. The 24-inch line turns north and follows the SCE right-of-way to Cortland Avenue, where it runs west to Orange Avenue. The line then runs north on Orange Avenue to Century Boulevard where a T-section was installed. From this point, the 24-inch line runs westerly along Century Boulevard to the Los Angeles River, where it was jacked under the river and the Long Beach (710) Freeway. This line terminates just to the west of the freeway for connection to Construction Schedule 4 (detailed below) at Martin Luther King Jr. Boulevard. From the T-section on Century Boulevard, the line reduces to a 16-inch pipe that runs northeasterly back to the SCE right-of-way, where the line runs northerly then northeasterly to Rio Hondo Drive. The 16-inch line continues northeast along this street to the end of the cul-de-sac. At this point, the line crosses over to the Rio Hondo channel and continues northeast along the flood channel□s east side levee. The line reduces to 8-inches and uses an existing footbridge to cross the Rio Hondo channel where it terminates at John Anson Ford Park in the City of Bell Gardens. There are several other lines that branch off the 24- and 16-inch main line in this schedule.

- A 16-inch cement-coated and lined pipe branches off the 24-inch line running along the MTA right-of-way (located just west of the intersection of Somerset Boulevard and Hayter Avenue) and runs southerly along Los Angeles Department of Water and Power (LADWP) right-of-way to a point just north of Flower Street.

- At the point where the 24-inch line ends within the MTA right-of-way and moves into the SCE right-of-way, the 8-inch line (previously mentioned) runs southerly along the east side of the SCE right-of-way by Texaco Avenue where a T-section was installed at San Luis Street. At this point a 6-inch line continues to Somerset Boulevard where it turns west to the west side of the SCE right-of-way. The 6-inch line continues southerly to the south side of Alondra Boulevard where it terminates in a T-section.

- From the 8-inch line, another 6-inch PVC line branches off just north of Exeter Street and runs westerly to Gundry Avenue, where it turns north and runs to its terminus at San Rafael Street.

- At the T-section at San Luis Street, an 8-inch line crosses the SCE right-of-way westerly, continuing along San Luis Street to San Antonio Avenue where another T-section was installed. The 8-inch line continues southerly along San Antonio Avenue to Somerset Boulevard, where the line turns westerly and runs to its terminus at the Los Angeles River.

- From the T-section at San Luis Street and San Antonio Avenue, a 4-inch PVC line runs westerly along San Luis Street to its terminus at Banana Park. A 6-inch PVC line branches off the 8-inch line on San Luis Street at San Jose Avenue (east of San Antonio Avenue) and runs southerly to Mark Keppel Street where it terminates in a T-section. From this point, a 6-inch line runs the west and to the east.

- Farther north along the 16-inch line in the SCE right-of-way, a 6-inch PVC line branches off at Southern Avenue, which becomes Stewart □ Gray Road, and runs easterly to Pernell Avenue. The 6-inch line turns south and runs to Cole Street, where it turns east back to Pernell Avenue. The line turns south and runs to the Los Amigos Country Club, where the line runs easterly to its terminus.

- Also along the 16-inch line in the SCE right-of-way, another 6-inch PVC line branches off at Garfield Avenue and runs southerly to its terminus in a public alley south of Burntwood Street.

- The Bell Gardens Extension was completed in July 1995, and was connected to the 8-inch line that terminated in John Anson Ford Park. A dieccentric reducer was installed to allow for a 16-inch line to be connected. The 16-inch line then runs north through the park to Scout Avenue, where it turns east. The line continues along Scout, which changes to Park Lane, to its terminus at Garfield Avenue.

Schedule 4: A 24-inch cement-lined and coated steel pipe was connected to the 24-inch Schedule 3 line that terminated just west of the 710 Freeway. This line runs westerly along Martin Luther King Jr. Boulevard to a T-section at Wright Road, where two sections of pipeline run to the north and south. The north section begins with a 12-inch line that runs north along Wright Road to Duncan Avenue, where both Wright Road and the 12-inch line turn north. This line runs to Atlantic Avenue, where the line turns northeast and runs to a T-section at Tweedy Boulevard, then west to its terminus.

The south section begins with an 8-inch line from the T-section at Wright Road and Martin Luther King Jr. Boulevard and runs south along Wright Road to McMillan Street. At this point, the line turns west and runs to Gibson Avenue, where it turns south and runs for 1,039 feet to a T-section a San Rafael Street. From this point, the line reduces to a 6-inch pipe and runs easterly along San Rafael Street to its terminus at the 710 Freeway.

In 2008, The City of Lynwood connected an extension to the 8-inch line along the southerly section of the line on Wright Road. An 8-inch PVC line runs westerly along Josephine Street to its termination point at Virginia Avenue where it will serve the relocated Ham Park.

WALNUT VALLEY WATER DISTRICT

A 3,500 gpm pump station and an 8,000 gallon wet well was constructed at the intersection of Valley Boulevard and Grand Avenue, at the end of the 21-inch concrete gravity line from the Pomona WRP. At the pump station, a smaller, 500 gpm booster pump and hydropnuematic system supplies a 12-inch PVC pipe which runs north along Grand Avenue to Snow Creek Drive where it reduces to an 8-inch PVC pipe. The 8-inch line continues north from Snow Creek Drive to Amar Road where it turns west and terminates just before Lemon Avenue. An 8-inch AC line branches off the 12-inch PVC line at Snow Creek Drive and Grand Avenue and runs east, reducing to a 6-inch PVC line at La Puente Road and terminating east of Rodeo Way. A 6-inch AC line branches off from the 8-inch AC line at La Puente Road where it runs north before terminating just south of Bridgewater Lane.

From the pump station, a 20-inch cement mortar-lined and coated steel pipe runs west along Valley Boulevard to Fairway Avenue, where it turns south. This line continues to Colima Road, then south again along Brea Canyon Cutoff Road, where it terminates at the storage reservoirs located at Oakleaf Canyon Road. Several smaller transmission lines branch off the 20-inch main transmission line.

- A 6-inch PVC line branches off the main line on Valley Boulevard at Somerset Drive to serve the Walnut Ridge housing tract.

- An 8-inch PVC line branches off the main line on Valley Boulevard and Pierre Avenue. This line runs north on Pierre Avenue to Puente Avenue, where it reduces to a 6-inch PVC line. The 6-inch line continues east on Puente Avenue, then north on Suzanne Road where it terminates just south of Fuerte Drive.

- A 6-inch PVC line branches off the main line at Valley Boulevard and Lemon Avenue, running north to Vejar Road where it splits into 6-inch PVC lines running east and west. The line continues north on Lemon Avenue and terminates north of La Puente Road. The west line turns north through an easement, then continues west on Avenida Deseo, then south on Avenida Alipaz, where it terminates at Calle Baja. The east line continues along Vejar Road to its termination just east of Scherer Avenue.

- At the point where the 20-inch main line turns south off of Valley Boulevard and onto Fairway Drive, a 12-inch PVC line branches off and continues west along Valley Boulevard to Nogales Street, where it reduces to 8-inches. The line terminates at a T-section at Trafalgar Avenue, allowing for future expansion. Several smaller lines branch off this section of the distribution system. A 6-inch PVC line branches off at Valley Boulevard and Sentous Street, where it runs north to Hollingworth Street. From this point, three 6-inch lines branch off for short distances to serve users located to the east, west and north. A 12-inch PVC line branches off at Valley Boulevard and Nogales Street, where it runs north to its terminus just before La Puente Avenue. In addition to serving Nogales High School, this line allows for possible future service into the City of West Covina. A 6-inch PVC line continues north from the T-section at Valley Boulevard and Trafalgar Avenue, then east on Rorimer Street and north on Deepmead Avenue to its terminus at Sunshine Park.

- Another 12-inch PVC line branches off the line on Fairway Drive, running west along Colima Road to Otterbein Avenue, where it reduces to 8-inches that terminates at Shabarum Regional County Park, just before Azusa Avenue. Several smaller lines branch off this section of the distribution system. A 6-inch PVC line branches off the 12-inch line, running north along Bandida Avenue to its terminus at Rowland

Regional County Park. Two 6-inch PVC lines branch off the 12-inch line at the intersection of Colima Road and Otterbein Avenue. The first line runs north to Addis Street, while the second runs south along Otterbein Avenue, then west along Killian Street, then south on Lerona Avenue. An 8-inch PVC line branches off the 12-inch line, running south along Fullerton Road to a T-section at Galatina Street. One end of the T-section is blind-flanged, while a 6-inch PVC line runs east through an easement, then continuing along Galatina Street. This line then runs north on Cantaria Avenue, east on Farjardo Street to its terminus just before Los Padres Drive. Another 6-inch PVC line runs along Batson Avenue from Farjardo Street.

- A second 12-inch PVC line branches off the main transmission line along Fairway Drive, running east along Colima Road to Lemon Avenue, where a 6-inch PVC line branches off and runs north to serve several users. The 12-inch line continues east along Colima Road to Grand Avenue, where it turns north to a meter at the Diamond Bar Golf Course. The 12-inch line continues north along Grand Avenue, where it reconnects to the 20-inch main line on Valley Boulevard. Two 6-inch PVC lines branch off the 12-inch line to supply a looped-system serving Gateway Corporate Center. Another 6-inch PVC line branches off the 12-inch line at Brea Canyon Road, terminating just north of Golden Springs Drive.

- In a 1994-95 extension of the recycled water system, a 12-inch PVC line was connected to the 20-inch main transmission line on Fairway Drive, running east along Business Parkway and Currier Road, and terminating on Currier Road just before Brea Canyon Road. A 6-inch AC line branches off the 12-inch PVC line and runs north through an easement to join an 8-inch PVC line on Spanish Lane. The 8-inch PVC line runs west where it terminates just west of Brea Canyon Road. The 8-inch line also runs east on Spanish Lane, then north on Cheryl Lane and Brea Canyon Road to its terminus at the WVWD office. This section serves the landscaping around a number of commercial and light industrial buildings.

- In a 1998-99 extension of the recycled water system, the 8-inch PVC line terminating at the WVWD office was extended north to Old Ranch Road. From this point, the line turns east and runs to a frontage road along the Union Pacific Railroad, where it turns and runs north to its terminus at Grand Avenue in the City of Industry. Also during this year, a 12-inch PVC was connected to an existing 12-inch PVC line on Golden Springs Drive, with the new line running south along Adel Avenue and Davan Street. Approximately 100 feet of DIP runs east along a right-of-way to Via Sorella, where the line changes back to PVC and continues south to Brea Canyon Road. The line continues southerly to its terminus at Diamond Lane. This line serves the Diamond Crest Homeowners Association.

APPENDIX H

CENTRAL BASIN MWD – RIO HONDO SYSTEM

Construction began in April 1993 on a 22,000 gpm pump station, located adjacent to the 66-inch San Jose Creek Outfall on the east side of San Gabriel River Parkway, approximately 900 feet north of Beverly Boulevard. The pump station was completed in March 1994 and went on-line delivering recycled water in July 1994. The first schedule of pipeline construction in the City of Whittier and the City of Santa Fe Springs began in April 1993 and was completed in February 1994, with the Whittier Connector Unit crossing of the 605 Freeway/San Gabriel River being completed in May 1994. Construction on the Vernon Phase 1 and 2A Unit began in June 1993 and was completed in September 1994, while construction on the Pico Rivera, Montebello, Montebello/Vernon, and Vernon 2B units has not yet begun.

Whittier Connector Unit: A 48-inch cement mortar-lined and coated steel pipeline carries recycled water from the Rio Hondo Pump Station toward San Gabriel River Parkway. Just outside the pump station, a 36-inch cement mortar-lined and coated steel pipeline tees off and runs back toward the San Gabriel River levee, where it turns and runs north. The line then turns east and invert siphons under the San Gabriel River channel, where it then crosses an SCE and a Yellow Freight Company railroad right-of-way. The line was then jacked under a Union Pacific Railroad line and the 605 Freeway to Pioneer Boulevard, just south of Strong Avenue. Between the railroad and the freeway, the pipeline was reduced to 24-inches. The 30-inch line is contained in a 42-inch steel casing, and the 24-inch line is contained in a 36-inch steel casing. At Pioneer Boulevard, the 24-inch line expands back to 30-inches, then runs southwest to a point where it is jacked under Beverly Boulevard in a 42-inch steel casing. This portion of the pipeline construction connects to the Whittier Unit on the south side of Beverly Boulevard.

Whittier Unit: The construction for this schedule began where the Whittier Connector Unit ended on Pioneer Boulevard just south of Beverly Boulevard. From this point, the 30-inch line continues southwest along Pioneer Boulevard to Orange Grove Avenue, where it turns southeast. The line continues along Orange Grove Avenue to Norwalk Boulevard, where it turns southwest and runs to El Rancho Drive. At this point, the line turns southeast and runs along El Rancho Drive to a T-section at Broadway Road. From this T-section, an 18-inch line runs east along Broadway Road to Western Avenue where it terminates in a temporary blow-off valve, plug and blind flange. Any future (although currently unplanned) extensions of the recycled water system into the City of Whittier will continue from the point.

From the T-section at El Rancho Drive and Broadway Road, a 16-inch cement mortar-lined and coated steel pipeline continues southwesterly along Broadway Road to Norwalk Boulevard. Along the way, the line was jacked underneath Washington Boulevard. At Norwalk Boulevard, the 16-inch line turns south and runs to a point just south of Walnut Street, where the line connects to the Santa Fe Springs Unit. Along the way, the line was jacked underneath Slauson Avenue.

A second set of pipelines was constructed from the Rio Hondo Pump Station. From the pump station, a 48-inch cement-lined and coated steel pipeline runs to the property line on San Gabriel River Parkway, where it terminates in a T-section. A 12-inch line runs northeasterly from the T-section along the parkway to the intersection of Fairway Drive, where it terminates in a blind-flanged T-section. Also branching from the 48-inch line T-section is a 36-inch cement-lined and coated steel line that runs southwesterly to Beverly Boulevard. At this point, the line reduces to 30-inches and terminates in a T-section at Tobias Avenue, with the 30-inch branch blind-flanged. A 10-inch line runs along Tobias Avenue from the T-section before it also terminates in a blind-flange. Future construction will continue from the blind-flanged sections.

Santa Fe Springs Unit: The main portion of this construction schedule is a 16-inch cement-lined and coated steel that connects to the Whittier Unit on Norwalk Boulevard, between Walnut and Burke Streets. The 16-inch line continues south along Norwalk Boulevard to Florence Avenue, where it connects to a 24-inch line of the Century recycled water distribution system. This is the first of several links between the two distribution systems. Along the 16-inch line on Norwalk Boulevard, two T-sections were installed to allow for construction of other pipelines.

The first T-section on the 16-inch line is located at the intersection of Norwalk Boulevard and Burke Street, with a 12-inch line branching off and running east to its termination at a T-section at Dice Road. From this point, a looped-section of pipelines begins. The northern portion consists of a 12-inch line running north on Dice Road to a T-section, then east through an alley to a T-section on Sorenson Avenue, where the line reduces to 6-inches and continues south to a T-section at Santa Fe Springs Road, then southwest to a T-section at Los Nietos Road. The south portion also begins at the T-section at Burke Street and Dice Road and consists of a 12-inch line running south to Los Nietos Road, then southeast to Santa Fe Springs Road, where it connects to the northern portion at the T-section.

From the T-section at Los Nietos and Santa Fe Springs Roads (the street name changes to Bloomfield Avenue at Telegraph Road), the 12-inch line continues southwest to Florence Avenue, where it connects to a 12-inch line of the Century recycled water distribution system.

The second T-section on the 16-inch Norwalk line is located at Norwalk Boulevard and Los Nietos Road. From this point, an 8-inch line runs west to Pioneer Boulevard, where the line terminates in a temporary blow-off valve and plug.

Vernon Phase 1 and 2A Unit: This section of pipeline connects the west side of the Rio Hondo distribution system to Schedule 4 of the Century distribution system, detailed in Appendix F. The 12-inch line of Schedule 4 terminated at a T-section at the intersection of Atlantic Avenue and Tweedy Boulevard in the City of South Gate. From this point, an 18-inch line runs north along Atlantic Avenue to a T-section at Ardine Street, where a 10-inch line runs west to Quartz Avenue, then south to its terminus at Independence Avenue.

From the T-section at Atlantic Avenue and Ardine Street, the 18-inch line continues north to a T-section at Elizabeth Street. At this intersection, the line turns west and runs to Otis Avenue. The 18-inch line turns north again and runs along Otis Avenue to a T-section at Randolph Street.

From the T-section at Otis Avenue and Randolph Street, a short section of 6-inch line runs east where a blind-flange was installed to allow for future construction. The 18-inch line continues west along Randolph Street to its terminus at Boyle Avenue. Along Randolph Street, an 8-inch line branches off at Newell Street and runs south to its terminus at Saturn Avenue.

PUENTE HILLS/ROSE HILLS

The distribution system consists of 2,956 feet of 36-inch reinforced concrete gravity line that runs east from the 66-inch San Jose Creek WRP Outfall on Workman Mill Road to the original landfill entrance. The first of three pump stations lifts 12,000 gpm of recycled water 500 feet through 2,200 feet of 36-inch force main to an existing 650,000 gallon reservoir located close to the PERG Facility. The second pump station, located at the 650,000 gallon reservoir, lifts the recycled water another 300 feet through 3,700 feet of 30-inch force main to a 1.2 million gallon reservoir constructed by Rose Hills on the border between the landfill and cemetery. The third pump station, located at the Rose Hills storage tank, lifts 2,200 gpm of recycled water through 4,700 feet of 18-inch buried DIP leading to a new 800,000 gallon reservoir located at the former Nike site, with 2,000 feet of aboveground galvanized steel pipe serving the eastern landfill.

Construction of the gravity line was completed in June 1993, with construction of its connection to the San Jose Creek Outfall completed in March 1996. In 2001, construction of the expansion to serve the eastern portions of the landfill and the upper areas of the ever-expanding cemetery was completed.

APPENDIX J

USGVMWD – WHITTIER NARROWS RECREATION AREA EXTENSION

Recycled water is delivered from the USGVMWD pump station located adjacent to the chlorine contact tanks in the northwest section of the WNWRP. This pump station, designed by Tetra Tech, Inc., is capable of providing 10,000 gpm of recycled water to the transmission and distribution system. This pumping plant consists of one 200 HP, 2,000 gpm and three 350 HP, 4,000 gpm vertical turbine pumps provided by Simflo Pumps Inc. The third 4,000 gpm pump serves as a backup.

From the USGVMWD pump station the recycled water is transported through a 24-inch, Class 200 ductile iron pipeline (DIP) that runs northeasterly, suspended along the eastern side of the WRP's chlorine contact tank. All buried portions of the DIP have been double-bagged with 8 ml purple plastic to protect it against corrosion and to identify it as a recycled water pipeline. The 24-inch pipeline exits the pump station near the northeast corner of the WNWRP site and heads north for approximately 165 feet and turns northwest for 115 feet, tentatively following the property line. The pipeline then turns due west for 195 feet.

Approximately 50 feet south of the northwest corner of the WRP's property and a SCE easement, the 24-inch pipeline exits the WRP site and runs northwest to the southern edge of the SCE easement, then north through the easement. On the north side of the easement, the pipeline is jacked under Mission Creek and encased in an 82-foot long, 36-inch welded steel casing. The 24-inch pipeline continues northward through an archery range and a second SCE easement to a point approximately 33 feet north of the easement where it ends in a T-section (hereinafter identified as "Junction 1").

There is a 24-inch butterfly valve on the western branch of the Tee at Junction 1, after which the 24-inch pipeline continues due west, then northwesterly, then due west again, then northwesterly until it reaches the eastern bank of the Rio Hondo. The 24-inch pipeline then follows the bike path northward along the eastern edge of the river until it passes under the Pomona (60) Freeway right-of-way. Under the freeway, the pipeline is encased in a 36-inch welded steel casing. Just north of the freeway, the 24-inch pipeline turns east and runs parallel to the freeway to Loma Avenue.

Along Loma Avenue, the 24-inch pipeline runs north where it reduces to an 18-inch Class 250 DIP. Along this run, three T-sections with gate valves (two 6-inch and one 12-inch) were installed to serve the existing irrigation systems in what is known as Area "A" of the Whittier Narrows Recreation Area. The 18-inch pipeline continues north along Loma Avenue where it terminates with an 18-inch butterfly valve and a blind-flange for future extension. Three more T-sections with 6-inch gate valves for servicing Area "A" have been installed along the 18-inch pipeline.

In order to interconnect the irrigation systems serving Area "A" (located north of the 60 Freeway and bordered by Loma Avenue on the west and Rosemead Boulevard on the east) and Area "B" (located east of Rosemead Boulevard), a 12-inch Class 350 DIP was installed. On the south side of the Rosemead Boulevard entrance to Area "A", north of the 60 Freeway, a 12-inch tapping sleeve and gate valve was installed on an existing 12-inch AC irrigation pipeline. From this point, a 12-inch DIP runs northeast to the north side of the park entrance where it was jacked under Rosemead Boulevard and encased in 18-inch welded steel casing. From the west side of Rosemead Boulevard, the 12-inch pipeline runs due east to Area "B". At the end of this pipeline, an 8-inch reducer and tapping sleeve with a gate valve were installed on an existing 8-inch irrigation pipeline completing the interconnection of the two recreation areas.

Back at the T-section at Junction 1, the east branch reduces to a 16-inch Class 250 DIP through a butterfly valve, running due east to a T-section with a 6-inch stub-out and gate valve for a future extension. From this Tee, the 16-inch pipeline jogs slightly to the north, then continues due east where a second T-section with a 6-inch stub-out and gate valve for a future extension was installed. From the second Tee, the 16-inch pipeline continues due east where a third T-section with a 6-inch stub-out and gate valve for a future extension was installed. From the third Tee, the 16-inch pipeline continues due east to the west side of Rosemead Boulevard at the southern entrance to the Whittier Narrows Recreation Area, south of the 60 Freeway. At this point, the 16-inch pipeline was jacked under the street and encased in 24-inch welded steel casing.

From the east side of Rosemead Boulevard, the 16-inch pipeline continues due east into Area "D" of the Whittier Narrows Recreation Area where a fourth T-section with a 6-inch stub-out and gate valve for a future extension was installed. From the fourth Tee, the 16-inch pipeline continues due east to the edge of Legg Lake. From this point, the 16-inch pipeline was jacked under the connecting channel between the middle lake and the south lake and encased in 24-inch welded steel casing. From this point, the 16-inch pipeline continues due east where it turns southeast and runs to a T-section at the intersection of Santa Anita Avenue and Lexington Gallatin Road (hereinafter identified as "Junction 2").

There is a 16-inch butterfly valve on the southeastern branch of the Tee at Junction 2, after which the 16-inch pipeline continues southeast, where it terminates in a fifth T-section with a 6-inch stub-out and gate valve for a future extension.

Back at Junction 2 at the Santa Anita Avenue–Lexington Gallatin Road intersection, an 8-inch reducer and gate valve is connected to the T-section, and an 8-inch, Class 350 DIP pipeline runs. This pipeline then turns southeast. The pipeline then runs due east where it terminates at Andrews Street in a T-section with a 6-inch gate valve and an 8-inch lateral that serves a 4-inch stub out to South El Monte High School.

APPENDIX K

Lancaster Eastern Agricultural Site

To deliver recycled water to this site, approximately 17.2 miles of transmission lines (terminating in a 2 million gallon storage tank) were designed and constructed to supply the proposed agricultural area of approximately 4,650 acres (3,800 acres actually cultivated). A 36-inch steel transmission line runs south from the Lancaster WRP along Sierra Highway, then east along East Avenue E. At 60th Street East, the transmission line transitions down to a 28-inch HDPE line and splits, with one line running down Avenue E then south on 90th Street East to Avenue G, then east again to its terminus halfway between 90th and 100th Streets. The second line runs south on 60th Street East then east on East Avenue F to 90th Street East where it reconnects with the first line.

Twenty- Third ANNUAL STATUS REPORT

ON

RECYCLED WATER USE

Fiscal Year 2011-12

Sanitation Districts of Los Angeles County
1955 Workman Mill Road
Whittier, CA 90601

PREFACE

In addition to its mission of collecting, treating and disposing of municipal wastewater, the Sanitation Districts of Los Angeles County (Sanitation Districts) have adopted the goal of maximizing the beneficial reuse of the highly treated effluents produced by its water reclamation plants. The Sanitation Districts work with a number of local, regional, and state agencies and other entities in an effort to continue developing recycled water as a "local" water supply to supplement the area's limited groundwater and imported water supplies.

In response to many requests for information regarding various aspects of the Sanitation Districts' water reuse program, this fiscal year report has been prepared for distribution to interested parties. This report is the twenty-third of its kind and includes: historic recycled water use activities, descriptions of plant operations, diagrams of the various recycled water distribution systems, lists of the users and quantities used, tables of recycled water quality, and plans for expanding the use of recycled water, among other subjects.

This report is divided into five chapters. Chapter 1 is an overview of the Sanitation Districts' water reuse program. Chapters 2, 3, and 4 detail the water reuse activities at each of the Sanitation Districts' ten water reclamation plants, which are grouped in three geographic areas: Los Angeles Basin, Santa Clarita Valley, and Antelope Valley, respectively. Chapter 5 details the various proposed water recycling projects in the Sanitation Districts' service area that are currently under development or in the planning phase.

In order to improve the flow and readability of this report, the narrative descriptions of the more complicated distribution system facilities (Long Beach Water Department, City of Cerritos, City of Lakewood, Central Basin Municipal Water District's Century and Rio Hondo systems, Walnut Valley Water District, Puente Hills/Rose Hills system, Upper San Gabriel Valley Municipal Water District's Whittier Narrows Recreation Area Extension, and the Sanitation Districts' Eastern Agricultural Site in Lancaster) have been moved to their own individual appendices at the end of this report. The same has been done for the chronology of Sanitation Districts' reuse activities and all of the individual effluent quality tables.

A "Facts-at-a-Glance" summary page containing a brief list of data regarding the Sanitation Districts' water recycling program for the fiscal year appears before Chapter 1.

If you would like additional copies of this report (paper or electronic), or would like to comment on its contents, please contact Earle Hartling, Water Recycling Coordinator at (562) 908-4288, extension 2806, or by email at *ehartling@lacsd.org*. Further information regarding the Sanitation Districts and its water recycling activities can be found at the Sanitation Districts' website at *http://www.lacsd.org/waterreuse/*.

Cover Photo: Shaw Industries' Tuftex Carpet Mill in Santa Fe Springs has successfully been using just under 100 acre-feet per year of recycled water from the San Jose Creek Water Reclamation Plant for the dyeing of carpet since September 1993. This quantity of recycled water has only served about 30% of this mill's industrial water needs, so mill staff have recently undertaken the conversion of more of the dye processes to recycled water use, with the intent of reaching 100% recycled water use.

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FY 11-12 FACTS-AT-A-GLANCE

SANITATION DISTRICTS
<u>Total Effluent Produced</u>: 431.39 MGD (484,720 AFY), 2.2% decrease
<u>Total Recycled Water Produced</u>: 165.92 MGD (186,435 AFY), 66.3% of capacity, 38.5% of the total produced, 1.5% increase
<u>Total Recycled Water Used</u>: 84.74 MGD (95,211 AFY), 51.1% of recycled water produced, 11.4% increase, 706 sites (55 new sites added, 1 site disconnected)

Groundwater replenishment (4) -	47.99 MGD (53,922 AFY)	56.6% of total reuse	18.8% increase
Landscape irrigation (667) -	14.85 MGD (16,682 AFY)	17.5% of total reuse	9.0% increase
Agriculture (10) -	12.59 MGD (14,148 AFY)	14.9% of total reuse	4.1% increase
Industrial (24) -	2.96 MGD (3,325 AFY)	3.5% of total reuse	6.2% increase
Environmental (1) -	6.35 MGD (7,133 AFY)	7.5% of total reuse	11.0% increase

<u>Total Reuse Since Inception</u>: 2,592,849 AF (844.6 billion gallons)

<u>Transmission lines</u>: 1,317,860 linear feet (250 miles)

<u>Acreage Served</u>: 14,558 acres (direct non-potable use)

<u>Jurisdictions Served</u>: 31 (30 cities plus Los Angeles County Unincorporated Areas)

<u>Recycled Water Purveyors</u>: 31

<u>Recycled Water Contracts</u>: 24

<u>Chemical Savings</u>[1]: $134,935

<u>Greenhouse Gas Reduction</u>[2]: 214,225 tons of carbon dioxide

<u>Capacity of Future Planned Reuse Projects</u>: 77,245 AFY (68.93 MGD)

JOINT OUTFALL SYSTEM
<u>Total Effluent Produced</u>: 391.49 MGD (439,882 AFY), 2.5% decrease
<u>Total Recycled Water Produced</u>: 126.02 MGD (141,597 AFY), 32.2% of the total produced, 1.9% increase
<u>Total Recycled Water Used</u>: 65.81 MGD (73,944 AFY), 52.2% of recycled water produced, 15.8% increase

SANTA CLARITA
<u>Total Recycled Water Produced</u>: 19.82 MGD (22,271 AFY), 0.4% decrease
<u>Total Recycled Water Used</u>: 0.339 MGD (381 AFY), 1.7% of recycled water produced, 13.1% increase

ANTELOPE VALLEY
<u>Total Wastewater Treated</u>: 23.29 MGD, 0.8% increase
<u>Total Recycled Water Produced</u>: 20.08 MGD (22,567 AFY), 0.7% increase
<u>Total Recycled Water Used</u>: 18.59 MGD (20,886 AFY), 92.6% of recycled water produced, 1.8% decrease

1 Recycled water delivered to the various distribution systems is not dosed with either sulfur dioxide or sodium bisulfate for dechlorination or with defoamant.
2 The use of locally produced recycled water eliminates the need to pump State Project water into the Los Angeles Basin at an energy cost of approximately 3,000 kWh/AF with the attendant CO_2 production.

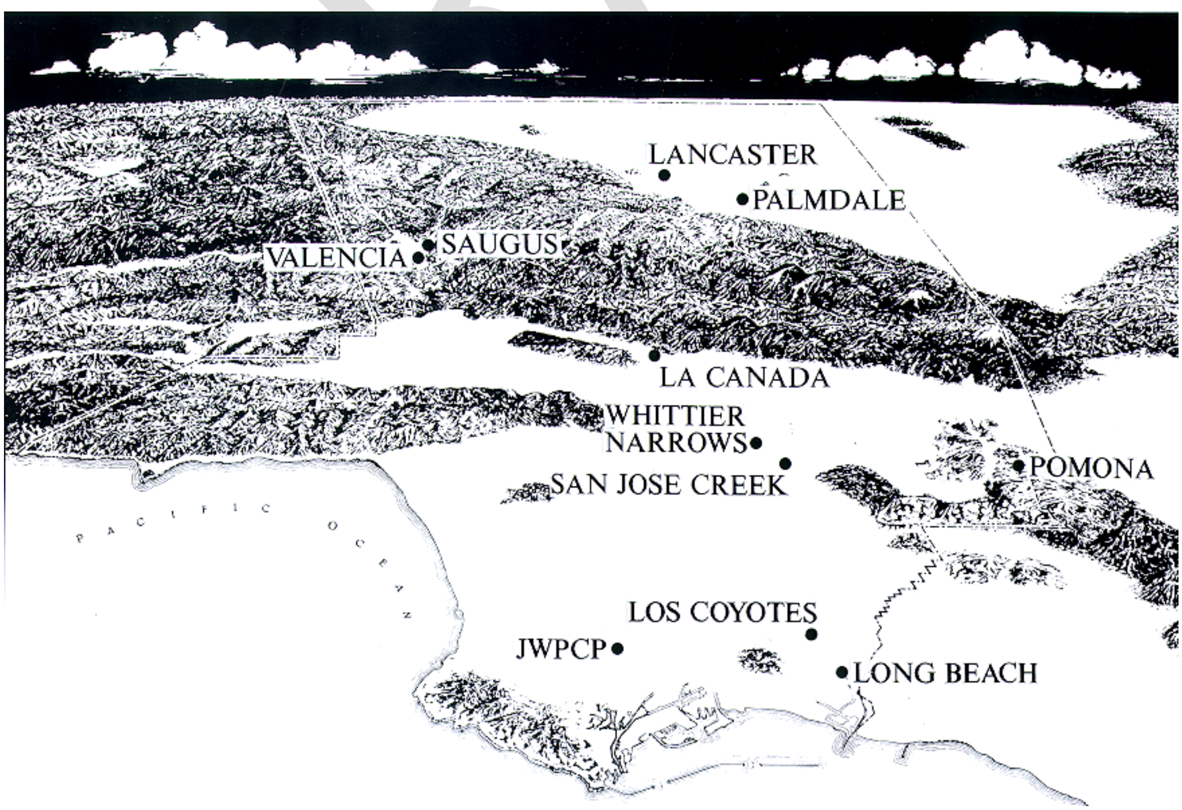
DRAFT

1. OVERVIEW

1.1 WATER RECLAMATION ACTIVITIES

The Sanitation Districts of Los Angeles County (Sanitation Districts) operate 11 wastewater treatment facilities (Figure 1), 10 of which are classified as water reclamation plants (WRPs). These facilities serve approximately five million people in 78 cities and unincorporated areas within Los Angeles County. Effluent quality from the WRPs ranges from undisinfected secondary quality recycled water to filtered, disinfected tertiary quality recycled water. During Fiscal Year 2011-12 (FY 11-12), Sanitation Districts' facilities produced an average of 431.39 million gallons per day (MGD), or 484,720 acre-feet per year (AFY) of effluent, which is a decrease of 2.2% from the preceding fiscal year, and a 19.5% decrease from the historic peak of FY 89-90. Following this peak, total average effluent flow had decreased by 11% in FY 91-92 as a result of widespread water conservation in response to a drought-induced, statewide water crisis, as well as an economic recession. After the drought ended in 1992, overall effluent flows increased, due in part to population growth, a healthier economy, and the easing of conservation measures in response to the improved statewide water supply situation. Total effluent flow peaked again in 1998 due to the extremely heavy, El Niño generated rainfall. Since 1999, total flow production has continued decreasing despite population growth in the Sanitation Districts' service area. The 16.4% decrease in effluent production since FY 04-05 is a result of a downturn in local economic activity combined with increasing water conservation efforts (low flow toilets, waterless urinals, water efficient washing machines, etc.) due to a three-year statewide drought (2006-09). Effluent production at Sanitation Districts' facilities is currently at levels last seen in the late 1970s.

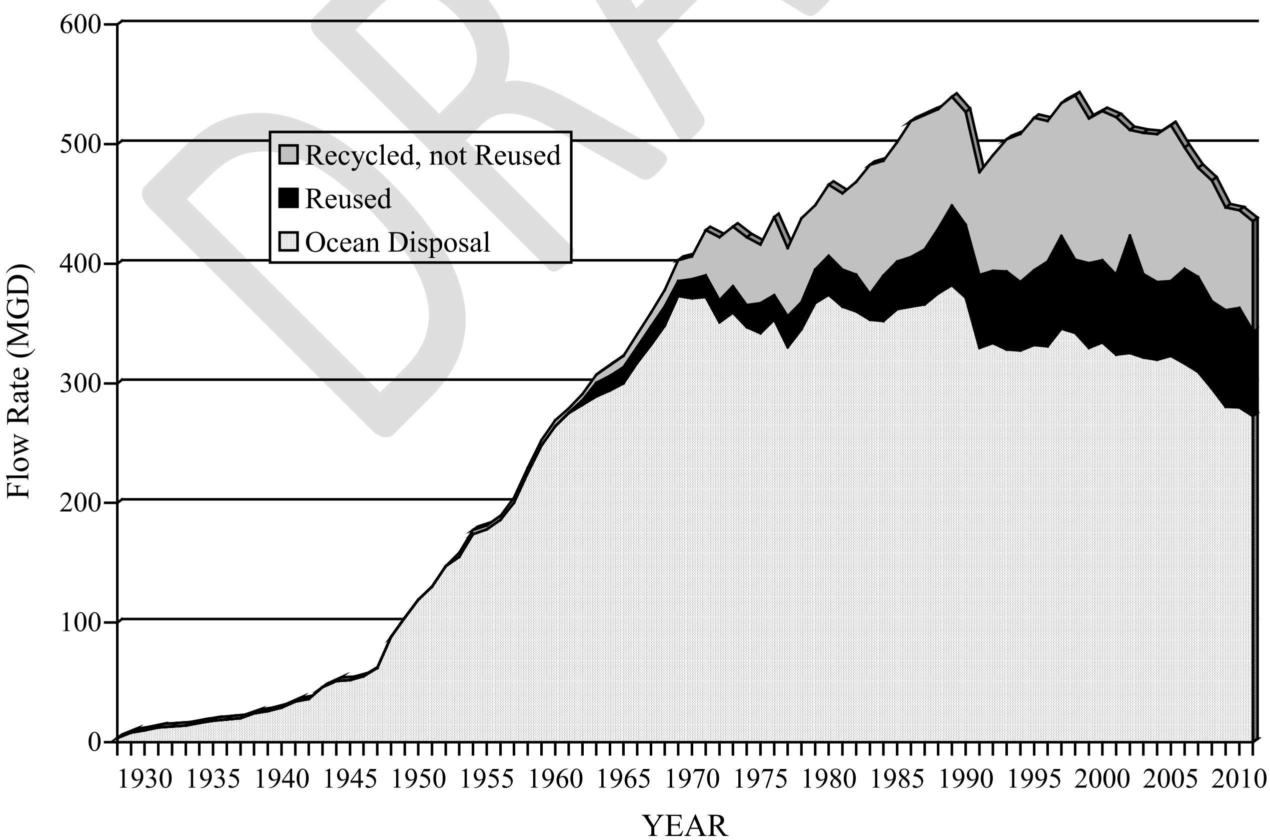
FIGURE 1
LOCATION OF SANITATION DISTRICTS' WASTEWATER TREATMENT FACILITIES



Capacity at the ten Sanitation Districts' WRPs is 250.8 MGD (281,040 AFY) as of the end of FY 11-12. However, of the total effluent produced, only 165.92 MGD (186,435 AFY) consisted of recycled water available for reuse from these 10 facilities (66.3% of capacity). This amount is 38.5% of the total amount of effluent produced, and an increase of 1.5% over the preceding fiscal year. The remaining 265.47 MGD (298,285 AFY) was effluent discharged to the ocean from the Sanitation Districts' Joint Water Pollution Control Plant (JWPCP) in the City of Carson, a 4.4% decrease from the preceding fiscal year.

For the past half century, the Sanitation Districts have diverted high quality wastewater flows away from direct ocean disposal to the upstream WRPs in order to provide recycled water supplies for eventual reuse, as illustrated in Figure 2 (data through the end of calendar year 2011). Discharge to the ocean (lower band on graph) has steadily decreased since the WRPs in the Los Angeles Basin (i.e., the Joint Outfall System, or JOS) were built in the early 1970's, while additional needed treatment capacity has been added to the WRPs (the combined upper two bands on the graph). Significant drops in effluent production occurred in 1977 and 1991 in response to serious droughts. A similar drop in effluent production has been occurring since 2006 when the current water crisis in the State became apparent and conservation actions began to be implemented. The majority of these decreases came from the JWPCP, while the upstream WRPs were able to maintain a relatively high level of production, which contributed to recycled water's reputation as being “drought-proof.” The center band represents the recycled water produced by the WRPs that is actually being put to beneficial use, while the upper band represents the remaining recycled water that is currently being discharged to rivers, but has the potential to be beneficially reused.

FIGURE 2
SANITATION DISTRICTS' FLOW DIVERSION TO RECYCLING
1928-2011



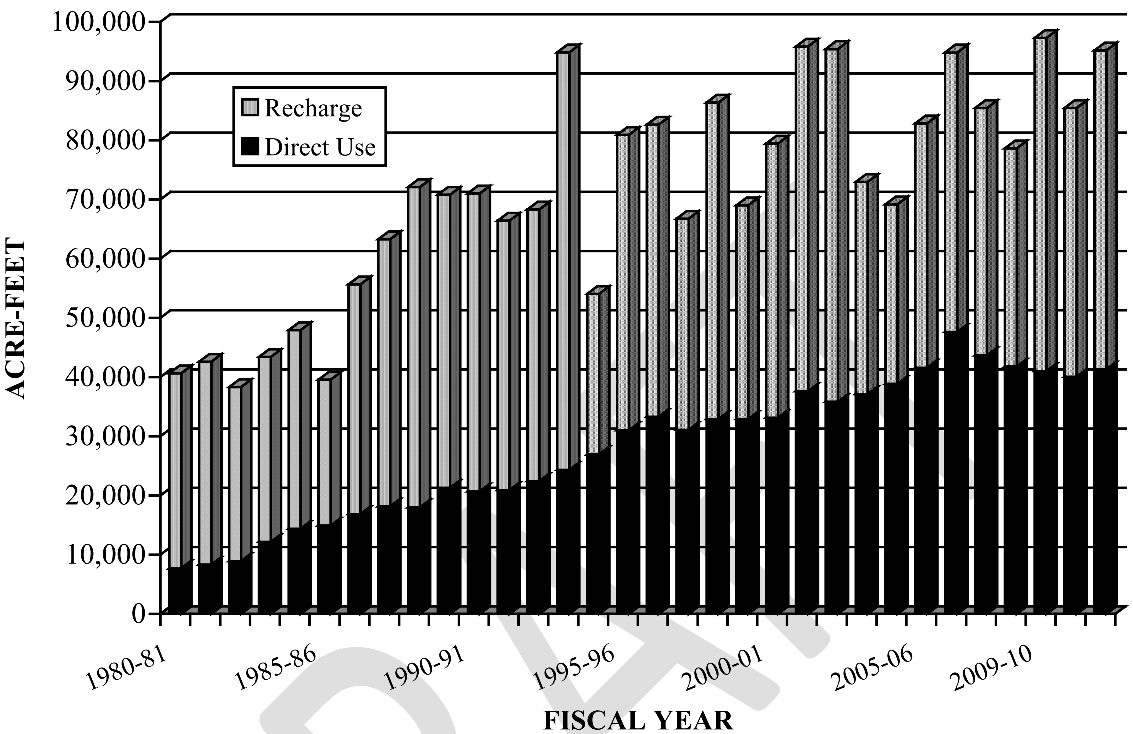
Of the total amount of recycled water produced, 84.736 MGD (95,211 AFY) was actively reused for a variety of applications including urban landscape irrigation, agricultural irrigation, recreational impoundments, industrial process water, wildlife habitat maintenance, and groundwater replenishment. The amount of recycled water produced and reused at each of the WRPs and the percent change from the preceding fiscal year is summarized in Table 1. The amount reused was 51.1% of the recycled water produced, an 11.4% increase over the preceding fiscal year. During FY 11-12, 54 new landscape irrigation sites and one industrial site began receiving Sanitation Districts' recycled water (with one reuse site ceasing operations).

TABLE 1
RECYCLED WATER PRODUCED AND REUSED AT WATER RECLAMATION PLANTS
FISCAL YEAR 2011-12

Water Reclamation Plant	Nominal Treatment Capacity (AFY)	Quantity Recycled (AFY)	Percent Change from FY 10-11 (+/-)	Quantity Reused (AFY)	Percent Change from FY 10-11 (+/-)	Percent of Recycled Water Used
La Cañada	225	93	-12.3	93	-12.3	100
Long Beach	28,015	20,472	-2.8	6,868	+6.8	33.5
Los Coyotes	42,020	26,018	+11.2	5,982	+6.5	23.0
Pomona	16,810	9,541	-5.4	8,241	+8.1	86.0
San Jose Creek	112,055	75,849	+0.4	43,266	+21.1	57.0
Whittier Narrows	16,810	9,624	+10.6	9,494	+14.0	98.6
Valencia	24,205	16,695	-0.3	381	+13.4	2.3
Saugus	7,285	5,576	-0.7	0	0	0
Lancaster	20,170	12,869	-3.4	12,765	-3.9	99.2
Palmdale	13,445	9,698	+6.6	8,121	+1.6	83.7
TOTAL	281,040	186,435	+1.5	95,211	+11.4	51.1

The amount of recycled water used for replenishment of the underground water supply can vary greatly from year to year, depending on the amount and timing of rainfall runoff, maintenance activities in the spreading grounds, and other factors, as illustrated by the upper bar in Figure 3. The long-term trend of recycled water usage is best represented by the increase in direct, non-potable reuse for landscape and agricultural irrigation, industrial process supply, and environmental enhancement. The lower bar on Figure 3 shows the steady growth of annual average daily demand for direct, non-potable reuse through FY 11-12.

FIGURE 3
DIRECT NON-POTABLE REUSE VS. GROUNDWATER RECHARGE
1980-81 TO 2011-12



1.2 WATER RECYCLING PROJECTS

In 1970, prior to the droughts of 1976-77 and 1987-92, there were six reuse customers using 21 MGD on 940 acres (consisting of both irrigable acres and recharge basins). By the end of the subject fiscal year, there were a total of 706 reuse sites on approximately 14,558 acres, utilizing approximately 1,317,860 linear feet (almost 250 miles) of transmission pipelines in 30 cities. This usage includes one city employing a water truck to haul recycled water to various greenbelt areas and occasional private water trucks hauling recycled water to construction sites. Table 2 summarizes the approximate length of distribution system pipelines (where applicable), the amount of recycled water used by each of the water recycling projects (detailed in later sections), the percent change from the preceding fiscal year, and the number of new reuse sites added to that recycling project over the past fiscal year. Figure 4 shows the increase in the number of reuse sites receiving recycled water from the Sanitation Districts from 1970 to mid-2012.

Cities with Sites Using Sanitation Districts' Recycled Water

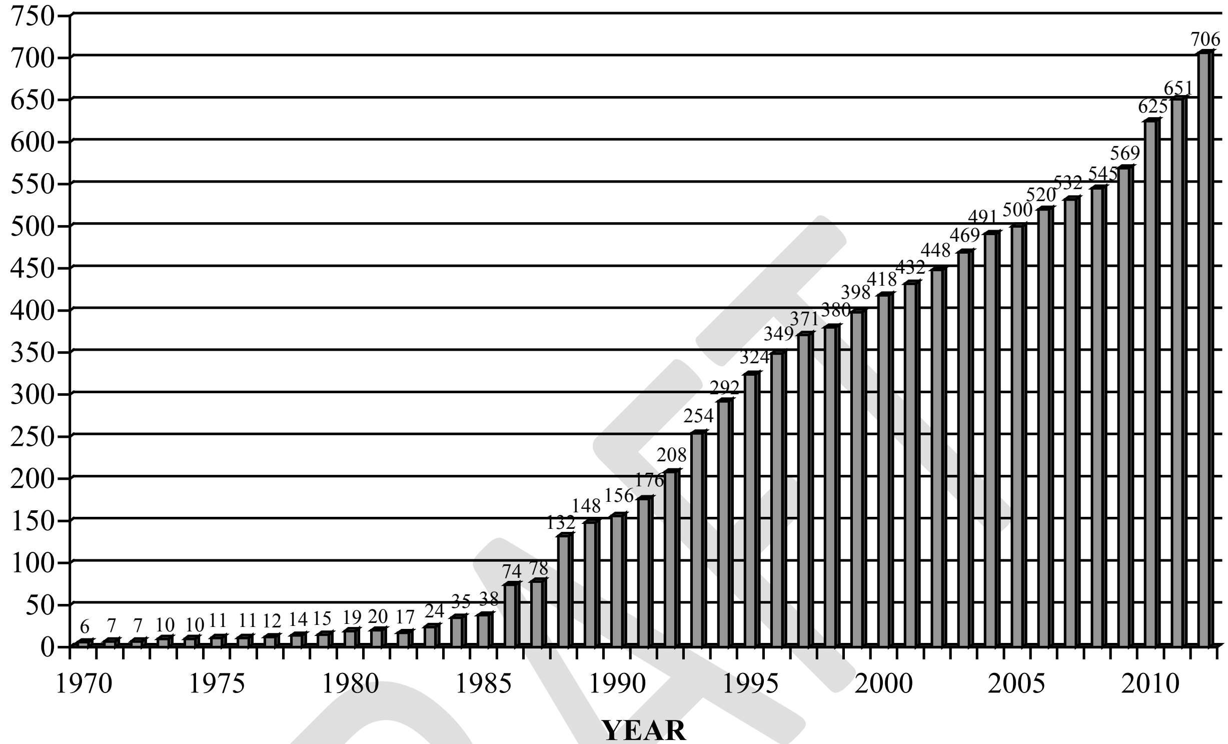
Bellflower	Norwalk
Bell Gardens	Palmdale
Cerritos	Paramount
Compton	Pico Rivera
Cudahy	Pomona
Diamond Bar	Rowland Heights
Downey	Santa Clarita
El Monte	Santa Fe Springs
Huntington Park	Signal Hill
Industry	South El Monte
La Cañada	South Gate
Lakewood	Vernon
Lancaster	Walnut
Long Beach	West Covina
Lynwood	Whittier

Note: Recycled water is also used in areas of Unincorporated Los Angeles County

Table 2
Recycled Water Used by Water Recycling Project
Fiscal Year 2011-12

Project Name	Pipeline Length (linear feet)	Recycled Water Used (AFY)	Percent Change from FY 10-11 (□-)	No. of New Reuse Sites
La Ca□ada-Flintridge Country Club		93	-12.3	
Long Beach Water Department	179,680	4,697	□15.8	4
Alamitos Seawater Barrier		2,171	-8.5	
City of Bellflower	1,900	47	□11.9	
City of Cerritos	142,600	1,871	□2.6	2
City of Lakewood	28,300	474	□7.0	
Central Basin MWD (Century)	107,160	3,590	□8.5	
Pomona Water Department	37,000	1,560	□15.8	
Spadra Landfill		434	□24.0	
Walnut Valley Water District	166,320	1,247	□6.8	2
Water Replenishment District		51,750	□20.3	
City of Industry	44,350	903	-5.6	
Rowland Water District	85,540	94	□25.3	27
California Country Club		423	0	
LA Sanchez Nursery		13	□8.3	
Central Basin MWD (Rio Hondo)	290,400	253	□11.5	5
Puente Hills□Rose Hills	8,900	2,231	□5.8	
USGVMWD Rio Hondo Extension	11,020	636	□16.9	
Whittier Narrows Recreation Area	18,900	1,457	□1.7	15
Castaic Lake Water Agency	16,490	381	□13.1	
Piute Pond		7,133	-11.0	
Nebeker Ranch	15,900	4,311	□4.9	
Apollo Community Regional Park	23,800	254	□23.3	
Eastern Agricultural Site	96,600	1,063	□12.2	
City of Lancaster	29,800	4	□300.0	
Los Angeles World Airports Lease	13,200	8,121	□1.6	
TOTALS	1,317,860	95,211	□11.4	55

FIGURE 4
INCREASE IN NUMBER OF REUSE SITES
1970-2012



During FY 11-12, 41.607 MGD (46,751 AFY) was used for groundwater replenishment from the San Jose Creek and Whittier Narrows WRPs. Approximately 1,581,214 acre-feet (AF) of recycled water from these two plants have been used to recharge the Central Basin aquifer since August 1962, when the Whittier Narrows WRP was commissioned, through the end of FY 11-12. Another 4.450 MGD (5,000 AFY) of effluent discharged from the Pomona WRP to the San Jose Creek Channel was credited toward indirect groundwater recharge, after estimating how much of this discharge was lost to the ocean during the winter storm season. In the past, this flow stream was not included in the total amount of recycled water used, since most of it entered groundwater via incidental recharge upstream of the spreading grounds. However, because this flow stream is credited against the allowable amount to be recharged, it has been included in the total amount of water actively reused, beginning in FY 94-95.

More recycled water is typically used for groundwater recharge (via surface spreading) than for all other applications combined because of its cost-effectiveness. The San Jose Creek, Whittier Narrows, and Pomona WRPs discharge to rivers or creeks (i.e., flood control channels) that can convey the water by gravity to existing off-stream recharge basins. These basins and the unlined portions of the rivers and creeks permit large volumes of recycled water to percolate by gravity into the aquifer. Recycled water used in this way requires no additional capital improvement and related operation and maintenance (O&M) costs or any energy consumption for pumping.

There was another source of replenishment water during FY 11-12, as the Alamitos Seawater Intrusion Barrier received 1.933 MGD (2,171 AFY) of recycled water originating from the Long Beach WRP and treated to an advanced level (see details in Section 2.2.2). Even though the purpose of this facility is to prevent seawater from moving inland and contaminating the groundwater aquifer, most of the injected water (roughly 80%) moves inland and becomes part of the region's drinking water supply. Due to operational limitations, the full capacity of the Leo Vander Lans advanced treatment plant that supplies the Alamitos Barrier is still not being realized.

During FY 11-12, the total of 47.990 MGD (53,921 AFY) that went to groundwater replenishment was an 18.8% increase over the preceding fiscal year. Of the total amount of water reused during FY 11-12, 56.6% went for groundwater replenishment, which is only the third time in the past eight years that this reuse application has made up more than half of total reuse. In previous years, concerns over the potential for a fish kill of a colony of non-native *Tilapia* fish living in the lined portion of the San Gabriel River necessitated the continued discharge of effluent from the San Jose Creek WRP to that point, thus preventing its diversion directly into the San Gabriel Coastal Spreading Grounds from the San Jose Creek Outfall line. However, modifications were made at the spreading ground diversion gate that allowed it to be partially closed. In March 2009, a partial closure of the gate was initiated, with the degree of closure being increased incrementally over the following months to a point where the majority of flow in the Outfall was being diverted for recharge. The small amount of effluent being discharged to the lined portion of the San Gabriel River is sufficient to sustain the fish until a permanent solution for this invasive species can be found.

The remainder of the recycled water usage was divided between four broad categories of direct usage:

- A total of 667 of the individual reuse sites used recycled water for some form of landscape irrigation, and approximately 14.847 MGD (16,682 AFY), or 17.5% of the total water reused, went toward this application. These sites include 107 parks, 110 schools, 231 commercial and office buildings (e.g., offices, warehouses, retail, car dealerships, hotels, restaurants, etc.), 112 roadway greenbelts, 28 public facilities (e.g., police station, post office, libraries, landfills, etc.), 23 golf courses, 21 nurseries, 17 residential developments, 11 churches, and 7 cemeteries.

- Agricultural usage at 10 reuse sites accounted for approximately 12.591 MGD (14,148 AFY), or 14.9% of the total reused.

- Twenty-four industrial applications of recycled water (which include carpet dyeing, oil field injection, power plant cooling towers, metal finishing, street sweeping, sewer flushing, and construction applications such as dust control and concrete mixing) totaled 2.960 MGD (3,325 AFY), or 3.5% of the total reused.

- Approximately, 6.348 MGD (7,133 AFY), or 7.5% of the total reused, went to environmental enhancement of a wildlife habitat (Piute Ponds) in the Mojave Desert.

TOP TEN LARGEST DIRECT REUSE SITES OF 2011-12*

1. **Antelope Valley Farms** — **8,030 AFY**
   Palmdale WRP *(agricultural irrigation of alfalfa)*
2. **Nebeker Ranch** — **4,311 AFY**
   Lancaster WRP *(agricultural irrigation of alfalfa)*
3. **Alamitos Intrusion Barrier** — **2, 171 AFY**
   Long Beach WRP *(seawater barrier injection)*
4. **THUMS** — **1,412 AFY**
   Long Beach WRP *(oil zone repressurization)*
5. **Puente Hills Landfill** — **1,109 AFY**
   San Jose Creek WRP *(irrigation & dust control)*
6. **Rose Hills Memorial Park** — **1,077 AFY**
   San Jose Creek WRP *(landscape irrigation)*
7. **Eastern Agricultural Site** — **1,063 AFY**
   Lancaster WRP *(agricultural irrigation of alfalfa)*
8. **Industry Hills Recreation Area** — **903 AFY**
   San Jose Creek WRP *(landscape irrigation)*
9. **Bonelli County Regional Park** — **841 AFY**
   Pomona WRP *(landscape irrigation)*
10. **Whittier Narrows Recreation Area** — **771 AFY**
    Whittier Narrows WRP *(landscape irrigation)*

** excluding discharge-based reuse applications of groundwater recharge by spreading and Piute Ponds*

Table 3 lists the number of sites in each category of use, along with total acreage and average daily usage. Figure 5 shows the distribution of reuse flows among these various applications.

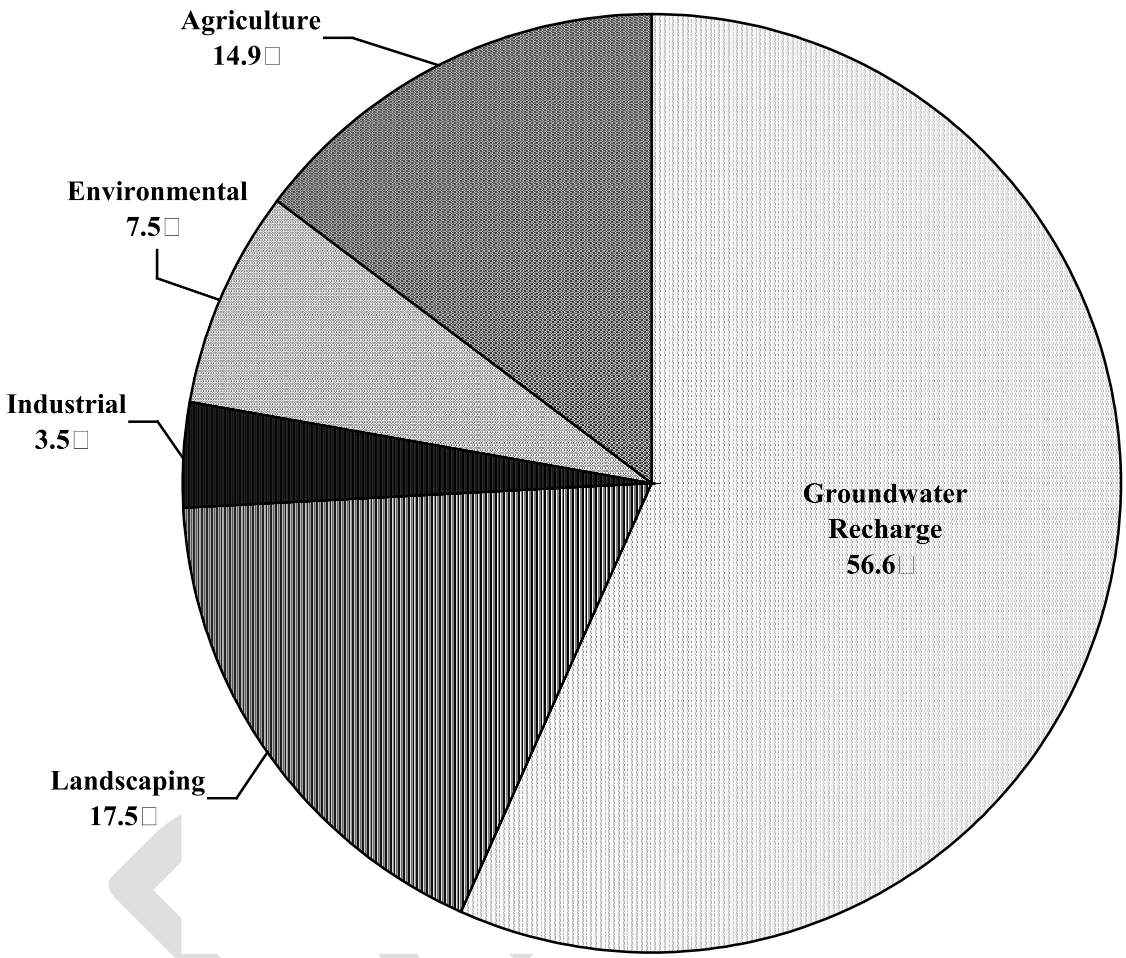
TABLE 3
CATEGORIES OF RECYCLED WATER USAGE
FISCAL YEAR 2011-12

Reuse Application	No. of Sites	Area Applied (acres)	Usage (MGD)
Parks	107	3,477.9	4.093
Golf Courses	23	2,665.8	4.138
Schools	110	1,267.1	1.871
Roadway Greenbelts	112	647.8	0.881
Public Facilities[1]	28	497.5	1.247
Commercial Buildings[2]	231	520.4	0.979
Nurseries	21	118.9	0.139
Cemeteries	7	701.4	1.187
Residential Developments	17	114.3	0.274
Churches	11	12.5	0.037
Industrial[3]	24	157.5	2.960
Agriculture[4]	10	3,977.0	12.591
Environmental Enhancement	1	400	6.348
SUBTOTAL	702	14,558.0	36.745
Groundwater Recharge	4	646	47.990
TOTAL	706	15,204.0	84.735

NOTES:

1. "Public Facilities" includes police stations, libraries, post offices, city halls, government offices, landfills, etc.
2. "Commercial Buildings" includes offices, warehouses, retail, car dealerships, hotels, restaurants, etc.
3. Industrial processes receiving recycled water include carpet dyeing, concrete mixing, cooling towers, metal finishing, oil field injection, toilet flushing and construction applications such as soil compaction and dust control.
4. California Polytechnic University, Pomona, while technically a school, uses most of its recycled water for agricultural purposes and is thus included in this category.

FIGURE 5
DISTRIBUTION OF RECYCLED WATER USAGE
FISCAL YEAR 2011-12



1.3 ECONOMIC AND ENVIRONMENTAL IMPACTS

At the end of FY 11-12, the Sanitation Districts had 24 contracts (four pending initial deliveries) for the sale and/or delivery of recycled water produced at its facilities. Actual O&M and energy costs incurred by the Sanitation Districts while operating the pump stations on behalf of the purchasers of recycled water are also fully recovered through these contracts. Since the recycled water delivered to the various distribution systems was not dosed with either sulfur dioxide or sodium bisulfate for dechlorination or with defoamant, an estimated $134,935 in chemical savings was realized at the five Sanitation Districts' tertiary WRPs located in the JOS and at the Valencia WRP in the Sanitation Districts' Santa Clarita Valley Joint Sewerage System (SCVJSS).

Table 4 compares selected potable water rates and recycled water rates (in effect as of the end of FY 11-12), illustrating the savings realized by the end users. Table 5 lists all of the current recycled water purveyors.

Table 4
Potable vs. Recycled Water Rates
Fiscal Year 2011-12

Purveyor	Potable Water ($/AF)	Recycled Water ($/AF)	Discount (%)
Long Beach Water Department	1,062.43	531.43 – 744.00	30 – 50
City of Cerritos	614.20	326.70	47
City of Lakewood	1,089.00	444.31	59
Central Basin MWD	859.00 – 984.00	291.00 – 536.00	37 – 70
Pomona Water Department	1,271.95	533.66	58
Walnut Valley Water District	1,041.08	649.04	36
Rowland Water District	1,010.59	635.98	38
San Gabriel Valley Water Co.	907.79	220.00 – 771.62	15 – 76
Valencia Water Company	609.40	511.83	16

To put things into perspective, the 95,211 AF of water reused in FY 11-12 is equivalent to the water supply for a population of 476,055, between the cities of Fresno and Sacramento, CA, the 34th and 35th largest cities in the U.S.[3] The use of locally produced recycled water reduces the need to pump State Project water over the Tehachapi Mountains at a net energy cost of roughly 3,000 kilowatt-hours (kWh) per acre-foot.[4] Thus, approximately 285.6 million kWh of electricity were conserved in FY 11-12, which is equivalent to the annual output of a 32.6-megawatt power plant consuming nearly 155,000 barrels of oil. At $0.15/kWh (based on Southern California Edison residential billing rate), this equates to an annual savings of approximately $43 million in electricity. At $106.16/barrel,[5] this equates to an annual savings of approximately $16.4 million in oil.

The conservation of fossil fuels and energy also resulted in significant reductions in potential air pollutants. During FY 11-12, 164.2 tons of nitrogen oxide, 28.6 tons of carbon monoxide, 17.1 tons of sulfur oxides, 5.7 tons of particulates, and 1.4 tons of reactive organic gases were kept out of the atmosphere.[6] Perhaps more important, the use of local recycled water avoided the production of approximately 214,225 tons of carbon dioxide, a greenhouse gas that contributes to global warming.[7]

Table 6 summarizes the water, energy, chemicals, and air pollutant savings realized by the use of local recycled water sources.

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3 2010 Census.
4 "Refining Estimates of Water-Related Energy Use in California," California Energy Commission, December 2006.
5 May 1, 2012 spot price for "West Texas Intermediate crude oil".
6 Estimates based upon emission factors from "Power Plant Fuel Use and Emissions," South Coast Air Quality Management District, May 1986.
7 Estimate based upon data from "Compilation of Air Pollutant Emission Factors, Vol. 1: Stationary Point and Area Sources," USEPA, January 1995.

TABLE 5
RECYCLED WATER PURVEYORS

City of Long Beach
1800 East Wardlow Road
Long Beach, CA 90807-4994
(562) 570-2300

City of Cerritos
Bloomfield at 183rd Street
Cerritos, CA 90701
(562) 860-0311

City of Lakewood
5050 North Clark Avenue
Lakewood, CA 90714
(562) 866-9771

City of Bellflower
16600 Civic Center Drive
Bellflower, CA 90706
(562) 804-1424

City of Industry
P.O. Box 3366
Industry, CA 91744
(626) 333-2211

City of Pomona
505 South Garey Avenue
Pomona, CA 91766
(909) 620-2253

City of Cudahy
5220 Santa Ana Street
Cudahy, CA 90201
(323) 773-5143

Walnut Valley Water District
271 South Brea Canyon Road
Walnut, CA 91789
(909) 595-1268

City of Pico Rivera
6615 Passons Boulevard
Pico Rivera, CA 90660-1016
(562) 801-4462

City of Vernon
4305 Santa Fe Avenue
Vernon, CA 90058
(323) 583-8811

Golden State Water Company
110 E. Live Oak Avenue
Arcadia, CA 91006
(626) 446-1372

City of Paramount
16400 Colorado Avenue
Paramount, CA 90723
(562) 220-2020

City of Santa Fe Springs
11710 Telegraph Road
Santa Fe Springs, CA 90670
(562) 868-0511

City of Downey
9252 Stewart □ Gray Road
Downey, CA 90242
(562) 904-7202

City of Whittier
13250 East Penn Street
Whittier, CA 90602
(562) 945-8215

City of South Gate
4244 Santa Ana Street
South Gate, CA 90280
(323) 563-5795

City of Lynwood
11330 Bullis Road
Lynwood, CA 90262
(562) 603-0220

City of Norwalk
12700 Norwalk Boulevard
Norwalk, CA 90650
(562) 929-2677

Rowland Water District
3021 S. Fullerton Road
Rowland Heights, CA 91748
(562) 697-1726

Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350
(661) 297-1600

City of Lancaster
615 West Avenue H
Lancaster, CA 93534
661-945-6863

Central Basin Municipal Water District
6252 Telegraph Road
Commerce, CA 90040-2512
(323) 201-5555

Park Water Company
9750 Washburn Road
Downey, CA 90241
(562) 923-0711

Bellflower Municipal Water Systems
16913 Lakewood Blvd.
Bellflower, CA 90706
(562) 531-1500

Bellflower-Somerset Mutual Water Co.
10016 Flower Street
Bellflower, CA 90706
(562) 866-9980

Golden State Water Company
11469 Rosecrans Avenue
Norwalk, CA 90650
(562) 907-9200

San Gabriel Valley Water Company
11142 Garvey Avenue
El Monte, CA 91733
(626) 448-6183

City of Huntington Park
6900 Bissell Street
Huntington Park, CA 90255
(323) 584-6323

Upper San Gabriel Valley MWD
11310 East Valley Boulevard
El Monte, CA 91731
(626) 423-2297

Valencia Water Company
24631 Avenue Rockefeller
Valencia, CA 91355
(661) 294-0828

Los Angeles Co. Waterworks No. 40
900 S. Fremont Avenue
Alhambra, CA 91803
(626) 458-5100

TABLE 6
WATER, ENERGY, CHEMICAL, AND AIR POLLUTANT SAVINGS
FROM RECYCLED WATER USAGE - FISCAL YEAR 2011-12

Category	Units	Savings
Water Supply	acre-feet	95,211
Water Supply	No. of People	476,055
Energy	kilowatt-hours	285,633,000
Energy	megawatts	32.6
Energy	barrels of oil	154,786
Electricity	dollars	42,844,950
Petroleum	dollars	16,432,082
WRP chemicals	dollars	134,935
Nitrogen oxide	tons	164.2
Carbon monoxide	tons	28.6
Sulfur oxides	tons	17.1
Particulates	tons	5.7
Reactive organic gases	tons	1.4
Carbon dioxide	tons	214,225

1.4 SUMMARY

Of the 431.39 MGD of treated effluent produced by the Sanitation Districts, 165.92 MGD (38.5%) was treated to a suitable level for reuse, with 84.74 MGD (19.6%) actually being reused at 706 individual sites in 30 cities for numerous diverse applications (with more than half of the reuse being for groundwater replenishment). This level of reuse represented more than half of the recycled water available for reuse. Effluent production continued to decrease due to increased conservation and reduced commercial/industrial activity. The top 10 largest direct reuse sites (less than 2% of all sites, excluding recharge and environmental) used almost 23% of the recycled water delivered during the fiscal year. Fifty-five new reuse sites were added during FY 11-12 (one site ceased operation), and the amount of recycled water used increased by 11.4% over the preceding fiscal year mostly due to a significant increase in the amount of groundwater replenishment. The use of 95,211 AF of locally produced recycled water essentially resulted in the conservation of the water supply needs of nearly half a million people, and in significant reductions in treatment plant chemical usage, water rates for end users, energy consumption, and air pollution.

Since the official beginning of the Sanitation Districts’ water recycling program in August 1962 with the start-up of the Whittier Narrows WRP, approximately 2,592,849 AF (844.6 billion gallons) of recycled water produced by Sanitation Districts’ facilities have been beneficially used. This use of recycled water has avoided the release of approximately 5.83 million tons of carbon dioxide and 5,912 tons of other air pollutants into the atmosphere.

All of the currently active reuse sites, along with their acreage, start-up dates, applications, and quantities of recycled water used for FY 11-12 are presented chronologically in Table 7. A chronology of significant events in the Sanitation Districts’ reuse programs is presented at the end of this report in Appendix A. Final effluent quality for each of the Sanitation Districts’ tertiary WRPs is presented in Appendix B.

TABLE 7
SUMMARY OF FISCAL YEAR 11-12 RECYCLED WATER USAGE
(PAGE 1 OF 13)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Water Replenishment District (WNWRP)	Aug 62	--	R	7.153	8,037
La Ca□ada-Flintridge Country Club (La Ca□ada)	Oct 62	105	L,P	0.083	93
Apollo Lakes Community Regional Park (Lancaster)	Jun 69	56	L,P	0.226	254
Water Replenishment District(SJCWRP)	Jun 71	--	R	34.454	38,713
Cal Poly, Pomona-Kellogg (Pomona)	Dec 73	500	AG,L,O,P,AF	0.566	636
Lanterman Hospital (Pomona)	Dec 73	100	AG	0	0
South Campus Drive Parkway (Pomona)	Dec 73	8	L	0.012	13
Route 57 and 10 Freeways (Pomona)	May 75	18	L	0.051	57
Bonelli Regional County Park (San Dimas)	Apr 77	789	L	0.749	841
California Country Club (Industry)	Jun 78	120	L,P	0.376	423
Ironwood 9 Golf Course (Cerritos)	Nov 78	25	L,P	0.089	100
Caruthers Park (Bellflower)	Nov 78	5	L	0.042	47
El Dorado Park West (Long Beach)	Aug 80	135	L	0.125	141
El Dorado Golf Course (Long Beach)	Aug 80	150	L	0.179	201
Suzanne Park (Walnut)	Oct 80	12	L	0.016	18
Route 71 and 10 Freeways (Pomona)	Apr 81	12	L	0.005	6
Piute Ponds (Lancaster)	May 81	400	E	6.348	7,133
Recreation Park (Long Beach)	Oct 82	26	L	0.053	59
Recreation Golf Course (Long Beach)	Oct 82	149	L	0.226	253
Whaley Park (Long Beach)	Jun 83	9	L	0.024	27
Industry Hills Recreation Area (Industry)	Aug 83	600	L,P	0.804	903
El Dorado Park East (Long Beach)	Jan 84	300	L	0.375	422
Nature Center (Long Beach)	Jan 84	60	L	0.042	47
605 Freeway at Wardlow (Long Beach)	Feb 84	50	L	0.021	24
Heartwell Park (Long Beach)	Feb 84	120	L	0.137	153
Skylinks Golf Course (Long Beach)	Apr 84	155	L,P	0.240	270
Douglas Park (Long Beach)	Apr 84	3	L	0.005	5
405 Freeway at Atherton (Long Beach)	May 84	5	L	0.00004	0.05
DeMille Junior High School (Long Beach)	Jun 84	5	AF,L	0.0005	1
Heartwell Golf Park (Long Beach)	Jun 84	30	L	0.064	72
Spadra Landfill landscape (Walnut)	Jul 84	53	L	0.327	368
Spadra Landfill dust control (Walnut)	Jul 84	--	I	0.003	4
Veterans Memorial Stadium (Long Beach)	Jan 85	6	AF	0.018	20
Harrington Farms Pistachio Orchard (Palmdale)	Apr 85	23	AG	0.076	85
Recreation Park Bowling Green (Long Beach)	Aug 85	3	L	0.005	6
California State University, Long Beach	Dec 85	52	AF,L	0.141	159
Long Beach City College (Long Beach)	Feb 86	15	AF,L	0.183	206
Recreation 9-Hole Golf Course (Long Beach)	Mar 86	37	L	0.073	83
Blair Field (Long Beach)	Apr 86	5	AF	0.012	13
Woodlands Park (Long Beach)	Apr 86	7	L	0.012	13
Colorado Lagoon Park (Long Beach)	Apr 86	4	L	0.0002	0.3
Marina Vista Park (Long Beach)	Apr 86	30	L	0.033	37
Suzanne Middle School (Walnut)	May 86	4	AF,L	0.011	12
Walnut High School (Walnut)	May 86	15	AF,L	0.019	21
Vejar School (Walnut)	May 86	3	AF,L	0.009	10
Morris School (Walnut)	May 86	9	AF,L	0.010	12
Snow Creek Park (Walnut)	May 86	7	L	0.011	12
Snow Creek Landscape Maintenance Dist. (Walnut)	May 86	13.5	L	0.048	54
Lemon Creek Park (Walnut)	May 86	5	L	0.006	7
Friendship Park (West Covina)	May 86	6	L	0.008	9
Hollingworth School (West Covina)	May 86	3	AF,L	0.006	7
Lanesboro Park (West Covina)	May 86	2	L	0.008	9
Rincon Middle School (West Covina)	May 86	3	AF,L	0.009	11
Route 57 and 60 Freeways (Rowland Heights)	May 86	19.7	L	0.019	21

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

Table 7
Summary of Fiscal Year 11-12 Recycled Water Usage
(Page 2 of 13)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Rowland Heights Reg. Co. Park (Rowland Heights)	May 86	11	L	0.013	15
Rowland High School (Rowland Heights)	May 86	9	AF,L	0.017	20
Killian Elementary School (Rowland Heights)	May 86	3	AF,L	0.005	5
Walnut Elementary School (Walnut)	May 86	4	AF,L	0.001	1
WUSD Administrative Service Center (Walnut)	May 86	4	L	0.003	3
Walnut Ranch Park (Walnut)	Jun 86	26	L	0.022	25
Amar Road greenbelt (Walnut)	Jun 86	16	L	0.035	40
Diamond Bar Golf Course (Diamond Bar)	Jul 86	174	L,P	0.192	215
Walnut Ridge Landscape Maintenance Dist. (Walnut)	Mar 87	25.5	L	0.040	45
Morningside Park (Walnut)	Mar 87	4	L	0.006	7
Gateway Corporate Center (Diamond Bar)	Jun 87	45	L	0.038	43
Library Civic Center (Cerritos)	Dec 87	4	L	0.016	18
Olympic Natatorium (Cerritos)	Dec 87	6	L	0.018	20
Whitney Learning Center (Cerritos)	Dec 87	10	AF,L	0.020	23
Gonsalves Elementary School (Cerritos)	Dec 87	5	AF,L	0.010	11
Wittman Elementary School (Cerritos)	Dec 87	5	AF,L	0.010	11
Gahr High School (Cerritos)	Dec 87	28	AF,L	0.055	62
Area Development Project No. 2 (Cerritos)	Jan 88	11.5	L,P	0.061	69
Medians Parkways (Cerritos)	Jan 88	42.8	L	0.146	164
605 Freeway (Cerritos)	Jan 88	58.6	L	0.104	117
91 Freeway (Cerritos)	Jan 88	70	L	0.032	36
Frontier Park (Cerritos)	Jan 88	2.5	L	0.010	11
Carmenita Junior High School (Cerritos)	Jan 88	5	AF,L	0.016	18
Cerritos Elementary School (Cerritos)	Jan 88	6	AF,L	0.009	10
Stowers Elementary School (Cerritos)	Jan 88	6	AF,L	0.019	22
Kennedy Elementary School (Cerritos)	Jan 88	7	AF,L	0.016	18
City Park East (Cerritos)	Jan 88	18	L	0.047	52
Satellite Park (Cerritos)	Jan 88	2	L	0.004	4
Leal Elementary School (Cerritos)	Jan 88	6	AF,L	0.007	8
Cerritos High School (Cerritos)	Jan 88	20	AF,L	0.044	49
Elliott Elementary School (Cerritos)	Jan 88	7	AF,L	0.012	14
Carmenita Park (Cerritos)	Jan 88	4.5	L	0.016	17
Juarez Elementary School(Cerritos)	Jan 88	7	AF,L	0.018	20
ABC Adult School Office (Cerritos)	Jan 88	3	L	0.014	16
Tracy Education Center (Cerritos)	Jan 88	6	AF,L	0.003	3
Liberty Park (Cerritos)	Jan 88	20	L	0.072	80
Gridley Park (Cerritos)	Jan 88	9	L	0.026	30
Jacob Park (Cerritos)	Jan 88	4.5	L	0.016	18
Heritage Park (Cerritos)	Feb 88	12	L	0.034	39
Bragg Elementary School (Cerritos)	Feb 88	7	AF,L	0.015	17
Haskell Junior High School (Cerritos)	Feb 88	18	AF,L	0.045	51
Pat Nixon Elementary School(Cerritos)	Feb 88	5	AF,L	0.009	11
Cabrillo Lane Elementary School (Cerritos)	Feb 88	9	AF,L	0.001	1
Sunshine Park (Cerritos)	Feb 88	3.5	L	0.010	11
Friendship Park (Cerritos)	Feb 88	4	L	0.009	10
Bettencourt Park (Cerritos)	Feb 88	2	L	0.005	6
Brookhaven Park (Cerritos)	Feb 88	2	L	0.005	6
Saddleback Park (Cerritos)	Feb 88	2	L	0.005	5
Westgate Park (Cerritos)	Feb 88	4	L	0.009	11
Rainbow Park (Cerritos)	Mar 88	2.5	L	0.005	6
Bellflower Christian School	Mar 88	31.4	AF,L	0.035	39
Cerritos Community College (Cerritos)	Mar 88	55	AF,L	0.094	106
Cerritos Regional County Park (Cerritos)	Apr 88	59	L	0.113	127
Artesia Cemetery District (Cerritos)	Apr 88	10.9	L	0.024	26

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

Table 7
Summary of Fiscal Year 11-12 Recycled Water Usage
(Page 3 of 13)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Rosewood Park (Cerritos)	Apr 88	2.7	L	0.015	17
20659 E. Valley Blvd. (Walnut)	May 88	7	O	0.00001	0.01
Nebeker Ranch (Lancaster)	Jun 88	600	AG	3.837	4,311
Lakewood 1st Presbyterian Church (Long Beach)	Sep 88	1	L	0.0001	0.1
Westhoff Elementary School (Walnut)	Sep 88	8	AF,L	0.005	6
Tree Farm (Palmdale)	Feb 89	46	O	0.006	6
Virginia Country Club (Long Beach)	Mar 89	135	L,P	0.076	85
Lakewood Golf Course (Long Beach)	Mar 89	128	L,P	0.293	330
Scherer Park (Long Beach)	Mar 89	24	L	0.036	41
Sports Complex (Cerritos)	Mar 89	25	AF,L	0.052	59
Sunnyside Memorial Park (Long Beach)	Apr 89	35	L	0.073	82
All Soul's Cemetery (Long Beach)	Apr 89	40	L	0.100	112
Cherry Avenue Park (Long Beach)	May 89	10	L	0.014	16
River (Rynerson) Park (Lakewood)	Aug 89	40	L	0.076	85
Monte Verde Park (Lakewood)	Aug 89	4	L	0.053	60
Mae Boyer Park (Lakewood)	Aug 89	8	L	0.027	31
Jose Del Valle Park (Lakewood)	Aug 89	12	L	0.031	35
Jose San Martin Park (Lakewood)	Aug 89	9.3	L	0.021	23
City Water Yard (Lakewood)	Aug 89	1	L	0.008	9
Woodruff Avenue greenbelt (Lakewood)	Aug 89	4.1	L	0.012	13
South Street greenbelt (Lakewood)	Aug 89	3.3	L	0.008	9
Mayfair Park (Lakewood)	Dec 89	18	L	0.041	47
Shoemaker On-Off Ramp - 91 Freeway (Cerritos)	Dec 89	4.6	L	0.013	15
Temple Avenue greenbelt (Walnut)	Jan 90	1	L	0.001	1
Transpacific Development Co. (Cerritos)	Feb 90	6.9	L	0.010	12
Automated Data Processing (Cerritos)	Feb 90	0.7	L	0.004	4
Sheraton Hotel (Cerritos)	Mar 90	0.6	L	0.003	4
Walnut Tech Business Center (Walnut)	Apr 90	1	L	0.002	2
Cerritos Pontiac-GMC Truck (Cerritos)	May 90	0.5	L	0.002	2
Moothart Chrysler (Cerritos)	May 90	0.4	L	0.005	5
St. Joseph Parish School (Lakewood)	Aug 90	3.5	AF,L	0.010	11
Foster Elementary School (Lakewood)	Sep 90	6	AF,L	0.016	18
Windjammer Off Ramp - 91 Freeway (Cerritos)	Sep 90	0.8	L	0.002	3
Browning Oldsmobile (Cerritos)	Sep 90	0.1	L	0.002	2
Civic Center Way and City Hall (Lakewood)	Nov 90	2.8	L	0.018	21
Los Coyotes Diagonal (Long Beach)	Mar 91	1	L	0.005	6
City Water Truck (Cerritos)	May 91	--	L	0.0001	0.1
Private Haulers (Cerritos)	May 91	--	I	0	0
Parkside Condominiums (Cerritos)	May 91	1.8	L	0.005	6
Mayfair High School (Lakewood)	May 91	36.5	AF,L	0.044	50
Wilson High School (Long Beach)	Jun 91	5	AF,L	0.023	26
Concordia Church (Cerritos)	Jun 91	4	L	0.003	4
Church of the Nazarene (Cerritos)	Aug 91	1	L	0.003	4
B&B Stables (Cerritos)	Aug 91	18	I	0.004	5
Lemon Avenue greenbelt (Walnut)	Sep 91	4.3	L	0.007	8
Lindstrom Elementary School (Lakewood)	Sep 91	12	AF,L	0.015	16
Lakewood High School (Lakewood)	Sep 91	25	AF,L	0.026	29
Shadow Park Homeowner's Association (Cerritos)	Nov 91	6	L	0.019	21
South Coast AQMD Headquarters (Diamond Bar)	Nov 91	2	L	0.005	5
Long Beach Water Department office (Long Beach)	Jan 92	2	L	0.0003	0.3
Reservoir Park (Signal Hill)	Feb 92	2	L	0.008	8
Burroughs Elementary School (Signal Hill)	Feb 92	4	AF,L	0.002	2
Andy's Nursery (Bellflower)	Feb 92	9	O	0	0
Lake Center Park (Santa Fe Springs)	Mar 92	8	L	0.019	22

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

Table 7
Summary of Fiscal Year 11-12 Recycled Water Usage
(Page 4 of 13)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Lake Center School (Santa Fe Springs)	Mar 92	8	AF,L	0.018	20
Clarkman Walkway (Santa Fe Springs)	Mar 92	0.1	L	0.0004	0.4
Towne Center Walkway (Santa Fe Springs)	Apr 92	0.1	L	0.0002	0.2
Lakeview Child Care (Santa Fe Springs)	May 92	0.2	L	0.002	2
Orr □ Day Road medians (Santa Fe Springs)	May 92	0.1	L	0	0
Hughes Middle School (Long Beach)	Apr 92	3	AF,L	0.010	11
405 Freeway at Walnut (Long Beach)	Apr 92	9	L	0.004	5
Area Development Project No. 6 (Cerritos)	Apr 92	9	L	0.054	60
Somerset Park (Long Beach)	May 92	3	L	0.002	3
Longfellow Elementary School (Long Beach)	May 92	1	AF,L	0.001	1
Granada Park Homeowners Association (Cerritos)	May 92	3.8	L	0.008	10
Walnut Valley Water Dist. reservoir (Diamond Bar)	May 92	1	L	0.006	7
Florence Avenue medians (Santa Fe Springs)	Jun 92	3	L	0.006	6
Gauldin Elementary School (Downey)	Jun 92	8.4	AF,L	0.006	7
Rio San Gabriel School (Downey)	Jun 92	14.8	AF,L	0.016	18
Bellflower High School (Bellflower)	Jul 92	28.4	AF,L	0.070	78
Ernie Pyle Elementary School (Bellflower)	Aug 92	4.9	AF,L	0.011	13
Telegraph Road medians (Santa Fe Springs)	Aug 92	0.5	L	0.003	3
Lakeview Park (Santa Fe Springs)	Aug 92	6.7	L	0.013	14
Clark Estate (Santa Fe Springs)	Aug 92	4.3	L	0.006	6
Towne Center Green (Santa Fe Springs)	Aug 92	2.3	L	0.005	6
Pioneer Road medians (Santa Fe Springs)	Sep 92	0.4	L	0.028	32
Police Station (Santa Fe Springs)	Sep 92	0.2	L	0.002	2
Aquatic Center (Santa Fe Springs)	Sep 92	0.5	L	0.004	5
Lewis School (Downey)	Nov 92	4.6	AF,L	0.006	7
Wilderness Park (Downey)	Nov 92	24	L	0.089	100
First Chinese Baptist Church (Walnut)	Dec 92	0.3	L	0.002	2
605 Freeway at Foster (Bellflower)	Jan 93	14	L	0.005	5
Promenade Walkway (Santa Fe Springs)	Jan 93	0.3	L	0.002	2
Rio San Gabriel Park (Downey)	Jan 93	6.4	L	0.042	47
East Middle School (Downey)	Jan 93	26	AF,L	0.023	25
Zinn Park (Bellflower)	Jan 93	1.7	L	0.009	10
Cerritos Post Office (Cerritos)	Feb 93	0.7	L	0.005	5
605□105 Interchange (Bellflower)	Feb 93	22	L	0.0002	0.3
Hollywood Sports Center (Bellflower)	Feb 93	22.5	L	0.002	2
Santa Fe Springs High School (Santa Fe Springs)	Feb 93	14.5	AF,L	0.022	25
605□5 Freeway at Florence (Santa Fe Springs)	Feb 93	17	L	0	0
Center for the Performing Arts (Cerritos)	Mar 93	1	L	0.004	5
Old Downey Cemetery (Downey)	Apr 93	7.5	L	0.022	25
Thompson Park (Bellflower)	Apr 93	15	L	0.022	25
My Hoa Farm (Lakewood)	May 93	5	AG	0.013	15
105 Freeway at Bellflower (Downey)	May 93	17.9	L	0.009	10
Palms Park (Lakewood)	May 93	20	L	0.004	5
Crawford Park (Downey)	Jul 93	2.1	L	0.008	10
Humedo Nursery (Downey)	Aug 93	11	O	0.005	6
105 Freeway at Lakewood (Downey)	Sep 93	25	L	0.003	3
Shaw Industries Carpet Mill (Santa Fe Springs)	Sep 93	--	I	0.068	76
Palms Elementary School (Lakewood)	Sep 93	3.5	AF,L	0.013	14
Artesia High School (Lakewood)	Sep 93	20.9	AF,L	0.033	37
West Middle School (Downey)	Oct 93	19.5	AF,L	0.019	21
Circle Park (South Gate)	Oct 93	4	L	0.013	15
Burger King restaurant (Diamond Bar)	Oct 93	0.2	L	0.001	1
Majestic Mgmt., 19850 E. Business Pkwy (Walnut)	Nov 93	0.8	L	0.003	3
General Electric, 19705 E. Business Pkwy (Walnut)	Nov 93	1.6	L	0.006	7

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

TABLE 7
SUMMARY OF FISCAL YEAR 11-12 RECYCLED WATER USAGE
(PAGE 5 OF 13)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Hollydale Park (South Gate)	Nov 93	46	L	0.089	100
Delta Dental (Cerritos)	Nov 93	1.8	L	0.003	3
Cal Poly LandLab (Pomona)	Nov 93	2.5	AG,L	0.010	12
Rodeo Ridge Estates (Walnut)	Dec 93	6.3	L	0.006	7
Robertson's Ready-Mix (Santa Fe Springs)	Dec 93	--	I	0.005	6
710/105 Interchange (Paramount)	Dec 93	18.5	L	0.001	1
Downey/Contreras greenbelt (Paramount)	Dec 93	0.1	L	0.001	1
Compton Golf Course (Paramount)	Dec 93	13	L	0.023	26
Alondra Junior High School (Paramount)	Dec 93	14	AF,L	0.029	32
Mokler Elementary School (Paramount)	Dec 93	10	AF,L	0.009	10
Los Cerritos Elementary School (Paramount)	Dec 93	8	AF,L	0.013	15
Wirtz Elementary School (Paramount)	Dec 93	9	AF,L	0.011	12
Keppel Elementary School (Paramount)	Dec 93	4	AF,L	0.002	2
Billy Lee Nursery (Paramount)	Dec 93	2.5	O	0.009	10
Golden Springs Drive medians (Diamond Bar)	Jan 94	1.3	L	0.006	7
105 Freeway at Wright (Lynwood)	Jan 94	19.6	L	0.001	1
710 Freeway at M.L. King (Lynwood)	Jan 94	15.5	L	0	0
710 Freeway at Rosecrans (Compton)	Jan 94	24.2	L	0	0
Independence Park (Downey)	Feb 94	10.4	L	0.012	14
Paramount Park (Paramount)	Feb 94	9	L	0.023	26
Paramount High School (Paramount)	Feb 94	19	AF,L	0.030	34
Southern California Edison nursery (Cerritos)	Mar 94	3.5	O	0.004	5
Walnut Hills Village Shopping Center (Walnut)	Mar 94	2.4	L	0.005	6
Rosecrans/Paramount medians (Paramount)	Mar 94	0.2	L	0.001	1
Somerset medians (Paramount)	Apr 94	0.9	L	0.005	6
Rio Hondo Golf Course (Downey)	Apr 94	92.4	L	0.231	259
Zimmerman Park (Norwalk)	Apr 94	9.5	L	0.015	17
Vista Verde Park (Norwalk)	Apr 94	6.5	L	0.010	12
Gerdes Park (Norwalk)	Apr 94	8.6	L	0.017	19
Clearwater Junior High School (Paramount)	Apr 94	4	AF,L	0.033	37
Vestar Development (Cerritos)	Jun 94	9.6	L	0.032	36
Steam Engine Park (Paramount)	Jun 94	0.6	L	0.002	2
5 Freeway at Shoemaker/Firestone (Norwalk)	Jul 94	0.8	L	0.002	2
Spane Park (Paramount)	Jul 94	5	L	0.009	11
Orange/Cortland Parkway (Paramount)	Jul 94	1.3	L	0.003	3
Carpenter School (Downey)	Aug 94	7.4	AF,L	0.006	6
Brookside Equestrian Center (Walnut)	Aug 94	13.6	L	0.002	2
Field, S/W corner Norwalk/Telegraph (S.F. Spgs.)	Aug 94	5.2	L	0.012	13
Washington Elementary School (Whittier)	Sep 94	5	AF,L	0.010	11
605 Freeway at Beverly (Whittier)	Sep 94	30	L	0.011	12
John Anson Ford Park (Bell Gardens)	Sep 94	45	L	0.065	73
Ramona Park (Norwalk)	Oct 94	4.8	L	0.007	8
Alondra median (Paramount)	Oct 94	0.6	L	0.007	8
Imperial/Wright Road medians (Lynwood)	Oct 94	0.2	L	0.002	2
Walnut Valley Water District Office (Walnut)	Oct 94	0.2	L	0.002	2
Cattelus Development (Walnut)	Oct 94	18.9	L	0.013	15
Circuit City, 501 Cheryl Lane (Walnut)	Oct 94	1	L	0.007	8
Dreyer's Grand Ice Cream, 351 Cheryl Lane (Walnut)	Oct 94	0.6	L	0.004	4
Sorenson Elementary School (Whittier)	Oct 94	4	AF,L	0.005	6
Palm Park West (Whittier)	Nov 94	5	L	0.008	9
Metrolink Station (Industry)	Nov 94	0.6	L	0.002	2
Little Lake Park (Santa Fe Springs)	Dec 94	18	L	0.038	43
Sundance Condominiums (Cerritos)	Jan 95	9	L	0.033	37
Del Paso High School (Walnut)	Jan 95	3	AF,L	0.004	4

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

Table 7
Summary of Fiscal Year 11-12 Recycled Water Usage
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Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Dow Corning, 20832 Currier Road (Walnut)	Jan 95	0.1	L	0.0001	0.1
Circuit City Headquarters, Currier/Lemon (Walnut)	Apr 95	1.1	L	0.008	9
Sysco Food Service, 20701 Currier Road (Walnut)	Apr 95	2.3	L	0.008	9
Tung Hsin Trading, 20420 E. Business Pkwy (Walnut)	Apr 95	0.8	L	0.003	4
Amergence Tech. Inc., 20480 E. Bus. Pkwy (Walnut)	Apr 95	0.9	L	0.003	3
Dura Freight Lines, 515-525 S. Lemon (Walnut)	Apr 95	0.5	L	0.001	1
S/W-S/E Corner Lemon/Bus. Parkway (Walnut)	Apr 95	0.2	L	0.004	5
Dura Freight Lines , 20275 Bus. Parkway (Walnut)	Apr 95	1.3	L	0.003	3
Coaster Co. of America, 20300 Bus. Parkway (Walnut)	Apr 95	0.7	L	0.002	3
Dura Freight Lines, 20405 Bus. Parkway (Walnut)	Apr 95	1	L	0.002	3
Dura Freight Lines, 20595 E. Business Pkwy (Walnut)	Apr 95	0.8	L	0.004	4
Dura Freight Lines, 20445 E. Business Pkwy (Walnut)	Apr 95	0.7	L	0.002	2
Orange Grove School (Whittier)	Apr 95	6.6	AF,L	0.008	9
South Middle School (Downey)	May 95	15.8	AF,L	0.017	19
Nuffer Elementary School (Norwalk)	Jun 95	10.4	AF,L	0.009	10
Lampton Middle School (Norwalk)	Jun 95	9.5	AF,L	0.014	15
THUMS (Long Beach)	Jun 95	8	I	1.256	1,412
820 Fairway Drive medians (Industry)	Jun 95	0.1	L	0.001	1
Spencer N Enterprises, Inc., 435 S. Lemon (Walnut)	Jun 95	0.5	L	0.001	2
General Electric, 19805 E Business Pkwy (Walnut)	Jun 95	1.1	L	0.007	7
Menlo Logistics, 20002 E. Business Pkwy (Walnut)	Jun 95	4	L	0.006	7
General Electric, 20005 E. Business Parkway (Walnut)	Jun 95	6.7	L	0.010	11
Hargitt Middle School (Norwalk)	Jul 95	9.5	AF,L	0.022	24
Norwalk Adult School (Norwalk)	Jul 95	17.2	AF,L	0.026	29
John Glenn High School (Norwalk)	Jul 95	38.8	AF,L	0.045	50
Ramona Elementary School (Norwalk)	Jul 95	6.8	AF,L	0.007	8
New River Elementary School (Norwalk)	Jul 95	10.3	AF,L	0.010	12
Morrison Elementary School (Norwalk)	Sep 95	7.7	AF,L	0.009	10
Katherine Edwards Middle School (Whittier)	Sep 95	19	AF,L	0.018	20
Longfellow Elementary School (Whittier)	Sep 95	4.5	AF,L	0.003	3
Walter Dexter Middle School (Whittier)	Sep 95	15.5	AF,L	0.008	9
D.D. Johnston Elementary School (Norwalk)	Sep 95	8.9	AF,L	0.008	9
Corvallis Middle School (Norwalk)	Sep 95	16.9	AF,L	0.022	24
Norwalk High School (Norwalk)	Sep 95	35.1	AF,L	0.034	38
Heritage Park (Santa Fe Springs)	Oct 95	9.2	L	0.009	10
Belloso Farm Nursery (Paramount)	Oct 95	2.5	O	0	0
Robertson's Ready-Mix (Paramount)	Nov 95	--	I	0.008	8
Cerritos Nursery (Cerritos)	Dec 95	3	O	0.004	4
Spadra Gas-to-Energy Plant (Walnut)	Dec 95	--	I	0.045	51
Founders Memorial Park (Whittier)	Jan 96	4	L	0.011	12
Los Nietos Park (Santa Fe Springs)	Jan 96	11.2	L	0.016	19
Bell Gardens Soccer Field (Bell Gardens)	Feb 96	2.6	AF	0.011	12
Jersey Ave. School/city athl. fields (S.F. Springs)	Mar 96	8	AF	0.007	8
Salt Lake Municipal Park (Huntington Park)	Apr 96	20.9	L	0.044	50
Sorenson Park (Whittier)	May 96	10.7	L	0.017	20
Sorenson Library (Whittier)	May 96	0.4	L	0	0
Encore Maintenance-Warmington Homes (Cerritos)	May 96	1.1	L	0.003	3
Bellflower Blvd. medians (Bellflower)	Jul 96	0.3	L	0.002	2
Alta Produce (Paramount)	Aug 96	4	AG	0.002	2
Artesia Off Ramp - 91 Freeway (Cerritos)	Aug 96	3.3	L	0.006	6
Ping Ting Hsu, 20701 Currier Road (Walnut)	Aug 96	0.1	L	0.0005	1
Belloso Farm Nursery (South Gate)	Sep 96	2.5	O	0.002	2
Temple Park (Downey)	Oct 96	1	L	0.001	2
Woodruff Avenue medians (Bellflower)	Oct 96	0.8	L	0.005	5

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

TABLE 7
SUMMARY OF FISCAL YEAR 11-12 RECYCLED WATER USAGE
(PAGE 7 OF 13)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Lawrence Allen □ Assoc., 20822 Currier Rd. (Walnut)	Oct 96	0.1	L	0.001	1
Fairway Business Cntr., 19700 Business Pkwy (Walnut)	Nov 96	0.4	L	0.002	3
Joe Rodgers Park (Long Beach)	Nov 96	4.5	L	0.008	9
Ham Park (Lynwood)	Dec 96	10	L	0	0
Jauregui Nursery (Paramount)	Dec 96	2	O	0.002	3
Heritage Corporate Center (Santa Fe Springs)	Jan 97	29.9	L	0.027	31
Belloso Farm Nursery (Bellflower)	Jan 97	8	O	0	0
Foster Road medians (Norwalk)	Jan 97	0.3	L	0.002	3
Rowland Heights Christian Church (Rowland Heights)	Feb 97	0.5	L	0.0004	0.4
Rosecrans Avenue medians (Paramount)	Mar 97	0.2	L	0.002	3
Texaco□Somerset medians (Paramount)	Mar 97	0.2	L	0.002	2
McLane Mowers (Paramount)	Mar 97	0.6	L	0	0
ABC Nursery (Paramount)	Mar 97	16	O	0	0
L.A. County Vector Control Bldg. (Santa Fe Springs)	Mar 97	3.8	L	0.004	5
Greenstone Warehouse (Santa Fe Springs)	Apr 97	0.4	L	0.002	2
Viewsonic, 510 Cheryl□455 Brea Canyon (Walnut)	Jul 97	1.8	L	0.010	11
Jauregui Nursery (Long Beach)	Jul 97	5	O	0.031	35
McNab Avenue medians (Bellflower)	Jul 97	0.1	L	0.0004	0.4
Foster Road□Premier Ave. medians (Downey)	Aug 97	0.1	L	0.00005	0.1
Palm Growers Nursery (Downey)	Oct 97	7.3	O	0	0
Alondra Blvd medians @ SGR (Bellflower)	Oct 97	0.1	L	0.001	1
Puente Hills Landfill irrigation (Industry)	Nov 97	320	L	0.824	926
Puente Hills Landfill dust control (Industry)	Nov 97	130	I	0.155	175
Puente Hills Gas-to-Energy Facility (Industry)	Nov 97	--	I	0.563	632
Midway International (Cerritos)	Feb 98	0.3	L	0.001	1
Countryside Suites (Diamond Bar)	Mar 98	1.4	L	0.003	3
Lugo Park (Cudahy)	Apr 98	7	L	0.006	7
Rose Hills Memorial Park □upper area (Whittier)	Jun 98	298	L	0.436	490
El Dorado Lakes Condominiums (Long Beach)	Aug 98	11	L	0.025	28
Bloomfield Associates, 17871 Park Plaza Dr. (Cerritos)	Sep 98	0.5	L	0.001	1
Maruichi American building (Santa Fe Springs)	Oct 98	0.4	L	0.002	2
Diamond Crest Homeowners Assn. (Diamond Bar)	Oct 98	14	L	0.024	26
Norm Ashley Park (Walnut)	Nov 98	0.2	L	0.001	1
Play Hut, 368 Cheryl Lane (Walnut)	Nov 98	0.8	L	0.002	3
Waterfall Estates (Rowland Heights)	Dec 98	1.2	L	0.004	4
WalMart (Long Beach)	Dec 98	3	L	0.020	22
Norwalk Golf Course (Norwalk)	Jan 99	8	L	0.024	26
Vestar Development (Long Beach)	Feb 99	8	L	0.029	32
Soco-Lynch Corp. building (Santa Fe Springs)	Feb 99	1	L	0.003	3
183rd Street On Ramp - 91 Freeway (Cerritos)	Feb 99	0.6	L	0.0005	1
MC□C building (Santa Fe Springs)	Mar 99	0.7	L	0.008	9
Lakewood Blvd. medians (Paramount)	Mar 99	0.2	L	0.002	2
Progress Park (Paramount)	Mar 99	6.2	L	0.014	15
Garfield Avenue medians (Paramount)	Apr 99	0.1	L	0.002	2
Calvary Chapel (Diamond Bar)	Apr 99	1	L	0.017	20
B□B Pallet Co. (South Gate)	May 99	--	I	0	0
Hi-Tek Warehouse, 20851 Currier Road (Walnut)	Jun 99	0.2	L	0.001	2
Garcia□s Nursery (Bellflower)	Jun 99	6	O	0.001	1
Campus Group Inc, 319 Cheryl Road (Walnut)	Jul 99	0.1	L	0	0
Wind River Homeowners Assn. (Rowland Heights)	Jul 99	12.6	L	0.031	35
AT□T building, 12900 Park Plaza Drive (Cerritos)	Aug 99	0.9	L	0.010	11
Orange Avenue medians (Paramount)	Aug 99	0.1	L	0.003	4
Metropolitan State Hospital (Norwalk)	Sep 99	80	L	0	0
Moffit School (Norwalk)	Sep 99	1.6	AF,L	0.007	8

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Table 7
Summary of Fiscal Year 11-12 Recycled Water Usage
(Page 8 of 13)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
L.A. Fitness Inter., 20801 Golden Springs (Industry)	Sep 99	1.2	L	0.002	2
Comtop Enterprises, 268 Benton Court (Industry)	Sep 99	0.3	L	0.001	1
Gemini Foods Corp., 251 Benton Court (Industry)	Sep 99	0.6	L	0.001	1
Tri-Net Technology, 21709 Ferraro Parkway (Industry)	Sep 99	0.3	L	0.001	1
Hupa International, 21717 Ferraro Parkway (Industry)	Oct 99	0.3	L	0.0002	0.2
Nu-Health Products, 20875-85-95 Currier (Walnut)	Oct 99	0.1	L	0	0
Rio Hondo Channel (Downey)	Nov 99	0.8	L	0.0003	0.3
Simms Park (Bellflower)	Dec 99	12.5	L	0.017	19
Lemon Avenue medians (Industry)	Dec 99	0.1	L	0.0004	0.4
Prudential Insurance Co., 21558 Ferraro (Walnut)	Jan 00	3.5	L	0.007	8
Foster Road Greenbelt (Norwalk)	Mar 00	3.3	L	0.005	6
McDonald□s Restaurant (Diamond Bar)	Mar 00	0.1	L	0.001	1
San Luis Street @ flood channel (Paramount)	Apr 00	3	L	0.0003	0.4
J□L Footwear, 250 Benton Court (Industry)	Jul 00	0.6	L	0.001	1
Jefferson School (Paramount)	Jul 00	0.5	AF,L	0.003	3
Columbus High School (Downey)	Aug 00	25	AF,L	0.019	22
Triangle Park (South Gate)	Nov 00	0.4	L	0.002	3
Markwins Inter. Corp., 22067 Ferraro (Industry)	Nov 00	1.9	L	0.004	4
Lee Wang LLC, 21901 Ferraro Parkway (Industry)	Nov 00	2	L	0.006	7
Sun Yin USA, 280 Maclin Court (Industry)	Nov 00	0.8	L	0.001	1
SL Investment Group LLC, 218 Maclin Ct. (Industry)	Nov 00	1.5	L	0.002	2
Morrow Meadows, 231 Benton Court (Industry)	Apr 01	0.9	L	0.003	3
Golden Springs Business Park (Santa Fe Springs)	Apr 01	31.4	L	0.117	132
The Cross Schools of Education (Walnut)	May 01	0.6	AF,L	0.001	1
Bellflower Storage (Bellflower)	Jun 01	3	L	0.002	2
Railroad Beautification (Paramount)	Jul 01	0.5	L	0	0
Rio Hondo Channel (Bell Gardens)	Jul 01	0.3	L	0.002	2
Bank of the West (Rowland Heights)	Sep 01	0.1	L	0.0001	0.1
Gym□Teen Center (Walnut)	Sep 01	0.6	L	0.002	2
CDM building (Santa Fe Springs)	Oct 01	0.1	L	0.002	3
Laskey-Weil building, 13101 Moore Street (Cerritos)	Oct 01	0.4	L	0.002	3
Willow Street medians (Long Beach)	Dec 01	2.4	L	0.004	4
Yellow Box Corp., 19835 Walnut Drive (Walnut)	Dec 01	0.3	L	0.001	1
Harvard Estates (Rowland Heights)	Dec 01	2	L	0.002	2
L.A. County Recorder□s Office (Norwalk)	Jan 02	2.7	L	0.012	14
Tays Cool Fuel (Paramount)	Feb 02	0.2	L	0.002	2
Walnut Nazarene Church (Walnut)	Feb 02	0.8	L	0.0002	0.3
Antelope Valley Farms (Palmdale)	Mar 02	2,100	AG	7.146	8,030
L.A. River landscaping (South Gate)	Mar 02	2.5	L	0.0003	0.3
Majestic Mgmt., 168-188 Brea Canyon Rd. (Walnut)	Apr 02	0.6	L	0.002	2
Synnex, 108-118 Brea Canyon Rd. (Walnut)	Apr 02	0.7	L	0.002	3
Majestic Management, 108-288 Mayo Drive (Walnut)	Apr 02	0.1	L	0.006	7
Holiday Inn Express (Walnut)	May 02	0.4	L	0.002	2
Lemon Avenue Investments (Walnut)	Jun 02	0.6	L	0.002	3
Magnolia at Snow Creek (Walnut)	Jul 02	5.4	L	0.023	25
Lakewood-Adoree medians (Downey)	Jul 02	3.4	L	0.045	50
River Ridge Golf Course (Pico Rivera)	Jul 02	21.3	L	0.028	31
Long Beach Water Dept. Impoundment (Long Beach)	Jul 02	--	I	0.001	1
Everbright Management, 1163 Fairway (Industry)	Sep 02	0.6	L	0.002	2
Everbright Management, 1169 Fairway (Industry)	Sep 02	0.2	L	0.001	1
Kelly Paper, 228 Brea Canyon Road (Walnut)	Sep 02	1.2	L	0.0002	0.2
V-Tec Automotive, 19677 Valley Blvd. (Walnut)	Sep 02	0.1	L	0.0002	0.2
Grand and Valley landscaping (Walnut)	Sep 02	0.1	L	0.005	6
Extra Space Storage (Walnut)	Oct 02	0.8	L	0.002	2

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TABLE 7
SUMMARY OF FISCAL YEAR 11-12 RECYCLED WATER USAGE
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Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Latter Days Saints Church (Walnut)	Oct 02	0.9	L	0.003	3
Nogales and Killian landscaping (Rowland Heights)	Oct 02	0.1	L	0.0005	1
A&R West Family LLC, 20855 Golden Sprgs (D. Bar)	Nov 02	0.2	L	0.001	1
Chancellor Village Senior Housing (Cerritos)	Nov 02	0.9	L	0.003	3
Simon Trucking (Santa Fe Springs)	Nov 02	0.9	L	0.001	1
Foster/Coldbrook medians (Bellflower)	Nov 02	0.1	L	0.0003	0.3
L.A. County Library (Norwalk)	Nov 02	0.9	L	0.005	5
Metro State/Wheelabrator (Norwalk)	Jan 03	B	I	0.192	216
Alamitos Seawater Intrusion Barrier (Long Beach)	Feb 03	--	R	1.933	2,171
Boeing (Long Beach)	Mar 03	52	L	0.016	18
Brea Canyon Rd./Old Ranch Road medians (Industry)	May 03	0.1	L	0.0001	0.1
CLT Computers, Inc., 20153 Paseo del Prado (Walnut)	May 03	0.6	L	0.002	3
Rio Hondo College (Whittier)	Jun 03	85	AF,L	0.023	25
Mill Elementary School (Whittier)	Jun 03	15	AF,L	0.005	6
Del Amo Blvd. greenbelt (Lakewood)	Jul 03	0.3	L	0.002	3
Imperial Equestrian (South Gate)	Jul 03	1.5	L	0.003	4
Norwalk Walkway/Parking (Santa Fe Springs)	Jul 03	1	L	0.004	5
Tournament Players Club at Valencia (Santa Clarita)	Aug 03	120	L	0.311	349
26840-27236 The Old Road medians (Santa Clarita)	Aug 03	5.8	L	0.020	22
Autosmart Intl., 19885 Harrison Ave. (Industry)	Aug 03	0.2	L	0.001	1
Broadway.com, 19715 Harrison Ave. (Industry)	Aug 03	0.5	L	0.002	2
Bayharbor-Harrison Assn., 19901 Harrison (Industry)	Aug 03	0.8	L	0.003	3
J Pack International, 19789 Harrison Ave. (Industry)	Aug 03	0.5	L	0.001	1
Ziprint Image Corp., 19805 Harrison Ave. (Industry)	Aug 03	0.2	L	0.001	1
San Malone Enterprises, 19865 Harrison (Industry)	Aug 03	0.3	L	0.002	2
Shinetec Group, Inc., 19685 Harrison Ave. (Industry)	Aug 03	0.4	L	0.0004	0.5
Majestic Realty, Grand Ave./Village Staples (Walnut)	Aug 03	1.6	L	0.006	6
Orange Grove Services, Lemon/La Puente (Walnut)	Sep 03	0.4	L	0.003	3
Max Property LLC, 21401 Ferraro Pkwy. (Industry)	Sep 03	0.7	L	0.004	5
NP 21301 Ferraro Pkwy., 21301 Ferraro (Industry)	Sep 03	0.8	L	0.003	3
568 TriNet Court (Walnut)	Oct 03	0.3	L	0.001	1
Steve Horn Way/Bellflower medians (Downey)	Nov 03	0.3	L	0.015	17
Walnut City Hall (Walnut)	Dec 03	0.6	L	0.001	1
Walnut Senior Center (Walnut)	Dec 03	0.5	L	0.001	1
Hill's Pet Nutrition, 318 Brea Canyon Rd. (Walnut)	Dec 03	2.6	L	0.006	6
Young Hoon Cho, 1709 Nogales St. (Rowland Heights)	Mar 04	0.1	L	0.0004	0.4
Shell Station, 21103 Golden Springs Dr. (Diamond Bar)	Mar 04	0.1	L	0.0002	0.2
Ferraro/Grand East ramp (Industry)	Apr 04	3.8	L	0.005	5
Hing Wa Lee Plaza, 1569 Fairway Dr. (Walnut)	May 04	0.1	L	0.001	1
Tucker Elementary School (Long Beach)	May 04	3	AF, L	0.005	5
Southcoast Cabinet, 20625 Lycoming St. (Walnut)	Jun 04	0.3	L	0.001	1
APL Logistics, 408 Brea Canyon Rd. (Walnut)	Jun 04	2.1	L	0.005	6
Alamitos Hill Reservoir landscaping (Long Beach)	Jul 04	8.6	L	0.0003	0.3
Adnoff Family Trust, 20801 Currier Rd. (Walnut)	Jul 04	0.1	L	0.001	1
Sentous Valley LLC, 2889 Valley Blvd. (Walnut)	Aug 04	0.1	L	0.0003	0.4
Pro Growers Nursery (Norwalk)	Sep 04	11.3	O	0.063	71
Kaiser Administration building (Downey)	Oct 04	2.5	L	0.005	6
Downey Studios (Downey)	Oct 04	1	L	0.004	4
Community Day School (Walnut)	Nov 04	0.1	AF,L	0.0004	0.4
Majestic Mgmt., Bldg. 25 on Mayo Dr. (Walnut)	Jan 05	0.1	L	0.00003	0.03
Gateway Pointe (Whittier)	Jan 05	8	L	0.016	18
Puente Hill Materials Recovery Facility (Industry)	Feb 05	2.4	L	0.007	8
Sy Develop. condos, 20118-20138 Colima, (Walnut)	Jun 05	0.1	L	0.0002	0.2
Dills Park (Paramount)	Jul 05	12.5	L	0.031	34

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

TABLE 7
SUMMARY OF FISCAL YEAR 11-12 RECYCLED WATER USAGE
(PAGE 10 OF 13)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
N□E corner Cheryl Lane□Baker Parkway (Industry)	Aug 05	3.3	L	0.014	16
Jakk□s Pacific, Inc. 21733-21749 Baker (Industry)	Aug 05	1.2	L	0.003	4
20813 Valley Blvd. medians (Walnut)	Sep 05	0.4	L	0.001	1
20265 Valley Blvd. medians (Walnut)	Sep 05	0.4	L	0.001	1
19849 Valley Blvd. medians (Walnut)	Sep 05	0.4	L	0.001	1
Kohl□s Center (Walnut)	Sep 05	2	L	0.009	11
Hollydale Elementary (South Gate)	Sep 05	3	AF,L	0.001	1
Malburg Generation Station (Vernon)	Oct 05	B	I	0.624	701
Phoenix Private Schools (Rowland Heights)	Dec 05	0.1	AF,L	0	0
The Home Depot, 21535-21651 Baker (Industry)	Jan 06	2.8	L	0.009	10
Industry East Land LLC, 21415 Baker (Industry)	Jan 06	2.3	L	0.006	7
Stuart and Gray medians (Downey)	Dec 05	0.4	L	0.006	7
Woodruff and Maple medians (Bellflower)	Mar 06	0.1	L	0.0001	0.1
Charles Hailong Cui, 350 Cheryl Lane (Walnut)	Apr 06	0.7	L	0.006	6
LA Sanchez Nursery (Industry)	Apr 06	5	O	0.011	13
Sculpture Garden (Santa Fe Springs)	May 06	0.6	L	0	0
Fairway median@ Brea Canyon (Walnut)	Jun 06	0.3	L	0.001	1
Grand Avenue Crossing (Industry)	Jul 06	18.5	L	0.019	22
22002 Valley Blvd. (Industry)	Jul 06	1.6	L	0.003	4
Foster Road medians (Santa Fe Springs)	Jul 06	1	L	0.009	10
Rose Hills Memorial Park □lower area (Whittier)	Aug 06	275	L	0.523	587
Christian Chapel of Walnut Valley (Walnut)	Aug 06	2.2	L	0.007	8
Target Store T-2179, 747 Grand Ave. (Walnut)	Sep 06	3.9	L	0.005	6
Whittier Narrows Recreation Area (South El Monte)	Sep 06	568	L	0.686	771
Leg Avenue, 19601 E. Walnut Dr. (Walnut)	Oct 06	0.5	L	0.002	3
LandRover (Cerritos)	Dec. 06	0.3	L	0.002	3
Harold M. Pitman Co., 21908-21958 Baker (Industry)	Jan 07	0.8	L	0.002	2
Eastern Agricultural Site (Lancaster)	Feb 07	696	AG	0.946	1,063
Williams-Sonoma, 21508-21662 Baker (Industry)	Apr 07	4.8	L	0.012	13
FedEx Ground, 200 Old Ranch Road (Walnut)	May 07	28	L	0.012	13
Currier Road Devel. Inc., 20819 Currier Rd. (Walnut)	May 07	0.3	L	0.001	1
Bluff Park (Long Beach)	Jul 07	25.8	L	0.020	22
Stearns Park (Long Beach)	Jul 07	21	L	0.025	28
Bixby Park (Long Beach)	Jul 07	12.5	L	0.014	15
South El Monte High School (South El Monte)	Aug 07	16.1	AF, L	0.065	73
Williams-Sonoma, 21700 Baker (Industry)	Aug 07	2	L	0.005	6
Douglas Park development (Long Beach)	Nov 07	2.1	L	0.088	99
21350 Valley Blvd. (Industry)	Feb 08	0.4	L	0.001	1
Grand Avenue Venture, 21508 Ferraro Pkwy (Walnut)	Apr 08	3.5	L	0.004	4
Space Learning Center (Downey)	Apr 08	10.5	L	0.025	28
Surgical Center, Carmenita □ 166th (Cerritos)	May 08	0.1	L	0.0002	0.3
UPS Parking Structure, 13150 Moore (Cerritos)	May 08	0.5	L	0.002	2
Grand Avenue□Baker Parkway medians (Industry)	May 08	6.7	L	0.011	12
Majestic Management, 21530-21590 Baker (Industry)	May 08	2	L	0.009	10
Cornerstone Commerce Center (Downey)	Jun 08	0.8	L	0.007	8
Gomez Upholstery, 19935 Valley Blvd. (Walnut)	Jul 08	2	L	0	0
Susann Sutseng Lee, 1335-1337 Otterbein (Row. Hts.)	Jul 08	0.1	L	0.0003	0.3
Golden Springs Plaza (20657 Golden Sprgs (Dia. Bar)	Aug 08	0.4	L	0.001	2
Chili□s Restaurant, Golden Springs Dr. (Diamond Bar)	Sep 08	0.01	L	0.001	1
Majestic Management, 21808 Garcia Ln. (Industry)	Sep 08	0.5	L	0.002	2
Majestic Management, 21858 Garcia Ln. (Industry)	Sep 08	0.4	L	0.002	2
Majestic Management, 21912 Garcia Ln. (Industry)	Sep 08	0.3	L	0.001	1
Majestic Management, 21760-21788 Garcia (Industry)	Sep 08	0.4	L	0.001	2
CFT Development, Golden Springs Dr. (Diamond Bar)	Oct 08	0.01	L	0.0004	0.5

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TABLE 7
SUMMARY OF FISCAL YEAR 11-12 RECYCLED WATER USAGE
(PAGE 11 OF 13)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Mora Drive medians (Santa Fe Springs)	Oct 08		L	0.006	7
Jenny Hsieh, 20125 Valley Blvd. (Walnut)	Nov 08	0.03	L	0.00003	0.03
UPS Main Building, 13233 Moore (Cerritos)	Nov 08	4.4	L	0.012	13
Fountain Walk Housing, 18310 Carmenita (Cerritos)	Nov 08	0.1	L	0.0002	0.3
Public Works Dept. sewer flushing (Lancaster)	Jan 09	--	I	0.004	4
Public Works Dept. street sweeping (Lancaster)	Feb 09	--	I	0.0004	0.4
ASCIP Building, 16550 Bloomfield (Cerritos)	Feb 09	0.1	L	0.0004	0.4
Tincher Elementary School (Long Beach)	Feb 09	1.5	AF, L	0.003	3
Firestone Blvd. medians (Downey)	Feb 09	0.1	L	0.0004	0.4
Citibank, 8764 Firestone Blvd. (Downey)	Feb 09	0.1	L	0.001	1
Brea Canyon Rd./Currier Road median (Walnut)	Feb 09	2	L	0.006	7
Cardinal Capital Partners, Currier/Lemon (Walnut)	Mar 09	2.5	L	0	0
Family Property Holdings, 20888 Amar Rd. (Walnut)	May 09	0.04	L	0.0004	0.4
KW Global Inc., 293 Brea Canyon Drive (Walnut)	May 09	0.3	L	0.001	1
Steve Horn Pkwy. medians @ Kaiser (Downey)	May 09	1.4	L	0.027	30
Walgreens/Big Lots, 9018 Firestone (Downey)	May 09	0.4	L	0.003	3
Lancaster University Center (Lancaster)	May 09	2	L	0	0
12800 Center Court (Cerritos)	Jul 09	0.4	L	0.001	2
Pacific Alloy Casting (South Gate)	Jul 09	--	I	0.016	18
Sunshine Park (L.A. County)	Jul 09 (May 86)	4	L	0.003	3
Rowland Elementary School (Rowland Heights)	Jul 09 (May 86)	3	AF,L	0.002	2
Farjardo School (Rowland Heights)	Jul 09 (May 86)	4	AF,L	0.0004	0.5
Farjardo Park (Rowland Heights)	Jul 09 (May 86)	4	L	0.002	2
Nogales High School (L.A. County)	Jul 09 (Jun 86)	11	AF,L	0.004	4
Queen of Heaven Cemetery (Rowland Heights)	Jul 09 (Jun 86)	35	L	0.010	11
Schabarum Regional County Park (L.A. County)	Jul 09 (Sep 86)	233	L	0.016	18
Pepperbrook Park (Hacienda Heights)	Jul 09	4.4	L	0.002	2
Countrywood Park (Hacienda Heights)	Jul 09	5.4	L	0.002	2
Rowland Heights Golf Center (Rowland Heights)	Jul 09	8	L	0.002	3
Medians at 755 Nogales (Industry)	Jul 09	0.1	L	0.0001	0.1
Medians at 4115-1/2 Nogales (West Covina)	Jul 09	0.1	L	0.001	2
Medians at 2654-1/2 Valley (West Covina)	Jul 09	0.2	L	0.0001	0.1
Bu Sha Temple, 4111 Nogales (West Covina)	Jul 09	0.5	L	0.0001	0.1
Megan Racing, 788 Phillips (Industry)	Jul 09	0.1	L	0.0005	1
JJ Plaza, 18253 Colima (Rowland Heights)	Jul 09	0.1	L	0.0001	0.1
New World RTCI-LP, 18958 Daisetta St. (Row. Hts.)	Jul 09	0.1	L	0.00003	0.03
Battery Technology, 16651 Johnson (Industry)	Jul 09	0.1	L	0.00001	0.01
FTH Group Inc., 16685 Johnson (Industry)	Jul 09	0.1	L	0.0001	0.1
Ancillary Provider 16664 Johnson (Industry)	Jul 09	0.1	L	0.0001	0.2
Ancillary Provider 16666 Johnson (Industry)	Jul 09	0.2	L	0.0002	0.3
Pan American, 16610 Gale Ave. (Industry)	Jul 09	0.2	L	0.0001	0.1
Blue Pacific, 1354 Marion Ct. (Industry)	Jul 09	0.2	L	0.0002	0.3
Romano's Macaroni Grill, 17603 Colima (Row. Hts.)	Jul 09	0.1	L	0.0004	0.4
Acosta Growers, 16412 Wedgeworth Dr. (Industry)	Jul 09	5	O	0.001	1
Wedgeworth Elementary School (Hacienda Heights)	Aug 09	2.5	AF,L	0.001	1
Wilson High School (Hacienda Heights)	Aug 09	18.3	AF,L	0.005	6
Light of America, Inc. (20722 Currier Rd.) (Walnut)	Sep 09	0.1	L	0.0003	0.3
Ybarra Elementary School (Rowland Heights)	Sep 09	5.6	AF,L	0.007	8
Bixby Elementary School (Hacienda Heights)	Sep 09	6.1	AF,L	0.002	2
Jade Fashion, 1350 Bixby (Industry)	Sep 09	0.1	L	0.0002	0.2
Gutierrez Nursery, 16411 Wedgeworth (Industry)	Sep 09	4	O	0.001	1
Robertson's Ready-Mix (Pomona)	Oct 09	--	I	0.007	7
MTA Bike Trail (Bellflower)	Nov 09	0.1	L	0.009	10
Whittier Narrows Golf Course (South El Monte)	Dec 09	260	L	0.476	535

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Table 7
Summary of Fiscal Year 11-12 Recycled Water Usage
(Page 12 of 13)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Frank Raper, 1215 Bixby (Industry)	Dec 09	0.1	L	0.0002	0.2
Laido International, 16710-12 Johnson (Industry)	Dec 09	0.1	L	0.0002	0.2
Bolt Products, 16725 Johnson Dr. (Industry)	Dec 09	0.1	L	0.0001	0.1
Ily Enterprise, 783 Phillips (Industry)	Jan 10	0.1	L	0.0001	0.2
Superior Profiles, 1325 Bixby (Industry)	Jan 10	0.2	L	0.0002	0.2
60 Fwy., Countrywood □ Fullerton (Industry)	Jan 10	5	L	0.001	1
Camacho Strawberries (Industry)	Jan 10	3	O	0.0002	0.2
Advanced Media, 881 Azusa (Industry)	Jan 10	0.1	L	0.0001	0.1
East Group Prop., 855 Anaheim-Puente (Industry)	Mar 10	0.6	L	0.0005	1
So.Cal. Air Condition, 16950 Chestnut (Industry)	Mar 10	2	L	0.0002	0.3
USACD, 17101 Chestnut (Industry)	Mar 10	0.3	L	0.0002	0.2
Azusa Blvd Medians (Industry)	Mar 10	0.2	L	0.0001	0.1
Acosta Growers, 17101 Chestnut (Industry)	Mar 10	2.4	O	0	0
Paramount Blvd. Medians (Paramount)	Mar 10		L	0.006	7
L.A. County ISD bldg., 16610 Chestnut (Industry)	Apr 10	0.5	L	0.0003	0.3
Azusa Property Co., 885 Azusa (Industry)	Apr 10	0.2	L	0.0002	0.2
Golden West Footwear, 16750 Chestnut (Industry)	Apr 10	0.3	L	0.0002	0.2
Teledyne Instruments, 16830 Chestnut (Industry)	Apr 10	0.4	L	0.0005	1
Medians, 18927 Daisetta St. (Rowland Heights)	Apr 10	0.2	L	0.0001	0.1
Colima Medians (L.A. County)	Apr 10	0.1	L	0.0001	0.1
Medians, 1442 Fullerton (Industry)	Apr 10	0.3	L	0.00003	0.03
Teledyne Picco, 16800 Chestnut (Industry)	May 10	0.4	L	0.0003	0.4
Hou Yi Mao Nursery, 18002 Colima (Rowland Hts.)	May 10	1.3	O	0.0002	0.2
East Group Prop., 16700 Chestnut (Industry)	Jun 10	0.6	L	0.001	1
Pro Motion Distribution, 883 Azusa (Industry)	Jun 10	0.1	L	0.0001	0.2
New Age Kaleidoscope, 7 Colima (Industry)	Jun 10	0.6	L	0.001	1
Min Maw Intl. Inc., 18350 San Jose (Industry)	Jun 10	0.7	L	0.0003	0.3
Hot Topic, 18305 San Jose Ave. (Industry)	Jul 10	0.6	L	0.001	1
FedEx, 1081 Fullerton Rd. (Industry)	Jul 10	0.6	L	0.001	1
Long Beach DPW sewer flushing (Long Beach)	Aug 10	--	I	0.002	3
Long Beach DPW street sweeping (Long Beach)	Aug 10	--	I	0.001	1
Los Amigos Golf Course (L.A. County)	Aug 10	110	L	0.168	189
Public Works Dept. dust control (Lancaster)	Sep 10	--	I	0.00001	0.01
Donald Miller, 19803 Valley (Walnut)	Sep 10	0.1	L	0.0003	0.4
Hudd Distribution, 18215 Rowland St. (Industry)	Sep 10	0.6	L	0.001	1
New Age Kaleidoscope, 5 Stoner Creek (Industry)	Oct 10	1.4	L	0.001	1
Perrin Manufacturing, 1020 Bixby (Industry)	Oct 10	0.1	L	0.0002	0.2
Centro Watt Operating, 17518A Colima (Industry)	Oct 10	0.4	L	0.001	1
Centro Watt Operating, 17414 Colima (Industry)	Oct 10	0.5	L	0.001	1
717 Nogales LLC, 717 Nogales (Industry)	Oct 10	0.5	L	0.0004	0.4
The Old Road□Magic Mtn. Pkwy medians (Snt Clarita)	Nov 10	2.8	L	0.008	9
Walgreens, 18308 Colima (Industry)	Dec 10	0.1	L	0.0001	0.1
RWD Office, 3021 S. Fullerton (Industry)	Dec 10	0.3	L	0.0001	0.2
Bell Memorial Church, 1747 Nogales (Rowland Hts.)	Dec 10	0.3	L	0.001	1
Atlantic Ave. medians (South Gate)	Mar 11	16.3	L	0.003	4
Pathfinder Park (Rowland Heights) (Industry)	May 11	29	L	0.005	5
USGVMWD site, 401 Nogales St. (Industry)	May 11	0.5	L	0.0001	0.1
East Group Prop., 18551 Arenth Ave. (Industry)	May 11	0.7	L	0.001	1
717 Nogales LLC, 18961 Arenth Ave. (Industry)	May 11	0.5	L	0.0005	1
Kimco Realty, 17100 Colima Rd. (Industry)	May 11	3	L	0.001	1
Acme Trading Group, 18501 Arenth (Industry)	May 11	0.9	L	0.001	1
Third Party Enterprises, 18501 Arenth (Industry)	May 11	0.6	L	0.001	1
Floria International, 18701 Arenth (Industry)	May 11	0.4	L	0.0004	0.4
Chugh Firm, 15925 Carmenita Road (Cerritos)	Jan 11	0.2	L	0.001	1

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Table 7

SUMMARY OF FISCAL YEAR 11-12 RECYCLED WATER USAGE
(PAGE 13 OF 13)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Chevron, 17255 Bloomfield (Cerritos)	Mar 11	0.1	L	0.0004	0.4
YHS Trading, 755 Epperson Dr. (Industry)	Jul 11	0.1	L	0.0003	0.4
TriVantage LLC, 745 Epperson Dr. (Industry)	Jul 11	0.1	L	0.0003	0.3
Floria International Inc., 18689 Arenth (Industry)	Aug 11	0.4	L	0.0003	0.4
HT Window Fashions, 770 Epperson (Industry)	Aug 11	0.1	L	0.0002	0.2
Royal Crown Enterprise, 780 Epperson (Industry)	Aug 11	0.1	L	0.0004	0.4
HD Technology, 738 Epperson Dr. (Industry)	Aug 11	0.2	L	0.0001	0.2
Kiewit Power Constructors, 911 Bixby (Industry)	Aug 11	--	I	0.002	2
Sanchez Elementary□Temple Middle (Rosemead)	Aug 11	12.8	AF, L	0.003	3
Loma Elementary School (South El Monte)	Aug 11	1.9	AF, L	0.005	6
Guardian Life Insurance, 710 Epperson (Industry)	Sep 11	0.2	L	0.0005	1
Valor Communication, 18701 Arenth (Industry)	Sep 11	0.1	L	0.0004	0.5
Rubbercraft, 3701 Conant St. (Long Beach)	Sep 11	0.9	L	0.002	2
Jess Gonzales Sports Park (Rosemead)	Oct 11	4	L	0.005	6
Southern California Edison corporate offices	Oct 11	53	L	0.025	28
Eldridge Rice Elementary School (Rosemead)	Oct 11	8.3	AF, L	0.006	6
Millikin High School (Long Beach)	Oct 11	12	AF, L	0.016	18
K-1 Printing, 17989 Arenth Ave. (Industry)	Oct 11	0.2	L	0.00004	0.05
K-1 Printing, 17979 Arenth Ave. (Industry)	Oct 11	0.2	L	0.0001	0.1
Private Label PC Inc., 748 Epperson (Industry)	Nov 11	0.2	L	0.0001	0.2
Penske Truck Leasing, 18305 Arenth (Industry)	Nov 11	0.6	L	0.0002	0.2
Schurr High School (Montebello)	Nov 11	11	AF,L	0.011	12
Commercial Cooling, 17855 Arenth (Industry)	Dec 11	0.4	L	0.0001	0.1
Forever Link, 18738 San Jose (Industry)	Dec 11	0.4	L	0.0002	0.2
Majestic Realty (179 S. Grand Ave.) (Walnut)	Dec 11	2.5	L	0.002	2
Garvey Ave. medians (Rosemead)	Dec 11	0.1	L	0.002	2
Walnut Grove Ave. medians (Rosemead)	Dec 11	0.1	L	0.001	1
Rush St. medians (South El Monte)	Dec 11	0.1	L	0	0
Sunshine Nursery, 8448 Dorothy St. (Rosemead)	Dec 11	4.6	L	0.004	5
WalMart, 1827 Walnut Grove Ave. (Rosemead)	Dec 11	17.7	L	0.006	6
Panda Restaurant Grp. 1683 Walnut Grove (Rosemead)	Dec 11	8.9	L	0.007	8
Willard Elementary School (Rosemead)	Jan 12	6	AF, L	0.001	1
Brook Furniture, 18960 San Jose (Industry)	Jan 12	0.4	L	0.0002	0.2
Rio Hondo Park (Pico Rivera)	Jan 12	8	L	0.018	20
Beverly Blvd. medians (Pico Rivera)	Jan 12	1	L	0.002	3
University of the West, 1409 Walnut Grove (Rosemead)	Feb 12	0.4	L	0.001	1
LD Products, 3700 Cover Street (Long Beach)	Feb 12	0.7	L	0.0003	0.3
LD Products, 3700 Cover Street (Long Beach)	Feb 12	--	I	0.0001	0.2
Hot Topic, 18385 San Jose Ave. (Industry)	Feb 12	0.8	L	0.0003	0.4
Prologis Fund, 18901 Railroad (Industry)	Feb 12	0.4	L	0.0001	0.1
AMB-SGP CIF, 18825 Railroad St. (Industry)	Feb 12	0.2	L	0.00002	0.02
Ko Amex, 18965 San Jose Ave. (Industry)	Feb 12	0.5	L	0.0001	0.2
Ferguson Fire, 18825 San Jose Ave. (Industry)	Feb 12	0.3	L	0.0001	0.2
MA Labs Inc., 18755 San Jose Ave. (Industry)	Feb 12	0.4	L	0.0002	0.2
Majestic Management, 18691 San Jose (Industry)	Mar 12	0.3	L	0.0001	0.2
Majestic Management, 18601 San Jose (Industry)	Mar 12	0.6	L	0.0002	0.2
Third Party Entrprs., 18501 San Jose (Industry)	Mar 12	0.6	L	0.0002	0.2
Third Party Entrprs, 18591 San Jose (Industry)	Mar 12	0.6	L	0.00003	0.04
Shoe Magnate Inc., 18560 San Jose (Industry)	Mar 12	0.4	L	0.0001	0.1
Pinky Footware Shoes, 18600 San Jose (Industry)	Mar 12	0.8	L	0.0003	0.4
Zapopan Park (Rosemead)	Apr 12	7	L	0.005	5
Garvey Blvd. medians (Rosemead)	Apr 12	0.2	L	0.001	1
WVWD Parker Canyon Reservoir (Walnut)	May 12	3.5	L	0.001	1
La Merced Elementary School (Montebello)	Jun 12	10	AF,L	0.004	4
Montebello Gardens Elementary (Pico Rivera)	Jun 12	1	AF,L	0.001	1

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

2. LOS ANGELES BASIN

The treatment plants operated by the Sanitation Districts in the Los Angeles Basin area are the Joint Water Pollution Control Plant (JWPCP) with ocean disposal, and six water reclamation plants (WRPs): La Cañada, Long Beach, Los Coyotes, Pomona, San Jose Creek, and Whittier Narrows. These facilities and the associated trunk sewers comprise the Joint Outfall System (JOS) and together produced 391.49 MGD (439,882 AFY) of effluent in FY 11-12, a decrease of 2.5% from the preceding fiscal year. This decrease was due to the on-going effects of water conservation in response to the 2006-2009 drought and to the lingering effects of the recent nationwide economic recession. This level of flow is equal to that first seen in 1971 and again during the 1976-77 drought. Of the total amount of effluent produced, 126.02 MGD (141,597 AFY), or 32.2 %, was recycled water available for reuse, an increase of 1.9% in total flow over the preceding fiscal year. During FY 11-12, 65.81 MGD (73,944 AFY) was actively reused, a 15.8% increase over the preceding fiscal year, due mainly to below average rainfall during that year that allowed for the use of greater amounts of recycled water for both groundwater replenishment and landscape irrigation. This quantity was 52.2% of the recycled water available and 16.8% of the total effluent produced in the JOS (both percentages increasing somewhat substantially over the preceding year).

2.1 LA CAÑADA WRP

LA CAÑADA WRP FACTS	
Plant capacity:	0.2 MGD
Water produced and reused:	0.083 MGD 93 AFY 12.3% FY decrease
FY11-12 O&M:	$3,358/AF
No. of reuse sites:	1 105 acres

This treatment facility, completed in 1962 and expanded in 1971, is the smallest one operated by the Sanitation Districts and is located on the site of the La Cañada-Flintridge Country Club (Figure 6), at 533 Meadowview Drive, La Cañada, CA 91011. In February 1996, an outfall trunk sewer (for waste activated sludge disposal and excess storm flows) was completed that connected this plant with the main sewer system in the Los Angeles Basin, officially making this plant a JOS facility. The plant, which produces disinfected secondary (activated sludge) effluent, has a capacity of 0.2 MGD; however, it only treated an average of 0.083 MGD (93 AFY) of wastewater generated by the 425 homes surrounding the country club in FY 11-12 (0.07% of the effluent produced in the JOS). This flow rate represents a 12.3% decrease in average daily flows over the preceding fiscal year. The operation and maintenance (O&M) cost in FY 11-12 to produce this water was approximately $3,358/AF.

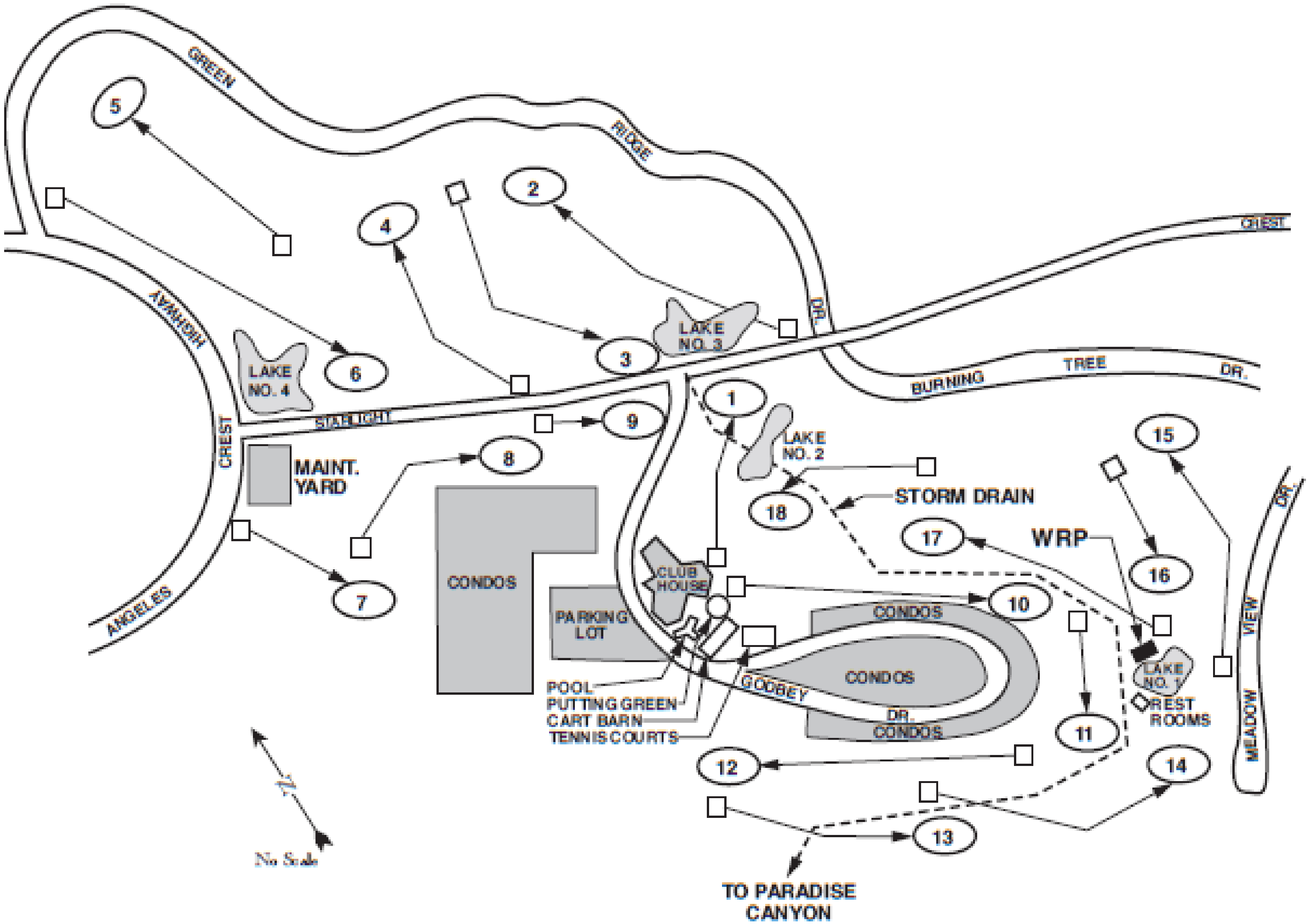
Use of recycled water from this facility is permitted under California Regional Water Quality Control Board, Los Angeles Region (LARWQCB) Order No. 00-099. All of the disinfected secondary effluent from the plant is conveyed to four lakes on the 105-acre golf course. Lake water (augmented by potable water during the summer) is used for landscape irrigation of the golf course. The developers of the country club and neighboring homes financed the construction of the treatment plant, which was later sold to the Sanitation Districts for $77,268, and the homeowners in District No. 28 finance the plant O&M costs. The operators of the country club are required to use all of the recycled water produced at this facility for irrigation.

2.2 LONG BEACH WRP

This treatment facility, located at 7400 East Willow Street, Long Beach, CA 90815, was completed in 1973 and was expanded in 1984 to its current design capacity of 25 MGD. However, it produced only 18.22 MGD

FIGURE 6

LA CANADA-FLINTRIDGE COUNTRY CLUB



LONG BEACH WRP FACTS	
Plant capacity:	25 MGD
Water produced:	18.22 MGD 20,472 AFY 2.8% FY decrease
FY11-12 O&M:	$270/AF
Water reused:	6.112 MGD 6,868 AFY 6.8% FY increase 33.5% of production
Delivery systems:	2 179,680 ft. of pipe
No. of reuse sites:	62 1,941.9 acres

(20,472 AFY) of coagulated, filtered, disinfected tertiary recycled water in FY 11-12 (4.6% of the effluent produced in the JOS), which was a 2.8% decrease from the preceding fiscal year, at an O&M cost of approximately $270/AF. The increase in recycled water production was the result of completed upgrades to the secondary treatment process facilities.

Recycled water quality for FY 11-12 is presented in Table B-1 of Appendix B. An average of 6.112 MGD (6,868 AFY), or 33.5% of the recycled water produced at this plant was delivered for reuse during FY 11-12. This represents a 6.8% increase over the preceding fiscal year. Use of recycled water from this facility during this fiscal year was permitted under LARWQCB Order Nos. 87-47 and 97-072 (for direct, non-potable reuse), R4-2009-0049 (for non-irrigation uses), and R4-2005-0061 (for seawater intrusion barrier injection).

2.2.1 LONG BEACH WATER DEPARTMENT

Beginning in 1980, the City of Long Beach Water Department (LBWD) embarked on a multi-phase program to distribute recycled water throughout the city, mainly for landscape irrigation (Figure 7). (Note: All recycled water produced at this plant goes to LBWD in exchange for the land on which the Sanitation Districts built the Long Beach WRP.) Recycled water service for use in repressurization of the oil-bearing strata, initially constructed in 1971, was restored to the THUMS project on Island White in June 1995. A narrative description of the layout of LBWD's recycled water distribution system is contained in Appendix C. Table 8 lists the users of the LBWD system as of the end of FY 11-12.

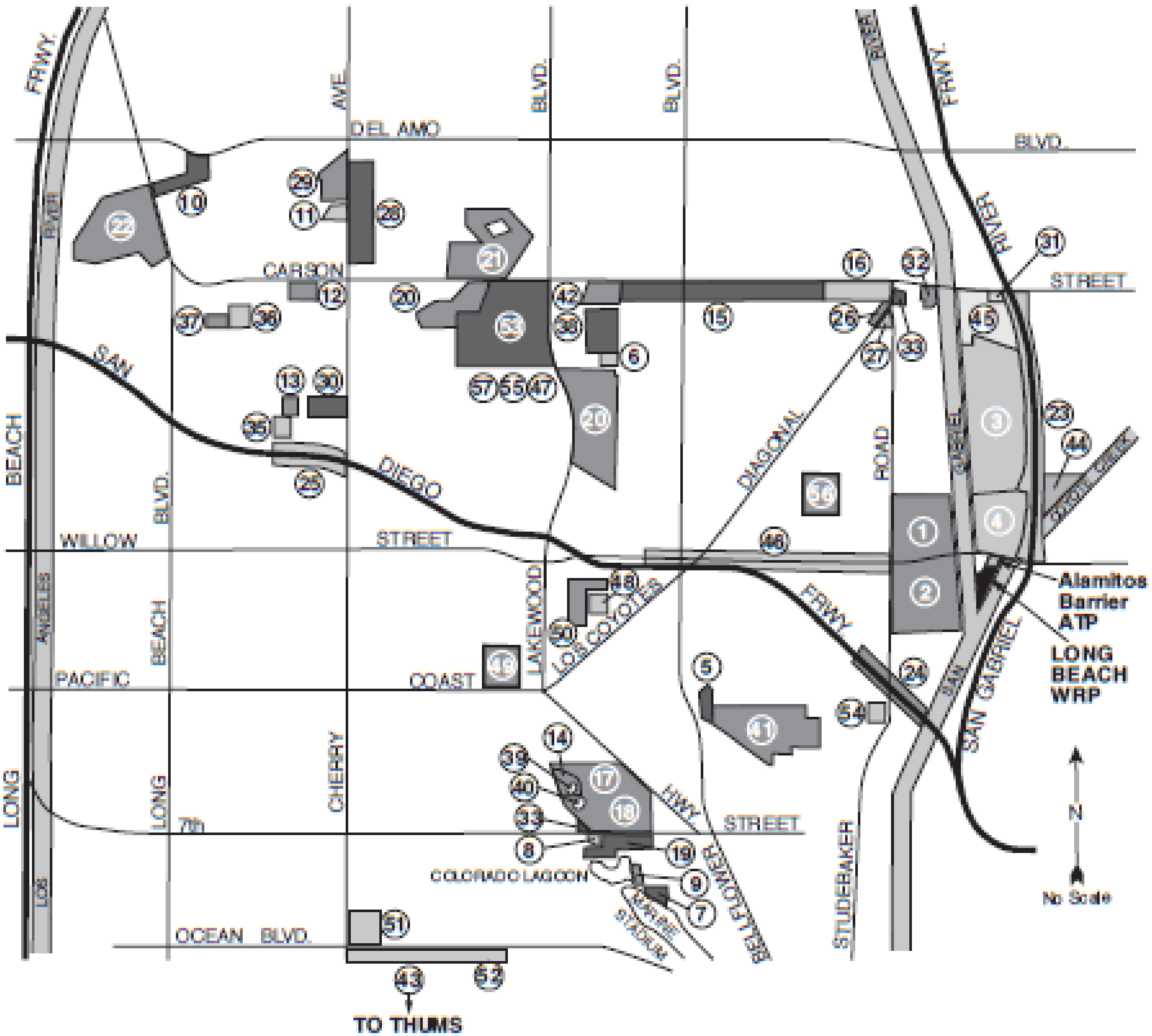
In FY 11-12, four new sites were added to the LBWD distribution system. In September 2011, the landscaping around the Rubbercraft building at 3701 Conant St. was connected. In October 2011, the athletic fields at Millikin High School were connected. In February 2012, the landscaping around and the toilets inside LD Products (3700 Cover St.) were connected through separate meters. During FY 11-12, LBWD served 4.180 MGD (4,697 AFY), or 22.9% of the recycled water produced at this plant, through approximately 179,680 feet of pipeline (6- to 24-inches in diameter) to 61 direct, non-potable reuse sites encompassing 1,942 acres (additional recycled water was delivered by LBWD to the Alamitos Seawater Intrusion Barrier project, see Section 2.2.2, below). This was a 15.8% increase over the preceding fiscal year.

LBWD sells the recycled water at a rate of $744.00/AF for peak demand (nighttime) usage or $531.43/AF for off-peak demand (daytime) usage, or between 50-70% of the potable water rate of $1,062.43/AF.

2.2.2 ALAMITOS SEAWATER INTRUSION BARRIER

Due to over-drafting of the Central Basin aquifer, which underlies and supplies water to the Metropolitan Los Angeles area, the groundwater level in that basin dropped below sea level by the 1950's. This condition allowed salt water to move inland into the aquifer at various points along the coastline leading to contamination of the groundwater supplies. In response, the Los Angeles County Department of Public Works (LACDPW) constructed engineered, freshwater injection barriers in front of the advancing seawater at three locations in Los Angeles County in an effort to stem the landward movement of seawater. One of these barrier projects, the Alamitos Seawater Intrusion Barrier (Alamitos Barrier) is two miles south of the Long Beach WRP, straddling

FIGURE 7
LONG BEACH WATER DEPARTMENT REUSE SITES



1 El Dorado Park West
2 El Dorado Golf Course
3 El Dorado Park East
4 Nature Center
5 Whaley Park
6 Douglas Park
7 Marina Vista Park
8 Woodlands Park
9 Colorado Lagoon Park
10 Scherer Park
11 Cherry Ave. Park
12 Somerset Park
13 Reservoir Park
14 Joe Rodgers Park
15 Heartwell Park
16 Heartwell Golf Course
17 Recreation Park
18 Recreation Golf Course
19 Recreation 9-Hole Golf Course
20 Skylinks Golf Course
21 Lakewood Golf Course
22 Virginia Country Course
23 Cal Trans - 605 Frwy. @ Warlow, Pioneer, Spring
24 Cal Trans - 405 Frwy. @ Atherton
25 Cal Trans - 405 Frwy. @ Walnut
26 Los Coyotes Diagonal greenbelt
27 Lakewood 1st Presbyterian Church
28 All Souls Cemetery
29 Sunnyside Memorial Park
30 Long Beach Water Dept. Office
31 WalMart
32 Sunrise Growers Nursery
33 DeMille Junior High School
34 Wilson High School
35 Burroughs Elementary School
36 Hughes Middle School
37 Longfellow Elementary School
38 Veteran's Memorial Stadium
39 Recreation Park Bowling Green
40 Blair Field
41 Cal State University, Long Beach
42 Long Beach City College
43 THUMS
44 El Dorado Lakes Condominiums
45 Vestar Development (Towne Centre)
46 Willow Street medians
47 Boeing
48 Tucker Elementary School
49 Alamitos Hill Reservoir
50 Stearns Park
51 Bixby Park
52 Bluff Park
53 Douglas Park Development
54 Tincher Elementary School
55 Rubbercraft (3701 Conant St.)
56 Millikan High School
57. LD Products (3700 Cover St.)

Table 8
Summary of Fiscal Year 11-12 Recycled Water Usage
Long Beach Water Department
(Page 1 of 2)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
El Dorado Park West	Aug 80	135	L	0.125	141
El Dorado Golf Course	Aug 80	150	L	0.179	201
Recreation Park	Oct 82	26	L	0.053	59
Recreation Golf Course	Oct 82	149	L	0.226	253
Whaley Park	Jun 83	9	L	0.024	27
El Dorado Park East	Jan 84	300	L	0.375	422
Nature Center	Jan 84	60	L	0.042	47
605 Freeway at Wardlow	Feb 84	50	L	0.021	24
Heartwell Park	Feb 84	120	L	0.137	153
Skylinks Golf Course	Apr 84	155	L,P	0.240	270
Douglas Park	Apr 84	3	L	0.005	5
405 Freeway at Atherton	May 84	5	L	0.00004	0.05
DeMille Junior High School	Jun 84	5	AF,L	0.0005	1
Heartwell Golf Park	Jun 84	30	L	0.064	72
Veterans Memorial Stadium	Jan 85	6	AF	0.018	20
Recreation Park Bowling Green	Aug 85	3	L	0.005	6
California State University, Long Beach	Dec 85	52	AF,L	0.141	159
Long Beach City College	Feb 86	15	AF,L	0.183	206
Recreation 9-Hole Golf Course	Mar 86	37	L	0.073	83
Blair Field	Apr 86	5	AF	0.012	13
Woodlands Park	Apr 86	7	L	0.012	13
Colorado Lagoon Park	Apr 86	4	L	0.0002	0.3
Marina Vista Park	Apr 86	30	L	0.033	37
Lakewood 1st Presbyterian Church	Sep 88	1	L	0.0001	0.1
Virginia Country Club	Mar 89	135	L,P	0.076	85
Lakewood Golf Course	Mar 89	128	L,P	0.293	330
Scherer Park	Mar 89	24	L	0.036	41
Sunnyside Memorial Park	Apr 89	35	L	0.073	82
All Soul's Cemetery	Apr 89	40	L	0.100	112
Cherry Avenue Park	May 89	10	L	0.014	16
Los Coyotes Diagonal	Mar 91	1	L	0.005	6
Wilson High School	Jun 91	5	AF,L	0.023	26
Long Beach Water Department office	Jan 92	2	L	0.0003	0.3
Reservoir Park (Signal Hill)	Feb 92	2	L	0.008	8
Burroughs Elementary School (Signal Hill)	Feb 92	4	AF,L	0.002	2
Hughes Middle School	Apr 92	3	AF,L	0.010	11
405 Freeway at Walnut	Apr 92	9	L	0.004	5
Somerset Park	May 92	3	L	0.002	3
Longfellow Elementary School	May 92	1	AF,L	0.001	1
THUMS	Jun 95	8	I	1.256	1,412
Joe Rodgers Park	Nov 96	4.5	L	0.008	9
Jauregui Nursery	Jul 97	5	O	0.031	35
El Dorado Lakes Condominiums	Aug 98	11	L	0.025	28
WalMart	Dec 98	3	L	0.020	22
Vestar Development	Feb 99	8	L	0.029	32
Willow Street medians	Dec 01	2.4	L	0.004	4
Long Beach Water Department Impoundment	Jul 02	--	I	0.001	1
Alamitos Seawater Intrusion Barrier (WRD)	Feb 03	--	R	1.933	2,171
Boeing	Mar 03	52	L	0.016	18
Tucker Elementary School	May 04	3	AF, L	0.005	5
Alamitos Hill Reservoir landscaping	Jul 04	8.6	L	0.0003	0.3
Bluff Park	Jul 07	25.8	L	0.020	22
Stearns Park	Jul 07	21	L	0.025	28

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

TABLE 8
SUMMARY OF FISCAL YEAR 11-12 RECYCLED WATER USAGE
LONG BEACH WATER DEPARTMENT
(PAGE 2 OF 2)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Bixby Park	Jul 07	12.5	L	0.014	15
Douglas Park residential/commercial development	Nov 07	2.1	L	0.088	99
Tincher Elementary School	Feb 09	1.5	AF, L	0.003	3
Long Beach Public Works sewer flushing	Aug 10	--	I	0.002	3
Long Beach Public Works street sweeping	Aug 10	--	I	0.001	1
Rubbercraft (3701 Conant St.)	Sep 11	0.9	L	0.002	2
Millikin High School	Oct 11	12	AF, L	0.016	18
LD Products (3700 Cover Street)	Feb 12	0.7	L	0.0003	0.3
LD Products (3700 Cover Street)	Feb 12	--	I	0.0001	0.2
TOTALS		**1,941.9**		**6.112**	**6,688**

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

the San Gabriel River and the Los Angeles/Orange County line and creating a pressure ridge in five aquifers across the Alamitos Gap. Historically, between 4,000 and 7,000 AFY of non-interruptible imported water jointly purchased from the Metropolitan Water District of Southern California (MWD) by the Water Replenishment District of Southern California (WRD) and the Orange County Water District (OCWD) was injected into the Alamitos Barrier. In 1993, additional injection wells were constructed, and have increased the freshwater injection capacity at the Alamitos Barrier to 7,500 AFY.

Originally conceived of in the late 1980's, the Leo J. Vander Lans Advanced Water Treatment Facility (LVLAWTF) treats tertiary effluent from the Long Beach WRP with microfiltration and reverse osmosis (MF/RO), followed by application of ultraviolet light (UV) for the destruction of NDMA. The advanced treated product water is then blended with MWD supplies for injection into the seawater intrusion barrier. This project uses the existing 27-inch MWD supply line to the Alamitos Barrier. Construction of the treatment processes on four acres of land directly north of the Long Beach WRP began in late 2001 and was completed in early 2003. After equipment testing and permit adoption by the LARWQCB, actual recycled water deliveries for injection began in October 2005. The approximate $15 million cost for the LVLAWTF was funded in part by MWD's Local Resource Program and the federal government.

During FY 11-12, the LVLAWTF produced 1.933 MGD (2,171 AFY) of advanced treated recycled water that was injected into the Alamitos Barrier, or 10.6% of the effluent produced at the Long Beach WRP. This was an 8.5% decrease in the amount of recycled water used for this application from the preceding fiscal year, and still below the production capacity of the LVLAWTF.

2.3 Los Coyotes WRP

This treatment facility, located at 16515 Piuma Avenue, Cerritos, CA 90703, was completed in 1970 and was expanded in 1975 to its current design capacity of 37.5 MGD. This plant produced an average of 23.16 MGD (26,018 AFY) of coagulated, filtered, disinfected tertiary recycled water during FY 11-12 (5.9% of the effluent produced in the JOS), which was an increase of 11.2% over the preceding fiscal year, at an O&M cost of approximately $293/AF. Effluent water quality for FY 11-12 is presented in Table B-2 of Appendix B.

LOS COYOTES WRP FACTS

Plant capacity:	37.5 MGD
Water produced:	23.16 MGD 26,018 AFY 11.2% FY increase
FY11-12 O&M:	$293/AF
Water reused:	5.323 MGD 5,982 AFY 6.5% FY increase 23.0% of production
Delivery systems:	4 279,960 ft. of pipe
No. of reuse sites:	275 2,471.8 acres

Through three contracts, an average of 5.323 MGD (5,982 AFY), or 23.0% of the recycled water produced at this plant was delivered during FY 11-12 for use in the cities of Bellflower, Bell Gardens, Cerritos, Compton, Downey, Lakewood, Lynwood, Norwalk, Paramount, Santa Fe Springs, South Gate, and Vernon. This represents a 6.5% increase in reuse flows over the preceding fiscal year. Use of recycled water from this facility is permitted under LARWQCB Order Nos. 87-51 and 97-072.

2.3.1 City of Bellflower

Recycled water deliveries to a single, 5-acre site (Ruth B. Caruthers Park) in this city began in November 1978. During FY 11-12, an average of 0.042 MGD (47 AFY), or about 0.2% of the recycled water produced at this plant, was used at this site for landscape irrigation. This was an 11.9% increase over the preceding fiscal year.

A 30 HP pump at the end of the plant's effluent forebay supplies recycled water to the park through 1,900 feet of 4-inch pipe that crosses the San Gabriel River along a footbridge.

2.3.2 *City of Cerritos*

Initial deliveries to this city also began in November 1978 and consisted of landscape irrigation and ornamental lake supply at the 25-acre Ironwood Nine Golf Course next to the Los Coyotes WRP. Recycled water was supplied to this site by means of a 50 HP pump at the plant's effluent forebay (next to the City of Bellflower pump) and 75 feet of 6-inch pipe. This system was abandoned in May 1988 when the City of Cerritos completed its citywide distribution system, including 142,600 feet of pipeline (Figure 8). A narrative description of the layout of the City of Cerritos' recycled water distribution system is contained in Appendix D. Table 9 lists all of the users of recycled water on the City of Cerritos distribution system as of the end of FY 11-12.

Two new users of recycled water were added to the City of Cerritos distribution system during FY 11-12. In January 2012, the landscaping around the Chugh Firm (15925 Carmenita Road) was connected. In March 2012, the landscaping around the Chevron station (17255 Bloomfield Ave.) was connected. During FY 11-12, the City of Cerritos used 1.665 MGD (1,871 AFY), or 7.2% of the recycled water produced at the Los Coyotes WRP, for landscape irrigation and impoundments on 755.7 acres at 85 individual sites. This was an increase of 2.6% over the preceding fiscal year. City trucks also hauled a small amount of recycled water for landscape irrigation. No private water trucks hauled recycled water during this fiscal year. In FY 11-12, the City of Cerritos charged its recycled water customers $326.70/AF, or 53% of the potable water rate of $614.20/AF.

2.3.3 *City of Lakewood*

In August 1989, the City of Lakewood connected to two of the stub-outs provided in the City of Cerritos recycled water distribution system to supply their own distribution system. In 1989, this system consisted of 28,300 feet of pipelines that initially served eight sites. Nine other sites have been connected since then. All of the users of recycled water from the City of Lakewood distribution system, as of the end of FY 11-12, are shown in Figure 9 and listed in Table 10. A narrative description of the layout of the City of Lakewood's recycled water distribution system is contained in Appendix E.

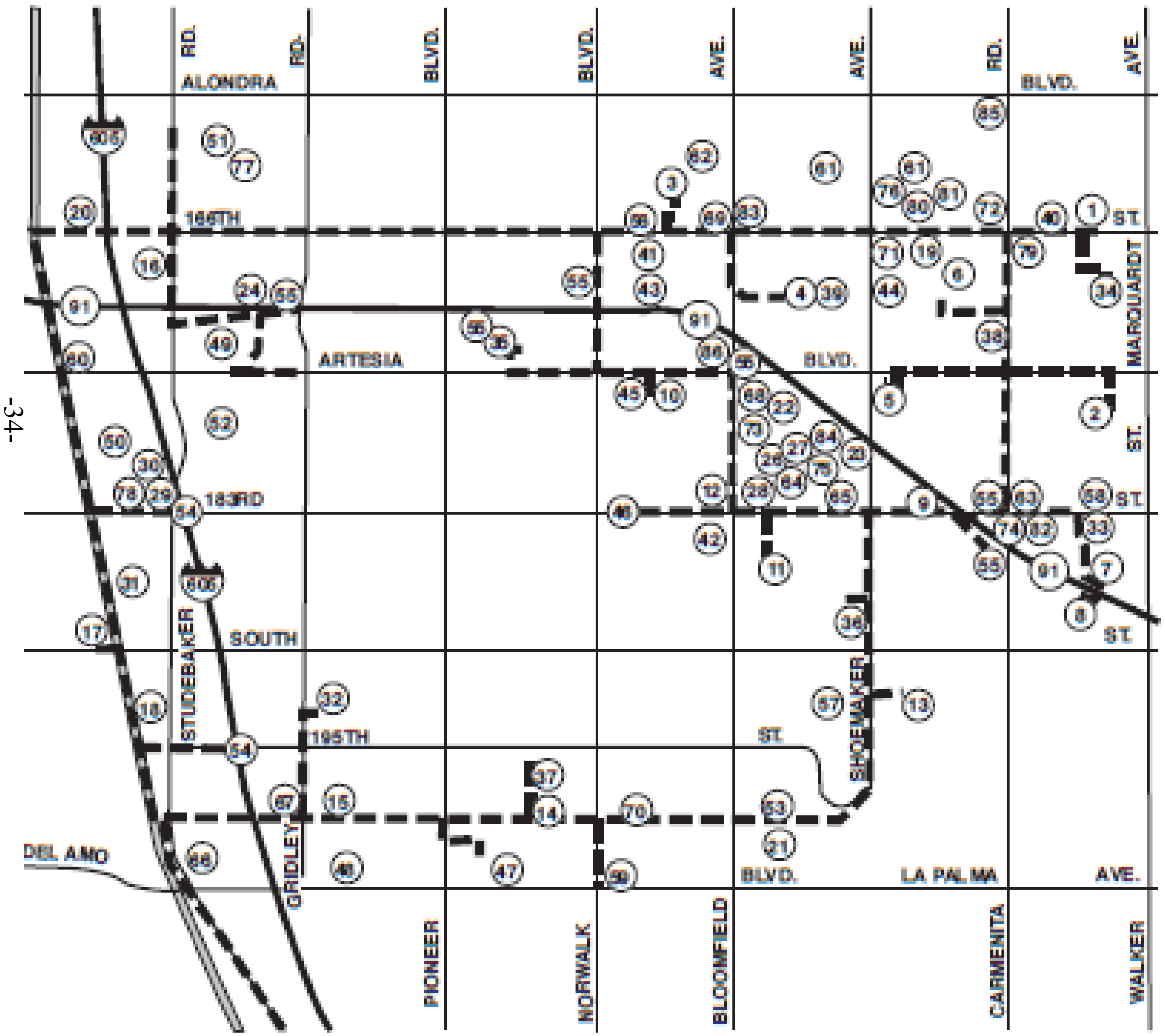
During FY 11-12, the City of Lakewood used 0.421 MGD (474 AFY), or 1.8% of recycled water produced at the Los Coyotes WRP, for irrigation of landscaping, athletic fields, and vegetables on approximately 191 acres at 17 individual sites. This was an increase of 7.0% over the preceding fiscal year. No new reuse sites were added to City's recycled water distribution system in FY 11-12.

The City of Lakewood was charged $479.00/AF by the City of Cerritos during FY 11-12. The City of Lakewood, in turn, retailed the recycled water to its customers for $444.31/AF, or 41% of its potable rate of $1,089/AF. However, it is the City's policy to reimburse its recycled water customers for their capital expenditures to convert their on-site facilities to accept recycled water.

2.3.4 *Central Basin Municipal Water District (Century System)*

Central Basin Municipal Water District (CBMWD), a regional wholesale water purveyor and member agency of MWD, is the lead agency in developing the regional Century recycled water distribution system that serves the cities of Bellflower, Bell Gardens, Compton, Downey, Lakewood, Lynwood, Norwalk, Paramount, Santa Fe Springs, and South Gate. The $15 million project initially consisted of 26 miles of pipeline connected to one of the 24-inch distribution lines coming from the City of Cerritos pump station, and now has 189,800 feet of pipeline. The backbone of the distribution system is a 30-inch pipeline paralleling the San Gabriel River.

FIGURE 8
CITY OF CERRITOS RECLAIMED WATER DISTRIBUTION SYSTEM



1. Carmenita Park
2. Friendship Park
3. Satellite Park
4. Frontier Park
5. Saddleback Park
6. City Park West
7. Rainbow Park
8. Bettencourt Park
9. Brookhaven Park
10. Rosewood Park
11. Heritage Park
12. Library/Civic Center
13. Sunshine Park
14. Jacob Park
15. Gridley Park
16. Reservoir Hill Park
17. Westgate Park
18. Liberty Park
19. Olympic Natatorium
20. Ironwood 9 Golf Course
21. Sports Complex
22. ADP No. 2
23. Shoemaker on/off ramp
24. Windjammer off-ramp
25. Medians/Parkways
26. Transpacific Devel. Co.
27. Sheraton Hotel
28. Automated Data Proc.
29. Cerritos Pontiac/GMC
30. Moothart Chrysler
31. Browning Oldsmobile
32. Bragg Elementary
33. Cerritos Elementary
34. Gonsalves Elementary
35. Juarez Elementary
36. Leal Elementary
37. Pat Nixon Elementary
38. Stowers Elementary
39. Whitman Elementary
40. Carmenita Junior High
41. ABC Adult School/Office
42. Cerritos High School
43. Tracy Education Center
44. Whitney Learning Center
45. Kennedy Elementary
46. Elliott Elementary
47. Cabrillo Lane Elementary
48. Haskell Junior High
49. Gahr High School
50. Bellflower Christian School
51. Cerritos Community College
52. Artesia Cemetery Dist.
53. Cerritos Reg. Co. Park
54. Cal Trans 605 Freeway
55. Cal Trans 91 Freeway
56. Parkside Condominiums
57. Shadow Park HOA
58. Concordia Church
59. Church of Nazarene
60. B&B Stables
61. ADP No. 6
62. Granada Park HOA
63. Cerritos Post Office
64. Performing Arts Center
65. Delta Dental
66. Orange County Nursery
67. SCE Nursery
68. Vestar Development
69. Sundance Condos
70. Cerritos Nursery
71. Warmington Homes
72. Midway International
73. Bloomfield Associates
74. 183rd St. on-ramp
75. AT&T Headquarters
76. Laskey-Weil
77. Chancellor Village
78. Land Rover
79. Surgical Center
80. UPS parking structure
81. UPS main building
82. Fountain Walk Senior Housing
83. ASCIP Building
84. 12800 Center Court
85. Chugh Firm
86. Chevron

N

1 REUSE SITES
TRANSMISSION LINE

TABLE 9
SUMMARY OF FISCAL YEAR 11-12 RECYCLED WATER USAGE
CITY OF CERRITOS
(PAGE 1 OF 2)

Reuse Site	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Ironwood 9 Golf Course	Nov 78	25	L,P	0.089	100
Library/Civic Center	Dec 87	4	L	0.016	18
Olympic Natatorium	Dec 87	6	L	0.018	20
Whitney Learning Center	Dec 87	10	AF,L	0.020	23
Gonsalves Elementary School	Dec 87	5	AF,L	0.010	11
Wittman Elementary School	Dec 87	5	AF,L	0.010	11
Gahr High School	Dec 87	28	AF,L	0.055	62
Area Development Project No. 2	Jan 88	11.5	L,P	0.061	69
Medians/Parkways	Jan 88	42.8	L	0.146	164
605 Freeway	Jan 88	58.6	L	0.104	117
91 Freeway	Jan 88	70	L	0.032	36
Frontier Park	Jan 88	2.5	L	0.010	11
Carmenita Junior High School	Jan 88	5	AF,L	0.016	18
Cerritos Elementary School	Jan 88	6	AF,L	0.009	10
Stowers Elementary School	Jan 88	6	AF,L	0.019	22
Kennedy Elementary School	Jan 88	7	AF,L	0.016	18
City Park East	Jan 88	18	L	0.047	52
Satellite Park	Jan 88	2	L	0.004	4
Leal Elementary School	Jan 88	6	AF,L	0.007	8
Cerritos High School	Jan 88	20	AF,L	0.044	49
Elliott Elementary School	Jan 88	7	AF,L	0.012	14
Carmenita Park	Jan 88	4.5	L	0.016	17
Juarez Elementary School	Jan 88	7	AF,L	0.018	20
ABC Adult School / Office	Jan 88	3	L	0.014	16
Tracy Education Center	Jan 88	6	AF,L	0.003	3
Liberty Park	Jan 88	20	L	0.072	80
Gridley Park	Jan 88	9	L	0.026	30
Jacob Park	Jan 88	4.5	L	0.016	18
Heritage Park	Feb 88	12	L	0.034	39
Bragg Elementary School	Feb 88	7	AF,L	0.015	17
Haskell Junior High School	Feb 88	18	AF,L	0.045	51
Pat Nixon Elementary School	Feb 88	5	AF,L	0.009	11
Cabrillo Lane Elementary School	Feb 88	9	AF,L	0.001	1
Sunshine Park	Feb 88	3.5	L	0.010	11
Friendship Park	Feb 88	4	L	0.009	10
Bettencourt Park	Feb 88	2	L	0.005	6
Brookhaven Park	Feb 88	2	L	0.005	6
Saddleback Park	Feb 88	2	L	0.005	5
Westgate Park	Feb 88	4	L	0.009	11
Rainbow Park	Mar 88	2.5	L	0.005	6
Bellflower Christian School	Mar 88	31.4	AF,L	0.035	39
Cerritos Community College	Mar 88	55	AF,L	0.094	106
Cerritos Regional County Park	Apr 88	59	L	0.113	127
Artesia Cemetery District	Apr 88	10.9	L	0.024	26
Rosewood Park	Apr 88	2.7	L	0.015	17
Sports Complex	Mar 89	25	AF,L	0.052	59
Shoemaker On/Off Ramp - 91 Freeway	Dec 89	4.6	L	0.013	15
Transpacific Development Co.	Feb 90	6.9	L	0.010	12
Automated Data Processing	Feb 90	0.7	L	0.004	4
Sheraton Hotel	Mar 90	0.6	L	0.003	4
Cerritos Pontiac/GMC Truck	May 90	0.5	L	0.002	2
Moothart Chrysler	May 90	0.4	L	0.005	5
Windjammer Off Ramp - 91 Freeway	Sep 90	0.8	L	0.002	3

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

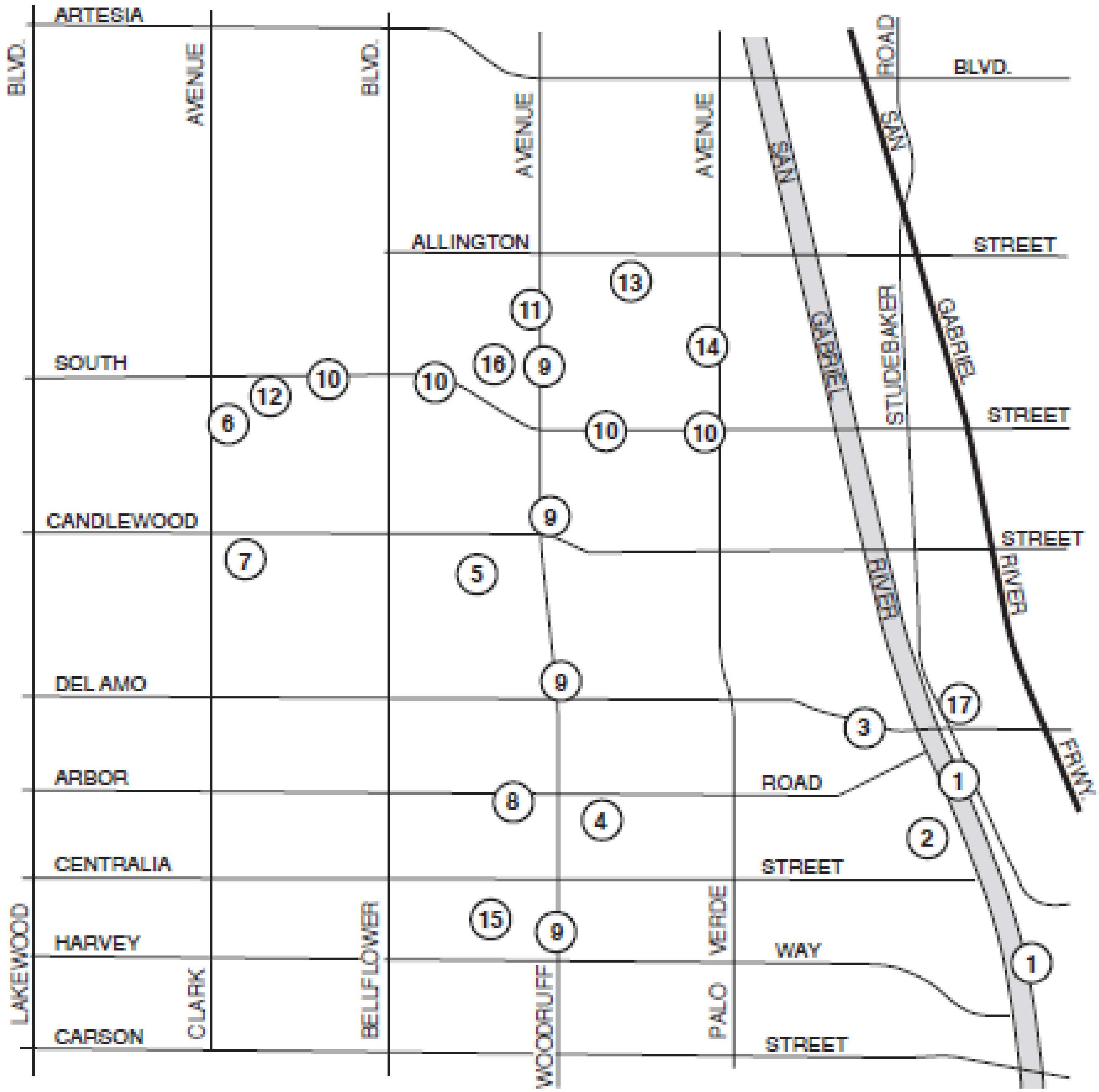
TABLE 9
SUMMARY OF FISCAL YEAR 11-12 RECYCLED WATER USAGE
CITY OF CERRITOS
(PAGE 2 OF 2)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Browning Oldsmobile	Sep 90	0.1	L	0.002	2
City Water Truck	May 91	--	L	0.0001	0.1
Private Haulers	May 91	--	I	0	0
Parkside Condominiums	May 91	1.8	L	0.005	6
Concordia Church	Jun 91	4	L	0.003	4
Church of the Nazarene	Aug 91	1	L	0.003	4
B□B Stables	Aug 91	18	I	0.004	5
Shadow Park Homeowner□s Association	Nov 91	6	L	0.019	21
Area Development Project No. 6	Apr 92	9	L	0.054	60
Granada Park Homeowners Association	May 92	3.8	L	0.008	10
Cerritos Post Office	Feb 93	0.7	L	0.005	5
Center for the Performing Arts	Mar 93	1	L	0.004	5
Delta Dental	Nov 93	1.8	L	0.003	3
Southern California Edison nursery	Mar 94	3.5	O	0.004	5
Vestar Development	Jun 94	9.6	L	0.032	36
Sundance Condominiums	Jan 95	9	L	0.033	37
Cerritos Nursery	Dec 95	3	O	0.004	4
Encore Maintenance-Warmington Homes	May 96	1.1	L	0.003	3
Artesia Off Ramp - 91 Freeway	Aug 96	3.3	L	0.006	6
Midway International	Feb 98	0.3	L	0.001	1
Bloomfield Associates, 17871 Park Plaza Drive	Sep 98	0.5	L	0.001	1
183rd Street On Ramp - 91 Freeway	Feb 99	0.6	L	0.0005	1
AT□T building, 12900 Park Plaza Drive	Aug 99	0.9	L	0.010	11
Laskey-Weil building, 13101 Moore Street	Oct 01	0.4	L	0.002	3
Chancellor Village Senior Housing	Nov 02	0.9	L	0.003	3
LandRover	Dec. 06	0.3	L	0.002	3
Surgical Center, Carmenita □ 166th	May 08	0.1	L	0.0002	0.3
UPS Parking Structure, 13150 Moore	May 08	0.5	L	0.002	2
UPS Main Building, 13233 Moore	Nov 08	4.4	L	0.012	13
Fountain Walk Senior Housing, 18310 Carmenita	Nov 08	0.1	L	0.0002	0.3
ASCIP Building, 16550 Bloomfield	Feb 09	0.1	L	0.0004	0.4
12800 Center Court	Jul 09	0.4	L	0.001	2
Chugh Firm, 15925 Carmenita Road	Jan 11	0.2	L	0.001	1
Chevron, 17255 Bloomfield	Mar 11	0.1	L	0.0004	0.4
TOTALS		**755.6**		**1.665**	**1,871**

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

FIGURE 9

CITY OF LAKEWOOD REUSE SITES



1. RIVER (RYNERSON) PARK
2. MONTE VERDE PARK
3. MAE BOYER PARK
4. JOSE DEL VALLE PARK
5. JOSE SAN MARTIN PARK
6. MAYFAIR PARK
7. CIVIC CENTER WAY & CITY HALL
8. CITY WATER YARD
9. WOODRUFF AVENUE GREENBELT
10. SOUTH STREET GREENBELT
11. ST. JOSEPH'S PARISH SCHOOL
12. FOSTER ELEMENTARY SCHOOL
13. MAYFAIR HIGH SCHOOL
14. LINDSTROM ELEMENTARY SCHOOL
15. LAKEWOOD HIGH SCHOOL
16. MY HOA FARM
17. DEL AMO BLVD. MEDIANS

N

No Scale

Table 10
Summary of Fiscal Year 11-12 Recycled Water Usage
City of Lakewood

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
River (Rynerson) Park	Aug 89	40	L	0.076	85
Monte Verde Park	Aug 89	4	L	0.053	60
Mae Boyer Park	Aug 89	8	L	0.027	31
Jose Del Valle Park	Aug 89	12	L	0.031	35
Jose San Martin Park	Aug 89	9.3	L	0.021	23
City Water Yard	Aug 89	1	L	0.008	9
Woodruff Avenue greenbelt	Aug 89	4.1	L	0.012	13
South Street greenbelt	Aug 89	3.3	L	0.008	9
Mayfair Park	Dec 89	18	L	0.041	47
St. Joseph Parish School	Aug 90	3.5	AF,L	0.010	11
Foster Elementary School	Sep 90	6	AF,L	0.016	18
Civic Center Way and City Hall	Nov 90	2.8	L	0.018	21
Mayfair High School	May 91	36.5	AF,L	0.044	50
Lindstrom Elementary School	Sep 91	12	AF,L	0.015	16
Lakewood High School	Sep 91	25	AF,L	0.026	29
My Hoa Farm	May 93	5	AG	0.013	15
Del Amo Blvd. greenbelt	Jul 03	0.3	L	0.002	3
TOTALS		**190.8**		**0.421**	**474**

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

Construction of the initial system was completed in 1992, with the delivery of recycled water for applications such as landscape irrigation of parks, schools, and freeway slopes, nursery stock irrigation, and various industrial applications. To ensure reliable and efficient delivery of recycled water to the City of Vernon's Malburg Electrical Generation Station, along with existing and future Sanitation Districts' customers, CBMWD worked with the City of South Gate to construct a booster pump at the City's Hollydale Park in November 2004. The Hollydale Pump Station has improved the overall water pressure and supply reliability for CBMWD's recycled water customers in various local cities, including the cities of South Gate, Lynwood, Huntington Park, and Vernon.

This system was also connected in 1994 to the completed portions of the Rio Hondo recycled water distribution system, as detailed in Section 2.5.6 below. Both the Century and Rio Hondo distribution systems can be partially supplied with recycled water from either the Los Coyotes or San Jose Creek WRPs individually or in combination. Most of the recycled water delivered through the Century distribution system actually originated at the San Jose Creek WRP. However, the usage is still reported from the Los Coyotes WRP, as there is no way to differentiate which reuse sites receive which recycled water. Therefore, for the sake of consistency, recycled water usage along the Century facilities is reported in the water reuse reports as coming from the Los Coyotes WRP, and along the Rio Hondo facilities as coming from the San Jose Creek WRP. Figure 10 shows all of the pipelines for both distribution systems, as well as all of the current recycled water use sites. A narrative description of the layout of the Century recycled water distribution system is contained in Appendix F. Table 11 lists all of the recycled water use sites connected to the Century distribution system through FY 11-12.

CBMWD has constructed the delivery facilities right up to the end user; however, the local retail water purveyor is the entity actually supplying the recycled water. Over the past few years, three of the retail purveyors, the cities of Downey, Santa Fe Springs and Lynwood, constructed an additional 20,800 feet of pipelines connecting to the CBMWD distribution system. During FY 11-12, no new sites were added to the Century recycled water distribution system.

During FY 11-12, CBMWD delivered 3.195 MGD (3,590 AFY) of recycled water), or 13.8% of recycled water produced at the Los Coyotes WRP, through 11 retail water purveyors to 172 individual sites for landscape and athletic field irrigation on approximately 1,520 acres and for industrial process water. This was an increase of 8.5% over the preceding fiscal year.

In FY 11-12, CBMWD sold the recycled water on a wholesale basis to its retail water purveyor customers on a monthly use, tiered rate schedule of $536 for the first 50 AF, and $488 for anything above 50 AF. This price is between 57% and 62% of the rate of $859/AF it charges for Tier 1 non-interruptible potable water supplied by MWD, and between 50% and 54% of the rate of $984/AF it charges for Tier 2 supplies. Recycled water delivered outside of CBMWD's service area was subject to a $21-22/AF surcharge for each of the two tiers. Recycled water deliveries to the Malburg power plant in Vernon received an industrial use rate of $368 for the first 25 AF, $342 for the next 25 AF, $317 for the next 50 AF, and $291 for anything above 100 AF. Once they receive recycled water from CBMWD, the retail purveyors then set their own rates for the recycled water delivered to individual customers.

2.4 POMONA WRP

Several treatment plants serving the east San Gabriel Valley were constructed and operated by other agencies as early as 1927. The current Pomona WRP, located at 295 Humane Way, Pomona, CA 91766, was completed in 1966 and most recently expanded in 1991, allowing the plant to treat up to 15 MGD. In FY 11-12, the plant produced 8.49 MGD (9,541 AFY) of coagulated, filtered, disinfected tertiary recycled water (2.0% of the effluent produced in the JOS), which was a 5.7% decrease from the preceding fiscal year, at a FY 11-12

FIGURE 10
CENTRAL BASIN MUNICIPAL WATER DISTRICT
RECLAIMED WATER DISTRIBUTION SYSTEM

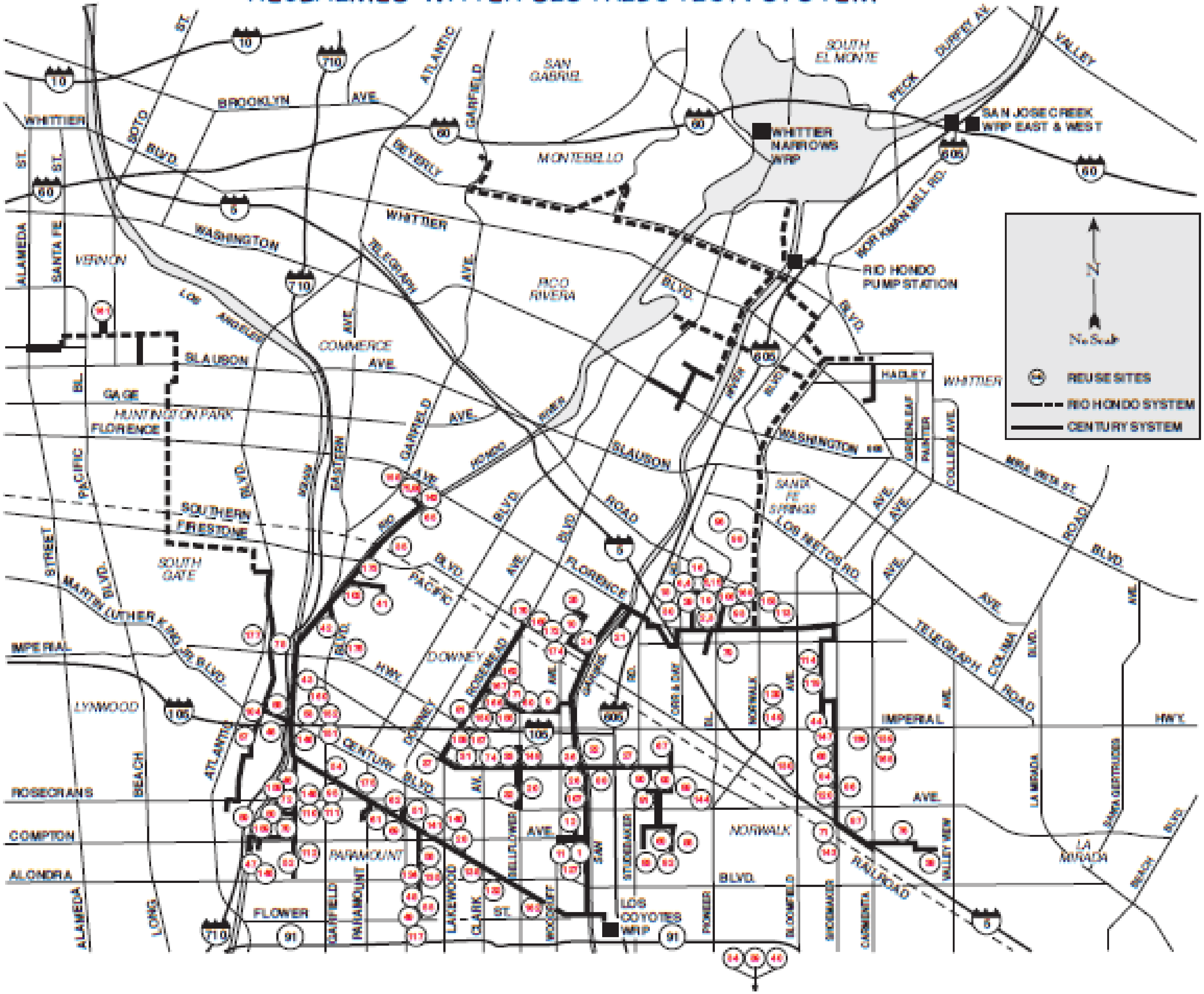


TABLE 11
SUMMARY OF FISCAL YEAR 11-12 RECYCLED WATER USAGE
CENTURY DISTRIBUTION SYSTEM
(PAGE 1 OF 4)

Reuse Site (City) (Map No.)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Andy's Nursery (Bellflower) (1)	Feb 92	9	O	0	0
Lake Center Park (Santa Fe Springs) (2)	Mar 92	8	L	0.019	22
Lake Center School (Santa Fe Springs) (3)	Mar 92	8	AF,L	0.018	20
Clarkman Walkway (Santa Fe Springs) (4)	Mar 92	0.1	L	0.0004	0.4
Towne Center Walkway (Santa Fe Springs) (5)	Apr 92	0.1	L	0.0002	0.2
Lakeview Child Care (Santa Fe Springs) (6)	May 92	0.2	L	0.002	2
Orr & Day Road medians (Santa Fe Springs) (7)	May 92	0.1	L	0	0
Florence Avenue medians (Santa Fe Springs) (8)	Jun 92	3	L	0.006	6
Gauldin Elementary School (Downey) (9)	Jun 92	8.4	AF,L	0.006	7
Rio San Gabriel School (Downey) (10)	Jun 92	14.8	AF,L	0.016	18
Bellflower High School (Bellflower) (11)	Jul 92	28.4	AF,L	0.070	78
Ernie Pyle Elementary School (Bellflower) (12)	Aug 92	4.9	AF,L	0.011	13
Telegraph Road medians (Santa Fe Springs) (13)	Aug 92	0.5	L	0.003	3
Lakeview Park (Santa Fe Springs) (14)	Aug 92	6.7	L	0.013	14
Clark Estate (Santa Fe Springs) (15)	Aug 92	4.3	L	0.006	6
Towne Center Green (Santa Fe Springs) (16)	Aug 92	2.3	L	0.005	6
Pioneer Road medians (Santa Fe Springs) (17)	Sep 92	0.4	L	0.028	32
Police Station (Santa Fe Springs) (18)	Sep 92	0.2	L	0.002	2
Aquatic Center (Santa Fe Springs) (19)	Sep 92	0.5	L	0.004	5
Lewis School (Downey) (20)	Nov 92	4.6	AF,L	0.006	7
Wilderness Park (Downey) (21)	Nov 92	24	L	0.089	100
605 Freeway at Foster (Bellflower) (22)	Jan 93	14	L	0.005	5
Promenade Walkway (Santa Fe Springs) (23)	Jan 93	0.3	L	0.002	2
Rio San Gabriel Park (Downey) (24)	Jan 93	6.4	L	0.042	47
East Middle School (Downey) (25)	Jan 93	26	AF,L	0.023	25
Zinn Park (Bellflower) (26)	Jan 93	1.7	L	0.009	10
605-105 Interchange (Bellflower) (27)	Feb 93	22	L	0.0002	0.3
Hollywood Sports Center (Bellflower) (28)	Feb 93	22.5	L	0.002	2
Santa Fe Springs High School (Santa Fe Springs) (29)	Feb 93	14.5	AF,L	0.022	25
605-5 Freeway at Florence (Santa Fe Springs) (30)	Feb 93	17	L	0	0
Old Downey Cemetery (Downey) (31)	Apr 93	7.5	L	0.022	25
Thompson Park (Bellflower) (32)	Apr 93	15	L	0.022	25
105 Freeway at Bellflower (Downey) (33)	May 93	17.9	L	0.009	10
Palms Park (Lakewood) (34)	May 93	20	L	0.004	5
Crawford Park (Downey) (35)	Jul 93	2.1	L	0.008	10
Humedo Nursery (Downey) (36)	Aug 93	11	O	0.005	6
105 Freeway at Lakewood (Downey) (37)	Sep 93	25	L	0.003	3
Shaw Industries Carpet Mill (Santa Fe Springs) (38)	Sep 93	--	I	0.068	76
Palms Elementary School (Lakewood) (39)	Sep 93	3.5	AF,L	0.013	14
Artesia High School (Lakewood) (40)	Sep 93	20.9	AF,L	0.033	37
West Middle School (Downey) (41)	Oct 93	19.5	AF,L	0.019	21
Circle Park (South Gate) (42)	Oct 93	4	L	0.013	15
Hollydale Park (South Gate) (43)	Nov 93	46	L	0.089	100
Robertson's Ready-Mix (Santa Fe Springs) (44)	Dec 93	--	I	0.005	6
710-105 Interchange (Paramount) (45)	Dec 93	18.5	L	0.001	1
Downey-Contreras greenbelt (Paramount) (46)	Dec 93	0.1	L	0.001	1
Compton Golf Course (Paramount) (47)	Dec 93	13	L	0.023	26
Alondra Junior High School (Paramount) (48)	Dec 93	14	AF,L	0.029	32
Mokler Elementary School (Paramount) (49)	Dec 93	10	AF,L	0.009	10
Los Cerritos Elementary School (Paramount) (50)	Dec 93	8	AF,L	0.013	15
Wirtz Elementary School (Paramount) (51)	Dec 93	9	AF,L	0.011	12
Keppel Elementary School (Paramount) (52)	Dec 93	4	AF,L	0.002	2
Billy Lee Nursery (Paramount) (56)	Dec 93	2.5	O	0.009	10

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

TABLE 11
SUMMARY OF FISCAL YEAR 11-12 RECYCLED WATER USAGE
CENTURY DISTRIBUTION SYSTEM
(PAGE 2 OF 4)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
105 Freeway at Wright (Lynwood) (57)	Jan 94	19.6	L	0.001	1
710 Freeway at M.L. King (Lynwood) (58)	Jan 94	15.5	L	0	0
710 Freeway at Rosecrans (Compton) (59)	Jan 94	24.2	L	0	0
Independence Park (Downey) (60)	Feb 94	10.4	L	0.012	14
Paramount Park (Paramount) (61)	Feb 94	9	L	0.023	26
Paramount High School (Paramount) (62)	Feb 94	19	AF,L	0.030	34
Rosecrans/Paramount medians (Paramount) (63)	Mar 94	0.2	L	0.001	1
Somerset medians (Paramount) (64)	Apr 94	0.9	L	0.005	6
Rio Hondo Golf Course (Downey) (65)	Apr 94	92.4	L	0.231	259
Zimmerman Park (Norwalk) (66)	Apr 94	9.5	L	0.015	17
Vista Verde Park (Norwalk) (67)	Apr 94	6.5	L	0.010	12
Gerdes Park (Norwalk) (68)	Apr 94	8.6	L	0.017	19
Clearwater Junior High School (Paramount) (69)	Apr 94	4	AF,L	0.033	37
Steam Engine Park (Paramount) (70)	Jun 94	0.6	L	0.002	2
5 Freeway at Shoemaker/Firestone (Norwalk) (71)	Jul 94	0.8	L	0.002	2
Spane Park (Paramount) (72)	Jul 94	5	L	0.009	11
Orange/Cortland Parkway (Paramount) (73)	Jul 94	1.3	L	0.003	3
Carpenter School (Downey) (74)	Aug 94	7.4	AF,L	0.006	6
John Anson Ford Park (Bell Gardens) (75)	Sep 94	45	L	0.065	73
Ramona Park (Norwalk) (76)	Oct 94	4.8	L	0.007	8
Alondra median (Paramount) (77)	Oct 94	0.6	L	0.007	8
Imperial/Wright Road medians (Lynwood) (78)	Oct 94	0.2	L	0.002	2
Little Lake Park (Santa Fe Springs) (79)	Dec 94	18	L	0.038	43
John Anson Ford Golf Course (Bell Gardens) (80)	Feb 95	13.6	L	--	--
South Middle School (Downey) (81)	May 95	15.8	AF,L	0.017	19
Nuffer Elementary School (Norwalk) (82)	Jun 95	10.4	AF,L	0.009	10
Lampton Middle School (Norwalk) (83)	Jun 95	9.5	AF,L	0.014	15
Hargitt Middle School (Norwalk) (84)	Jul 95	9.5	AF,L	0.022	24
Norwalk Adult School (Norwalk) (85)	Jul 95	17.2	AF,L	0.026	29
John Glenn High School (Norwalk) (86)	Jul 95	38.8	AF,L	0.045	50
Ramona Elementary School (Norwalk) (87)	Jul 95	6.8	AF,L	0.007	8
New River Elementary School (Norwalk) (88)	Jul 95	10.3	AF,L	0.010	12
Morrison Elementary School (Norwalk) (89)	Sep 95	7.7	AF,L	0.009	10
D.D. Johnston Elementary School (Norwalk) (90)	Sep 95	8.9	AF,L	0.008	9
Corvallis Middle School (Norwalk) (91)	Sep 95	16.9	AF,L	0.022	24
Norwalk High School (Norwalk) (92)	Sep 95	35.1	AF,L	0.034	38
Heritage Park (Santa Fe Springs) (93)	Oct 95	9.2	L	0.009	10
Belloso Farm Nursery (Paramount) (94)	Oct 95	2.5	O	0	0
Robertson's Ready-Mix (Paramount) (95)	Nov 95	--	I	0.008	8
Los Nietos Park (Santa Fe Springs) (96)	Jan 96	11.2	L	0.016	19
Bell Gardens Soccer Field (Bell Gardens) (97)	Feb 96	2.6	AF	0.011	12
Jersey Ave. School/city athl. fields (S.F. Springs) (98)	Mar 96	8	AF	0.007	8
Bellflower Blvd. medians (Bellflower) (99)	Jul 96	0.3	L	0.002	2
Alta Produce (Paramount) (100)	Aug 96	4	AG	0.002	2
Belloso Farm Nursery (South Gate) (101)	Sep 96	2.5	O	0.002	2
Temple Park (Downey) (102)	Oct 96	1	L	0.001	2
Woodruff Avenue medians (Bellflower) (103)	Oct 96	0.8	L	0.005	5
Ham Park (Lynwood) (104)	Dec 96	10	L	0	0
Jauregui Nursery (Paramount) (105)	Dec 96	2	O	0.002	3
Heritage Corporate Center (Santa Fe Springs) (106)	Jan 97	29.9	L	0.027	31
Belloso Farm Nursery (Bellflower) (107)	Jan 97	8	O	0	0
Foster Road medians (Norwalk) (108)	Jan 97	0.3	L	0.002	3
Rosecrans Avenue medians (Paramount) (109)	Mar 97	0.2	L	0.002	3

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

TABLE 11
SUMMARY OF FISCAL YEAR 11-12 RECYCLED WATER USAGE
CENTURY DISTRIBUTION SYSTEM
(PAGE 3 OF 4)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Texaco□Somerset medians (Paramount) (110)	Mar 97	0.2	L	0.002	2
McLane Mowers (Paramount) (111)	Mar 97	0.6	L	0	0
ABC Nursery (Paramount) (112)	Mar 97	16	O	0	0
L.A. County Vector Control Bldg. (S.F. Springs) (113)	Mar 97	3.8	L	0.004	5
Greenstone Warehouse (Santa Fe Springs) (114)	Apr 97	0.4	L	0.002	2
McNab Avenue medians (Bellflower) (115)	Jul 97	0.1	L	0.0004	0.4
Foster Road□Premier Ave. medians (Downey) (116)	Aug 97	0.1	L	0.00005	0.1
Palm Growers Nursery (Downey) (117)	Oct 97	7.3	O	0	0
Alondra Blvd medians @ SGR (Bellflower) (118)	Oct 97	0.1	L	0.001	1
Maruichi American building (Santa Fe Springs) (119)	Oct 98	0.4	L	0.002	2
Norwalk Golf Course (Norwalk) (120)	Jan 99	8	L	0.024	26
Soco-Lynch Corp. building (Santa Fe Springs) (121)	Feb 99	1	L	0.003	3
MC□C building (Santa Fe Springs) (122)	Mar 99	0.7	L	0.008	9
Lakewood Blvd. medians (Paramount) (123)	Mar 99	0.2	L	0.002	2
Progress Park (Paramount) (124)	Mar 99	6.2	L	0.014	15
Garfield Avenue medians (Paramount) (125)	Apr 99	0.1	L	0.002	2
B□B Pallet Co. (South Gate) (126)	May 99	--	I	0	0
Garcia□s Nursery (Bellflower) (127)	Jun 99	6	O	0.001	1
Orange Avenue medians (Paramount) (128)	Aug 99	0.1	L	0.003	4
Metropolitan State Hospital (Norwalk) (129)	Sep 99	80	L	0	0
Moffit School (Norwalk) (130)	Sep 99	1.6	AF,L	0.007	8
Rio Hondo Channel (Downey) (131)	Nov 99	0.8	L	0.0003	0.3
Simms Park (Bellflower) (132)	Dec 99	12.5	L	0.017	19
Foster Road Greenbelt (Norwalk) (133)	Mar 00	3.3	L	0.005	6
San Luis Street @ flood channel (Paramount) (134)	Apr 00	3	L	0.0003	0.4
Jefferson School (Paramount) (135)	Jul 00	0.5	AF,L	0.003	3
Columbus High School (Downey) (136)	Aug 00	25	AF,L	0.019	22
Triangle Park (South Gate) (137)	Nov 00	0.4	L	0.002	3
Golden Springs Business Park (Santa Fe Springs) (139)	Apr 01	31.4	L	0.117	132
Bellflower Storage (Bellflower) (140)	Jun 01	3	L	0.002	2
Railroad Beautification (Paramount) (141)	Jul 01	0.5	L	0	0
Rio Hondo Channel (Bell Gardens) (142)	Jul 01	0.3	L	0.002	2
CDM building (Santa Fe Springs) (143)	Oct 01	0.1	L	0.002	3
L.A. County Recorder□s Office (Norwalk) (144)	Jan 02	2.7	L	0.012	14
Tays Cool Fuel (Paramount) (145)	Feb 02	0.2	L	0.002	2
L.A. River landscaping (South Gate) (146)	Mar 02	2.5	L	0.0003	0.3
Lakewood-Adoree medians (Downey) (150)	Jul 02	3.4	L	0.045	50
Simon Trucking (Santa Fe Springs) (147)	Nov 02	0.9	L	0.001	1
Foster□Coldbrook medians (Bellflower) (148)	Nov 02	0.1	L	0.0003	0.3
L.A. County Library (Norwalk) (149)	Nov 02	0.9	L	0.005	5
Metro State□Wheelabrator (Norwalk) (129)	Jan 03	B	I	0.192	216
Imperial Equestrian (South Gate) (152)	Jul 03	1.5	L	0.003	4
Norwalk Walkway□Parking (Santa Fe Springs) (153)	Jul 03	1	L	0.004	5
Steve Horn Way□Bellflower medians (Downey) (155)	Nov 03	0.3	L	0.015	17
Pro Growers Nursery (Norwalk) (156)	Sep 04	11.3	O	0.063	71
Kaiser Administration building (Downey) (157)	Oct 04	2.5	L	0.005	6
Downey Studios (Downey) (158)	Oct 04	1	L	0.004	4
Dills Park (Paramount) (159)	Jul 05	12.5	L	0.031	34
Hollydale Elementary (South Gate) (160)	Sep 05	3	AF,L	0.001	1
Malburg Generation Station (Vernon) (161)	Oct 05	B	I	0.624	701
Stuart and Gray medians (Downey) (162)	Dec 05	0.4	L	0.006	7
Woodruff and Maple medians (Bellflower) (163)	Mar 06	0.1	L	0.0001	0.1
Sculpture Garden (Santa Fe Springs) (164)	May 06	0.6	L	0	0

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

Table 11
Summary of Fiscal Year 11-12 Recycled Water Usage
Century Distribution System
(Page 4 of 4)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Foster Road medians (Santa Fe Springs) (165)	Jul 06	1	L	0.009	10
Space Learning Center (Downey) (166)	Apr 08	10.5	L	0.025	28
Cornerstone Commerce Center (Downey) (167)	Jun 08	0.8	L	0.007	8
Mora Drive medians (Santa Fe Springs) (168)	Oct 08		L	0.006	7
Firestone Blvd. medians (Downey) (169)	Feb 09	0.1	L	0.0004	0.4
Citibank, 8764 Firestone Blvd. (Downey) (170)	Feb 09	0.1	L	0.001	1
Steve Horn Pkwy. medians @ Kaiser (Downey) (171)	May 09	1.4	L	0.027	30
Walgreens/Big Lots, 9018 Firestone (Downey) (172)	May 09	0.4	L	0.003	3
Pacific Alloy Casting (South Gate) (173)	Jul 09	--	I	0.016	18
MTA Bike Trail (Bellflower) (174)	Nov 09	0.1	L	0.009	10
Paramount Blvd. Medians (Paramount) (175)	Mar 10		L	0.006	7
Los Amigos Golf Course (L.A. County) (176)	Aug 10	110	L	0.168	189
Atlantic Ave. medians (South Gate) (177)	Mar 11	16.3	L	0.003	4
TOTALS		**1,520.3**		**3.195**	**3,590**

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

POMONA WRP FACTS

Plant capacity:	15 MGD
Water produced:	8.49 MGD 9,541 AFY 5.7% FY decrease
FY11-12 O&M:	$328/AF
Water reused: (excluding recharge)	2.885 MGD 3,241 AFY 13.1% FY increase 34.0% of production
Delivery systems:	2 190,100 ft. of pipe
No. of reuse sites:	196 2,197.0 acres

O&M cost of approximately $328/AF. Recycled water quality for FY 11-12 is presented in Table B-3 of Appendix B.

Two agencies, the Pomona Water Department (PWD) and the Walnut Valley Water District (WVWD), along with the Sanitation Districts' Spadra Landfill, together used 2.885 MGD (3,241 AFY) or 34.0% of the plant's total production. This was a 13.1% increase over the preceding fiscal year. A third purveyor, Rowland Water District (RWD), took over operation of that portion of the WVWD recycled water distribution system that ran through its service area and has connected to the City of Industry system which gets its recycled water from the San Jose Creek WRP (Section 2.5.3).

The remaining recycled water is discharged to south fork of San Jose Creek, which is tributary to the unlined portion of the San Gabriel River. Therefore, nearly 100% of the recycled water produced at this plant is reused, since most of the river discharge percolates into the underlying groundwater. Use of recycled water from this facility is permitted by the LARWQCB under Order Nos. 81-34 and 97-072 for direct, non-potable applications, and No. 91-100 for groundwater replenishment.

2.4.1 *Pomona Water Department*

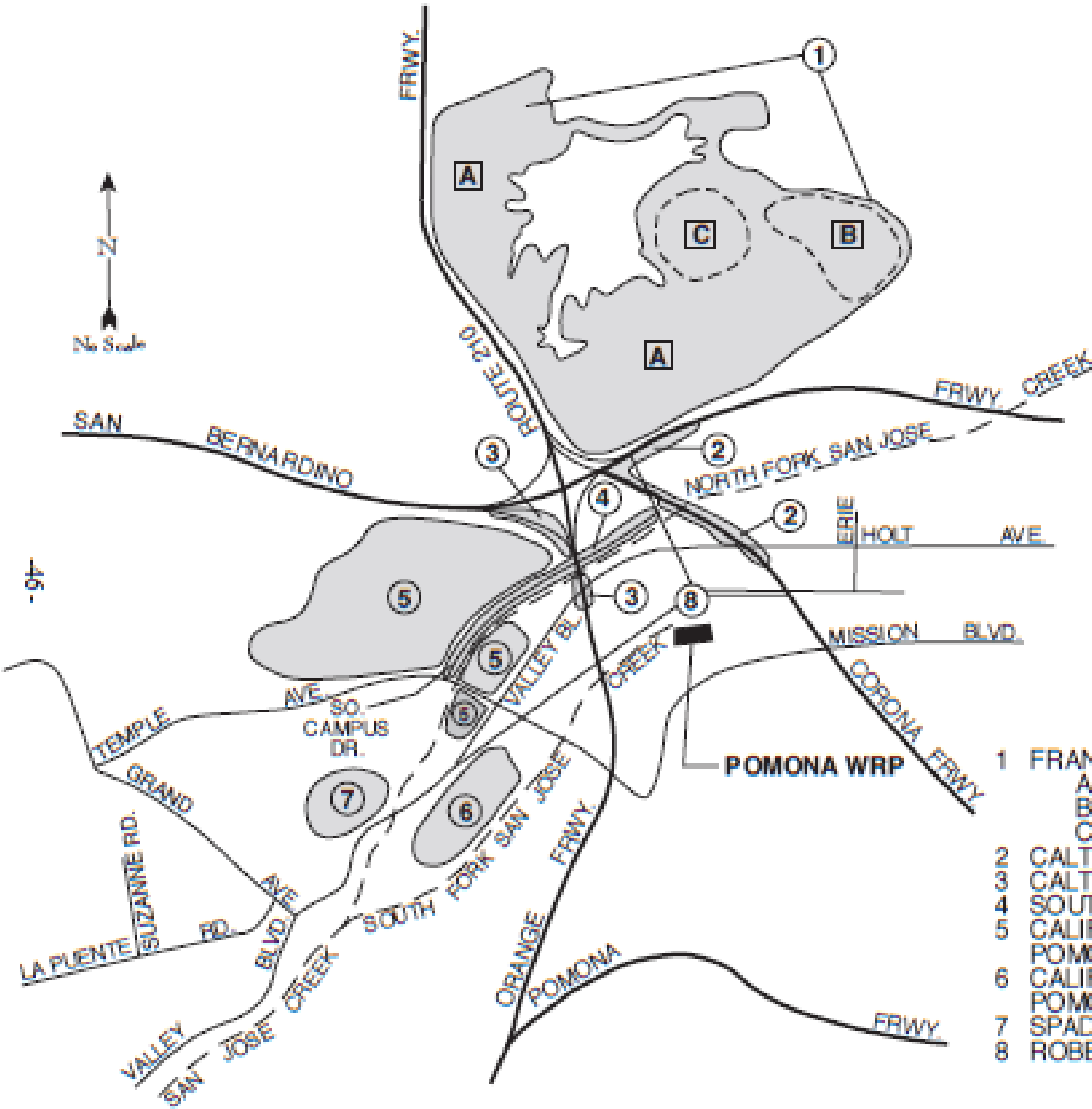
Documented use of recycled water in the Pomona area goes as far back as 1904 when effluents treated to various levels were used on the many farms and ranches in the area. The PWD began using recycled water from the Sanitation Districts' current treatment facility in December 1973 when agricultural irrigation at California State Polytechnic University, Pomona (Cal Poly) and its occasional satellite farming operation at Lanterman State Hospital, and landscape irrigation along South Campus Drive Parkway were connected to a recycled water distribution system.

The distribution system consists of a 490 HP, 9,000 gpm pump station that feeds two, 21-inch pipelines. One 21-inch line runs east along Pomona Boulevard and Vernon Avenue. The other 21-inch line runs north along Ridgeway Street to a T-section at South Campus Drive and the 71 Freeway. From this point, an 18-inch line continues north along Ridgeway, then east along Murchison Avenue for a short distance before it terminates at a 4.5 million gallon storage reservoir in Bonelli Park. At the T-section, a 16-inch line runs west along South Campus Drive, serving the parkway, Cal Poly, and the 57 and 71 Freeways. Lanterman Hospital had been served by a 21-inch unreinforced concrete gravity line from the Pomona WRP that currently serves the former Landfill site and the WVWD pump station (discussed in Sections 2.4.2 and 2.4.3, below).

During FY 11-12, the PWD delivered 1.389 MGD (1,560 AFY), or 16.3% of the recycled water from the Pomona WRP though 37,000 feet of pipeline, to seven retail customers on 1,427 acres as shown in Figure 11. This was a 15.8% increase over the preceding fiscal year. Table 12 lists the users of the PWD system as of the end of FY 11-12. No new users were added during this fiscal year.

During FY 11-12, the PWD sold the recycled water to its customers from its pressure system at a rate of $533.66/AF. This is 42% of its potable water rate of $1,271.95/AF.

FIGURE 11
POMONA WATER DEPARTMENT AND SPADRA LANDFILL REUSE SITES



1 FRANK G. BONELLI REGIONAL COUNTY PARK
  A BONELLI PARK
  B MOUNTAIN MEADOWS GOLF COURSE
  C EAST SHORE R. V. PARK
2 CALTRANS 71 FREEWAY
3 CALTRANS 57 FREEWAY
4 SOUTH CAMPUS DRIVE PARKWAY
5 CALIFORNIA STATE POLYTECHNIC UNIVERSITY, POMONA - KELLOGG CAMPUS
6 CALIFORNIA STATE POLYTECHNIC UNIVERSITY, POMONA - LANTERMAN STATE HOSPITAL
7 SPADRA LANDFILL
8 ROBERTSON'S READY MIX

TABLE 12
SUMMARY OF FISCAL YEAR 11-12 RECYCLED WATER USAGE
POMONA WATER DEPARTMENT & SANITATION DISTRICTS' SPADRA SITE

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Cal Poly, Pomona-Kellogg	Dec 73	500	AG,L,O,P,AF	0.566	636
Lanterman Hospital	Dec 73	100	AG	0	0
South Campus Drive Parkway	Dec 73	8	L	0.012	13
Route 57 and 10 Freeways	May 75	18	L	0.051	57
Bonelli Regional County Park	Apr 77	789	L	0.749	841
Route 71 and 10 Freeways	Apr 81	12	L	0.005	6
Spadra Landfill landscape	Jul 84	53	L	0.327	368
Spadra Landfill dust control	Jul 84	--	I	0.003	4
Cal Poly LandLab	Nov 93	2.5	AG,L	0.010	12
Spadra Gas-to-Energy Plant	Dec 95	--	I	0.045	51
Robertson's Ready-Mix	Oct 09	--	I	0.007	7
TOTALS		**1,482.5**		**1.775**	**1,994**

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

2.4.2 Spadra Landfill Site

The Sanitation Districts' Spadra Landfill began receiving recycled water from the Pomona WRP in July 1984 from the 21-inch unreinforced concrete gravity line from the plant. A pressure-sustaining valve on the line at the landfill site provides enough static head in the pipeline for the pumps of the landfill to operate. Cal Poly's LandLab project began receiving recycled water from the landfill site in November 1993, and the Spadra Gas-to-Energy (SGE) Facility began using recycled water in its cooling towers in December 1995. These sites are shown in Figure 11 and are also listed in Table 12 along with the users of the Pomona Water Department system.

During FY 11-12, 0.386 MGD (434 AFY), or 4.5% of the recycled water from the Pomona WRP, was used on approximately 56 acres at the former Spadra Landfill site, the SGE Facility, and Cal Poly's LandLab. This was a 24.0% increase over the preceding fiscal year.

2.4.3 Walnut Valley Water District

In March 1986, WVWD completed the initial construction of its recycled water distribution system. This system consists of a 3,500 gpm pump station and an 8,000 gallon wet well at the end of the 21-inch concrete gravity line from the Pomona WRP, approximately 166,320 feet of pipeline, and a 2 million gallon reservoir. A second, 2 million gallon reservoir was constructed in mid-1992 to provide more storage for the nighttime peak demands. The distribution system is supplemented during the peak summer demand periods with non-potable water from a well located next to the recycled water line on Fairway Avenue and with imported water from MWD at the pump station. Initially, 26 individual sites were served following completion of the distribution system. In January 2003, the RWD assumed operation of the 29,280 feet of the WVWD recycled water system pipeline serving seven reuse sites in RWD's service area which was connected to the City of Industry main recycled transmission line in July 2009 (see Section 2.5.3 below). Figure 12 and Table 13 present the users of the WVWD system as of the end of FY 11-12. A narrative description of the layout of the WVWD recycled water distribution system is contained in Appendix G.

In FY 11-12, two new sites were added to the WVWD distribution system. In December 2011, the landscaping around Majestic Realty (179 S. Grand Ave.) was connected. In May 2012, the landscaping around the Parker Canyon Storage Reservoir was connected. During FY 11-12, WVWD delivered 1.110 MGD (1,247 AFY), or 13.1% of the recycled water produced at the Pomona WRP, an increase of 6.8% over the preceding fiscal year. WVWD received the recycled water directly from the Sanitation Districts and retailed it to its 185 customers (which irrigate approximately 714.5 acres) at 62% of its potable water rate of $1,041.08/AF, or $649.04/AF.

2.5 San Jose Creek WRP

This treatment facility, located at 1965 Workman Mill Road, Whittier, CA 90601, was first built in 1971 with a design capacity of 37.5 MGD. The 25 MGD Stage II expansion was completed in 1982, and the 37.5 MGD Stage III expansion was completed in 1993. The facility currently has a design capacity of 100 MGD, with enough space for a future 25 MGD Stage IV expansion (however, there is no set schedule for this project). During FY 11-12, Stages I & II (east side) produced 47.65 MGD (53,542 AFY) and Stage III (west side) produced 19.85 MGD (22,307 AFY), at O&M costs of $212/AF and $241/AF, respectively. The entire facility, therefore, produced a total of 67.50 MGD (75,849 AFY) of coagulated, filtered, disinfected tertiary recycled water (17.2% of the effluent produced in the JOS), a 0.4% increase over the preceding fiscal year.

Recycled water quality from both the east and west sides of the plant for FY 11-12 is presented in Tables B-4 and B-5, respectively, of Appendix B. Of the total amount of recycled water produced, 38.506 MGD (43,266

FIGURE 12
WALNUT VALLEY WATER DISTRICT RECLAIMED WATER DISTRIBUTION SYSTEM

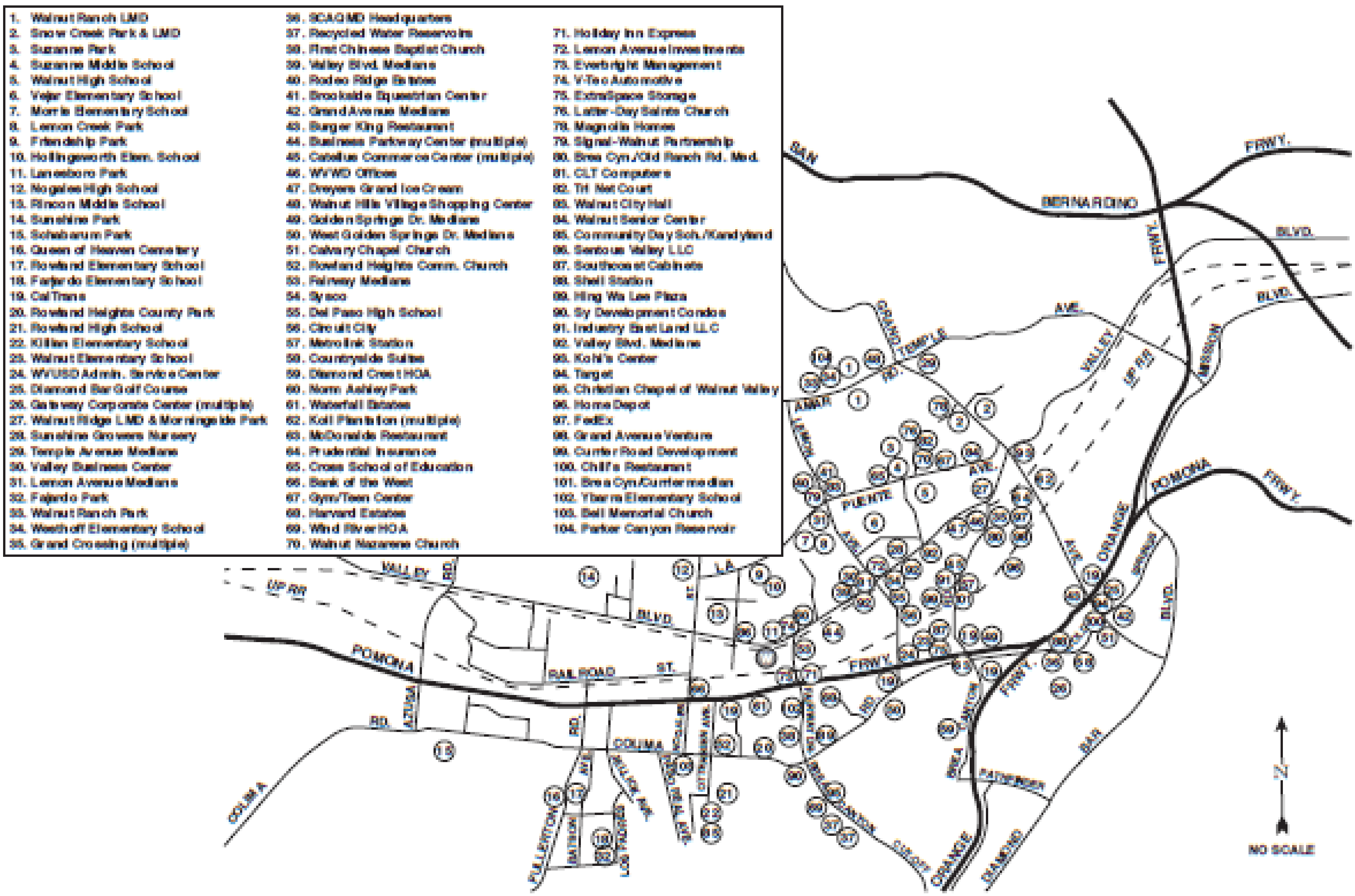


TABLE 13
SUMMARY OF FISCAL YEAR 11-12 RECYCLED WATER USAGE
WALNUT VALLEY WATER DISTRICT
(PAGE 1 OF 4)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Suzanne Park (Walnut)	Oct 80	12	L	0.016	18
Suzanne Middle School (Walnut)	May 86	4	AF,L	0.011	12
Walnut High School (Walnut)	May 86	15	AF,L	0.019	21
Vejar School (Walnut)	May 86	3	AF,L	0.009	10
Morris School (Walnut)	May 86	9	AF,L	0.010	12
Snow Creek Park (Walnut)	May 86	7	L	0.011	12
Snow Creek Landscape Maintenance Dist. (Walnut)	May 86	13.5	L	0.048	54
Lemon Creek Park (Walnut)	May 86	5	L	0.006	7
Friendship Park (West Covina)	May 86	6	L	0.008	9
Hollingworth School (West Covina)	May 86	3	AF,L	0.006	7
Lanesboro Park (West Covina)	May 86	2	L	0.008	9
Rincon Middle School (West Covina)	May 86	3	AF,L	0.009	11
Route 57 and 60 Freeways (Rowland Heights)	May 86	19.7	L	0.019	21
Rowland Heights Reg. Co. Park (Rowland Heights)	May 86	11	L	0.013	15
Rowland High School (Rowland Heights)	May 86	9	AF,L	0.017	20
Killian Elementary School (Rowland Heights)	May 86	3	AF,L	0.005	5
Walnut Elementary School (Walnut)	May 86	4	AF,L	0.001	1
WUSD Administrative Service Center (Walnut)	May 86	4	L	0.003	3
Walnut Ranch Park (Walnut)	Jun 86	26	L	0.022	25
Amar Road greenbelt (Walnut)	Jun 86	16	L	0.035	40
Diamond Bar Golf Course (Diamond Bar)	Jul 86	174	L,P	0.192	215
Walnut Ridge Landscape Maintenance Dist. (Walnut)	Mar 87	25.5	L	0.040	45
Morningside Park (Walnut)	Mar 87	4	L	0.006	7
Gateway Corporate Center (Diamond Bar)	Jun 87	45	L	0.038	43
20659 E. Valley Blvd. (Walnut)	May 88	7	O	0.00001	0.01
Westhoff Elementary School (Walnut)	Sep 88	8	AF,L	0.005	6
Temple Avenue greenbelt (Walnut)	Jan 90	1	L	0.001	1
Walnut Tech Business Center (Walnut)	Apr 90	1	L	0.002	2
Lemon Avenue greenbelt (Walnut)	Sep 91	4.3	L	0.007	8
South Coast AQMD Headquarters (Diamond Bar)	Nov 91	2	L	0.005	5
WVWD reservoir (Diamond Bar)	May 92	1	L	0.006	7
First Chinese Baptist Church (Walnut)	Dec 92	0.3	L	0.002	2
Burger King restaurant (Diamond Bar)	Oct 93	0.2	L	0.001	1
Majestic Mgmt., 19850 E. Business Pkwy (Walnut)	Nov 93	0.8	L	0.003	3
General Electric, 19705 E. Business Pkwy (Walnut)	Nov 93	1.6	L	0.006	7
Rodeo Ridge Estates (Walnut)	Dec 93	6.3	L	0.006	7
Golden Springs Drive medians (Diamond Bar)	Jan 94	1.3	L	0.006	7
Walnut Hills Village Shopping Center (Walnut)	Mar 94	2.4	L	0.005	6
Brookside Equestrian Center (Walnut)	Aug 94	13.6	L	0.002	2
WVWD Office (Walnut)	Oct 94	0.2	L	0.002	2
Cattelus Development (Walnut)	Oct 94	18.9	L	0.013	15
Circuit City, 501 Cheryl Lane (Walnut)	Oct 94	1	L	0.007	8
Dreyer□s Grand Ice Cream, 351 Cheryl Lane (Walnut)	Oct 94	0.6	L	0.004	4
Metrolink Station (Industry)	Nov 94	0.6	L	0.002	2
Del Paso High School (Walnut)	Jan 95	3	AF,L	0.004	4
Dow Corning, 20832 Currier Road (Walnut)	Jan 95	0.1	L	0.0001	0.1
Circuit City Headquarters, Currier□Lemon (Walnut)	Apr 95	1.1	L	0.008	9
Sysco Food Service, 20701 Currier Road (Walnut)	Apr 95	2.3	L	0.008	9
Tung Hsin Trading, 20420 E. Business Pkwy (Walnut)	Apr 95	0.8	L	0.003	4
Amergence Tech. Inc., 20480 E. Bus. Pkwy (Walnut)	Apr 95	0.9	L	0.003	3
Dura Freight Lines, 515-525 S. Lemon (Walnut)	Apr 95	0.5	L	0.001	1
S□W-S□E Corner Lemon□Bus. Parkway (Walnut)	Apr 95	0.2	L	0.004	5
Dura Freight Lines , 20275 Bus. Parkway (Walnut)	Apr 95	1.3	L	0.003	3

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

TABLE 13
SUMMARY OF FISCAL YEAR 11-12 RECYCLED WATER USAGE
WALNUT VALLEY WATER DISTRICT
(PAGE 2 OF 4)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Coaster Co. of America, 20300 Bus. Parkway (Walnut)	Apr 95	0.7	L	0.002	3
Dura Freight Lines, 20405 Bus. Parkway (Walnut)	Apr 95	1	L	0.002	3
Dura Freight Lines, 20595 E. Business Pkwy (Walnut)	Apr 95	0.8	L	0.004	4
Dura Freight Lines, 20445 E. Business Pkwy (Walnut)	Apr 95	0.7	L	0.002	2
820 Fairway Drive medians (Industry)	Jun 95	0.1	L	0.001	1
Spencer N Enterprises, Inc., 435 S. Lemon (Walnut)	Jun 95	0.5	L	0.001	2
General Electric, 19805 E Business Pkwy (Walnut)	Jun 95	1.1	L	0.007	7
Menlo Logistics, 20002 E. Business Pkwy (Walnut)	Jun 95	4	L	0.006	7
General Electric, 20005 E. Business Parkway (Walnut)	Jun 95	6.7	L	0.010	11
Ping Ting Hsu, 20701 Currier Road (Walnut)	Aug 96	0.1	L	0.0005	1
Lawrence Allen □ Assoc., 20822 Currier Rd. (Walnut)	Oct 96	0.1	L	0.001	1
Fairway Business Cntr., 19700 Bus. Parkway (Walnut)	Nov 96	0.4	L	0.002	3
Rowland Heights Christian Church (Rowland Hghts.)	Feb 97	0.5	L	0.0004	0.4
Viewsonic, 510 Cheryl□455 Brea Canyon (Walnut)	Jul 97	1.8	L	0.010	11
Countryside Suites (Diamond Bar)	Mar 98	1.4	L	0.003	3
Diamond Crest Homeowners Assn. (Diamond Bar)	Oct 98	14	L	0.024	26
Norm Ashley Park (Walnut)	Nov 98	0.2	L	0.001	1
Play Hut, 368 Cheryl Lane (Walnut)	Nov 98	0.8	L	0.002	3
Waterfall Estates (Rowland Heights)	Dec 98	1.2	L	0.004	4
Calvary Chapel (Diamond Bar)	Apr 99	1	L	0.017	20
Hi-Tek Warehouse, 20851 Currier Road (Walnut)	Jun 99	0.2	L	0.001	2
Campus Group Inc, 319 Cheryl Road (Walnut)	Jul 99	0.1	L	0	0
Wind River Homeowners Assn. (Rowland Heights)	Jul 99	12.6	L	0.031	35
L.A. Fitness Inter., 20801 Golden Springs (Industry)	Sep 99	1.2	L	0.002	2
Comtop Enterprises, 268 Benton Court (Industry)	Sep 99	0.3	L	0.001	1
Gemini Foods Corp., 251 Benton Court (Industry)	Sep 99	0.6	L	0.001	1
Tri-Net Technology, 21709 Ferraro Parkway (Industry)	Sep 99	0.3	L	0.001	1
Hupa International, 21717 Ferraro Parkway (Industry)	Oct 99	0.3	L	0.0002	0.2
Nu-Health Products, 20875-85-95 Currier (Walnut)	Oct 99	0.1	L	0	0
Lemon Avenue medians (Industry)	Dec 99	0.1	L	0.0004	0.4
Prudential Insurance Co., 21558 Ferraro. (Walnut)	Jan 00	3.5	L	0.007	8
McDonald□s Restaurant (Diamond Bar)	Mar 00	0.1	L	0.001	1
J□L Footwear, 250 Benton Court (Industry)	Jul 00	0.6	L	0.001	1
Markwins Inter. Corp., 22067 Ferraro (Industry)	Nov 00	1.9	L	0.004	4
Lee Wang LLC, 21901 Ferraro Parkway (Industry)	Nov 00	2	L	0.006	7
Sun Yin USA, 280 Maclin Court (Industry)	Nov 00	0.8	L	0.001	1
SL Investment Group LLC, 218 Maclin Ct. (Industry)	Nov 00	1.5	L	0.002	2
Morrow Meadows, 231 Benton Court (Industry)	Apr 01	0.9	L	0.003	3
The Cross Schools of Education (Walnut)	May 01	0.6	AF,L	0.001	1
Bank of the West (Rowland Heights)	Sep 01	0.1	L	0.0001	0.1
Gym□Teen Center (Walnut)	Sep 01	0.6	L	0.002	2
Yellow Box Corp., 19835 Walnut Drive (Walnut)	Dec 01	0.3	L	0.001	1
Harvard Estates (Rowland Heights)	Dec 01	2	L	0.002	2
Walnut Nazarene Church (Walnut)	Feb 02	0.8	L	0.0002	0.3
Majestic Mgmt., 168-188 Brea Canyon Rd. (Walnut)	Apr 02	0.6	L	0.002	2
Synnex, 108-118 Brea Canyon Rd. (Walnut)	Apr 02	0.7	L	0.002	3
Majestic Management, 108-288 Mayo Drive (Walnut)	Apr 02	0.1	L	0.006	7
Holiday Inn Express (Walnut)	May 02	0.4	L	0.002	2
Lemon Avenue Investments (Walnut)	Jun 02	0.6	L	0.002	3
Magnolia at Snow Creek (Walnut)	Jul 02	5.4	L	0.023	25
Everbright Management, 1163 Fairway (Industry)	Sep 02	0.6	L	0.002	2
Everbright Management, 1169 Fairway (Industry)	Sep 02	0.2	L	0.001	1
Kelly Paper, 228 Brea Canyon Road (Walnut)	Sep 02	1.2	L	0.0002	0.2

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

Table 13
Summary of Fiscal Year 11-12 Recycled Water Usage
Walnut Valley Water District
(Page 3 of 4)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
V-Tec Automotive, 19677 Valley Blvd. (Walnut)	Sep 02	0.1	L	0.0002	0.2
Grand and Valley landscaping (Walnut)	Sep 02	0.1	L	0.005	6
Extra Space Storage (Walnut)	Oct 02	0.8	L	0.002	2
Latter Days Saints Church (Walnut)	Oct 02	0.9	L	0.003	3
Nogales and Killian landscaping (Rowland Heights)	Oct 02	0.1	L	0.0005	1
A□R West Family LLC, 20855 Golden Sprgs (D. Bar)	Nov 02	0.2	L	0.001	1
Brea Canyon Rd.□Old Ranch Road medians (Industry)	May 03	0.1	L	0.0001	0.1
CLT Computers, Inc., 20153 Paseo del Prado (Walnut)	May 03	0.6	L	0.002	3
Autosmart Intl., 19885 Harrison Ave. (Industry)	Aug 03	0.2	L	0.001	1
Broadway.com, 19715 Harrison Ave. (Industry)	Aug 03	0.5	L	0.002	2
Bayharbor-Harrison Assn., 19901 Harrison (Industry)	Aug 03	0.8	L	0.003	3
J Pack International, 19789 Harrison Ave. (Industry)	Aug 03	0.5	L	0.001	1
Ziprint Image Corp., 19805 Harrison Ave. (Industry)	Aug 03	0.2	L	0.001	1
San Malone Enterprises, 19865 Harrison (Industry)	Aug 03	0.3	L	0.002	2
Shinetec Group, Inc., 19685 Harrison Ave. (Industry)	Aug 03	0.4	L	0.0004	0.5
Majestic Realty, Grand Ave.□Village Staples (Walnut)	Aug 03	1.6	L	0.006	6
Orange Grove Services, Lemon□La Puente (Walnut)	Sep 03	0.4	L	0.003	3
Max Property LLC, 21401 Ferraro Pkwy. (Industry)	Sep 03	0.7	L	0.004	5
NP 21301 Ferraro Pkwy., 21301 Ferraro (Industry)	Sep 03	0.8	L	0.003	3
568 TriNet Court (Walnut)	Oct 03	0.3	L	0.001	1
Walnut City Hall (Walnut)	Dec 03	0.6	L	0.001	1
Walnut Senior Center (Walnut)	Dec 03	0.5	L	0.001	1
Hill□s Pet Nutrition, 318 Brea Canyon Rd. (Walnut)	Dec 03	2.6	L	0.006	6
Young Hoon Cho, 1709 Nogales St. (Rowland Heights)	Mar 04	0.1	L	0.0004	0.4
Shell Station, 21103 Golden Springs Dr. (Diamond Bar)	Mar 04	0.1	L	0.0002	0.2
Ferraro□Grand East ramp (Industry)	Apr 04	3.8	L	0.005	5
Hing Wa Lee Plaza, 1569 Fairway Dr. (Walnut)	May 04	0.1	L	0.001	1
Southcoast Cabinet, 20625 Lycoming St. (Walnut)	Jun 04	0.3	L	0.001	1
APL Logistics, 408 Brea Canyon Rd. (Walnut)	Jun 04	2.1	L	0.005	6
Adnoff Family Trust, 20801 Currier Rd. (Walnut)	Jul 04	0.1	L	0.001	1
Sentous Valley LLC, 2889 Valley Blvd. (Walnut)	Aug 04	0.1	L	0.0003	0.4
Community Day School (Walnut)	Nov 04	0.1	AF,L	0.0004	0.4
Majestic Mgmt., Bldg. 25 on Mayo Dr. (Walnut)	Jan 05	0.1	L	0.00003	0.03
Sy Develop. condos, 20118-20138 Colima, (Walnut)	Jun 05	0.1	L	0.0002	0.2
N□E corner Cheryl Lane□Baker Parkway (Industry)	Aug 05	3.3	L	0.014	16
Jakk□s Pacific, Inc. 21733-21749 Baker (Industry)	Aug 05	1.2	L	0.003	4
20813 Valley Blvd. medians (Walnut)	Sep 05	0.4	L	0.001	1
20265 Valley Blvd. medians (Walnut)	Sep 05	0.4	L	0.001	1
19849 Valley Blvd. medians (Walnut)	Sep 05	0.4	L	0.001	1
Kohl□s Center (Walnut)	Sep 05	2	L	0.009	11
Phoenix Private Schools (Rowland Heights)	Dec 05	0.1	AF,L	0	0
The Home Depot, 21535-21651 Baker (Industry)	Jan 06	2.8	L	0.009	10
Industry East Land LLC, 21415 Baker (Industry)	Jan 06	2.3	L	0.006	7
Charles Hailong Cui, 350 Cheryl Lane (Walnut)	Apr 06	0.7	L	0.006	6
Fairway median@ Brea Canyon (Walnut)	Jun 06	0.3	L	0.001	1
Grand Avenue Crossing (Industry)	Jul 06	18.5	L	0.019	22
22002 Valley Blvd. (Industry)	Jul 06	1.6	L	0.003	4
Christian Chapel of Walnut Valley (Walnut)	Aug 06	2.2	L	0.007	8
Target Store T-2179, 747 Grand Ave. (Walnut)	Sep 06	3.9	L	0.005	6
Leg Avenue, 19601 E. Walnut Dr. (Walnut)	Oct 06	0.5	L	0.002	3
Harold M. Pitman Co., 21908-21958 Baker (Industry)	Jan 07	0.8	L	0.002	2
Williams-Sonoma, 21508-21662 Baker (Industry)	Apr 07	4.8	L	0.012	13
FedEx Ground, 200 Old Ranch Road (Walnut)	May 07	28	L	0.012	13

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial,
L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

TABLE 13
SUMMARY OF FISCAL YEAR 11-12 RECYCLED WATER USAGE
WALNUT VALLEY WATER DISTRICT
(PAGE 4 OF 4)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Currier Road Devel. Inc., 20819 Currier Rd. (Walnut)	May 07	0.3	L	0.001	1
Williams-Sonoma, 21700 Baker (Industry)	Aug 07	2	L	0.005	6
21350 Valley Blvd. (Industry)	Feb 08	0.4	L	0.001	1
Grand Avenue Venture, 21508 Ferraro Pkwy (Walnut)	Apr 08	3.5	L	0.004	4
Grand Avenue/Baker Parkway medians (Industry)	May 08	6.7	L	0.011	12
Majestic Management, 21530-21590 Baker (Industry)	May 08	2	L	0.009	10
Gomez Upholstery, 19935 Valley Blvd. (Walnut)	Jul 08	2	L	0	0
Susann Sutseng Lee, 1335-1337 Otterbein (Row. Hts.)	Jul 08	0.1	L	0.0003	0.3
Golden Springs Plaza (20657 Golden Sprgs (Dia. Bar)	Aug 08	0.4	L	0.001	2
Chili's Restaurant, Golden Springs Dr. (Diamond Bar)	Sep 08	0.01	L	0.001	1
Majestic Management, 21808 Garcia Ln. (Industry)	Sep 08	0.5	L	0.002	2
Majestic Management, 21858 Garcia Ln. (Industry)	Sep 08	0.4	L	0.002	2
Majestic Management, 21912 Garcia Ln. (Industry)	Sep 08	0.3	L	0.001	1
Majestic Management, 21760-21788 Garcia (Industry)	Sep 08	0.4	L	0.001	2
CFT Development, Golden Springs Dr. (Diamond Bar)	Oct 08	0.01	L	0.0004	0.5
Jenny Hsieh, 20125 Valley Blvd. (Walnut)	Nov 08	0.03	L	0.00003	0.03
Brea Canyon Rd./Currier Road median (Walnut)	Feb 09	2	L	0.006	7
Cardinal Capital Partners, Currier/Lemon (Walnut)	Mar 09	2.5	L	0	0
Family Property Holdings, 20888 Amar Rd. (Walnut)	May 09	0.04	L	0.0004	0.4
KW Global Inc., 293 Brea Canyon Drive (Walnut)	May 09	0.3	L	0.001	1
Light of America, Inc. (20722 Currier Rd.) (Walnut)	Sep 09	0.1	L	0.0003	0.3
Ybarra Elementary School (Rowland Heights)	Sep 09	5.6	AF,L	0.007	8
Donald Miller, 19803 Valley (Walnut)	Sep 10	0.1	L	0.0003	0.4
Bell Memorial Church, 1747 Nogales (Rowland Hts.)	Dec 10	0.3	L	0.001	1
Majestic Realty (179 S. Grand Ave.) (Walnut)	Dec 11	2.5	L	0.002	2
WVWD Parker Canyon Reservoir (Walnut)	May 12	3.5	L	0.001	1
TOTALS		**714.5**		**1.110**	**1,247**

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

AFY), or 57.0% of the plant's combined production, was actively reused, a 21.1% increase over the preceding fiscal year. This increase was mainly due to above average rainfall that greatly reduced the amount of recycled water used for groundwater replenishment during this fiscal year.

The remaining effluent was discharged to the concrete-lined portion of the San Gabriel River below Firestone Boulevard where it flows to the ocean. Recycled water from this plant is used at 134 sites (not including recharge) shown in Figure 13 and listed in Table 14. Use of recycled water from this facility is permitted under LARWQCB Order Nos. 87-50 and 97-072 for direct, non-potable applications, and Nos. 91-100 and R4-2009-0048 for groundwater replenishment.

SAN JOSE CREEK WRP FACTS

Plant capacity:	100 MGD
Water produced:	67.50 MGD 75,849 AFY 0.4% FY increase
FY11-12 O&M:	$212/AF (east) $241/AF (west)
Water reused:	38.506 MGD 43,266 AFY 21.1% FY increase 57.0% of production
Delivery systems:	7 440,210 ft. of pipe
No. of reuse sites:	134 2,922.4 acres

2.5.1 Water Replenishment District of Southern California

The great majority (89.8%) of recycled water actively used from the San Jose Creek WRP goes to recharge the Central Basin groundwater aquifer, which in FY 11-12 was 34.454 MGD (38,713 AFY), a 23.3% increase over the preceding fiscal year and 51.0% of the recycled water produced by this plant. In FY 11-12, 19.17 MGD (21,545 AFY) was directed either to the San Gabriel Coastal Spreading Grounds or to the Rio Hondo Spreading Grounds via the plant's discharge point from the east side to the San Jose Creek channel (58.7%). Another 0.012 MGD (14 AFY), or <0.1%, was discharged from the west side into the San Gabriel River upstream of the Zone 1 Ditch. Deliveries of recycled through the plant's 66-inch outfall pipe directly to the San Gabriel Coastal Spreading Grounds turnout resumed in March 2009 as the diversion gate began to be incrementally opened to the spreading grounds. The new gate operations and meter allowed for 13.459 MGD (15,122 AFY), or 41.2%, was able to be recharged directly during this fiscal year, significantly more than had been conserved in previous years.

Of the total amount of recycled water delivered from the San Jose Creek WRP, 11.395 MGD (12,804 AFY), or 32.9%, went to the Rio Hondo Spreading Grounds and 23.132 MGD (25,992 AFY), or 66.9%, went to the San Gabriel Coastal Spreading Grounds. Another 0.073 MGD (82 AFY), or 0.2% of the recycled water delivered, was bypassed around the spreading grounds and lost to the ocean during October 2011. Any discrepancy between the total amount discharged and the totals recharged and bypassed is attributed to differences in metering between the Sanitation Districts and the LACDPW.

The groundwater recharge operation with recycled water had been limited by its 1991 permit to a three-year running total of 150,000 AFY, with no more than 35% recycled water being recharged (with maximums of 60,000 AFY and 50% in any one year). To allow the use of more recycled water, WRD requested that the LARWQCB revise the 1991 recharge permit to eliminate the existing annual and three-year total quantity limits (60,000 and 150,000 AF, respectively), and rely on a running 5-year average recycled water contribution of 35%. This permit modification was supported by State DPH staff and was adopted by the LARWQCB in April 2009. Sampling and analysis for TOC at the spreading grounds shallow monitoring wells has been increased from bimonthly to weekly during the first year of operation. Assuming there is sufficient dilution water, this change would allow approximately 5,000 AFY more of recycled water to be recharged.

FIGURE 13
SAN JOSE CREEK WRP REUSE SITES

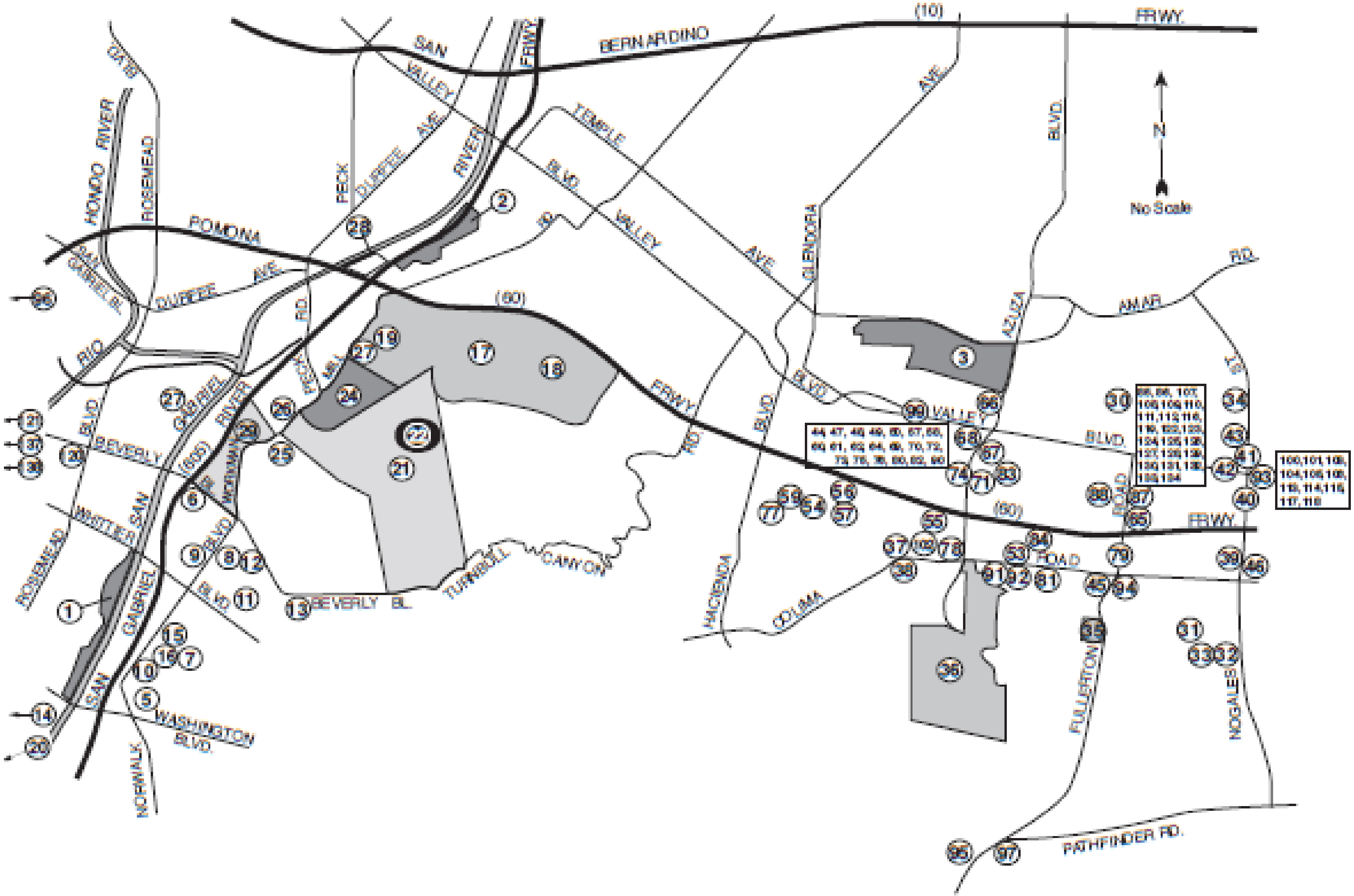


TABLE 14
SUMMARY OF FISCAL YEAR 11-12 RECYCLED WATER USAGE
SAN JOSE CREEK WRP
(PAGE 1 OF 3)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Water Replenishment District (1)	Jun 71	--	R	34.454	38,713
California Country Club (Industry) (2)	Jun 78	120	L,P	0.376	423
Industry Hills Recreation Area (Industry) (3)	Aug 83	600	L,P	0.804	903
Field, S/W corner Norwalk/Telegraph (S.F. Spgs.) (4)	Aug 94	5.2	L	0.012	13
Washington Elementary School (Whittier) (5)	Sep 94	5	AF,L	0.010	11
605 Freeway at Beverly (Whittier) (6)	Sep 94	30	L	0.011	12
Sorenson Elementary School (Whittier) (7)	Oct 94	4	AF,L	0.005	6
Palm Park West (Whittier) (8)	Nov 94	5	L	0.008	9
Orange Grove School (Whittier) (9)	Apr 95	6.6	AF,L	0.008	9
Katherine Edwards Middle School (Whittier) (10)	Sep 95	19	AF,L	0.018	20
Longfellow Elementary School (Whittier) (11)	Sep 95	4.5	AF,L	0.003	3
Walter Dexter Middle School (Whittier) (12)	Sep 95	15.5	AF,L	0.008	9
Founders Memorial Park (Whittier) (13)	Jan 96	4	L	0.011	12
Salt Lake Municipal Park (Huntington Park) (14)	Apr 96	20.9	L	0.044	50
Sorenson Park (Whittier) (15)	May 96	10.7	L	0.017	20
Sorenson Library (Whittier) (16)	May 96	0.4	L	0	0
Puente Hills Landfill irrigation (Industry) (17)	Nov 97	320	L	0.824	926
Puente Hills Landfill dust control (Industry) (18)	Nov 97	130	I	0.155	175
Puente Hills Gas-to-Energy Facility (Industry) (19)	Nov 97	--	I	0.563	632
Lugo Park (Cudahy) (20)	Apr 98	7	L	0.006	7
Rose Hills Memorial Park – upper area (Whittier) (21)	Jun 98	298	L	0.436	490
River Ridge Golf Course (Pico Rivera) (23)	Jul 02	21.3	L	0.028	31
Rio Hondo College (Whittier) (24)	Jun 03	85	AF,L	0.023	25
Mill Elementary School (Whittier) (25)	Jun 03	15	AF,L	0.005	6
Gateway Pointe (Whittier) (26)	Jan 05	8	L	0.016	18
Puente Hill Materials Recovery Facility (Industry) (27)	Feb 05	2.4	L	0.007	8
LA Sanchez Nursery (Industry) (28)	Apr 06	5	O	0.011	13
Rose Hills Memorial Park – lower area (Whittier) (29)	Aug 06	275	L	0.523	587
Sunshine Park (L.A. County) (30)	Jul 09 (May 86)	4	L	0.003	3
Rowland Elementary School (Rowland Hts.) (31)	Jul 09 (May 86)	3	AF,L	0.002	2
Farjardo School (Rowland Heights) (32)	Jul 09 (May 86)	4	AF,L	0.0004	0.5
Farjardo Park (Rowland Heights) (33)	Jul 09 (May 86)	4	L	0.002	2
Nogales High School (L.A. County) (34)	Jul 09 (Jun 86)	11	AF,L	0.004	4
Queen of Heaven Cemetery (Rowland Hts.) (35)	Jul 09 (Jun 86)	35	L	0.010	11
Schabarum Regional County Park (L.A. Co.) (36)	Jul 09 (Sep 86)	233	L	0.016	18
Pepperbrook Park (Hacienda Heights) (37)	Jul 09	4.4	L	0.002	2
Countrywood Park (Hacienda Heights) (38)	Jul 09	5.4	L	0.002	2
Rowland Heights Golf Center (Rowland Heights) (39)	Jul 09	8	L	0.002	3
Medians at 755 Nogales (Industry) (40)	Jul 09	0.1	L	0.0001	0.1
Medians at 4115-1/2 Nogales (West Covina) (41)	Jul 09	0.1	L	0.001	2
Medians at 2654-1/2 Valley (West Covina) (42)	Jul 09	0.2	L	0.0001	0.1
Bu Sha Temple, 4111 Nogales (West Covina) (43)	Jul 09	0.5	L	0.0001	0.1
Megan Racing, 788 Phillips (Industry) (44)	Jul 09	0.1	L	0.0005	1
JJ Plaza, 18253 Colima (Rowland Heights) (45)	Jul 09	0.1	L	0.0001	0.1
New World RTCI-LP, 18958 Daisetta (Row. Hts.) (46)	Jul 09	0.1	L	0.00003	0.03
Battery Technology, 16651 Johnson (Industry) (47)	Jul 09	0.1	L	0.00001	0.01
FTH Group Inc., 16685 Johnson (Industry) (48)	Jul 09	0.1	L	0.0001	0.1
Ancillary Provider 16664 Johnson (Industry) (49)	Jul 09	0.1	L	0.0001	0.2
Ancillary Provider 16666 Johnson (Industry) (50)	Jul 09	0.2	L	0.0002	0.3
Pan American, 16610 Gale Ave. (Industry) (51)	Jul 09	0.2	L	0.0001	0.1
Blue Pacific, 1354 Marion Ct. (Industry) (52)	Jul 09	0.2	L	0.0002	0.3
Romano's Macaroni Grill, 17603 Colima (R. Hts.) (53)	Jul 09	0.1	L	0.0004	0.4
Acosta Growers, 16412 Wedgeworth Dr. (Industry) (54)	Jul 09	5	O	0.001	1

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

TABLE 14
SUMMARY OF FISCAL YEAR 11-12 RECYCLED WATER USAGE
SAN JOSE CREEK WRP
(PAGE 2 OF 3)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Wedgeworth Elementary School (Hacienda Hts.) (55)	Aug 09	2.5	AF,L	0.001	1
Wilson High School (Hacienda Heights) (56)	Aug 09	18.3	AF,L	0.005	6
Bixby Elementary School (Hacienda Heights) (57)	Sep 09	6.1	AF,L	0.002	2
Jade Fashion, 1350 Bixby (Industry) (58)	Sep 09	0.1	L	0.0002	0.2
Gutierrez Nursery, 16411 Wedgeworth (Industry) (59)	Sep 09	4	O	0.001	1
Frank Raper, 1215 Bixby (Industry) (60)	Dec 09	0.1	L	0.0002	0.2
Laido International, 16710-12 Johnson (Industry) (61)	Dec 09	0.1	L	0.0002	0.2
Bolt Products, 16725 Johnson Dr. (Industry) (62)	Dec 09	0.1	L	0.0001	0.1
Ily Enterprise, 783 Phillips (Industry) (63)	Jan 10	0.1	L	0.0001	0.2
Superior Profiles, 1325 Bixby (Industry) (64)	Jan 10	0.2	L	0.0002	0.2
60 Fwy., Countrywood □ Fullerton (Industry) (65)	Jan 10	5	L	0.001	1
Camacho Strawberries (Industry) (66)	Jan 10	3	O	0.0002	0.2
Advanced Media, 881 Azusa (Industry) (67)	Jan 10	0.1	L	0.0001	0.1
East Group Prop., 855 Anaheim-Puente (Industry) (68)	Mar 10	0.6	L	0.0005	1
So.Cal. Air Condition, 16950 Chestnut (Industry) (69)	Mar 10	2	L	0.0002	0.3
USACD, 17101 Chestnut (Industry) (70)	Mar 10	0.3	L	0.0002	0.2
Azusa Blvd Medians (Industry) (71)	Mar 10	0.2	L	0.0001	0.1
Acosta Growers, 17101 Chestnut (Industry) (72)	Mar 10	2.4	O	0	0
L.A. Co. ISD bldg., 16610 Chestnut (Industry) (73)	Apr 10	0.5	L	0.0003	0.3
Azusa Property Co., 885 Azusa (Industry) (74)	Apr 10	0.2	L	0.0002	0.2
Golden West Footwear, 16750 Chestnut (Industry) (75)	Apr 10	0.3	L	0.0002	0.2
Teledyne Instruments, 16830 Chestnut (Industry) (76)	Apr 10	0.4	L	0.0005	1
Medians, 18927 Daisetta St. (Rowland Heights) (77)	Apr 10	0.2	L	0.0001	0.1
Colima Medians (L.A. County) (78)	Apr 10	0.1	L	0.0001	0.1
Medians, 1442 Fullerton (Industry) (79)	Apr 10	0.3	L	0.00003	0.03
Teledyne Picco, 16800 Chestnut (Industry) (80)	May 10	0.4	L	0.0003	0.4
Hou Yi Mao Nursery, 18002 Colima (Row. Hts.) (81)	May 10	1.3	O	0.0002	0.2
East Group Prop., 16700 Chestnut (Industry) (82)	Jun 10	0.6	L	0.001	1
Pro Motion Distribution, 883 Azusa (Industry) (83)	Jun 10	0.1	L	0.0001	0.2
New Age Kaleidoscope, 7 Colima (Industry) (84)	Jun 10	0.6	L	0.001	1
Min Maw Intl. Inc., 18350 San Jose (Industry) (85)	Jun 10	0.7	L	0.0003	0.3
Hot Topic, 18305 San Jose Ave. (Industry) (86)	Jul 10	0.6	L	0.001	1
FedEx, 1081 Fullerton Rd. (Industry) (87)	Jul 10	0.6	L	0.001	1
Hudd Distribution, 18215 Rowland St. (Industry)(88)	Sep 10	0.6	L	0.001	1
New Age Kaleidoscope, 5 Stoner Creek (Industry) (89)	Oct 10	1.4	L	0.001	1
Perrin Manufacturing, 1020 Bixby (Industry) (90)	Oct 10	0.1	L	0.0002	0.2
Centro Watt Operating, 17518A Colima (Industry) (91)	Oct 10	0.4	L	0.001	1
Centro Watt Operating, 17414 Colima (Industry) (92)	Oct 10	0.5	L	0.001	1
717 Nogales LLC, 717 Nogales (Industry) (93)	Oct 10	0.5	L	0.0004	0.4
Walgreens, 18308 Colima (Industry) (94)	Dec 10	0.1	L	0.0001	0.1
RWD Office, 3021 S. Fullerton (Industry) (95)	Dec 10	0.3	L	0.0001	0.2
Pathfinder Park (Rowland Heights) (Industry) (97)	May 11	29	L	0.005	5
USGVMWD site, 401 Nogales St. (Industry) (98)	May 11	0.5	L	0.0001	0.1
East Group Prop., 18551 Arenth Ave. (Industry) (100)	May 11	0.7	L	0.001	1
717 Nogales LLC, 18961 Arenth Ave. (Industry) (101)	May 11	0.5	L	0.0005	1
Kimco Realty, 17100 Colima Rd. (Industry) (102)	May 11	3	L	0.001	1
Acme Trading Group, 18501 Arenth (Industry) (103)	May 11	0.9	L	0.001	1
Third Party Enterprises, 18501 Arenth (Industry) (104)	May 11	0.6	L	0.001	1
Floria International, 18701 Arenth (Industry) (105)	May 11	0.4	L	0.0004	0.4
YHS Trading, 755 Epperson Dr. (Industry) (106)	Jul 11	0.1	L	0.0003	0.4
TriVantage LLC, 745 Epperson Dr. (Industry) (107)	Jul 11	0.1	L	0.0003	0.3
Floria International Inc., 18689 Arenth (Industry) (108)	Aug 11	0.4	L	0.0003	0.4
HT Window Fashions, 770 Epperson (Industry) (109)	Aug 11	0.1	L	0.0002	0.2

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

TABLE 14
SUMMARY OF FISCAL YEAR 11-12 RECYCLED WATER USAGE
SAN JOSE CREEK WRP
(PAGE 3 OF 3)

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Royal Crown Enterprise, 780 Epperson (Industry) (110)	Aug 11	0.1	L	0.0004	0.4
HD Technology, 738 Epperson Dr. (Industry) (111)	Aug 11	0.2	L	0.0001	0.2
Kiewit Power Constructors, 911 Bixby (Industry) (112)	Aug 11	--	I	0.002	2
Guardian Life Insurance, 710 Epperson (Industry) (113)	Sep 11	0.2	L	0.0005	1
Valor Communication, 18701 Arenth (Industry) (114)	Sep 11	0.1	L	0.0004	0.5
K-1 Printing, 17989 Arenth Ave. (Industry) (115)	Oct 11	0.2	L	0.00004	0.05
K-1 Printing, 17979 Arenth Ave. (Industry) (116)	Oct 11	0.2	L	0.0001	0.1
Private Label PC Inc., 748 Epperson (Industry) (117)	Nov 11	0.2	L	0.0001	0.2
Penske Truck Leasing, 18305 Arenth (Industry) (118)	Nov 11	0.6	L	0.0002	0.2
Schurr High School (Montebello) (119)	Nov 11	11	AF,L	0.011	12
Commercial Cooling, 17855 Arenth (Industry) (120)	Dec 11	0.4	L	0.0001	0.1
Forever Link, 18738 San Jose (Industry) (121)	Dec 11	0.4	L	0.0002	0.2
Brook Furniture, 18960 San Jose (Industry) (122)	Jan 12	0.4	L	0.0002	0.2
Rio Hondo Park (Pico Rivera) (123)	Jan 12	8	L	0.018	20
Beverly Blvd. medians (Pico Rivera) (124)	Jan 12	1	L	0.002	3
Hot Topic, 18385 San Jose Ave. (Industry) (125)	Feb 12	0.8	L	0.0003	0.4
Prologis Fund, 18901 Railroad (Industry) (126)	Feb 12	0.4	L	0.0001	0.1
AMB-SGP CIF, 18825 Railroad St. (Industry) (127)	Feb 12	0.2	L	0.00002	0.02
Ko Amex, 18965 San Jose Ave. (Industry) (128)	Feb 12	0.5	L	0.0001	0.2
Ferguson Fire, 18825 San Jose Ave. (Industry) (129)	Feb 12	0.3	L	0.0001	0.2
MA Labs Inc., 18755 San Jose Ave. (Industry) (130)	Feb 12	0.4	L	0.0002	0.2
Majestic Management, 18691 San Jose (Industry)(131)	Mar 12	0.3	L	0.0001	0.2
Majestic Management, 18601 San Jose (Industry) (132)	Mar 12	0.6	L	0.0002	0.2
Third Party Entrprs., 18501 San Jose (Industry) (133)	Mar 12	0.6	L	0.0002	0.2
Third Party Entrprs, 18591 San Jose (Industry) (134)	Mar 12	0.6	L	0.00003	0.04
Shoe Magnate Inc., 18560 San Jose (Industry) (135)	Mar 12	0.4	L	0.0001	0.1
Pinky Footware Shoes, 18600 San Jose (Industry) (136)	Mar 12	0.8	L	0.0003	0.4
La Merced Elementary School (Montebello) (137)	Jun 12	10	AF,L	0.004	4
Montebello Gardens Elementary (Pico Rivera) (138)	Jun 12	1	AF,L	0.001	1
TOTALS		**2,922.4**		**38.506**	**43,266**

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

2.5.2 CITY OF INDUSTRY

In August 1983, the City of Industry completed a recycled water distribution system to serve the Industry Hills Recreation and Conservation Area. This system includes a 13,500 gpm pump station at the San Jose Creek WRP, 36,960 feet of 36-inch pipe following the San Jose Creek Channel, and a 2 million gallon reservoir with a 3,400 gpm booster pump station at Anaheim-Puente Road. From this point, a 16-inch pipe with a second, 3,300 gpm booster pump station brings recycled water into the 600-acre reuse site for landscape irrigation of two 18-hole golf courses and an equestrian center, and as a source of supply for eight ornamental lakes and storage impoundments. During FY 11-12, 0.804 MGD (903 AFY), or 1.2% of recycled water produced at this plant, was delivered through a total of 44,350 feet of pipeline and used at this site, a 5.6% decrease from the preceding fiscal year. While no new sites were directly connected to the Industry distribution system, RWD did, however, continue connecting sites to its own extension off the Industry system throughout the fiscal year. This system is discussed in the following section.

2.5.3 ROWLAND WATER DISTRICT

In July 2009, RWD began recycled water deliveries through a new distribution system that branched off the City of Industry pipeline. In FY 11-12, RWD connected 27 new reuse sites to its distribution system: In July 2011, the landscaping around YHS Trading (755 Epperson Dr.) and TriVantage LLC (745 Epperson Dr.) were connected. In August 2011, the landscaping around Floria International Inc. (18689 Arenth Ave.), HT Window Fashions (770 Epperson Dr.), Royal Crown Enterprise (780 Epperson Dr.), and HD Technology (738 Epperson Dr.). Also this month, Kiewit Power Constructors (911 Bixby Dr.), was also connected and is using recycled water for the construction of a new power plant for Mission Energy, which is expected to come on-line in 2013. In September 2011, the landscaping around Guardian Life Insurance (710 Epperson Dr.) and Valor Communication (18701 Arenth Ave.) were connected. In October 2011, the landscaping around two K-1 Printing buildings (17989 and 17979 Arenth Ave.) was connected. In November 2011, Private Label PC Inc. (748 Epperson Dr.) and Penske Truck Leasing (18305 Arenth Ave.) were connected. In December 2011, Commercial Cooling (17855 Arenth Ave.) and P Forever Link International (18738 San Jose Ave.) were connected. In February 2012, the landscaping around Hot Topic (18385 San Jose Ave.), Prologis Targeted US Fund (18901 Railroad St.), AMB-SGP CIF (18825 Railroad St.), Ko Amex (18965 San Jose Ave.), Ferguson Fire and Fabrication (18825 San Jose Ave.) and MA Labs Inc. (18755 San Jose Ave.) were connected. In March 2012, the landscaping around Majestic Management (18601 and 18691 San Jose Ave.), Third Party Enterprises (18501 and 18591 San Jose Ave.) and Shoe Magnate Inc. (18560 San Jose Ave.) were connected. n April 2012, the landscaping around Pinky Footware Shoes (18600 San Jose Ave.) was connected.

During FY 11-12, RWD delivered 0.083 MGD (94 AFY), or 0.1% of the recycled water produced at the San Jose Creek WRP to 102 sites serving 873.4 acres listed in Table 14 and shown in Figure 13. This was a 25.3% increase over the preceding fiscal year. RWD purchased the recycled water from the City of Industry, retailing it at 63% of its potable rate of $1,010.59/AF (for "Zone I" elevation), or $635.98/AF.

2.5.4 CALIFORNIA COUNTRY CLUB

In June 1978, deliveries of recycled water began to this 120-acre golf course located directly across the San Jose Creek Channel from the San Jose Creek WRP. An 8-inch polypropylene line inside a 24-inch reinforced concrete pipe siphon under the channel delivers chlorinated recycled water from the plant's "foam spray" system to the golf course's 0.75-acre lake No. 2. The golf course irrigation system is supplied by two pumps that can deliver a maximum of 1,800 gallons per minute (gpm) of recycled water from the lake. During FY 11-12, 0.376 MGD (423 AFY), or 0.6% of recycled water produced at this plant, was delivered to this site, the same as the preceding fiscal year.

2.5.5 SAN GABRIEL VALLEY WATER COMPANY - LA SANCHEZ NURSERY

This nursery has signed a lease with Los Angeles Department of Water and Power (LADWP) for the property immediately adjacent to San Jose Creek WRP West formerly occupied by Arbor, Chuy's, J&E's and Ortiz's nurseries. During FY 11-12, 0.011 MGD (13 AFY), or ~0.02% of recycled water produced at this plant, was delivered to this site for the irrigation of ornamental plants for commercial resale. This was an 8.3% increase over the preceding fiscal year. Contract No. 3286 with the San Gabriel Valley Water Company (SGVWC) replaced the old contract for the sale of recycled water directly to this nursery's predecessor (Contract No. 2835) beginning in September 1994. SGVWC resold the recycled water to the nursery for $381.79/AF, a 58% discount from its corresponding potable water rate of $907.79/AF.

2.5.6 CENTRAL BASIN MUNICIPAL WATER DISTRICT (RIO HONDO SYSTEM)

CBMWD continues to develop its second regional distribution system to deliver an estimated 5,000 to 10,000 AFY of recycled water from the San Jose Creek WRP to sites in the upper portion of its service area in the cities of Montebello, Pico Rivera, Commerce, Cudahy, Huntington Park, Bell Gardens, Vernon, Santa Fe Springs, and Whittier. This project is patterned after the regional concept of the "Century Project" described previously in Section 2.3.4. Interconnections with the Century distribution system originating from the Los Coyotes WRP will allow for a looped system (once the western connection is completed, see Section 5.4.4) served by both treatment plants for additional reliability and system pressures. Both the Century and Rio Hondo distribution systems can be partially supplied with recycled water from either the Los Coyotes WRP or either side of the San Jose Creek WRP individually or in combination. However, for the sake of consistency, recycled water usage at the Rio Hondo facilities is reported in water reuse reports as coming from the San Jose Creek WRP, and at the Century facilities as coming from the Los Coyotes WRP, as there is no way to differentiate which reuse sites receive which recycled water. Recycled water is used at 15 sites shown in Figure 13 and listed in Table 14. A narrative description of the layout of the Rio Hondo recycled water distribution system is contained in Appendix H. The layout of the pipelines for both the Century and Rio Hondo distribution systems is shown in Figure 10.

During FY 11-12, CBMWD delivered 0.225 MGD (253 AFY), or 0.3% of the recycled water produced at this plant, through 290,400 feet of pipeline to six water purveyors (SGVWC and the cities of Whittier, Cudahy, Huntington Park, Pico Rivera, and Santa Fe Springs) for landscape and athletic field irrigation on approximately 191 acres at the 20 sites. This represents an 11.5% increase over the preceding fiscal year. CBMWD has constructed the delivery facilities right up to the end user; however, the local retail water purveyor is the entity actually supplying the recycled water. Five new sites were connected to the Rio Hondo recycled water distribution system during FY 11-12. In November 2011, Schurr High School in Montebello was connected. In January 2012, Rio Hondo Park and the Beverly Blvd medians in the City of Pico Rivera were connected. In June 2012, the athletic fields at the La Merced and Montebello Gardens elementary schools in the San Gabriel Valley Water Company and City of Pico Rivera service areas, respectively, were connected.

In FY 11-12, CBMWD wholesaled the recycled water to its customers, the retail water purveyors, on a monthly use, tiered rate schedule ($536 for the first 50 AF, and $488 for anything above 50 AF). This is between 57% and 62% of the rate of $859/AF it charges for Tier 1 non-interruptible potable water supplied by MWD, and between 50% and 54% of the rate of $984/AF it charges for Tier 2 supplies. Recycled water delivered outside of CBMWD's service area was subject to a $21-22/AF surcharge on each of the two tiers. Recycled water deliveries to the Malburg power plant in Vernon received an industrial use rate ($368 for the first 25 AF, $342 for the next 25 AF, $317 for the next 50 AF, and $291 for anything above 100 AF). The retail purveyors then set their own rates for the recycled water.

2.5.7 PUENTE HILLS/ROSE HILLS

A distribution system was constructed to deliver recycled water from the San Jose Creek WRP to the Sanitation Districts' nearby Puente Hills Landfill, Materials Recovery Facility (MRF), Puente Hills Energy Recovery from Landfill Gas (PERG) Facility, and to Rose Hills Memorial Park. These sites are shown in Figure 13 and listed in Table 14.

This project was conceived of as far back as 1978 as a means of reducing the Landfill's $20,000 per month water bill; however, various impediments stalled this project over the years. Not the least of these impediments was the claim of "duplication of services" by the local water company that had served domestic water to the Puente Hills Landfill. To resolve this, Senate Bill 778 was passed and became law on January 1, 1995. This legislation allowed the Sanitation Districts to deliver their own recycled water to their landfill, without having to pay the water company for lost revenues, only for the physical facilities that would be rendered less useful.

Recycled water deliveries to the Puente Hills Landfill and the PERG Facility began in November 1997, while deliveries to Rose Hills began in June 1998 and to the MRF began in February 2005.The total project cost was approximately $7.2 million and was funded by a low-interest State water reclamation loan. In order to serve the eastern portions of the Landfill and the upper areas of the cemetery, $4 million of additional on-site distribution facilities were completed in mid-2001. A narrative description of the layout of the Puente Hills/Rose Hills recycled water distribution system is contained in Appendix I.

During FY 11-12, the Puente Hills/Rose Hills distribution system delivered 1.986 MGD (2,231 AFY), or 2.9% of the recycled water produced at this plant, through 8,900 feet of pipeline to five users on approximately 855 acres, an increase of 5.8% over the preceding fiscal year. Recycled water is used for landscape irrigation of slopes and for dust control on the working deck at the Puente Hills Landfill and MRF, for cooling tower supply at the PERG Facility, and for landscape irrigation and impoundments at Rose Hills Memorial Park.

2.5.8 UPPER SAN GABRIEL VALLEY MUNICIPAL WATER DISTRICT (PHASE I EXTENSION)

A distribution system has been completed that transports water from CBMWD's Rio Hondo distribution system to the Upper San Gabriel Valley Municipal Water District's (USGVMWD's) service area, referred to by this agency as its Phase I Extension. This system will ultimately deliver approximately 1,800 AFY from the San Jose Creek WRP to a number of sites. Rio Hondo College and Mill Elementary School were both connected in June 2003 and the Gateway Pointe commercial development was connected in January 2005. In August 2006, recycled water deliveries to 275 acres of the lower, older portion of Rose Hills Memorial Park began (acreage was erroneously reported as 858 previously). Due to the age of its irrigation system, Rose Hills required extensive retrofitting, mainly consisting of the installation of a separate domestic water system to serve hose bibbs for visitor use (i.e., vase filling). These sites are shown in Figure 13 and listed in Table 14.

From the existing Whittier Connector Unit on CBMWD's Rio Hondo distribution system (Section 2.5.5 above), a 36-inch distribution pipeline located at intersection of Strong Avenue and Pioneer Avenue, USGVMWD installed a tee connecting to a 16-inch steel pipeline, which extends north along Pioneer Avenue to Workman Mill Road. Approximately 200 feet north of the intersection of Workman Mill Road and Mill Road, a 6-inch service lateral provides service to Mill Elementary School. The 16-inch steel pipeline continues north along Workman Mill Road and terminates approximately 50 feet south of the main entrance of Rio Hondo College in a 10-inch service connection to the college.

During FY 11-12, the USGVMWD distribution system delivered 0.566 MGD (636 AFY), or 0.8% of the recycled water produced at this plant, through 11,020 feet of pipeline to four users on 383 acres, an increase of 16.9% over the preceding fiscal year. SGVWC, the retail purveyor for this system, resold the recycled water to three of its customers at its tariff rate of $771.62/AF, or 85% of its corresponding potable water rate of $907.79/AF. Since Rose Hills Memorial Park is not a part of SGVWC's service area, it received recycled water at a contract rate of $220/AF.

2.6 WHITTIER NARROWS WRP

WHITTIER NARROWS WRP FACTS

Plant capacity:	15 MGD
Water produced:	8.57 MGD 9,624 AFY 10.6% FY increase
FY11-12 O&M:	$405/AF
Water reused:	8.449 MGD 9,494 AFY 14.0% FY increase 98.6% of production
Delivery systems:	1 18,900 ft. of pipe
No. of reuse sites:	18 969.2 acres

This treatment facility, located at 301 North Rosemead Boulevard, El Monte, CA 91733, was the first activated sludge water reclamation plant built by the Sanitation Districts and was completed in 1962 with a design capacity of 15 MGD. Of the 8.57 MGD (9,624 AFY) of coagulated, filtered, disinfected tertiary recycled water produced during FY 11-12 (2.2% of the effluent produced in the JOS) at an O&M cost of $405/AF, 8.449 MGD (9,494 AFY) was actively reused. The amount produced was a 10.6% increase in recycled water production over the preceding fiscal year, while the amount reused was a 14.0% increase, both as a direct result of completion of the plant's conversion to the NDN secondary treatment process and the subsequent ability to divert more flow through the plant.

Recycled water quality for FY 11-12 is presented in Table B-6 of Appendix B. Recycled water from this plant is used at eighteen direct, non-potable reuse sites and for groundwater recharge of the Central Basin, as shown on Figure 14 and listed in Table 15. Use of recycled water from this facility is permitted under LARWQCB Order Nos. 88-107 and 97-072 for direct, non-potable applications, and Nos. 91-100 and R4-2009-0048 for groundwater replenishment (see Section 2.5.1 for a discussion on the amended groundwater recharge permit).

2.6.1 WATER REPLENISHMENT DISTRICT OF SOUTHERN CALIFORNIA

The majority (82.6%) of recycled water actively used from this plant went to recharge the Central Basin aquifer. In FY 11-12, 7.153 MGD (8,037 AFY) was used to replenish the groundwater supply, a 16.8% increase over the preceding fiscal year and 83.5% of the plant's production. In FY 11-12, 5.337 MGD (5,997 AFY) was delivered to the Rio Hondo Spreading Grounds via the plant's main discharge point to the Rio Hondo (73.7%), with another 1.900 MGD (2,135 AFY), or 26.3%, being directed to the San Gabriel Coastal Spreading Grounds via the plant's 45-inch outfall pipe. The third discharge point, the Zone 1 Ditch leading to the Rio Hondo Spreading Grounds, was not used during the fiscal year.

Of the total amount of recycled water delivered from the Whittier Narrows WRP, 5.221 MGD (5,866 AFY), or 72.5%, went to the Rio Hondo Spreading Grounds and 1.983 MGD (2,228 AFY), or 27.5%, went to the San Gabriel Coastal Spreading Grounds. Another 0.051 MGD (57 AFY), or 0.7% of the recycled water delivered, was bypassed around the spreading grounds and lost to the ocean during October 2011 and March and April 2012 as a result of rainfall runoff. Any discrepancy between the total amount discharged and the totals recharged and bypassed is attributed to differences in metering between the Sanitation Districts and the LACDPW.

FIGURE 14
WHITTIER NARROWS WRP REUSE SITES

1. Whittier Narrows Recreation Area
2. South El Monte High School
3. Whittier Narrows Golf Course
4. Sanchez Elementary/Temple Middle Schools
5. Loma Elementary School
6. Jess Gonzales Sports Park
7. Garvey Medians
8. Walnut Grove Medians
9. Rush Street Medians
10. SCE Campus
11. WalMart
12. Panda restaurant Group
13. Sunshine Nursery
14. Rice Elementary School
15. Willard Elementary School
16. University of the West
17. Zapopan Park
18. Garvey Medians

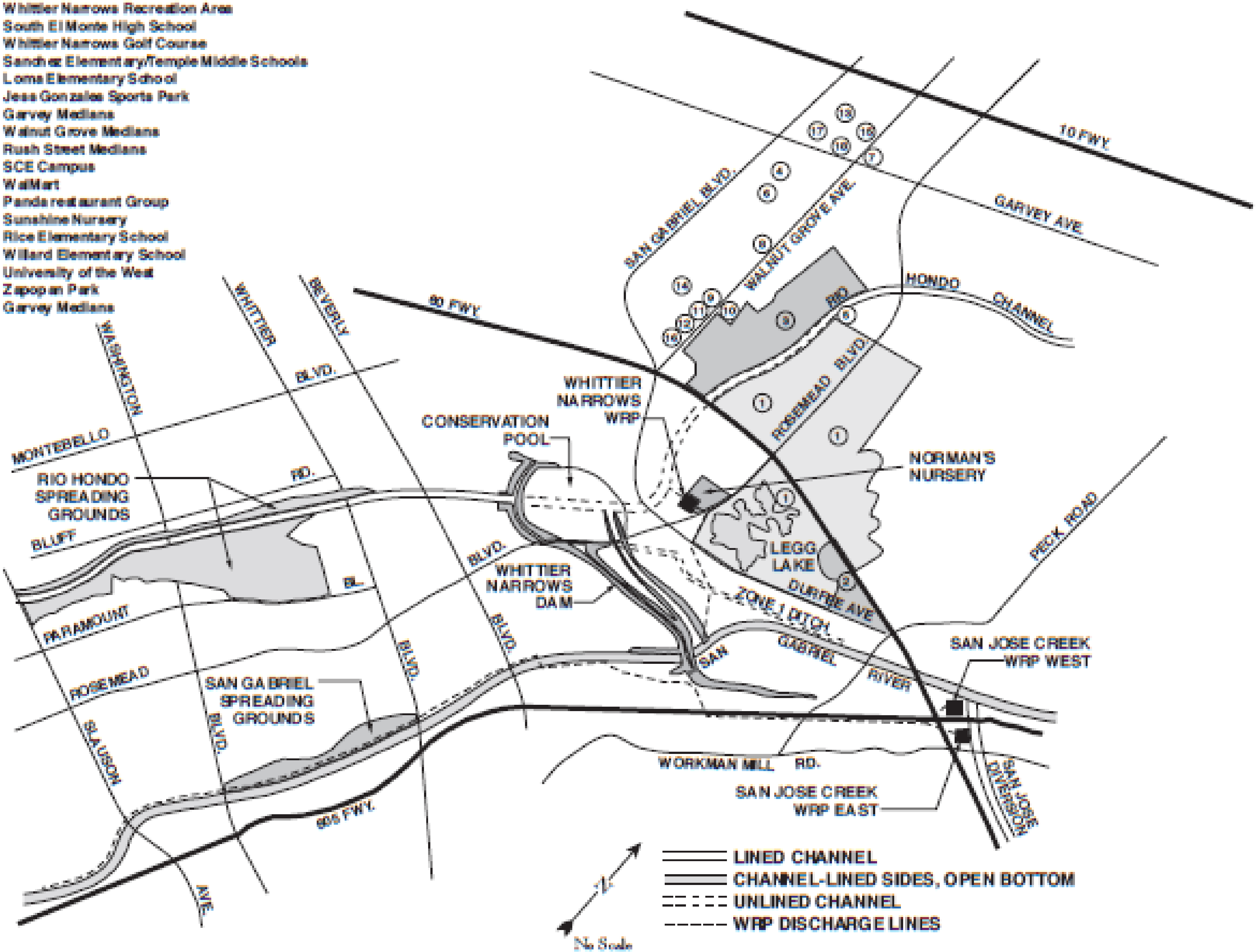


TABLE 15
SUMMARY OF FISCAL YEAR 11-12 RECYCLED WATER USAGE
WHITTIER NARROWS WRP

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Water Replenishment District	Aug 62	--	R	7.153	8,037
Whittier Narrows Recreation Area	Sep 06	568	L	0.686	771
South El Monte High School	Aug 07	16.1	AF, L	0.065	73
Whittier Narrows Golf Course	Dec 09	260	L	0.476	535
Sanchez Elementary/Temple Middle School	Aug 11	12.8	AF, L	0.003	3
Loma Elementary School	Aug 11	1.9	AF, L	0.005	6
Jess Gonzales Sports Park	Oct 11	4	L	0.005	6
Southern California Edison corporate offices	Oct 11	53	L	0.025	28
Eldridge Rice Elementary School	Oct 11	8.3	AF, L	0.006	6
Garvey Ave. medians	Dec 11	0.1	L	0.002	2
Walnut Grove Ave. medians	Dec 11	0.1	L	0.001	1
Rush St. medians	Dec 11	0.1	L	0	0
Sunshine Nursery, 8448 Dorothy St.	Dec 11	4.6	L	0.004	5
WalMart, 1827 Walnut Grove Ave.	Dec 11	17.7	L	0.006	6
Panda Restaurant Group, 1683 Walnut Grove Ave.	Dec 11	8.9	L	0.007	8
Willard Elementary School	Jan 12	6	AF, L	0.001	1
University of the West, 1409 Walnut Grove Ave.	Feb 12	0.4	L	0.001	1
Zapopan Park	Apr 12	7	L	0.005	5
Garvey Blvd. medians	Apr 12	0.2	L	0.001	1
TOTALS		**969.2**		**8.449**	9,494

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

2.6.2 Upper San Gabriel Valley Municipal Water District (Phase II-A Extension) – Whittier Narrows Recreation Area

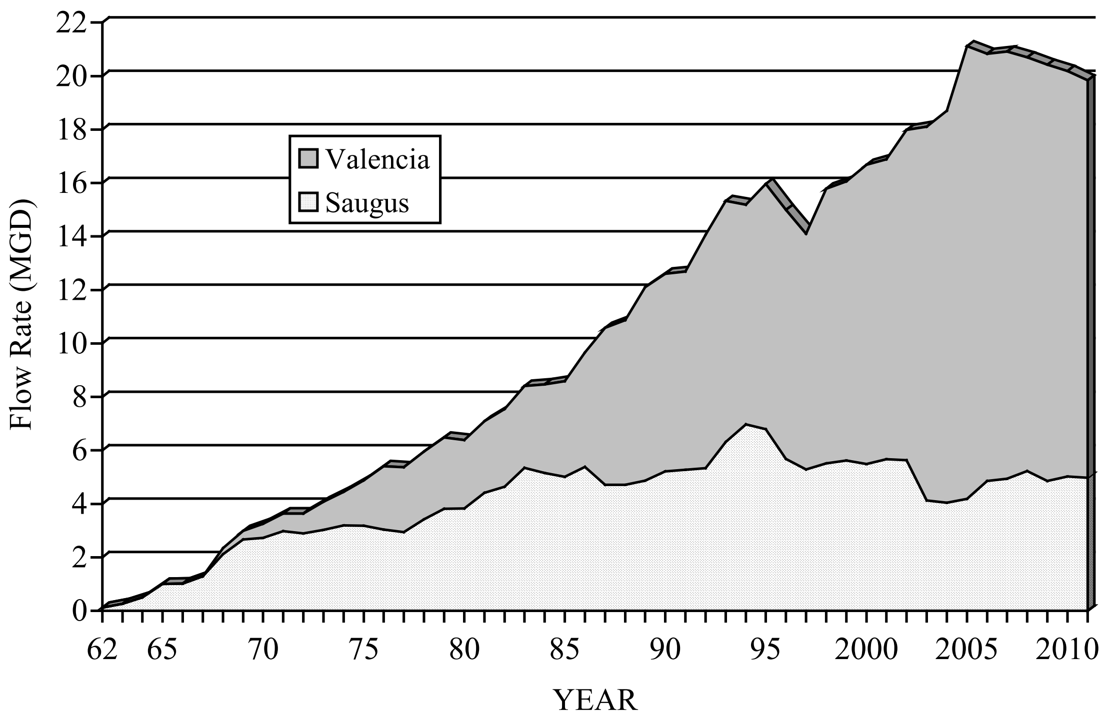
This project (designated Phase II-A by USGVMWD) was completed in September 2006, at which time deliveries of recycled water began to the Los Angeles County Department of Parks and Recreation's (LACDPR's) Whittier Narrows Recreation Area, located adjacent to the Whittier Narrows WRP. The athletic fields and landscaping at South El Monte High School were connected in July 2007. Construction of a pipeline to the adjacent Golf Course was completed and the golf course connected in December 2009. The $9 million project was constructed with the help of a $2.1 million Prop. 50 grant from the SWRCB and utilizes the plant's existing chlorine contact tanks, which will no longer be regularly needed for effluent disinfection after the plant is converted from sodium hypochlorite to UV disinfection. A mitigated Negative Declaration for the "Rosemead Extension" to this project was adopted in April 2009, with construction beginning in the fall of 2009 on 14,467 linear feet of pipeline from the existing recycled water system. All of the pipelines had been installed by the end of 2010, with retrofits and connections completed in early 2012.

During FY 11-12, the USGVMWD distribution system delivered 1.297 MGD (1,457 AFY) through 18,900 feet of pipeline for use on 969.2 acres. This was 15.1% of the recycled water produced at this plant and a 1.7% increase over the preceding fiscal year. Fifteen new sites were added to the system during FY 11-12 in the service areas of SGVWC and Golden State Water Company, as construction of the Rosemead extension to this system was completed. In August 2011, Sanchez Elementary/Temple Middle School and Loma Elementary School were connected. In October 2011, Jess Gonzales Sports Park, Rice Elementary School and the Southern California Edison corporate office park were connected. In December 2011, the medians along Garvey Ave., Walnut Grove Ave. and Rush St., Sunshine Nursery (8448 Dorothy St.), and the landscaping around Walmart (1827 Walnut Grove Ave.) and Panda Restaurant Group (1683 Walnut Grove Ave.) were connected. In January 2012, Willard Elementary School was connected. In February 2012, the University of the West (1409 Walnut Grove Ave.) was connected. In April 2012, and Zapopan Park and another section of medians along Garvey Blvd. were connected.

USGVMWD wholesaled the recycled water to SGVWC, the retail purveyor for this system, who then resold the recycled water to the LACDPR at a contract rate of $696.00/AF, or 77% of its corresponding potable water rate of $907.79/AF. LACDPR then leases a portion of its groundwater pumping rights to SGVWC in exchange, resulting in a lower effective rate for the recycled water. The golf course and high school were charged their tariff rate of $771.62/AF, 85% of the potable water rate.

This area, which includes the City of Santa Clarita, is located northwest of the City of Los Angeles. The Valencia and Saugus WRPs together make up the Santa Clarita Valley Joint Sewerage System (SCVJSS) and have a design capacity of 28.1 MGD (31,487 AFY). During FY 11-12, these plants produced 19.82 MGD (22,271 AFY) of recycled water available for reuse, a 0.4% decrease from the preceding fiscal year. Figure 15 illustrates the growth of recycled water production from Valencia and Saugus WRPs from 1962 through the end of 2011. During most of the history of these plants, only occasional reuse via water truck hauling occurred. The use of recycled water through a permanent distribution system began during FY 03-04, with 0.339 MGD (381 AFY), or 1.7% of the total amount of recycled water produced in the SCVJSS, being delivered from the Valencia WRP during FY 11-12. This was a 13.1% increase over the preceding fiscal year.

FIGURE 15
SANTA CLARITA VALLEY JOINT SEWERAGE SYSTEM RECYCLED WATER PRODUCTION
1962-2011



3.1 VALENCIA WRP

The Valencia WRP, located at 28185 The Old Road, Valencia, CA 91355, was completed in 1967. Following several expansions, the construction of a 4.4 million gallon flow equalization tank in February 1995, a solids handling expansion in August 2002, and the construction of additional aeration tanks for NDN in May 2003, the Valencia WRP now has a capacity of 21.6 MGD. In FY 11-12, the plant produced an average of 14.86 MGD (16,695 AFY) of recycled water, a 0.3% decrease from the preceding fiscal year. The FY 11-12 O&M cost to produce this water was approximately $645/AF, which includes solids processing for both the Saugus and Valencia WRPs. Recycled water quality for FY 11-12 is presented in Table B-7 of Appendix B.

Use of recycled water from this facility is permitted under Los Angeles RWQCB Order Nos. 87-48 and 97-072. During FY 11-12, 0.339 MGD (381 AF), or 2.3□ of the recycled water produced was actively reused, a 13.1□ increase over the preceding year.

VALENCIA WRP FACTS

Plant capacity:	21.6 MGD
Water produced:	14.86 MGD 16,695 AFY 0.3% FY decrease
FY11-12 O&M:	$645/AF
Water reused:	0.339 MGD 381 AFY 2.3% of production 13.1% FY increase
Delivery systems:	1
No. of reuse sites:	3 129 acres

3.1.1 *Castaic Lake Water Agency*

The Castaic Lake Water Agency (CLWA), the regional importer and wholesaler of State Project water in the Santa Clarita Valley, has begun the implementation of a recycled water distribution system. In spring 1998, Kennedy□Jenks completed design of a 10,000 gpm pump station located adjacent to the Valencia WRP□s chlorine contact tanks, with enough pipeline to go through the plant site to the street, with construction being completed in 1999. Construction of a 20- and 24-inch pipeline southerly along The Old Road to Valencia Boulevard was completed in May 2002. Recycled water deliveries for hydrostatic testing of the storage reservoir constructed at the Westridge Development reuse site as a part of this project began in August 2003, with irrigation of the Tournament Players Club golf course beginning the following month. These facilities are shown in Figure 16 and listed in Table 16.

During FY 11-12, 0.339 MGD (381 AF), or 2.3□ of the recycled water produced at the Valencia WRP was delivered through 16,490 feet of pipeline, a 13.1□ increase over the preceding fiscal year.

Valencia Water Company, the retail purveyor for this system, purchased the recycled water from CLWA for □479.87□AF and resold it at its tariff rate of □511.83□AF, or 84□ of its corresponding potable water rate of □609.40□AF.

3.2 Saugus WRP

SAUGUS WRP FACTS

Plant capacity:	6.5 MGD
Water produced:	4.96 MGD 5,576 AFY 0.7% FY decrease
FY11-12 O&M:	$614/AF
Water reused:	none

The Saugus WRP, located at 26200 Springbrook Avenue, Saugus, CA 91350, was completed in 1962. Three subsequent expansions in 1964, 1965, and 1968 and flow equalization facilities in 1991 brought its current design capacity to 6.5 MGD. The treatment process was upgraded to tertiary with the addition of dual-media pressure filters in 1987. No future conventional expansions are possible due to space limitations on the site; any increase in plant capacity would have to be in some form of compact treatment technology, such as membrane bioreactors (MBRs). In FY 11-12, the plant produced an average of 4.96 MGD (5,576 AFY) of recycled water, which was a 0.7□ decrease from the preceding fiscal year, at an O□M cost of □614□AF. Recycled water quality for FY 11-12 is presented in Table B-8 of Appendix B. Use of recycled water from this facility is permitted under LARWQCB Order Nos. 87-49 and 97-072; however, no recycled water was used from this facility in FY 11-12.

FIGURE 16
CASTAIC LAKE WATER AGENCY
RECLAIMED WATER DISTRIBUTION SYSTEM

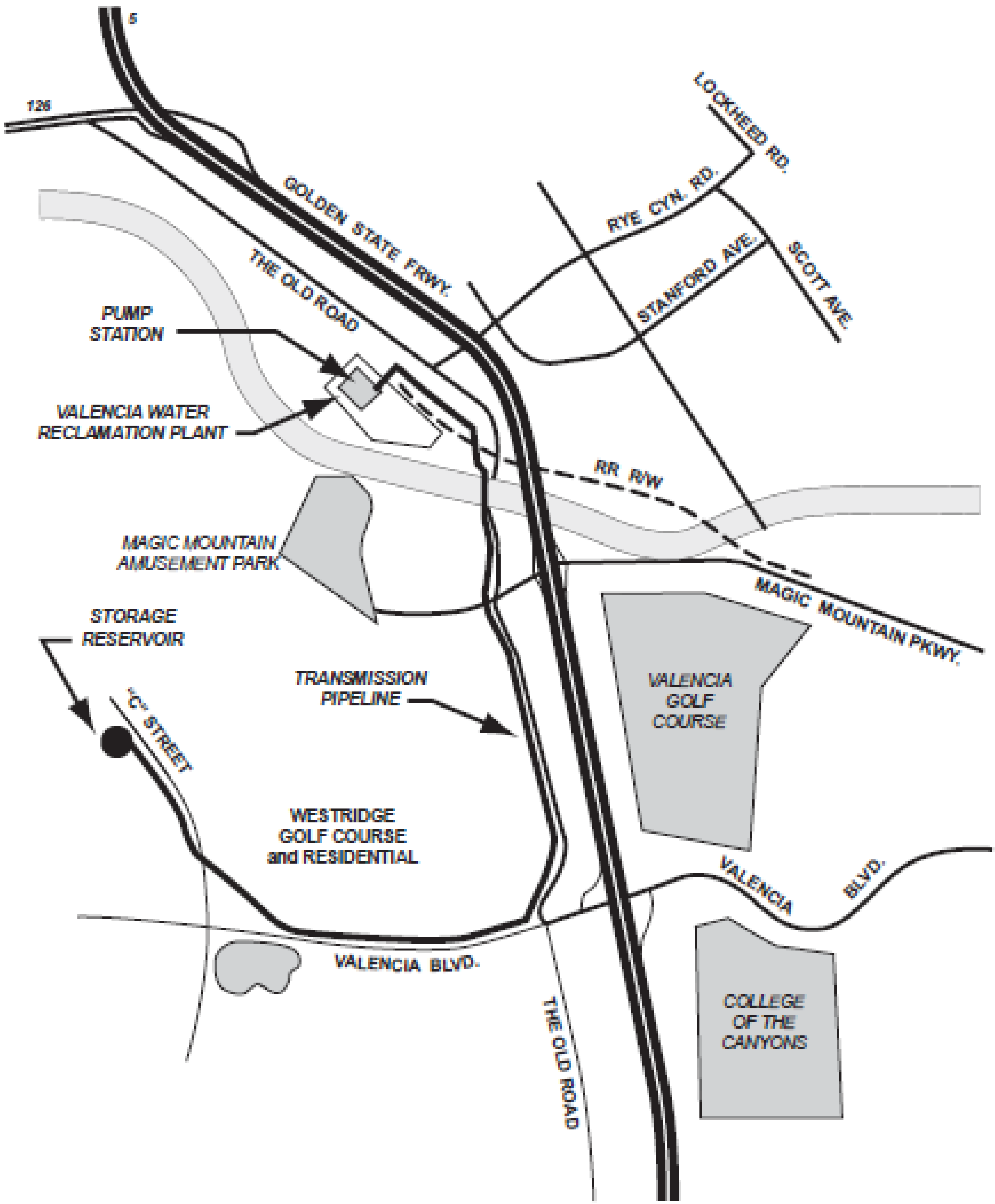


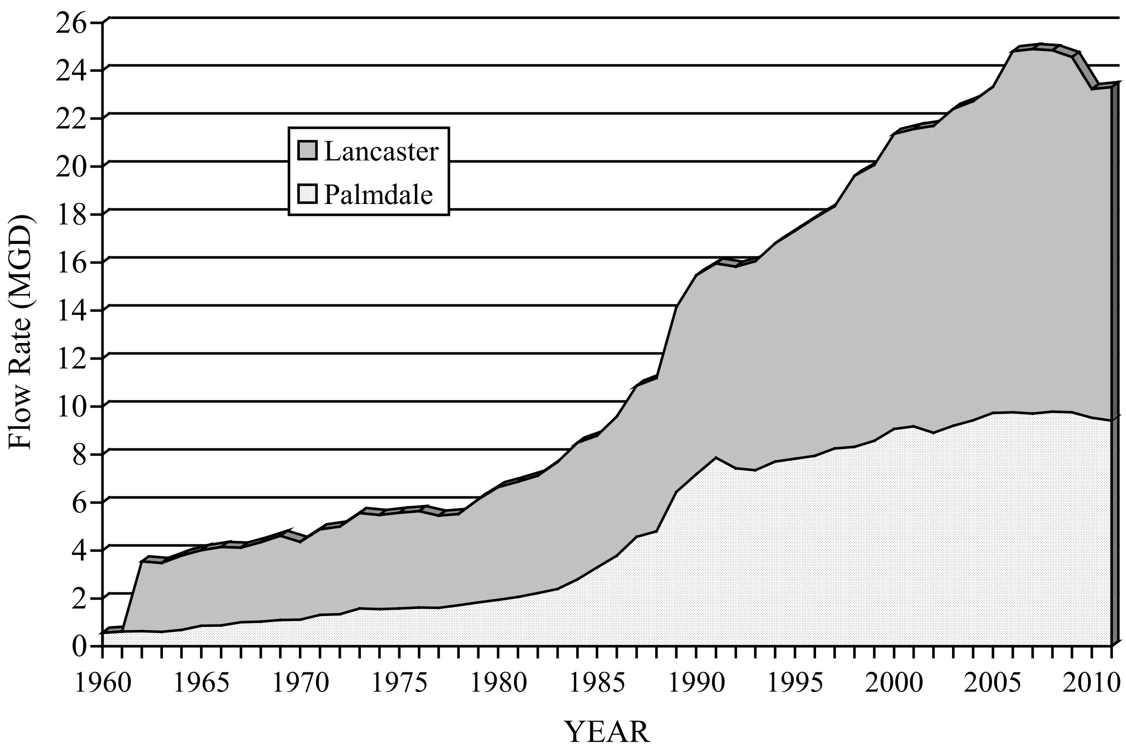
TABLE 16
SUMMARY OF FISCAL YEAR 11-12 RECYCLED WATER USAGE
VALENCIA WRP

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Tournament Players Club at Valencia	Aug 03	120	L	0.311	349
The Old Road medians, (26840-27236 The Old Road)	Aug 03	5.8	L	0.020	22
The Old Road/Magic Mtn. Pkwy medians	Nov 10	2.8	L	0.008	9
TOTALS		**128.6**		**0.339**	**381**

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial,
L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

Two treatment plants serve the communities of the Antelope Valley, one each in the cities of Lancaster and Palmdale. Both WRPs produce secondary effluent by means of oxidation ponds followed by disinfection with chlorine, both use anaerobic digesters and drying beds for solids processing and both are in the process of being converted to activated sludge with tertiary filtration and disinfection (the conversion of the Palmdale WRP actually completed in December 2011). Together, during FY 11-12 the two WRPs treated approximately 23.29 MGD of wastewater to produce 20.08 MGD (22,567 AFY) of effluent available for reuse, an increase of 0.7% over the preceding fiscal year. Figure 17 illustrates the growth of influent flows at the Lancaster and Palmdale WRPs from 1960 through the end of 2011. In this case, influent is a more accurate gauge of plant flows because the actual amount of effluent is variable from month to month, as water is either lost in the oxidation ponds by evaporation/percolation or gained by rainfall. From this graph, it appears from the decrease in influent flows over the past few years that water conservation and the economic slowdown have finally outweighed population growth in regard to wastewater generation in the Antelope Valley. During FY 11-12, 18.59 MGD (20,886 AFY), or 92.6% of the recycled water produced, was actively reused, a 1.8% decrease from the preceding fiscal year. Reuse flows from both WRPs are presented in Table 17.

FIGURE 17
ANTELOPE VALLEY WRPS INFLUENT FLOW
1960-2011



4.1 LANCASTER WRP

The existing treatment facility, located at 1865 West Avenue D, Lancaster, CA 93534, began operation in 1959, replacing an earlier treatment plant that had begun operation in 1941. The plant's capacity was expanded

TABLE 17
SUMMARY OF FISCAL YEAR 11-12 RECYCLED WATER USAGE
LANCASTER AND PALMDALE WRPS

Reuse Site (City)	Start-up Date	Acreage	Type of Use	Usage (MGD)	Usage (AFY)
Apollo Lakes Community Regional Park (Lancaster)	Jun 69	56	L,P	0.226	254
Piute Ponds (Lancaster)	May 81	400	E	6.348	7,133
Harrington Farms Pistachio Orchard (Palmdale)	Apr 85	23	AG	0.076	85
Nebeker Ranch (Lancaster)	Jun 88	600	AG	3.837	4,311
Tree Farm (Palmdale)	Feb 89	46	O	0.006	6
Antelope Valley Farms (Palmdale)	Mar 02	2,100	AG	7.146	8,030
Eastern Agricultural Site (Lancaster)	Feb 07	696	AG	0.946	1,063
Public Works Dept. sewer flushing (Lancaster)	Jan 09	--	I	0.004	4
Public Works Dept. street sweeping (Lancaster)	Feb 09	--	I	0.0004	0.4
Lancaster University Center (Lancaster)	May 09	2	L	0	0
Public Works Dept. dust control (Lancaster)	Sep 10		I	0.00001	0.01
TOTALS		**3,920**		**18.588**	**20,886**

NOTES: AF = Athletic field irrigation, AG = Agricultural irrigation, E = Environmental enhancement, I = Industrial, L = Landscape irrigation, O = Ornamental plant irrigation, P = Impoundment, R = Groundwater replenishment.

LANCASTER WRP FACTS

Plant capacity:	18 MGD
Water produced	11.45 MGD 12,869 AFY 3.1% FY decrease
FY11-12 O&M:	$373/AF
Water reused:	11.36 MGD 12,765 AFY 99.2% of production 3.9% FY decrease
Delivery systems:	5
No. of reuse sites:	6 1,752 acres

in 1989 to 8 MGD, with 460 million gallons (1,400 AF) of storage ponds to capture excess winter flows. The Stage III expansion increased plant capacity to 10 MGD in December 1992. The Stage IV expansion, consisting of a flow equalization basin, two sedimentation tanks and additional aeration equipment in the oxidation ponds, increased the plant's secondary treatment capacity to 16 MGD in May 1997. The MBR plant that went into operation in February 2007 raised the total plant treatment capacity to 17 MGD. In June 1969, the Antelope Valley Tertiary Treatment Plant (AVTTP) was placed in operation with the ability to treat 0.6 MGD of Lancaster WRP secondary effluent to tertiary quality. This plant completed its conversion to full tertiary treatment in mid-2012 with a capacity of 18 MGD, after which the AVTTP and MBR facilities were taken off-line.

This plant treated an average of 14.03 MGD in FY 11-12, utilizing oxidation ponds to produce 10.19 MGD (11,446 AFY) of recycled water, or a 14.1% decrease over the preceding fiscal year. Approximately 11.0% of the plant production was tertiary effluent being produced by both the AVTTP and the MBR plant (1.266 MGD, 1,422 AFY), with the remainder being secondary effluent. A portion of the wastewater entering the plant is lost due to evaporation from the oxidation and storage ponds during the summer, while additional flows are gained by precipitation during the winter. The FY 11-12 O&M cost to produce secondary effluent (based on influent flow) was approximately $373/AF (including solids processing). Besides a small amount of tertiary effluent used for on-site irrigation and construction at the WRP, all of the recycled leaving the plant was reused at four fixed sites and two hauled uses shown in Figure 18, and presented in Table 17.

4.1.1 PIUTE PONDS

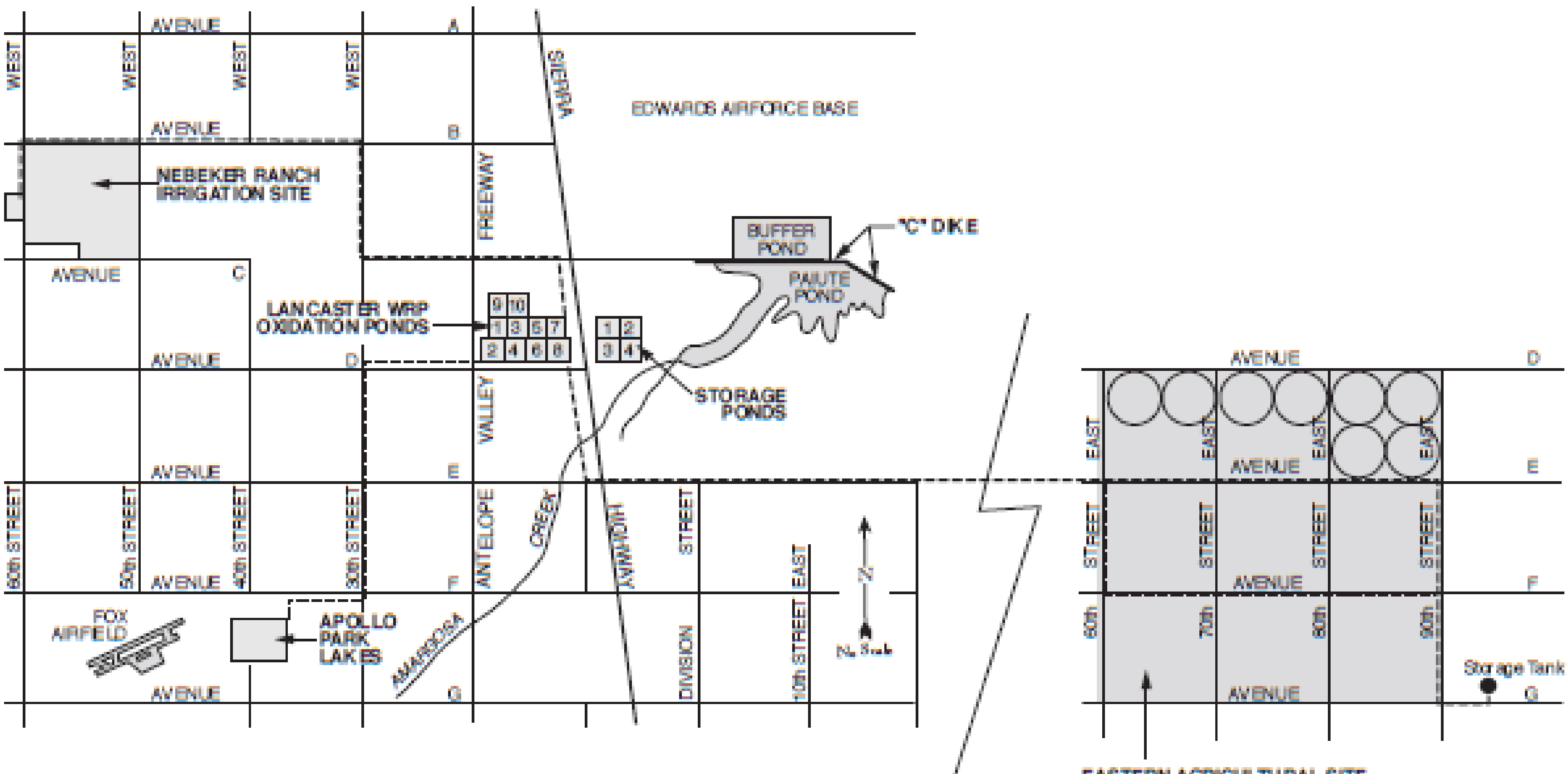
The initial discharge point for disposal of effluent from the Lancaster WRP had been to Amargosa Creek that then flowed onto Rosamond Dry Lake. In order to prevent flooding of the dry lakebed (which is located within the boundaries of Edwards Air Force Base), a 1-⅓ mile long dike was constructed in 1960 to impound the effluent. Approximately 200 acres of wetlands formed, becoming an important migratory stopover for ducks along the Pacific Flyway. In a memorandum of understanding signed in 1981 with Edwards Air Force Base and the California Department of Fish and Game, the Sanitation Districts agreed to maintain at least 200 acres of wetlands with recycled water in order to preserve Piute Ponds as a wildlife refuge. The secondary effluent is disinfected with chlorine in order to protect the health of Air Force officers who use this area as a duck-hunting club.

In FY 11-12, 6.348 MGD (7,133 AFY) was delivered to Piute Ponds, a decrease of 11.0% from the preceding fiscal year. This reuse constitutes 55.4% of the recycled water produced at this facility.

4.1.2 NEBEKER RANCH

The dike constructed by the Air Force did not completely eliminate the flow of recycled water onto Rosamond Dry Lake during winter when evaporation was at a minimum and additional rainfall runoff entered Piute Ponds. Five hundred million gallons of storage capacity were added in 1988 to collect excess recycled water

FIGURE 18
LANCASTER WATER RECLAMATION PLANT FACILITIES



produced during the winter for delivery to the 680-acre (approximately 600 acres cultivated) Nebeker Ranch, an alfalfa farm located approximately three miles northwest of the treatment plant. The ranch is served by a pump station and 15,900 feet of 24-inch force main.

During FY 11-12, 3.837 MGD (4,311 AFY) of recycled water was used for agricultural irrigation at this site, an increase of 4.9% over the preceding fiscal year. This reuse constitutes 33.5% of the recycled water produced at this plant. Deliveries of recycled water to this site will cease in the near future following the upgrade of the Lancaster WRP to full tertiary treatment and the full utilization of recycled water by the Eastern Agricultural site (Section 4.1.4) and the planned recycled water distribution systems by the City of Lancaster (Section 4.1.5) and the Los Angeles County Waterworks (Section 5.8.1).

4.1.3 APOLLO COMMUNITY REGIONAL PARK

In 1962, the then Los Angeles County Engineer devised and developed an aquatic recreation area next to the General William J. Fox Airfield in the City of Lancaster. The source of water is an advanced treatment plant located at the Sanitation Districts' Lancaster WRP that consists of chemical coagulation (for the reduction of phosphate to inhibit algal growth), sedimentation, dual-media filtration, and chlorination. The AVTTP was placed in operation in June 1969 with a capacity of 0.6 MGD. Recycled water from the AVTTP is delivered by means of a 12-inch force main for construction of the 56-acre Apollo Community Regional Park (formerly known as Apollo Lakes County Park), which was opened to the public in November 1972.

In FY 11-12, 0.226 MGD (254 AFY) of recycled water was delivered through 23,800 feet of pipeline to maintain 26 acres (80 million gallon) of lakes at the park to make up for evaporative losses and for irrigation water withdrawn from the lakes for use on the park, an increase of 23.3% over the preceding fiscal year. This reuse constitutes 2.0% of the recycled water produced at this plant. The three lakes in the park, named Aldrin, Armstrong, and Collins, are stocked with trout and catfish for public fishing, although no swimming is allowed. Contract No. 1601 specifies that the County of Los Angeles reimburse the Sanitation Districts for all of the O&M costs incurred in operating the AVTTP. The upgrade of the Lancaster WRP to tertiary treatment may render the AVTTP superfluous if nutrients can be managed.

4.1.4 EASTERN AGRICULTURAL SITE DEVELOPMENT AND STORAGE PROJECT

In order to prevent unauthorized overflows of effluent from Piute Ponds onto Rosamond Dry Lake and to handle future increases in effluent flow, the 2020 Facilities Plan for the Lancaster WRP identified new treatment processes (conventional NDN activated sludge replacing oxidation ponds, followed by tertiary filtration and disinfection) and treatment capacity expansion (18 MGD in 2010, with an ultimate capacity of 26 MGD by 2020). This plant expansion is currently under construction. Additionally, since demand for recycled water is seasonal and weather dependent, approximately 4,000 AF of storage ponds have been constructed in advance of startup of the new treatment facilities.

There has been an increased interest in the recycled water that will be produced by the new plant. Agreements for the purchase of recycled water have been executed with Los Angeles County Waterworks District 40 (13,500 AFY), City of Lancaster (950 AFY), and City of Palmdale (2,000 AFY). These agreements allow recycled water to be provided from the Lancaster and/or Palmdale WRPs. Since many industrial/municipal reuse projects and the required infrastructure are still in their early development stages, the Eastern Agricultural Site was developed to immediately utilize the water. In February 2006, construction of the 18.3-mile distribution pipeline was completed. A narrative description of the layout of this system is included in Appendix K.

In the interim, while the new treatment facilities were being designed and constructed, a 1 MGD MBR pilot plant (with a temporary chlorine disinfection system and ultimately a UV disinfection system) was installed and put into operation in February 2007. The effluent from this plant is being delivered to the first agricultural area consisting of eight center pivot irrigation systems in the area bounded by 70th and 90th Streets East and Avenues D and E, which is being operated by Harrington Farms under contract to the Sanitation Districts. During FY 11-12, 0.946 MGD (1,063 AFY) of recycled water was used at this site for the irrigation of Sudan grass and a combination of barley, oats, and wheat, as well as for maintenance activities such as construction, dust control, and pipeline testing. Reuse at this site constitutes 8.3% of the recycled water produced at this plant, and an increase of 12.2% from the preceding fiscal year.

4.1.5 City of Lancaster – Division Street Corridor

A contract for the sale of recycled water produced at the Lancaster and Palmdale WRPs to the City of Lancaster was signed in March 2008 for deliveries of up to 950 AFY. Recycled water deliveries from the Lancaster WRP to the City's Division Street Corridor Recycled Water Project (Division Street Corridor) began in January 2009. The City, in collaboration with the U.S. Army Corps of Engineers, has begun construction of distribution system that will eventually deliver recycled water from the Lancaster WRP following its upgrade to tertiary treatment. Through the Sanitation Districts' Supplementary Environmental Project Fund, $1 million was contributed to the construction of this system. The remaining financing consisted of City and American Recovery and Reinvestment Act funds. During FY 11-12, a total of 0.004 MGD (4 AFY) was delivered through 29,800 feet of pipeline, a 300% increase over the preceding fiscal year. For the time being, production from the MBR plant is being delivered to the following reuse sites: the City's Public Works Department used 0.004 MGD (4 AFY) for sewer flushing and 0.0004 MGD (0.4 AFY) for street sweeping of 2,125 curb-miles of roadways and parking lots. The City has an existing storage reservoir to serve their planned system, and a permanent pump station is under development.

4.2 Palmdale WRP

PALMDALE WRP FACTS	
Plant capacity:	12 MGD
Water produced:	8.63 MGD 9,698 AFY 6.6% FY increase
FY11-12 O&M:	$598/AF
Water reused:	7.228 MGD 8,121 AFY 1.6% FY increase 83.7% of production
Delivery systems:	1
No. of reuse sites:	3 2,069 acres

This treatment facility, located at 39300 30th Street East, Palmdale, CA 93550, began operation in 1953 as 0.75 MGD plant, with subsequent expansions in 1958 (2.5 MGD), 1972 (3.1 MGD), 1989 (6.5 MGD), 1993 (8 MGD), and 1996 (15 MGD). This plant completed its conversion to full tertiary treatment in December 2011, although with only a capacity of 12 MGD through the filters. Additional filters can be added in the future as influent flow to this plant increases.

This plant treated an average of 9.25 MGD in FY 11-12 using oxidation ponds to produce 8.63 MGD (9,698 AFY) of secondary effluent, or a 6.6% increase over the preceding fiscal year. The O&M cost to produce this water (based on influent flow) was approximately $598/AF (including solids processing).

During FY 11-12, 7.228 MGD (8,121 AFY), or 83.7% of the plant's production, was actively reused on 2,069 acres at three sites. All reuse occurred on property owned by the City of Los Angeles World Airports (LAWA) but now under long-term lease to the Sanitation Districts. This usage represents a 1.6% increase in reuse over the preceding fiscal year. The area receiving recycled water is shown in Figure 19. The reuse sites are listed in Table 16 along with the reuse flows from the Lancaster WRP.

4.2.1 City of Los Angeles World Airports Lease

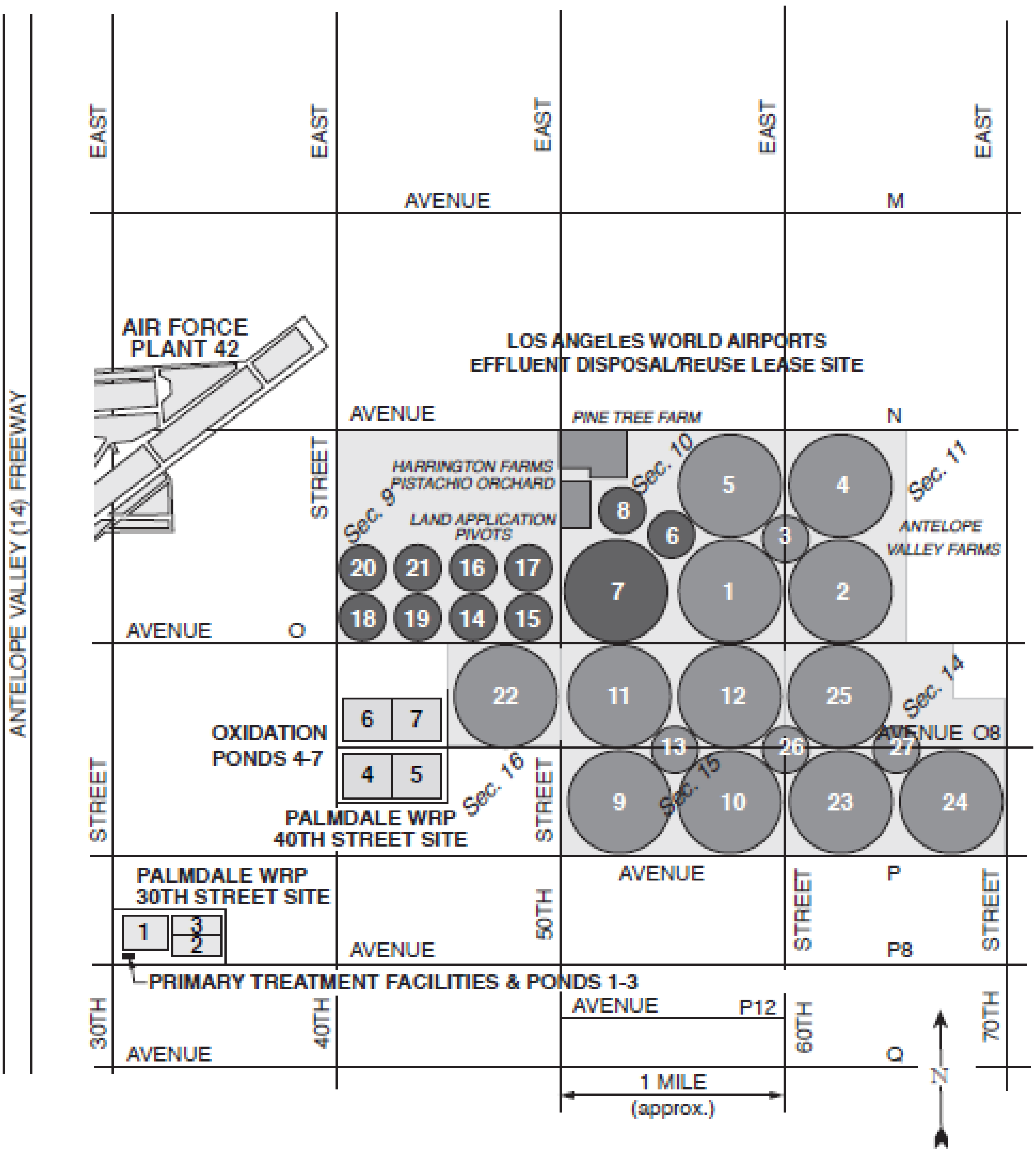
Recycled water from the Palmdale WRP has been sold to a series of local farmers since 1959. However, since the recycled water produced at the Palmdale WRP was historically secondary effluent, its applications have been limited. In January 1981, the Sanitation Districts signed Contract No. 2474 for the delivery of all the plant’s effluent to City of Los Angeles World Airports (LAWA) (formerly known as the Department of Airports, or DOA), who had purchased much of the land in the area in anticipation of the construction of Palmdale International Airport. LAWA had planned to lease out the land that they owned to farmers until the airport could be built, and would resell the recycled water to these farmers, with the excess water being spread on uncultivated land. However, since LAWA was unable to find tenants to buy the recycled water, a second contract (No. 3013) was signed in 1989 allowing the Sanitation Districts to land apply all water from the Palmdale WRP on LAWA land at no charge to either party.

In January 2001, in accordance with the plant’s Waste Discharge Requirements (WDRs), the Sanitation Districts submitted a Farm Management Plan (FMP), an Effluent Disposal Plan, and a Corrective Action Plan for the Palmdale WRP. The three documents provide an integrated solution for meeting the revised WDR established in the permit, Order No. 6-00-57. As a means of implementing the FMP, the Sanitation Districts signed a long-term lease with LAWA for four square miles of land to allow for the development of an integrated reuse system for water produced by the Palmdale WRP. As the master leaseholder, the Sanitation Districts are directly responsible for all land application and reuse activities at the site and, accordingly, have implemented agricultural management measures to minimize impacts to groundwater quality in land application areas. In March 2009, the Sanitation Districts eliminated land application and maximized reuse activities.

Recycled water is delivered to the Sanitation Districts’ LAWA-leased property through 13,200 feet of 36-inch DIP force main. An average of 0.076 MGD (85 AFY) was used during FY 11-12 to irrigate 23 acres of the Pistachio Orchard (previously planted and maintained by LAWA). Another 0.006 MGD (6 AFY) was used at a 46-acre Sanitation Districts-operated tree farm (formerly operated by Tree Mover). The Pistachio Orchard and Tree Farm are leased from the Sanitation Districts by Harrington Farms.

As part of the FMP implementation, the Sanitation Districts embarked on the Palmdale Agricultural Effluent Reuse Project, submitting an Engineering Report for the Demonstration Phase to the Lahontan RWQCB in October 2001. In March 2002, this project officially began with Antelope Valley Farms installing two center-pivot irrigation systems (125 acres each) on land leased by the Sanitation Districts from LAWA. The only cost to the farmer was the capital costs for the irrigation systems and the O&M and energy costs for the booster pumps. By the end of FY 11-12, a total of 13 center pivots and 14 mini-pivots had been installed. Previously, the pivots were used primarily for land application of effluent on crops (i.e., above agronomic rates) and were not considered as “reuse.” However, all application of recycled water began meeting agronomic rates in March 2009, therefore is now counted as reuse. During FY 11-12, this 2,000-acre site used 7.146 MGD (8,030 AFY), or 82.8% of the recycled water produced by the Palmdale WRP to grow livestock feed (first oats and later alfalfa). This was a 1.8% increase over the preceding fiscal year.

FIGURE 19
PALMDALE WATER RECLAMATION PLANT FACILITIES



5. FUTURE WATER RECYCLING PROJECTS

Several recycled water distribution projects throughout the Sanitation Districts□service area are in various stages of development to make use of up to an estimated 60,645 AFY of the remaining recycled water currently produced but not yet beneficially reused, with the possibility of another 16,600 AFY of effluent from JWPCP receiving additional treatment prior to reuse. These projects are listed in Table 17 along with the WRP that would supply the recycled water, the estimated quantities of recycled water, and the anticipated completion date. Unsecured funding, institutional concerns, and lack of regulatory approval make the anticipated completion dates for several projects uncertain. In addition to the projects listed in Table 18, there are a number of other potential reuse projects that are much more conceptual at this time that are described in Section 5.8 below.

TABLE 18
SUMMARY OF FUTURE WATER RECYCLING PROJECTS

Project Name	Recycled Water Source	Quantity (AFY)	Anticipated Completion
Long Beach Water Department	Long Beach WRP	4,510	TBD
City of Lakewood	Los Coyotes WRP	160	TBD
Walnut Valley Water District	Pomona WRP	4,550	TBD
City of Pomona Master Plan (recommended projects)	Pomona WRP	1,500	2030
Groundwater Reliability Improvement Program	San Jose Creek WRP	21,000	TBD
East San Gabriel Valley Regional	San Jose Creek WRP	1,710	Spring 2013
La Puente Valley County Water District	San Jose Creek WRP	280	TBD
Southeast Water Reliability Project	San Jose Creek WRP	1,000	2013
CBMWD La Mirada Extension	San Jose Creek WRP	1,200	TBD
CBMWD Santa Fe Springs Extension	San Jose Creek WRP	225	Late 2013
CBMWD South Gate Extension	San Jose Creek WRP	40	TBD
CBMWD Pico Rivera Rosemead Lateral	San Jose Creek WRP	30	TBD
City of Arcadia	Whittier Narrows WRP	740	2013
West Basin Municipal Water District	JWPCP	16,600	2020-25
Castaic Lake Water Agency	Valencia □ Saugus WRPs	17,400	2030
County Waterworks □Backbone System	Palmdale or Lancaster WRP	4,300	Early 2012
City of Palmdale	Palmdale or Lancaster WRP	2,000	Spring 2018
TOTAL		77,245	
TBD = to be determined			

5.1 Long Beach WRP

5.1.1 Long Beach Water Department Master Plan

In August 2010, the LBWD, with the assistance of Montgomery-Watson-Harza (MWH) and in conjunction with WRD, released a draft update of its recycled water Master Plan. MWH identified an additional 49 irrigation and industrial potable water customers with a demand of approximately 4,510 AFY that could be converted to recycled water, including the Haynes and AES power plants and the Southeast Resource Recovery Facility (SERRF), a number of residential developments, several industrial users and commercial laundries, and numerous greenbelts (schools, parks, golf courses, commercial nurseries, etc.). The revised Master Plan also took into consideration the expansion of the LVLAWTF for increased seawater intrusion barrier injection and recommended the construction of two, 3.3 MG storage tanks at the Alamitos Reservoir site. Seventeen of these customers with a demand of 2,505 AFY have been identified as the "most probable" for conversion to recycled water in the near term, as they are either located near an existing recycled water line or have expressed interest in conversion.

Eleven alternative construction projects were identified, with six being recommended for implementation:

Alternative 8 – A 6-inch pipeline west along Anaheim St. and north on Orizaba Ave. at a capital cost of $240,000 to serve 102 AFY to American Textile Maintenance Company (laundry).

Alternative 4 – A 4-inch pipeline north on Palo Verde Avenue at a capital cost of $320,000 to serve 39 AFY to Millikan High School.

Alternative 7 – A 16-inch pipeline beginning at the intersection of Vuelte Grand Ave. and Atherton St. at a capital cost of $7 million to serve 1,000 AFY to the Haynes Generating Station.

Alternative 6 – A 4-inch pipeline west on Spring St. at a capital cost of $250,000 to serve 20 AFY to Long Beach Airport Marriott Hotel.

Alternative 1A – 6- and 12-inch pipelines beginning at the intersection of 46th St. and Atlantic Ave. at a capital cost of $750,000 to serve 52 AFY to Los Angeles County Community Development (residential).

Alternative 9 – Sub-project 9A will begin at the intersection of 11th St. and Obispo Ave. and run to the intersection of Pico Ave. and Ocean Blvd. to serve 93 AFY to the Hyatt Regency Hotel, Rainbow Harbor Esplanade, Long Beach Shoreline Marina and Cesar Chavez Elementary School. Sub-projects 9B, 9C and 9D all require Subproject 9A to be built, although they each can be constructed individually. Sub-project 9B will serve 488 AFY to TOPKO and Montenay Pacific Power Corp. Sub-project 9C will serve 797 AFY to Nation Gypsum and BP West Coast Products. Sub-project 9D will serve 628 AFY for industrial uses at THUMS Long Beach and TOPKO. The four sub-projects will use 6- to 20-inch pipelines and are projected to have a capital cost of $32.9 million.

Alternative 4 has already been implemented by LBWD, as recycled water deliveries to Millikan High School began in October 2011. There is currently no time schedule for implementation of the other projects.

5.2 LOS COYOTES WRP

5.2.1 CITY OF LAKEWOOD MASTER PLAN

The City of Lakewood commissioned Wildan and Associates to conduct a study to determine the feasibility of expanding its recycled water distribution system westward. This potential expansion could serve an additional 159 AFY to city parks (e.g., Bolivar and Biscailuz Parks), numerous medians and parkways, and a number of public and private schools (e.g., Craig William and Lakewood Elementary Schools, the Intensive Learning Center, St. Pancratius School, and Hoover Junior High School). Such an extension would require about 7.7 miles of pipeline to be built in five phases and could cost as much as □7.25 million. This study was completed in July 2010; however, there is no implementation schedule as funding is currently unavailable.

5.3 POMONA WRP

5.3.1 WALNUT VALLEY WATER DISTRICT

WVWD contracts directly with the Sanitation Districts for the purchase of recycled water, instead of receiving recycled water through the City of Pomona. In conjunction with the Sanitation Districts, WVWD has already begun the process of repairing□replacing the gravity line that serves both it and the Sanitation Districts□Spadra Landfill. Approximately half of the gravity line between the Pomona WRP and the Spadra site has already been replaced with 24-inch mortar-lined and coated steel pipe. Also in the future, WVWD and the Sanitation Districts may jointly construct a storage reservoir at or near the Spadra site to serve both agencies and make use of Pomona WRP recycled that is currently lost to the river.

WVWD contracted with HDR Engineers to develop a master plan for the future orderly expansion of its recycled water distribution system by up to an estimated 4,550 AFY, although the currently proposed additional reuse sites have an expected demand of 1,676 AFY. This master plan, which is expected to be completed in May 2013, will detail the potential for expansion, primarily into the City of Diamond Bar, and determine what new infrastructure and facilities would be required. In addition to pipelines (ranging from 6- to 24-inch), seven pump stations, six reservoirs reservoir (one being a conversion), and six back-up wells would need to be added to the recycled water distribution system to accommodate the expansion. Completion of this □24 million system expansion is contingent upon the construction of a storage reservoir, as there are insufficient flows in the gravity distribution system as currently configured. In addition to its continued use of recycled water from the Pomona WRP, WVWD is expected to connect to the East San Gabriel Regional Recycled Water System detailed in Section 5.4.2.

5.3.2 CITY OF POMONA MASTER PLAN

The City□s consultant, Carollo Engineers, completed a master plan for expanding their recycled water distribution system in November 2009. The additional demand for their entire potential customer base was estimated at 6,150 AFY. However, the estimated maximum daily demand would be 11.6 MGD, which is not available to the City from the Pomona WRP. Therefore, additional sources of water would be required if all the potential reuse sites were connected. These water sources include potable water, non-potable groundwater from existing or rehabilitated wells, increased sewage flow to the Pomona WRP (i.e., process optimization□flow equalization), and recycled water from the Inland Empire Utilities Agency (although this agency has stated that it will not be delivering recycled water to the City within the Master Plan□s time horizon of 2030).

The proposed expansion of the City□s recycled water distribution system was divided into 10 segments serving an ultimate demand of 2,981 AFY. Because of the high, anticipated cost of implementing the entire proposed expansion (in addition to new distribution lines, eight new pump stations, five new storage reservoirs, and four additional pumps were needed), the Master Plan recommended that only three segments be built at this time, as they were the most cost effective and could be served by the existing recycled water supply from the Pomona WRP. This recommended project would be built in four phases from 2010 to 2030 and would yield an additional 1,497 AFY at an estimated capital cost of $20.7 million. The Master Plan also recommended replacing the existing pumps at the Pomona WRP with variable frequency drives prior to construction of the third segment so that more of the WRP's production could be beneficially reused with less discharge to the San Jose Creek channel. The seven remaining segments, if built, would be constructed in two phases after 2030, serving an additional 1,484 AFY of demand at an estimated capital cost of $52 million.

Independent work has already begun on the delivery of recycled water from Cal Poly to Forest Lawn's Covina Hills cemetery. A potable water standby agreement has negotiated with Golden State Water Company that will allow recycled water irrigation use at this site. As part of an amendment to their recycled water agreement, Forest Lawn will construct a pump station and piping to lift recycled water from Cal Poly's recycled water reservoir up to Forest Lawn's irrigation water tanks, and the Cal Poly irrigation water lift station will be upgraded to increase maximum flow rate from 3,000 to 4,000 gpm to accommodate the cemetery's demands. Forest Lawn expects to begin using 300 AFY of recycled water in 2013, which will increase gradually until the final build-out of the cemetery occurs in the year 2160, with an ultimate projected irrigation demand of 900 AFY.

5.4 SAN JOSE CREEK WRP

5.4.1 GROUNDWATER RECHARGE PROGRAM

USGVMWD and its partner, the San Gabriel Valley Municipal Water District (SGVMWD), had been developing a plan to replace imported State Project water (purchased either through MWD or directly) with a like amount of recycled water from the Sanitation Districts' San Jose Creek WRP West to prevent long-term groundwater overdraft of the basin. The initial proposal was for transmission line running north along the San Gabriel River to the Santa Fe Spreading Grounds to deliver a long-term average of 16,000 AFY (maximum of 25,000 AFY) of tertiary treated recycled water.

Because of opposition from a local brewery and a California Environmental Quality Act (CEQA) lawsuit, a compromise "demonstration" recharge project was proposed that would use a of maximum of 10,000 AFY of recycled water for recharge downstream of the Santa Fe Dam at five concrete drop structures in the San Gabriel River. The five, new discharge points in the San Gabriel River that would be the recharge locations for this project were identified in the June 2009 NPDES permit for the San Jose Creek WRP. Contracts for the sale of recycled water from the Sanitation Districts to USGVMWD and SGVMWD were executed in August and September 1998, respectively. However, permit action was delayed when LARWQCB staff proposed that this groundwater recharge project immediately comply with surface water human health-based criteria (California Toxics Rule, or CTR) for water bodies (i.e., the unlined San Gabriel River) that are existing or potential drinking water sources. CTR criteria for some constituents are significantly lower than Title 22 drinking water standards and are not attainable with current conventional tertiary treatment. Since that time, the designation as an existing or potential drinking water source has been removed from a number of water bodies in the Los Angeles Basin, including this portion of the San Gabriel River. CTR human health criteria for non-drinking water sources and criteria for aquatic life and all other applicable Basin Plan Objectives would be applied to the recycled water at the point of discharge to the San Gabriel River. Subsequently raised concerns about the disinfection by-product, NDMA, in recycled water had continued to prevent this project from moving forward. As such, the only way to obtain compliance with these requirements would be by the addition of advanced treatment to that portion of the recycled water to be recharged. Because of the substantial additional cost that would be incurred, the project had been indefinitely postponed.

Interest in this project was rekindled following MWD's May 2007 cessation of all deliveries of imported water for spreading. USGVMWD, WRD and the Sanitation Districts entered into a Memorandum of Understanding (MOU) on September 24, 2008 to develop the Groundwater Reliability Improvement Program (GRIP). As envisioned, Phase I of GRIP would consist of an advanced treatment plant (MF/RO/advanced oxidation) located at or adjacent to San Jose Creek WRP West that would produce 18,000 AFY for recharge in both the Main San Gabriel and Central groundwater basins. Phase II would increase production capacity to 46,000 AFY. In November 2010, a Joint Powers Authority was formed by USGVMWD, WRD, and the Sanitation Districts to proceed with the project. However, despite initial progress, the USGVMWD Board of Directors voted in March 2011 to remove their agency from the Joint Powers Authority due to shifting replenishment needs and cost concerns. Instead, USGVMWD has received a $150,000 grant from USBR to conduct a feasibility study to offset current interruptible imported supplies with 10,000 AFY of locally supplied recycled water within the next 8 to 13 years. The feasibility study will evaluate multiple sources of recycled water and compare these alternatives against a "no project" alternative in order to determine the best method for replenishment for the study area. WRD and the Sanitation Districts are moving forward with GRIP as a 21,000 AFY project focused on replenishment at the Montebello Forebay. The two agencies have begun working on the preliminary engineering to support the environmental documentation for the project (CEQA/NEPA) and anticipate that CEQA/NEPA work will begin in 2013.

5.4.2 EAST SAN GABRIEL VALLEY REGIONAL RECYCLED WATER SYSTEM

For a number of years, the City of Industry has been planning to extend its recycled water distribution system, since the demand at its single reuse site (Industry Hills Recreation Area) only uses a small portion of the capacity of the City's 36-inch distribution line coming from the Sanitation Districts' San Jose Creek WRP. The proposed expansion involved several alternatives over the years, including the possibility of locating a 10,000 AF open reservoir in the Tres Hermanos area of the City of Diamond Bar for seasonal storage of recycled water. In 2000, an MOU to develop a regional distribution system was signed by the City of Industry, Suburban Water Systems (SWS, which had purchased the City of West Covina's water system), BKK Landfill, RWD, and WVWD. A revised contract between the Sanitation Districts and City of Industry was negotiated to include the additional quantities of recycled water, and was signed on September 27, 2000. Because of anticipated higher recycled water demands, the City of Industry has requested an adjusted supply contract with the Sanitation Districts to support these needs. This regional system is expected to utilize 1,710 AFY more, and will be developed in two separate portions: one serving the City of Industry and RWD, and the other developed by USGVMWD to serve SWS, BKK Landfill, and WVWD. These are discussed separately below.

City of Industry/RWD – The City and its recycled water system operator, RWD, have completed a new pump station and 2.1 MG reservoir at Anaheim-Puente Road. In addition, construction was completed on an expansion of the City's pump station at San Jose Creek WRP East which included the addition of a fourth pump, replacement of the existing three pumps, installation of a larger surge tank, new control panels, and a new, separate power supply from SCE. RWD continues to expand its recycled water distribution system, adding new customers on a regular basis (discussed in Section 2.5.3 above). Construction of Mission Energy's Walnut Creek Energy Park 500 MW plant in the City of Industry is nearing completion and deliveries of an estimated annual average 485 AFY (maximum estimated annual demand of 1,385 AFY) of recycled water for cooling tower use and landscape irrigation of the site are expected to begin in May 2013.

USGVMWD – USGVMWD's portion of the system is called the "Phase II-B Expansion" and will serve 1,315 AFY to 34 customers. This system is being constructed in four packages, consisting of a pump station, storage reservoir and approximately 15.1 miles of 6- to 24-inch pipeline. The first package pipeline was completed in December 2010 and connects to the City's existing 36-inch pipeline at the intersection of Azusa Avenue and Temple Avenue. The pipeline extends to the Big League Dreams Development/BKK landfill entrance and continues east to Nogales Street. A new reservoir was built as part of this package, with completion occurring in December 2011. The second package pipeline was completed in August 2011 and continues north along

Azusa Avenue to the South Hills Country Club, a proposed recycled water customer. Site connections for both sub-phases were completed in summer 2012.

The third package consists of approximately 3.8 miles of pipeline ranging in size from 4- to 12-inches in diameter. The pipelines are located in the City of West Covina and branch off of the Package 2 recycled water main installed in Azusa Avenue and Vine Avenue. The fourth package consists of approximately 3.4 miles of pipeline ranging in size from 4- to 12-inches in diameter. The pipelines are located in the cities of West Covina and Walnut along Shadow Oak Drive, Gemini Street, Stephanie Drive, Woodgate Drive and other local side streets. Construction of these packages was completed in winter 2012, with deliveries of recycled beginning in late spring 2013.

5.4.3 La Puente Valley County Water District Master Plan

The La Puente Valley County Water District (LPVCWD) hired MWH to produce a recycled water master plan for that agency, which completed the task in May 2011. LPVCWD's potable water source is groundwater and it currently pumps over its annual allotment by approximately 40%, thereby requiring them to pay replenishment fees to the basin Watermaster. A total of 74 reuse sites with a demand of 375 AFY in and adjacent to its service area within the City of Industry were identified. The most cost effective of the four alternatives evaluated has LPVCWD tapping into the City of Industry's recycled water distribution line along the San Jose Creek Channel at Hacienda Blvd., with a smaller connection to the City of Industry transmission line on Azusa Ave., serving a total of approximately 280 AFY through a new pump station at an estimated cost of $9.1 million. The LPVCWD Board of Directors has yet to finalize this document. According to the LPVCWD General Manager, the cost of recycled water for this project will be too high to allow for its construction in the foreseeable future without outside funding. However, this project could possibly be included as part of the USGVMWD Phase II-B Expansion detailed in Section 5.4.2, above.

5.4.4 Southeast Water Reliability Project

CBMWD is proceeding with this system expansion that will loop the Rio Hondo (Torres) and Century (Ibbetson) systems for flow reliability and system pressure and to aid in chlorination. The ultimate capacity for the combined, looped systems is projected to be 15,000 AFY. The selected option is now called the Southeast Water Reliability Project. This will consist of approximately 11.4 miles of 30-inch cement mortar lined and coated steel pipeline to be built from the City of Pico Rivera, through the cities of Montebello, Commerce, and East Los Angeles, to the City of Vernon. This extension would serve the Montebello Golf Course and other irrigation sites and a second proposed power plant in the City of Vernon, as well as other industrial users. (However, the City of Vernon has officially cancelled its plans for this facility.) Letters of intent to serve recycled water have been received by the cities of Pico Rivera and Montebello, and the City of Vernon has already adopted a recycled water rate. Construction on the first phase from Pico Rivera to the Montebello Golf Course was completed in the fall of 2011and several sites have already been connected. Approximately 400-500 AFY of the 1,000 AFY of identified demand will begin using recycled water almost immediately. Construction of the Phase 2 from Montebello to Vernon will depend on funding, securing a customer base and other outstanding institutional issues.

In addition, CBMWD had planned to construct a four million gallon recycled water storage reservoir at its Rio Hondo pump station that would provide daily operational storage. In the meantime, a potable water back-up system was installed at the pump station in 2001. Construction on the tank had been put on hold due to financial considerations, but is expected to be a part of the first phase of the SWRP expansion. The site of the storage tank may be relocated to the Montebello Hills to take advantage of elevation for gravity feed of the system.

In 2008, CBMWD was approached by the LADPW regarding the possibility of constructing a new 8-inch recycled water pipeline on Mines Avenue in the City of Pico Rivera that could deliver recycled water for landscape irrigation to multiple sites on or near Mines Avenue. The "Pico Rivera Recycled Water Project – Phase I" is a sub-project to LADPW's "San Gabriel River Coastal Basin Spreading Grounds Pump Station and Pipeline" project, a 78-inch pipeline that will act as conduit for moving storm water, imported water, or recycled water between the San Gabriel and Rio Hondo spreading grounds. After much discussion with LADPW staff and the City of Pico Rivera, and with the support of Congresswoman Grace Napolitano, the recycled water pipeline was added to LADPW's Request for Proposals (RFP) for the 78-inch conduit. The agreement stipulates who is the lead agency and what percentage of funding each agency responsible for. The agreement divided the Pico Rivera Recycled Water Project into two phases:

Phase I – Phase I is a 1-mile long, 8-inch recycled water pipeline placed in the same trench used for the larger 78-inch conduit project. LADPW is the lead agency for the 8-inch recycled water pipeline and will be responsible for all construction and construction management. CBMWD's role is to provide a pipeline design. Because this project is important to all three agencies, final project costs will be equally split three ways.

Phase II – The second phase in the agreement is a project that will connect the Mines Avenue pipeline to CBMWD's existing recycled water system and the service laterals that will provide recycled water to the individual sites along the Mines Avenue corridor. CBMWD will be the lead agency on this portion of the Pico Rivera Recycled Water Project. Project costs will be split evenly with the City of Pico Rivera. Customer connections began in the second half of 2012.

Since construction costs were shared with LACDPW and the City of Pico Rivera, the impact to CBMWD was greatly reduced. CBMWD applied for funding through the United States Bureau of Reclamation's (USBR's) Title XVI program. The Title XVI program provides for cost recovery on 25% of all construction costs. Finally, construction bids came in much lower than anticipated in the engineer's estimates, so this will result in additional savings to CBMWD. All construction costs will be covered through pay-go funds.

As part of its 2008 Recycled Water Master Plan, CBMWD envisioned that additional connections would be made to the SWRP line to supply recycled water into the USGVMWD service area. No further action has been taken by either agency on this potential extension. CBMWD has had a consultant start on an update of their recycled water Master Plan, with a draft report produced in mid-2012.

5.4.5 City of La Mirada Extension

CBMWD has just begun looking at a new recycled water trunk line from the City of Santa Fe Springs to serve an identified 1,200 AFY of demand in the City of La Mirada. Both the City and the local purveyor, Suburban Water Company, are extremely interested in getting recycled water. CBMWD is currently in the planning process and is looking at potential pipeline routes, customer base, booster pump location, etc. CBMWD expects to begin serious work on this project in the summer of 2013.

5.4.6 City of Santa Fe Springs Extension

CBMWD has been working with Air Products & Chemicals Incorporated (Air Products), the City of Santa Fe Springs, CDPH and LACDPH, regarding Air Product's connection to the CBMWD recycled water system for use in their cooling towers. Due to their proximal location to CBMWC's recycled water system and the cost of potable water from the City of Santa Fe Springs, the Air Products operations team at the Santa Fe Springs facility has received management approval to begin the retrofit process. Annual recycled water use is expected to be 225 AFY.

The "Scope of Work" involves furnishing all labor, equipment and materials necessary to construct approximately 3,000 linear feet of buried 8-inch PVC pipeline and 120 linear feet of 18-inch diameter steel casing. A 6-inch recycled water service connection to the existing recycled water main, surface restoration and traffic control is also included. CBMWD and Air Products agreed to have CBMWD's contractor install a portion of the on-site piping for the plant, in addition to the work in the public right-of-way. This section of the pipeline work will be owned and maintained by Air Products. Once the on-site work is complete, Air Products has agreed to reimburse CBMWD for the on-site work. Duration of the entire construction project is expected to take 120 calendar days. The estimated payback time for the entire project is eight years. CBMWD expects to begin construction work on this project in March 2013.

5.4.7 *City of South Gate Extension*

South Gate is currently working on improving some of their existing city streets by restoring asphalt, installing new traffic signals, construction of new street medians, replacing and/or expanding underground utilities, amongst other work items within their projects scope of work. South Gate approached the District some time ago to inquire on the possibility of expanding the existing recycled water infrastructure further into the city during the same time that the city will be renovating the streets. This is to save on costs and to avoid disrupting city streets after improvements have been completed.

The City's design consultant has submitted design plans for the first phase of their project which is a 2,800 linear foot 10-inch diameter recycled water lateral on Firestone Boulevard. This project will create two new recycled water connections within the City. The first connection will be to a new strip mall on the corner of Firestone and Atlantic Boulevard and the second to medians along Firestone Boulevard. A third possible recycled water customer connection could be Shultz Steel for industrial needs. Annual recycled water use is expected to be 2.5 AFY for the Azalea Project, 3 AFY for the medians and possibly 35 AFY for Shultz Steel. A cost-share agreement is currently being established resulting from lack of customer demand for recycled water. The City is providing design plans and establishing the contractor who will be installing the lateral under inspection by CBMWD. The City plans to begin construction work on this project in summer 2013 if an agreement is made.

5.4.8 *City of Pico Rivera Rosemead Lateral*

CBMWD has just begun investigating a potential recycled water lateral to serve Rio Vista Park and El Rancho School District in the City of Pico Rivera. Annual recycled water use is expected to be 30 AFY. Feasibility is currently unknown at this time.

5.5 Whittier Narrows WRP

5.5.1 *City of Arcadia (USGVMWD Phase III Extension)*

The City of Arcadia, along with USGVMWD, commissioned Stetson Engineers to examine the feasibility of supplying recycled water to various sites within the city. A draft report was completed in December 2006 identifying an extension of USGVMWD's distribution system from the Whittier Narrows WRP as the most feasible alternative compared with obtaining recycled water from the San Jose Creek WRP or LADWP's LA-Glendale WRP. The proposed project consists of approximately 64,100 feet of 14- and 16-inch distribution lines, a 900 HP booster pump station, and an existing 1.5 million gallon storage reservoir for an estimated cost of $7.6 million. The pipeline route is proposed to run east on Rush Street, north on Santa Anita Avenue, north along the Rio Hondo, west on Live Oak Avenue, then north again on Santa Anita to Foothill Blvd. Within the main part of Arcadia, the pipeline would form a loop going west on Foothill/Colorado Blvd., then south on Michillinda Avenue, then east on Huntington Drive back to Santa Anita. This system would provide recycled water to 23 potential customers with a total annual recycled water demand of approximately 644 AFY and a peak demand of 4.3 MGD. Another 23 sites with a total annual demand of 96 AFY were identified in the vicinity, although not adjacent to the proposed pipeline route, and would require the investment in additional service laterals. The four largest sites, Santa Anita Racetrack, the Los Angeles County Arboretum, Arcadia County Park, and Santa Anita Golf Course, make up 56% of the total identified demand for water. This study did not include any potential reuse sites that might be located along the pipeline route outside of the City of Acadia. The completion of the project was initially estimated to be approximately 2013, although no specific timetable has been set for implementation. This project has been designated Phase III by USGVMWD.

5.6 Joint Water Pollution Control Plant

5.6.1 West Basin Municipal Water District

The WBMWD's June 2009 Master Plan outlined the expansion of its recycled water system deliveries to a potential of 70,000 AFY by 2020 and to 83,000 AFY by 2030, including expansion of their Carson Regional Water Recycling Facility (CRWRF) from 6 to 20 MGD. Their study of the options found that both their pump station at the City of Los Angeles' Hyperion treatment plant, which supplies its effluent for recycling and its distribution system would require extensive expansion in order to accommodate the additional flows from its El Segundo water recycling facility to serve reuse sites in the Carson and Palos Verdes areas. One option, which could prove more cost effective, would be to supply 20% of WBMWD's future needs, or up to approximately 16,600 AFY, from the Sanitation Districts JWPCP. This option would also help WBMWD meet its contractual obligation of using recycled water of Sanitation Districts' origin for future expansions in exchange for capacity in the JWPCP ocean outfall for disposal of brine from the CRWRF. The recommended option was a new $187.8 million, 26 MGD treatment plant at JWPCP to augment WBMWD's Title 22 distribution system and supply advanced treated recycled water to such large reuse customers at the Dominguez Gap Seawater Intrusion Barrier and the bp Carson refinery expansion, as well as for the Amoco and Watson cogeneration facilities. The option of using JWPCP effluent is expected to save WBMWD approximately $25 million in capital costs. The location of this new treatment plant could be at JWPCP, the CRWRF, or along the transmission line in route to a specific user or group of recycled water sites. Currently, plans for a major expansion of demands in the Carson and Harbor Area are being re-evaluated by WBMWD, along with the feasibility of a new treatment plant at the JWPCP. According to the Master Plan's recommended CIP, construction of the new treatment facilities is not scheduled until FY20-25.

5.7 Valencia and Saugus WRPs

5.7.1 Castaic Lake Water Agency

In 2002, CLWA, the regional importer and wholesaler of State Water Project water in the Santa Clarita Valley, developed the Recycled Water Master Plan for the use of 17,400 AFY of recycled water produced at both the Sanitation District's Valencia and Saugus WRPs by the year 2030. CLWA requires an update of the 2002 Recycled Water Master Plan in order to compile the latest information with regard to potential recycled water users, design of infrastructure and the availability of recycled water to serve them. In March 2012, CLWA submitted an Integrated Regional Water Management planning grant application to the DWR for the development of the Master Plan and subsequent Environmental Impact Report (EIR). CLWA is expected to enter into a new contract with the Sanitation District the purchase and sale of recycled water to support the updated Master Plan, when completed. The updated Master Plan is anticipated to be completed in 2014. In 2012, CLWA, along with the local purveyor Valencia Water Company, were awarded Proposition 84 grant funding for the next phase of their recycled water system, Phase 2C, which is expected to deliver up to 900 AFY of recycled water.

In June 2009, CLWA began investigating the feasibility of delivering recycled water from the Sanitation Districts Saugus WRP. This Phase 2A of the Master Plan consists of a booster pump station, several thousand feet of pipelines and a storage reservoir. This system would deliver and estimated 511 AFY of recycled water from the Saugus WRP to the 80-acre Central Park, the River Village and Bridgeport developments and assorted city landscaping. In June 2011, Mitigated Negative Declaration Environmental Assessment (MND EA) was completed and USEPA issued a Finding of No Significant Impact for this project. In July 2011, CLWA approved the resolution adopting the MND EA and approving the Mitigation Monitoring and Reporting Program, and a Notice of Determination was filed with the Los Angeles County Office of Clerk Recorder and with the California State Clearinghouse. CLWA anticipates the construction of the project to be completed in 2017.

5.8 LANCASTER AND PALMDALE WRPS

5.8.1 *ANTELOPE VALLEY REGIONAL RECYCLED WATER DISTRIBUTION PROJECT*

Sanitation Districts staff continue to work with the cities of Lancaster and Palmdale and Los Angeles County Waterworks District 40, Antelope Valley, (Waterworks) to develop a regional backbone recycled water distribution system for municipal and industrial users. The proposed North Los Angeles Kern County Regional Recycled Water Project (AV Backbone) includes facilities for the primary distribution system to provide disinfected tertiary recycled water produced from the Sanitation Districts Palmdale and Lancaster WRPs and from Rosamond Community Services District s Rosamond WRP to end users in the Antelope Valley Region. The Project is being built in phases and portions, with the Division Street Corridor and its extensions to Columbia Way and to City Park already having been constructed and partially implemented in the City of Lancaster using tertiary treated recycled water produced by the Lancaster WRP (detailed in Section 4.1.5).

The City of Palmdale and Waterworks have entered an agreement to design, construct and implement a southern segment of the AV Backbone. The main backbone pipeline will originate at the Palmdale WRP, travel west down Rancho Vista Blvd., then north on 10th St. East, west on Avenue O-8 and north along Sierra Highway, terminating at Columbia Way and connecting to the extension of the Division Street Corridor (described above). The Columbia Way lateral would serve the proposed Palmdale Hybrid Power Plant (PHPP), a 570-megawatt electric generating facility. Another portion of the main backbone pipeline will head west from Sierra Highway, along Avenue O, to the Amargosa Creek, and roughly parallel the creek to reach the Waterworks District s tank site facility next to the Antelope Valley Freeway, at 10th St. West and Avenue O-12. Facilities will also include the pump station and forebay tank to be located at the Palmdale WRP, and a storage tank at the Waterworks tank site. This segment of the backbone system has been designed and is planned for completion at nearly the same time as the completion of the PHPP, whose funding will also finance the recycled water pipeline. The PHPP was approved by the California Energy Commission in August 2011. The City of Palmdale will need to secure a developer and funding for the PHPP. Once initiated construction of the PHPP is estimated to take about 30 months. The PHPP is projected to use up to 4,300 AFY of recycled water, which will be distributed by Waterworks by means of a new pump station (plans for this pump station are awaiting final approval and funding of the PHPP).

5.8.2 *PALMDALE RECYCLED WATER AUTHORITY (PRWA)*

The PRWA was created in 2012 through an agreement between the City of Palmdale and the Palmdale Water District to jointly study, promote, develop, distribute, construct, install, finance, use and manage recycled water resources created by the Sanitation District Palmdale and Lancaster WRPs for any and all reasonable and beneficial uses, including irrigation and recharge, and to finance the acquisition and construction or installation of recycled water facilities, recharge facilities and irrigation systems. The City of Palmdale will allocate all of its contractual recycled water rights to the PRWA.

The PRWA has a contract with the Sanitation Districts for the purchase of up to 2,000 AFY of recycled water from the Palmdale and Lancaster WRPs. The PWRA is planning Phase 2 which would install a recycled water distribution line along 30th St. East, south to Avenue R-8 then east until 55th St. East with laterals to five parks: McAdam, Palmdale Oasis, Yellen and Domenic Massari. These parks are expected to use approximately 1,000 to 1,200 AFY. The PWRA also plans on using recycled water on the numerous (150 to 200) Landscape Maintenance Districts (LMDs) and five elementary schools along the route of the recycled water line. In addition, any schools or businesses that are easily accessible to this water will also be connected. The PWRA and Los Angeles County Waterworks are currently planning for the portion of the Backbone project that will connect the Palmdale WRP to the proposed PHPP (discussed in Section 5.7.1, above). The PWRA has installed a temporary pump station that began delivering recycled water to McAdam Park in the fall of 2012. The entire project is expected to be completed in the spring of 2018.

5.9 CONCEPTUAL WATER RECYCLING PROJECTS

The most recent statewide water crisis that ran from 2006-09 spurred numerous entities into giving more serious consideration to water recycling in their service areas. This sense of urgency was further stimulated by the passage of SB 7 in 2009 that requires urban water agencies to reduce per capita water consumption by 20 percent by the year 2020 (commonly referred to as the “20 x 2020 Plan”). And while the water supply situation in the State has improved considerably of late, several ambitious, large-scale water recycling projects involving groundwater replenishment continue to be investigated. The list of conceptual projects below is not meant to be exhaustive. Rather it is a listing of the most likely or ambitious projects the Sanitation Districts are currently tracking.

5.9.1 MWD ADVANCED TREATMENT PLANT AT JWPCP

In FY 11-12, JWPCP provided primary and secondary treatment to approximately 265.47 MGD (298,285 AFY) of wastewater prior to discharge through outfall tunnels to the Pacific Ocean, with water recycling at the facility being limited to in-plant uses. MWD and the Sanitation Districts have partnered to study the potential for a regional, indirect potable reuse program to advance treat as much as 200 MGD (224,110 AFY) of treated wastewater that is currently discharged to the Pacific Ocean. Implementation of such a large-scale regional reuse program could provide MWD with a significant supply of reliable, drought-resistant water to supplement imported raw water supplies and would be consistent with the enhanced regional approach currently being considered in their Integrated Resources Plan (IRP). Such a project would involve complex interagency agreements, extensive regulatory approvals, public outreach, and considerable capital costs.

From a technical standpoint, this project would require new advanced treatment facilities (e.g., MF/RO/UV), a regional distribution system to groundwater basins (e.g., Montebello Forebay and/or the Main San Gabriel Basin), and injection and extraction wells, modeled somewhat after the Groundwater Replenishment System in Orange County. No estimates of capital costs or timeline for implementation for such a project have been made at this time. Nevertheless, pilot scale testing of treatment systems was performed, funded with a $330,000 grant from the USBR to demonstrate the technology. Pilot scale testing concluded in June 2012 and a final report was submitted to the USBR in September 2012.

5.9.2 Downey/Cerritos Advanced Treatment Plant for Recharge

The cities of Downey and Cerritos are jointly investigating a potential project to take 7.1 MGD (8,000 AFY) of effluent from the Los Coyotes WRP, treat it to an advanced level (MF/RO/UV), and pipe approximately 6,000 AFY (after brine losses) north to the Montebello Forebay where it will be stored underground for the exclusive use by those cities. In addition to technical, financial and permitting obstacles, implementation of this project would require that the existing Basin Adjudication would need to be significantly revised.

5.9.3 Scalping Plants

The Sanitation Districts have been contacted regarding scalping plants in both the JOS and SCV systems. An evaluation of these proposals is currently underway. In general, there are several obstacles to overcome, including technical, financial, permitting, and siting. In addition, construction of scalping plants will decrease the amount of water available at the already constructed downstream WRPs. This poses a problem because recycled was has already been contracted for at these downstream WRPs.

5.9.4 Newhall Ranch Development

The Newhall Land and Farming Company, a major landowner in the Santa Clarita Valley, has plans for a 12,000 acre residential/commercial development known as Newhall Ranch. A new sanitation district, the Newhall Ranch County Sanitation District, has been formed and is expected to join the Sanitation Districts of Los Angeles County. Construction of a Newhall Ranch Water Reclamation Plant is planned to serve the sewer needs of Newhall Ranch, along with a portion of Newhall Ranch's estimated 9,545 AFY of recycled water demand.[8] During the initial development of this project, the recycled water demand is expected to be supplied by the Sanitation Districts' Valencia WRP, which may continue supplying recycled water even after full implementation of the construction and occupation. The earliest predicted occupation of Newhall Ranch homes is 2016; however, recycled water may be needed for grading activities planned for 2014.

8 "Valencia Water Company Reclaimed Water Master Plan for Newhall Ranch", Dexter Wilson Engineering, Inc., January 2006.

LIST OF ABBREVIATIONS

AF	acre-foot
AFY	acre-foot per year
AVTTP	Antelope Valley Tertiary Treatment Plant
AWWARF	American Water Works Association Research Foundation
BOD	biological oxygen demand
CBMWD	Central Basin Municipal Water District
CDM	Camp Dresser McKee
CEQA	California Environmental Quality Act
CLWA	Castaic Lake Water Agency
COD	chemical oxygen demand
CTR	California Toxics Rule
DIP	ductile iron pipe
DPH	State Department of Public Health (formerly Health Services)
EIR	Environmental Impact Report
EPA	United States Environmental Protection Agency
FMP	Farm Management Plan
FMWD	Foothill Municipal Water District
FWC	Foothill Water Coalition
FY	fiscal year
GAC	granular activated carbon
gpm	gallons per minute
HP	horsepower
JOS	Joint Outfall System
JWPCP	Joint Water Pollution Control Plant
LACDPR	Los Angeles County Department of Parks and Recreation
LACDPW	Los Angeles County Department of Public Works
LADWP	City of Los Angeles Department of Water and Power
LAWA	Los Angeles World Airports
LBWD	Long Beach Water Department
LMD	Landscape Maintenance District
LPVCWD	La Puente Valley County Water District
LVLAWTF	Leo Vander Lans Advanced Water Treatment Facility
MBR	membrane bioreactor
MF/RO	microfiltration/reverse osmosis

MGD	million gallons per day
MND/EA	Mitigated Negative Declaration/Environmental Assessment
MRF	Materials Recovery Facility
MTA	Metropolitan Transportation Authority
MWD	Metropolitan Water District of Southern California
MWH	Montgomery-Watson-Harza
NDMA	N-nitrosodimethylamine
NDN	nitrification-denitrification
O&M	operation and maintenance
OCWD	Orange County Water District
PERG	Puente Hills Energy Recovery from Landfill Gas Facility
PHPP	Palmdale Hybrid Power Plant
PVC	polyvinyl chloride
PWD	Pomona Water Department
PRWA	Palmdale Recycled Water Authority
RWD	Rowland Water District
RWQCB	Regional Water Quality Control Board
SCE	Southern California Edison
SCVJSS	Santa Clarita Valley Joint Sewerage System
SJCWRP	San Jose Creek Water Reclamation Plant
SGVMWD	San Gabriel Valley Municipal Water District
SGVWC	San Gabriel Valley Water Company
SRF	State Revolving Funds
SWS	Suburban Water Systems
THUMS	Texaco, Humboldt, Union, Mobil, Shell
TOC	total organic carbon
TVMWD	Three Valleys Municipal Water District
USBR	United States Bureau of Reclamation
USGS	United States Geologic Survey
USGVMWD	Upper San Gabriel Valley Municipal Water District
UV	ultraviolet light disinfection
WDR	waste discharge requirements
WRD	Water Replenishment District of Southern California
WRP	water reclamation plant
WVWD	Walnut Valley Water District

Chronology of Sanitation Districts' Reuse Activities

July 1927	The Tri-City Plant serving the cities of Pomona, Claremont, and La Verne is placed into service and the effluent is used for irrigation of crop and pasture land by the Diamond Bar Ranch Company and the Northside Water Company.
December 1941	The 0.36 MGD Lancaster WRP is placed into operation.
April 1949	Sanitation Districts' Report upon the Reclamation of Water from Sewage and Industrial Wastes in Los Angeles County, California is published which demonstrated the feasibility of water reclamation and eventual reuse.
January 1952	The Lancaster WRP is expanded from 0.36 to 1.35 MGD.
September 1953	The 0.75 MGD Palmdale WRP is placed into operation.
September 1954	Sanitation Districts assumes operations of Tri-City Plant.
November 1958	The Palmdale WRP is expanded from 0.75 to 2.5 MGD.
November 1958	Sanitation Districts' A Report Upon the Potential Reclamation of Sewage Now Wasting to the Ocean in Los Angeles County outlining the financing and construction of the Whittier Narrows WRP is published.
May 1959	The first direct deliveries of effluent from the Palmdale WRP for alfalfa irrigation begin.
October 1959	The new 6.5 MGD Lancaster WRP is constructed and placed into operation. The original plant ceased operation two months later.
1960	Edwards Air Force Base constructs "C" dike on Rosamond Dry Lake to impound effluent from the Lancaster WRP, forming Piute Pond.
July 1962	The 15 MGD Whittier Narrows WRP is placed into operation, becoming first of the "upstream" treatment plants in the Sanitation Districts' JOS.
July 1962	The 0.25 MGD Saugus WRP is placed into operation, with effluent being discharged into the Santa Clarita River.
August 1962	The first deliveries of recycled water from the Whittier Narrows WRP begin for groundwater replenishment in the Montebello Forebay of the Central Basin.
November 1962	The Angeles Crest Development Company completes the 0.1 MGD La Cañada WRP on the site of the La Cañada-Flintridge Country Club to treat wastewater produced by the homes surrounding the golf course. Recycled water produced by this facility is still used as a source of supply for the lakes and the irrigation system on the golf course.

July 1963	The Sanitation Districts produce A Plan for Water Re-use that studied the reclamation potential for the entire JOS and proposed the construction of 11 water reclamation facilities. However, this plan was only partially implemented.
August 1964	The Saugus WRP is expanded from 0.25 to 0.75 MGD.
October 1965	The Saugus WRP is expanded from 0.75 to 1.5 MGD.
June 1966	The 4 MGD Pomona WRP is constructed to replace Tri-City Plant.
September 1966	The La Cañada WRP is purchased by the Sanitation Districts.
July 1967	The 1.5 MGD Valencia WRP is placed into operation, with effluent begin discharged into the Santa Clarita River.
February 1968	The Saugus WRP is expanded from 1.5 to 5 MGD.
May 1968	The Central and West Basin Water Replenishment District (now the Water Replenishment District of Southern California, or WRD) contracts for the purchase of recycled water from the proposed San Jose Creek WRP.
June 1969	The County of Los Angeles constructs the 0.6 MGD Antelope Valley Tertiary Treatment Plant (AVTTP) to further treat Lancaster WRP effluent for use at Apollo Lakes Regional County Park, which opened in November 1972.
March 1970	The Pomona WRP is expanded from 4 to 10 MGD.
October 1970	The 12.5 MGD Los Coyotes WRP is placed into operation.
May 1971	The La Cañada WRP is expanded from 0.1 to 0.2 MGD.
June 1971	The 37.5 MGD San Jose Creek WRP is placed into operation.
September 1972	The Palmdale WRP is expanded from 2.5 to 3.1 MGD.
May 1973	The 12.5 MGD Long Beach WRP is placed into operation.
December 1973	The first direct deliveries of recycled water from the Pomona WRP begin through the Pomona Water Department (PWD) to Cal Poly Pomona.
June 1975	The Los Coyotes WRP is expanded from 12.5 to 37.5 MGD.
April 1976	The Valencia WRP is expanded from 1.5 to 4.5 MGD.
February 1977	The Sanitation Districts' Pomona Virus Study final report is published, demonstrating that direct filtration (adding coagulant just prior to inert media filters) was as effective at removing virus from secondary effluent as coagulation followed by a separate flocculation basin and then filtration. This led to the construction of effluent filters at the upstream WRPs in the late 1970's. The WRPs were then classified as tertiary treatment facilities.

June 1978	The first direct deliveries of recycled water from the San Jose Creek WRP begin with the adjacent California Country Club.
October 1978	Revised wastewater reclamation regulations are adopted by the California Department of Health Services (now California Department of Public Health, or CDPH) as Title 22 of the California Code of Regulations. The effluent from the Sanitation Districts' tertiary treatment plants can be used for all of the approved applications contained in these regulations.
November 1978	The first direct deliveries of recycled water from the Los Coyotes WRP begin through the cities of Cerritos and Bellflower with the Ironwood 9 Golf Course and Caruthers Park, respectively.
October 1979	The first industrial use of recycled water occurs as Garden State Paper (later Blue Heron Paper Company) begins to use more than 3 MGD of Pomona WRP effluent for recycling old newspapers.
August 1980	The first direct deliveries of recycled water from the Long Beach WRP begin through the City of Long Beach Water Department (LBWD) with El Dorado Park West and El Dorado Golf Course.
January 1981	Contract signed with City of Los Angeles Department of Airports (now Los Angeles World Airports, or LAWA) for the use of recycled water from the Palmdale WRP for tree irrigation and effluent disposal.
May 1981	Agreement is signed requiring the maintenance of 200 acres of wetlands at Piute Pond for use by waterfowl migrating along the Pacific Flyway migratory route.
April 1982	The Orange and Los Angeles Counties (OLAC) Water Reuse Study is published, which detailed numerous potential recycled water distribution system projects, many of which were subsequently constructed in the Sanitation Districts' service area and elsewhere.
October 1982	The San Jose Creek WRP is expanded from 37.5 to 62.5 MGD.
August 1983	The City of Industry completes its 7,100 gpm recycled water pump station at the San Jose Creek WRP and begins deliveries of recycled water to the Industry Hills Recreation Area.
January 1984	LBWD's North Long Beach recycled water distribution system is completed.
March 1984	The Sanitation Districts publish the Health Effects Study. This study determined that the recharge of recycled water into the groundwater drinking supply of the Central Basin did not adversely affect in a statistically significant way the health of people ingesting up to 15% recycled water in regards to gastrointestinal disease and cancers or birth defects. It also determined that recharge with recycled water was not adversely affecting the groundwater quality of the Central Basin.
May 1984	Daily average reuse flows in the Sanitation Districts' service area exceed 70 MGD for the first time.
June 1984	The Long Beach WRP is expanded from 12.5 to 25 MGD.
March 1986	LBWD's South Long Beach recycled water distribution system is completed.

May 1986	Deliveries of recycled water from the Pomona WRP begin to Walnut Valley Water District (WVWD) (purchased from PWD).
January 1987	The Saugus WRP’s treatment process is upgraded to tertiary with the addition of dual-media pressure filters.
March 1987	The Los Angeles RWQCB adopts Board Order No. 87-40, which permits the increase in the use of recycled water for groundwater recharge in the Montebello Forebay from 32,700 to 50,000 acre-feet per year (AFY).
December 1987	The City of Cerritos completes its 14,800 gpm pump station at the Los Coyotes WRP and expands delivery of recycled water throughout the city.
May 1988	Daily average reuse flows in the Sanitation Districts’ service area exceed 80 MGD for the first time.
June 1988	Deliveries of recycled water from the Lancaster WRP begin to Nebeker Ranch for alfalfa irrigation.
September 1988	The Valencia WRP is expanded from 4.5 to 7.5 MGD.
December 1988	Norman’s Nursery moves from the site of the Stage III expansion of the San Jose Creek WRP to a site next to the Whittier Narrows WRP, using recycled water from the latter facility.
February 1989	The Palmdale WRP is expanded from 3.1 to 6.5 MGD.
June 1989	Daily average reuse flows in the Sanitation Districts’ service area exceed 90 MGD for the first time, and the running 12-month average daily reuse flows exceed 60 MGD.
August 1989	Deliveries of recycled water from the Los Coyotes WRP begin to the City of Lakewood through the City of Cerritos’ recycled water distribution system.
November 1989	The Lancaster WRP is expanded from 6.5 to 8 MGD.
June 1991	The Pomona WRP is expanded from 10 to 15 MGD.
September 1991	The Los Angeles RWQCB adopts Board Order No. 91-100, which increases the amount of recycled water for groundwater recharge in the Montebello Forebay up to 60,000 AFY in any one year (150,000 acre-feet (AF) in any three-year period).
October 1991	The Saugus WRP is expanded from 5 to 6.5 MGD with the completion of flow equalization facilities.
February 1992	Central Basin Municipal Water District (CBMWD) constructs its Century (E. Thornton Ibbetson) recycled water distribution system (Century System) and begins delivery of recycled water from the Los Coyotes WRP through the City of Cerritos pump station.
December 1992	The Lancaster WRP is expanded from 8 to 10 MGD.

January 1993	The San Jose Creek WRP is expanded from 62.5 to 100 MGD with the completion of the Stage III expansion.
July 1993	The Palmdale WRP is expanded from 6.5 to 8 MGD.
August 1993	Daily average reuse flows in the Sanitation Districts' service area exceed 100 MGD for the first time, setting a record at 113 MGD.
February 1994	The running 12-month daily average reuse flows exceed 70 MGD for the first time.
April 1994	The running 12-month daily average reuse flows exceed 75 MGD for the first time.
May 1994	The running 12-month daily average reuse flows exceed 80 MGD for the first time.
July 1994	CBMWD constructs the Rio Hondo (Esteban Torres) recycled water pump station and distribution system (Rio Hondo System), which was interconnected to the CBMWD Century System. For the first time, two different WRPs (Los Coyotes and San Jose Creek) are used to supply recycled water to the same regional distribution system.
November 1994	Deliveries of recycled water from the Valencia WRP begin to the City of Santa Clarita via water trucks for irrigation of city-owned trees and parkways. This activity is extended to the Saugus WRP in March 1995; however, this practice ends in September 1995.
December 1994	The Valencia WRP is expanded from 7.5 to 11 MGD
June 1995	LBWD restores recycled water service to the THUMS project on Island White for oil field repressurization.
December 1995	Sanitation Districts complete the Plan for Beneficial Use of Recycled Water, which identifies impediments to expanding water reuse, along with solutions and potential new users.
December 1995	Deliveries of recycled water from the Pomona WRP begin to the Spadra Landfill and the adjacent Gas-to-Energy Facility (SPERG).
February 1996	An outfall trunk sewer for waste activated sludge disposal and excess storm flows was completed that connected the La Cañada WRP with the main sewer system in the Los Angeles Basin, officially making this plant a JOS facility.
June 1996	The Valencia WRP is expanded from 11 to 13.5 MGD
July 1996	The Palmdale WRP is expanded from 8 to 15 MGD.
December 1996	RAND Corporation publishes its first epidemiological study, commissioned by WRD, of the health effects associated with the consumption of recycled water that had been used to augment the surface recharge of the Central Basin aquifer. There was no statistical evidence that indicated that recycled water consumed in this manner adversely impacted human health in regards to certain cancers and gastrointestinal diseases.
May 1997	The Lancaster WRP is expanded from 10 to 16 MGD.

May 1997	The Los Angeles RWQCB readopts all of the Sanitation Districts' reuse permits that had been previously issued in the 1980's.
November 1997	Following years of delays, recycled water deliveries finally begin from the San Jose Creek WRP to the Puente Hills Landfill and the adjacent Gas-to-Energy Facility (PERG).
June 1998	Rose Hills Memorial Park begins receiving recycled water from the San Jose Creek WRP through the Puente Hills distribution system.
October 1999	RAND Corporation publishes its second epidemiological study, commissioned by the WRD, of the health effects associated with the consumption of Central Basin groundwater that had been augmented by the surface recharge of recycled water. There was no statistical evidence indicating that recycled water consumed in this manner adversely impacted human health in regards to certain birth outcomes.
December 2000	CDPH adopts revised Title 22 Water Recycling Criteria that contains an expanded list of approved uses of recycled water.
June 2001	The San Jose Creek WRP produces over 100,000 AF of recycled water during a fiscal year for the first time.
March 2002	Antelope Valley Farms begins installing center pivot irrigation systems in order to make commercial use of Palmdale WRP effluent on land leased from LAWA by Sanitation Districts.
January 2003	Rowland Water District (RWD) takes over that portion of WVWD's recycled water distribution system that lies within the RWD service area.
February 2003	WRD completes construction of the Leo J. Vander Lans Treatment Facility and begins using Long Beach WRP effluent for process testing.
May 2003	The Valencia WRP is expanded from 13.5 to 17 MGD with the completion of additional aeration tanks.
June 2003	The Upper San Gabriel Valley Municipal Water District (USGVMWD) begins delivery of recycled water from the San Jose Creek WRP through the CBMWD Rio Hondo System.
August 2003	The first direct deliveries of recycled water from the Valencia WRP begin through the Castaic Lake Water Agency (CLWA) with the Tournament Players Club golf course. This is the first permanently plumbed reuse site in the Santa Clarita Valley.
February 2005	Deliveries of recycled water begin from the San Jose Creek WRP to the Puente Hills Materials Recovery Facility (MRF).
May 2005	The Valencia WRP is expanded from 17 to 21.6 MGD with the completion of the Stage V expansion.
October 2005	Recycled water deliveries through the CBMWD's Century System are extended to the City of Vernon with the start-up of the Malburg Generation Station power plant.

October 2005	Deliveries of recycled water begin from the Leo J. Vander Lans Treatment Facility to the Alamitos Seawater Intrusion Barrier for injection.
August 2006	After extensive retrofitting, a large section of the lower portion of Rose Hills Memorial Park is connected to the USGVMWD recycled water distribution system, making this site one of the largest direct users of the Sanitation Districts' recycled water.
September 2006	USGVMWD begins deliveries of recycled water from the Whittier Narrows WRP to the Whittier Narrows Recreation Area.
February 2007	A 1 MGD pilot membrane bioreactor (MBR) plant begins operation at the Lancaster WRP, supplying tertiary treated effluent to the Sanitation Districts' Eastern Agricultural Site.
February 2007	The Sanitation Districts adopt the last of its Water Recycling Ordinances for its various service areas that allow it to govern the use of its recycled water supplies.
March 2007	One of the Sanitation Districts' largest non-potable users, Blue Heron Newsprint, ceases operations and stops receiving its usual 3 MGD of recycled water from the Pomona WRP.
May 2007	MWD ceases all deliveries of imported water for groundwater replenishment, increasing the demand for recycled water.
November 2007	The Sanitation Districts and the WVWD sign an agreement for the direct sale of recycled water from the Pomona WRP.
January 2008	The Sanitation Districts and Los Angeles County Waterworks District No. 40 sign an agreement for the sale of 13,500 AFY of recycled water from the Lancaster and Palmdale WRPs.
March 2008	The Sanitation Districts and the City of Lancaster sign an agreement for the sale of 950 AFY of recycled water from the Lancaster WRP.
July 2008	The Sanitation Districts adopt "Rules and Regulations" to regulate the use of its recycled water supplies.
August 2008	The Sanitation Districts initiate the Reuse Site Supervisor Training Program.
September 2008	The Sanitation Districts, USGVMWD, and WRD sign a Memorandum of Understanding to contract with MWH to study the feasibility of advanced treatment at the San Jose Creek WRP for increased groundwater recharge in both the Central and Main San Gabriel basins.
January 2009	Deliveries of tertiary treated recycled water from the Lancaster WRP begin to the City of Lancaster.
April 2009	The Los Angeles RWQCB adopts a general reuse permit allowing for the use of recycled water for non-irrigation purposes.
April 2009	A 24-inch valve was installed between chlorine contact chambers nos. 2 and 3 at the Long Beach WRP to increase recycled water supply to LBWD.

April 2009	LARWQCB revises the 1991 Montebello Forebay recharge permit to eliminate the existing annual and three-year total quantity limits (60,000 and 150,000 AF, respectively), and rely on a running 5-year average recycled water contribution of 35□. This change is expected to allow for approximately 5,000 AFY more of recycled water to be recharged.
July 2009	Deliveries of recycled water from the San Jose Creek WRP begin to RWD through the City of Industry distribution system.
June 2010	The Sanitation Districts and California County Club sign a new agreement for the sale of 525 AFY of recycled water from the San Jose Creek WRP.
August 2010	The City of Long Beach Department of Public Works began using recycled water this month for street sweeping and sewer flushing under the RWQCB□s new, region-wide non-irrigation reuse permit.
December 2011	The Palmdale WRP conversion to tertiary treatment is completed.
May 2012	The landscaping around the Parker Canyon Storage Reservoir was connected to the WVWD distribution system, becoming the Sanitation Districts□700th recycled water customer.

APPENDIX B

RECYCLED WATER QUALITY FROM SANITATION DISTRICTS' TERTIARY WRPS

Table B-1
Long Beach Water Reclamation Plant
Recycled Water Quality, FY 2011-12

Constituent	Units	Mean	Maximum	Minimum
pH		7.52	7.8	7.0
Turbidity	NTU	0.7	1.5	<0.1
Total Coliform	org./100 ml	<1	2	<1
Fecal Coliform	org./100 ml	<1	<1	<1
Temperature	deg. F	75	81	68
Suspended Solids	mg/L	<2.5	<2.5	<2.5
Settleable Solids	ml/L	<0.1	<0.1	<0.1
Total Dissolved Solids	mg/L	570	608	541
Total COD	mg/L	<25	41	<25
Total BOD	mg/L	<3	<3	<3
Ammonia Nitrogen	mg/L	1.29	1.74	0.92
Organic Nitrogen	mg/L	1.67	2.33	1.24
Nitrate Nitrogen	mg/L	7.01	8.27	5.41
Nitrite Nitrogen	mg/L	0.143	0.431	0.063
Fluoride	mg/L	0.690	0.743	0.654
Boron	mg/L	0.35	0.42	0.31
Cyanide	µg/L	<4.1	<5.0	1.4
Chloride	mg/L	111	127	101
Sulfate	mg/L	84.9	108	71.4
Total Hardness	mg/L	150	226	131
Total Alkalinity	mg/L	183	201	161
Antimony	µg/L	0.45	0.49	0.39
Arsenic	µg/L	2.24	2.78	1.76
Barium	µg/L	57.3	79.1	45.1
Beryllium	µg/L	<0.25	<0.25	<0.25
Cadmium	µg/L	<0.2	<0.2	<0.2
Total Chromium	µg/L	0.28	0.39	0.21
Hexavalent Chromium	µg/L	0.2	0.4	0.2
Copper	µg/L	2.09	3.09	1.31
Lead	µg/L	0.10	0.12	0.08
Mercury	µg/L	0.000718	0.00128	0.000456
Nickel	µg/L	1.27	1.45	1.07
Selenium	µg/L	0.37	0.44	0.30
Silver	µg/L	<0.06	<0.20	0.02
Thallium	µg/L	<0.25	<0.25	<0.25
Zinc	µg/L	35.6	46.1	24.1
Detergents (MBAS)	mg/L	<0.10	<0.10	<0.10
Oil and Grease	mg/L	<4.5	<4.6	<4.2
Conductivity	µmhos/cm	997	1110	914

Table B-2
Los Coyotes Water Reclamation Plant
Recycled Water Quality, FY 2011-12

Constituent	Units	Mean	Maximum	Minimum
pH		7.22	7.7	6.7
Turbidity	NTU	0.5	1.2	0.1
Total Coliform	org./100 ml	<1	2	<1
Fecal Coliform	org./100 ml	<1	<1	<1
Temperature	deg. F	77	82	72
Suspended Solids	mg/L	<2.5	3.0	<2.5
Settleable Solids	ml/L	<0.1	<0.1	<0.1
Total Dissolved Solids	mg/L	713	816	558
Total COD	mg/L	<27	47	<25
Total BOD	mg/L	<4	8	<3
Ammonia Nitrogen	mg/L	1.605	2.94	0.846
Organic Nitrogen	mg/L	0.734	1.31	0.34
Nitrate Nitrogen	mg/L	6.78	8.34	4.52
Nitrite Nitrogen	mg/L	<0.066	0.221	<0.02
Fluoride	mg/L	0.459	0.541	0.343
Boron	mg/L	0.38	0.46	0.30
Cyanide	mg/L	<2.27	<5.0	1.17
Chloride	mg/L	162	188	126
Sulfate	mg/L	142	171	97.8
Total Hardness	mg/L	255	305	210
Total Alkalinity	mg/L	191	233	168
Antimony	µg/L	1.90	3.03	1.19
Arsenic	µg/L	0.90	1.15	0.57
Barium	µg/L	53.5	57.0	45.8
Beryllium	µg/L	<0.25	<0.25	<0.25
Cadmium	µg/L	<0.156	<0.20	0.022
Total Chromium	µg/L	0.62	0.87	0.40
Hexavalent Chromium	µg/L	0.03	0.04	0.03
Copper	µg/L	2.28	5.46	1.31
Lead	µg/L	0.13	0.21	0.09
Mercury	µg/L	0.00100	0.00145	0.00061
Nickel	µg/L	5.55	10.2	2.93
Selenium	µg/L	0.55	0.78	0.41
Silver	µg/L	<0.06	<0.2	0.02
Sodium	mg/L	186	189	184
Thallium	µg/L	<0.25	<0.25	<0.25
Zinc	µg/L	35.6	39.2	31.8
Detergents (MBAS)	mg/L	<0.10	0.10	<0.10
Oil and Grease	mg/L	<4.6	<4.9	<4.2
Conductivity	µmhos/cm	1370	1570	1210

Table B-3
Pomona Water Reclamation Plant
Recycled Water Quality, FY 2011-12

Constituent	Units	Mean	Maximum	Minimum
pH		7.30	7.6	6.7
Turbidity	NTU	0.6	1.1	0.4
Total Coliform	org./100 ml	<1	3	<1
Fecal Coliform	org./100 ml	<1	1	<1
Temperature	deg. F	76	85	68
Suspended Solids	mg/L	<2.5	<2.5	<2.5
Settleable Solids	ml/L	<0.1	<0.1	<0.1
Total Dissolved Solids	mg/L	537	582	482
Total COD	mg/L	<28	65	<25
Total BOD	mg/L	<3	8	<1
Total Organic Carbon	mg/L	6.38	7.50	5.50
Ammonia Nitrogen	mg/L	1.73	3.14	1.17
Organic Nitrogen	mg/L	1.02	1.33	0.49
Nitrate Nitrogen	mg/L	6.58	7.46	5.34
Nitrite Nitrogen	mg/L	0.206	0.359	0.120
Fluoride	mg/L	0.321	0.368	0.281
Boron	mg/L	0.24	0.28	0.20
Cyanide	µg/L	1.4	1.8	1.0
Chloride	mg/L	124	132	109
Sulfate	mg/L	60.3	74.8	51.4
Total Alkalinity	mg/L	164	226	145
Total Hardness	mg/L	204	242	181
Calcium	mg/L	67.1	73.6	62.4
Magnesium	mg/L	13.6	14.3	12.2
Antimony	µg/L	0.40	0.45	0.32
Arsenic	µg/L	0.79	0.95	0.59
Barium	µg/L	35.8	37.6	34.4
Beryllium	µg/L	<0.25	<0.25	<0.25
Cadmium	µg/L	0.044	0.05	0.034
Total Chromium	µg/L	0.98	1.52	0.69
Hexavalent Chromium	µg/L	0.04	0.07	0.03
Copper	µg/L	5.74	6.47	5.00
Iron	µg/L	39.0	66.4	26.0
Lead	µg/L	0.32	0.46	0.25
Manganese	µg/L	4.94	8.75	2.36
Mercury	µg/L	0.00160	0.00200	0.00138
Nickel	µg/L	1.75	1.93	1.67
Potassium	mg/L	14.3	14.8	13.5
Selenium	µg/L	0.34	0.39	0.30
Silver	µg/L	0.04	0.06	0.03
Sodium	mg/L	95.6	105	93.2
Thallium	µg/L	<0.25	<0.25	<0.25
Zinc	µg/L	62.9	66.6	60.0
Detergents (MBAS)	mg/L	<0.10	<0.10	<0.10
Oil and Grease	mg/L	<4.3	<4.4	<4.3
Conductivity	µmhos/cm	905	987	852

Table B-4
San Jose Creek Water Reclamation Plant East
Recycled Water Quality, FY 2011-12

Constituent	Units	Mean	Maximum	Minimum
pH		7.03	7.4	6.5
Turbidity	NTU	0.6	0.9	0.4
Total Coliform	org.□100 ml	□1	2	□1
Fecal Coliform	org.□100 ml	□1	1	□1
Temperature	deg. F	77	86	71
Suspended Solids	mg□L	□2.5	2.6	□2.5
Settleable Solids	ml□L	□0.1	□0.1	□0.1
Total Dissolved Solids	mg□L	577	662	493
Total COD	mg□L	□26	37	□25
Total BOD	mg□L	□3	3	□3
Total Organic Carbon	mg□L	6.14	7.02	5.68
Ammonia Nitrogen	mg□L	1.083	1.54	0.819
Organic Nitrogen	mg□L	1.64	3.08	0.85
Nitrate Nitrogen	mg□L	4.68	6.50	3.28
Nitrite Nitrogen	mg□L	□0.050	0.102	□0.030
Fluoride	mg□L	0.494	0.516	0.466
Boron	mg□L	0.29	0.34	0.26
Cyanide	µg□L	□2.42	□5	1.16
Chloride	mg□L	131	157	116
Sulfate	mg□L	89.7	107	67.6
Total Alkalinity	mg□L	170	214	151
Total Hardness	mg□L	207	263	176
Calcium	mg□L	61.7	67.4	55.7
Magnesium	mg□L	18.2	21.0	16.4
Antimony	µg/L	0.57	0.70	0.50
Arsenic	µg/L	1.14	1.41	0.86
Barium	µg/L	67.2	74.2	51.1
Beryllium	µg/L	□0.25	□0.25	□0.25
Cadmium	µg/L	□0.070	□0.20	0.044
Total Chromium	µg/L	0.90	1.09	0.54
Hexavalent Chromium	µg/L	0.06	0.10	0.02
Copper	µg/L	4.03	4.97	2.70
Iron	mg□L	0.053	0.088	0.032
Lead	µg/L	0.39	0.79	0.17
Manganese	µg/L	16.9	29.6	8.92
Mercury	µg/L	0.00106	0.0015	0.00062
Nickel	µg/L	5.51	10.6	2.00
Potassium	mg□L	17.2	18.8	16.3
Selenium	µg/L	0.47	0.61	0.36
Silver	µg/L	□0.20	□0.20	□0.20
Sodium	mg□L	113	127	97.9
Thallium	µg/L	□0.25	□0.25	□0.25
Zinc	µg/L	64.3	77.8	56.1
Detergents (MBAS)	mg□L	□0.10	□0.10	□0.10
Oil and Grease	mg□L	□4.4	□5.2	□4.2
Conductivity	µmhos/cm	975	1140	875

TABLE B-5
SAN JOSE CREEK WATER RECLAMATION PLANT WEST
RECYCLED WATER QUALITY, FY 2011-12

Constituent	Units	Mean	Maximum	Minimum
pH		7.07	7.29	6.84
Turbidity	NTU	0.6	2.1	0.4
Total Coliform	org./100 ml	<1	3	<1
Fecal Coliform	org./100 ml	<1	1	<1
Temperature	deg. F	78	85	70
Suspended Solids	mg/L	<2.5	8.8	<2.5
Settleable Solids	ml/L	<0.1	<0.1	<0.1
Total Dissolved Solids	mg/L	516	546	493
Total COD	mg/L	<25	54	<25
Total BOD	mg/L	<3	3	<3
Total Organic Carbon	mg/L	5.01	5.74	4.56
Ammonia Nitrogen	mg/L	0.776	1.03	0.560
Organic Nitrogen	mg/L	<0.697	2.23	<0.200
Nitrate Nitrogen	mg/L	9.33	10.7	8.28
Nitrite Nitrogen	mg/L	<0.038	0.082	<0.030
Fluoride	mg/L	0.758	0.817	0.711
Boron	mg/L	0.32	0.38	0.27
Cyanide	mg/L	<4.35	<5.00	2.40
Chloride	mg/L	107	125	94.3
Sulfate	mg/L	75.1	99.2	62.2
Total Alkalinity	mg/L	151	203	134
Total Hardness	mg/L	183	238	156
Calcium	mg/L	55.5	58.4	52.8
Magnesium	mg/L	17.8	24.2	14.2
Antimony	µg/L	0.47	0.50	0.44
Arsenic	µg/L	1.15	1.35	0.99
Barium	µg/L	32.6	36.9	24.0
Beryllium	µg/L	<0.25	<0.25	<0.25
Cadmium	µg/L	0.054	0.11	0.039
Total Chromium	µg/L	1.03	1.15	0.85
Hexavalent Chromium	µg/L	0.07	0.11	0.04
Copper	µg/L	6.71	7.79	5.82
Iron	mg/L	0.031	0.038	0.024
Lead	µg/L	0.22	0.26	0.14
Manganese	µg/L	8.13	13.9	4.06
Mercury	µg/L	0.00140	0.00359	0.00071
Nickel	µg/L	2.07	3.10	1.39
Potassium	mg/L	14.6	15.4	13.8
Selenium	µg/L	0.27	0.33	0.20
Silver	µg/L	<0.14	<0.2	0.02
Sodium	mg/L	102	111	97.7
Thallium	µg/L	<0.25	<0.25	<0.25
Zinc	µg/L	56.1	64.3	51.0
Detergents (MBAS)	mg/L	<0.10	<0.10	<0.10
Oil and Grease	mg/L	<4.4	<4.6	<4.2
Conductivity	µmhos/cm	877	1060	810

Table B-6
Whittier Narrows Water Reclamation Plant
Recycled Water Quality, FY 2011-12

Constituent	Units	Mean	Maximum	Minimum
pH		7.35	7.6	6.9
Turbidity	NTU	0.5	1.3	0.3
Total Coliform	org./100 ml	<1	1	<1
Fecal Coliform	org./100 ml	<1	<1	<1
Temperature	deg. F	78	85	71
Suspended Solids	mg/L	<2.5	<2.5	<2.5
Settleable Solids	ml/L	<0.1	<0.1	<0.1
Total Dissolved Solids	mg/L	565	618	524
Total COD	mg/L	<25	37	<25
Total BOD	mg/L	<3	6	<3
Total Organic Carbon	mg/L	5.78	8.76	4.49
Ammonia Nitrogen	mg/L	0.404	0.781	0.243
Organic Nitrogen	mg/L	<0.690	1.17	<0.200
Nitrate Nitrogen	mg/L	6.99	8.14	4.17
Nitrite Nitrogen	mg/L	0.199	0.400	0.022
Fluoride	mg/L	0.702	0.735	0.676
Boron	mg/L	0.26	0.30	0.23
Cyanide	µg/L	<3.76	<5	1.05
Chloride	mg/L	116	142	97.7
Sulfate	mg/L	93.3	111	73.8
Total Alkalinity	mg/L	158	182	138
Total Hardness	mg/L	194	225	168
Calcium	mg/L	58.7	62.7	55.7
Magnesium	mg/L	16.1	17.2	14.7
Antimony	µg/L	0.54	0.60	0.45
Arsenic	µg/L	1.13	1.32	0.94
Barium	µg/L	30.9	46.7	15.5
Beryllium	µg/L	<0.25	<0.25	<0.25
Cadmium	µg/L	<0.095	<2.0	0.023
Total Chromium	µg/L	1.21	1.62	1.07
Hexavalent Chromium	µg/L	0.09	0.13	0.4
Copper	µg/L	4.36	6.58	3.32
Iron	µg/L	31.9	41.9	26.0
Lead	µg/L	0.28	0.37	0.22
Manganese	µg/L	11.34	24.0	1.05
Mercury	µg/L	0.00174	0.00284	0.00026
Nickel	µg/L	5.14	7.26	3.07
Potassium	mg/L	13.7	14.2	13.2
Selenium	µg/L	0.47	0.51	0.43
Silver	µg/L	<0.05	<0.20	0.02
Sodium	mg/L	115	129	106
Thallium	µg/L	<0.25	<0.25	<0.25
Zinc	µg/L	59.8	70.3	41.1
Detergents (MBAS)	mg/L	<0.10	<0.10	<0.10
Oil and Grease	mg/L	<4.5	<4.7	<4.4
Conductivity	µmhos/cm	934	1130	811

Table B-7
Valencia Water Reclamation Plant
Recycled Water Quality, FY 2011-12

Constituent	Units	Mean	Maximum	Minimum
pH		7.39	7.6	7.0
Turbidity	NTU	0.6	1.02	0.39
Total Coliform	org./100 ml	<1	1	<1
Fecal Coliform	org./100 ml	<1	<1	<1
Temperature	deg. F	76	83	69.1
Suspended Solids	mg/L	<2.5	<2.5	<2.5
Settleable Solids	ml/L	<0.1	<0.1	<0.1
Total Dissolved Solids	mg/L	665	760	609
Total COD	mg/L	<25.4	38.9	<25
Total BOD	mg/L	<3	<3	<3
Ammonia Nitrogen	mg/L	1.032	1.16	0.918
Organic Nitrogen	mg/L	0.939	1.43	0.520
Nitrate Nitrogen	mg/L	2.66	4.61	1.88
Nitrite Nitrogen	mg/L	<0.031	0.035	<0.030
Fluoride	mg/L	0.352	0.411	0.306
Boron	mg/L	0.56	0.73	0.51
Cyanide	µg/L	2.93	3.13	2.71
Chloride	mg/L	113	124	92.9
Sulfate	mg/L	170	223	139
Total Alkalinity	mg/L	188	217	164
Total Hardness	mg/L	248	306	214
Antimony	µg/L	0.52	0.57	0.47
Arsenic	µg/L	0.56	0.72	0.35
Barium	µg/L	15.4	19.6	13.7
Beryllium	µg/L	<0.25	<0.25	<0.25
Cadmium	µg/L	<0.095	<0.20	0.020
Total Chromium	µg/L	0.33	0.62	0.19
Hexavalent Chromium	µg/L	0.04	0.07	0.02
Copper	µg/L	3.15	4.10	1.90
Iron	µg/L	65.1	89.4	47.1
Lead	µg/L	0.08	0.15	0.06
Mercury	µg/L	0.000507	0.00101	0.000074
Nickel	µg/L	2.02	2.80	1.50
Selenium	µg/L	0.34	0.40	0.24
Silver	µg/L	<0.20	<0.20	<0.20
Thallium	µg/L	<0.25	<0.25	<0.25
Zinc	µg/L	36.5	47.2	27.9
Detergents (MBAS)	mg/L	<0.10	<0.10	<0.10
Oil and Grease	mg/L	<4.4	<4.6	<4.0
Conductivity	µmhos/cm	1096	1230	889

TABLE B-8
SAUGUS WATER RECLAMATION PLANT
RECYCLED WATER QUALITY, FY 2011-12

Constituent	Units	Mean	Maximum	Minimum
pH		7.6	7.9	7.4
Turbidity	NTU	0.65	1.32	0.32
Total Coliform	org./100 ml	<1	3	<1
Fecal Coliform	org./100 ml	<1	<1	<1
Temperature	deg. F	75.5	82.5	70
Suspended Solids	mg/L	<2.5	<2.5	<2.5
Settleable Solids	ml/L	<0.1	<0.1	<0.1
Total Dissolved Solids	mg/L	604	698	504
Total COD	mg/L	<25.4	38.2	<25
Total BOD	mg/L	<3	3	<3
Ammonia Nitrogen	mg/L	1.33	1.68	1.08
Organic Nitrogen	mg/L	1.650	3.26	0.784
Nitrate Nitrogen	mg/L	4.33	4.74	3.14
Nitrite Nitrogen	mg/L	<0.032	0.045	<0.030
Fluoride	mg/L	0.291	0.321	0.248
Boron	mg/L	0.61	0.83	0.49
Cyanide	mg/L	<2.09	<5	1.06
Chloride	mg/L	108	117	100
Sulfate	mg/L	125	155	99
Total Alkalinity	mg/L	193	223	146
Total Hardness	mg/L	216	276	148
Antimony	µg/L	0.42	0.59	0.35
Arsenic	µg/L	0.96	1.12	0.69
Barium	µg/L	37.5	42.2	32.1
Beryllium	µg/L	<0.25	<0.25	<0.25
Cadmium	µg/L	0.044	0.060	0.030
Total Chromium	µg/L	0.39	<0.5	0.28
Hexavalent Chromium	µg/L	<0.04	0.06	0.02
Copper	µg/L	7.77	8.69	6.84
Iron	µg/L	11.1	19.0	8.1
Lead	µg/L	0.14	0.16	0.12
Mercury	µg/L	0.000671	0.001040	0.000470
Nickel	µg/L	1.14	1.27	0.96
Selenium	µg/L	0.47	0.57	0.39
Silver	µg/L	<0.20	<0.20	<0.20
Thallium	µg/L	<0.25	<0.25	<0.25
Zinc	µg/L	57.8	59.1	56.5
Detergents (MBAS)	mg/L	<0.10	<0.10	<0.10
Oil and Grease	mg/L	<4.5	<4.6	<4.4
Conductivity	µmhos/cm	1031	1160	889

TABLE B-9
PALMDALE WATER RECLAMATION PLANT
RECYCLED WATER QUALITY, FY 2011-12

Constituent	Units	Mean	Maximum	Minimum
pH		7.5	7.9	7.0
Turbidity	NTU	0.84	1.50	0.48
Total Coliform	org./100 ml	<1	1	<1
Temperature	deg. F	68.7	77.7	62.1
Total Dissolved Solids	mg/L	448	473	422
Total COD	mg/L	<28.2	35.6	<25
Total Organic Carbon	mg/L	5.87	6.17	5.56
Ammonia Nitrogen	mg/L	6.75	15.9	1.58
Nitrate Nitrogen	mg/L	2.35	3.83	0.599
Nitrite Nitrogen	mg/L	0.257	0.679	0.058
Chloride	mg/L	135	135	135
Sulfate	mg/L	73.9	78.0	69.8
Calcium	mg/L	33.8	35.1	32.5
Magnesium	mg/L	9.9	10.4	9.4
Antimony *	µg/L	0.32	0.37	0.26
Arsenic *	µg/L	0.52	0.56	0.48
Beryllium *	µg/L	<0.25	<0.25	<0.25
Cadmium *	µg/L	0.029	0.030	0.028
Total Chromium *	µg/L	0.92	1.19	0.65
Copper *	µg/L	13.4	15.6	11.1
Lead *	µg/L	0.20	0.22	0.19
Mercury *	µg/L	0.01	0.02	0.01
Nickel *	µg/L	2.69	2.90	2.47
Selenium *	µg/L	0.44	0.46	0.43
Silver *	µg/L	0.16	0.22	0.11
Sodium	mg/L	116	117	116
Thallium *	µg/L	<0.25	<0.25	<0.25
Zinc *	µg/L	71.4	81.0	61.8
Detergents (MBAS)	mg/L	<0.14	0.17	<0.10

* Secondary effluent

LONG BEACH WATER DEPARTMENT

Phase 1 was completed in 1980 at a cost of □280,000. It consisted of a 200 HP, 2,500 gallon per minute (gpm) pump station, and 1,500 feet of 12-inch line that served El Dorado Park West and Golf Course.

Phase 2 made use of a previously constructed, but never used, 21-inch line between the Long Beach WRP and the Island White oil pumping facility in Long Beach Harbor. Recycled water travels through the 21-inch steel concrete-cylinder transmission line that runs south along Studebaker Road, west on Atherton Street, south on Clark Avenue, west on Anaheim Street, and then south on Park Avenue. At the intersection of Park Avenue and 11th Street, the 21-inch line turns west again, then south on Obispo Lane on its way to Island White. The line was capped at Obispo Lane and 2nd Street. This line was built in 1970 by the THUMS group (Texaco, Humboldt, Union, Mobil, and Shell) in the hope of using recycled water from the then under-construction Long Beach WRP to repressurize the oil-bearing zones that were being depleted. This project did not proceed at that time and the THUMS group deeded ownership of the pipeline to the city. In 1982, 520 feet of 12-inch line was installed to deliver recycled water to the Recreation Park and Golf Course, at a cost of □50,000.

Phase 3 was completed in 1983 at a total cost of □2,560,000. It consisted of a 750 HP, 8,500 gpm pump station (five variable speed, vertical turbine pumps producing 95 psi, with capacity for a sixth pump) connected to the adjacent Long Beach WRP effluent forebay through a 36-inch line, 25,685 feet of 20-inch pipe, and 4,130 feet of 12-inch pipe. The 20-inch main line runs north along the east bank of the San Gabriel River. Just south of Carson Street, the pipeline turns west and runs through a siphon under the river, then along Parkcrest Street. At Clark Avenue, the pipeline reduces to 12-inches, turns south and terminates at Wardlow Road. In 1983, the 200 HP 2,100 gpm pump located in El Dorado Park West was relocated to a spot next to the lake in El Dorado Park East where it serves to supply lake water to the recycled water system when recycled water may be unavailable.

Phase 4 was completed in 1986 and consisted of 3,760 feet of 8-inch pipe and 2,350 feet of 6-inch pipe at a cost of □410,000. At Park Avenue and 11th Street, an 8-inch steel line was connected to the 21-inch transmission line that had been built to serve the THUMS project. The 8-inch line runs south along Park Avenue, through Woodlands Park, then east along 6th Street, reducing to a 6-inches after serving the Recreation 9-Hole Golf Course. The 6-inch line turns south on Monrovia Avenue and terminates at the northern boundary of Marina Vista Park.

Phase 5 was completed in the first half of 1989 at a cost of □3,980,000. It consisted of 4,820 feet of 20-inch pipe, 5,917 feet of 14-inch pipe, 12,364 feet of 12-inch pipe, and 1,857 feet of 8-inch pipe. Also included in this project was a four pump, 500 HP, 105 psi, 3,000 gpm pump station at the south lake of the Lakewood Golf Course that had supplied recycled water, stored in the lake during the day peak supply period, to the distribution system during the peak nighttime demand period. From the end of the 20-inch Stage 3 line in Long Beach City College, a 20-inch ductile iron pipe (DIP) runs 300 feet north, where it turns west on Carson Street, and continues to the South Lake Pumping Plant. A 16-inch DIP continues westerly from the pumping plant along Carson Street, reducing to 14-inches. At Gardenia Avenue, the pipe turns north and runs to 45th Street where it reduces to 12-inches. The 12-inch line continues westerly along 45th Street, then north on Falcon Avenue, then southwest on San Antonio Drive, then northwest on East Goldfield Avenue, then southwest on 45th Way, then north on California Avenue, then west on 46th Street to its terminus at the Virginia Country Club.

The North Long Beach extension of Phase 5 was completed at the beginning of 1992 at a total cost of □627,000. This project connected to the 14-inch line at the intersection of Carson Street and Gardenia Avenue with a 14-inch tapping sleeve expanding to a 20-inch DIP. This 20-inch line runs south to Marshall Place where it turns west and runs along Marshall Place to a T-section at Gaviota Avenue. This line turns south again from the T-section and runs along Gaviota Avenue to Wardlow Road. The line turns west again and runs along Wardlow Road to Walnut Avenue where it terminates in a T-section. From this T-section, an 8-inch DIP line runs south along Walnut Avenue to the 405 Freeway where it terminates in a 3-inch service for use by the California Department of Transportation. Approximately midway along this final stretch of pipe, at 33rd Street, a 2-inch service runs to the LBWD Service Center. In addition, several smaller lines branch off the main distribution line:

- At the intersection of Marshall Place and Gaviota Avenue, a 6-inch DIP line branches off the T-section and runs west to Walnut Avenue where it terminates in a T-section. From this point, the 6-inch line continues north another where it terminates at a 4-inch service to Somerset Park.

- At the intersection of Gaviota Avenue and Bixby Road there is a T-section, from where an 8-inch DIP runs west to a point just beyond Cerritos Avenue where it supplies a 4-inch service to Hughes Junior High School. The 8-inch line continues west to Myrtle Avenue where it terminates in a 2-inch service to Longfellow Elementary School.

- At the intersection of Gaviota Avenue and Wardlow Road, a 6-inch DIP branches off a T-section and runs east to a point just past Rose Avenue where it terminates in a two more 2-inch services to the LBWD Service Center.

- At the intersection of Walnut Avenue and 33rd Street, a 6-inch DIP branches off and runs west into the City of Signal Hill and to a 3-inch service to Burroughs Elementary School, where it terminates. In addition, the 6-inch lateral has a 6-inch T-section at Brayton Avenue that extends north and terminates in a 4-inch service to Reservoir Park.

Recycled water service was extended to the common areas of the El Dorado Lakes Condominiums in August 1998. From the 20-inch main line running north along the San Gabriel River, an 8-inch DIP branches off and runs east along Spring Street. This line reduces to a 4-inch DIP which runs to the condominiums located on the east side of the 605 Freeway.

The recycled water system was extended again as LBWD began implementing its Master Plan with the completion of Phase 1A in June 1999 at a cost of □1.4 million. LBWD□s potable water tanks nos. 21, 22 and 23 on Alamitos Hill were converted to recycled water storage. Each tank has its own new 20-inch discharge line connecting to a 36-inch DIP that runs north, then west along 20th Street to a T-section at Redondo Avenue. The north side of this T-section on Redondo Avenue serves a 24-inch line which was constructed in 2000 as Phase 1B. A 24-inch DIP continues westerly along 20th Street for 939 feet to a T-section at Obispo Lane. The line turns south on Obispo Lane, where it terminates in a new T-section installed in the existing 21-inch recycled water line on 11th Street. Along Obispo Lane, a 6-inch DIP branches off and runs east along 14th Street, allowing for future expansion and customer connections.

CITY OF CERRITOS

A 14,800 gpm pump station next to the north side of the Los Coyotes WRP effluent forebay delivers recycled water to reuse sites through 142,600 feet of pipe that loops through the city. Provisions were made so that neighboring cities could connect to this distribution system sometime in the future and make use of the ultimate system capacity of 4,000 AFY.

The pump station discharges into a 30-inch cement mortar-lined and coated steel line which branches into two, 24-inch concrete cylinder pipelines. One of these lines runs east through the north part of the city, while the other turns south along the San Gabriel River. The two lines ultimately meet and form a loop in the distribution system. Pipes greater than 12-inches are cement mortar-lined and coated steel, and the 4- to 10-inch pipes are PVC.

The 24-inch main line serving the northern part of the city runs east from the WRP past the Ironwood 9 Golf Course, then continues east under the 605 Freeway and along 166th Street. At Studebaker Road, a 6-inch line runs north to Cerritos College, and an 8-inch line runs south to Gahr High School. At the school, the line branches into a 4-inch line running north to the 91 Freeway, and a 6-inch line running to the Artesia Cemetery. The 24-inch northern line reduces to 20-inches at 166th Street and Studebaker Road, then continues east along 166th Street through the City of Norwalk. This line branches into two 16-inch lines at the intersection of 166th Street and Norwalk Boulevard.

- One 16-inch line runs south along Norwalk Boulevard to form the west side of a smaller loop in the distribution system. At Artesia Boulevard, a 6-inch line branches off and runs west to Juarez Elementary School and two sections of the 91 Freeway on Pioneer Boulevard. The 16-inch line turns east on Artesia and runs to Barnhill Avenue where a short 4-inch line branches off and runs south to Kennedy Elementary School and Loma Park. At this point, the 16-inch line reduces to 14-inches and continues east on Artesia Boulevard to Bloomfield Avenue before it continues south. At Bloomfield Avenue and 183rd Street, a 6-inch line branches off the 14-inch line and runs west to Cerritos High School. It reduces to a 4-inch line before continuing west to Elliot Elementary School where it terminates. Also at Bloomfield Avenue and 183rd Street, an 8-inch line runs east to Dina Place where it connects with a 10-inch line from the east half of the loop (described below). Also at this point, a short 6-inch line branches off and runs south to Heritage Park.

- The second 16-inch line at Norwalk Boulevard and 166th Street continues east. At Elm Park Drive, a 4-inch line runs north to Satellite Park, and the 16-inch line reduces to 14-inches before continuing east. At Bloomfield Avenue, a 6-inch line runs south to serve Frontier Park, Wittman Elementary School and a section of the 91 Freeway. The 14-inch line continues east to Carmenita Road, where a 6-inch line continues east along 166th Street into Carmenita Junior High School and then to Carmenita Park. A 4-inch line branches off the 6-inch line south on Stowers Avenue to Park Street, then east to Gonsalves Elementary School where it terminates. The 14-inch line on 166th reduces to 10-inches and turns south on Carmenita Road, forming the east side of the smaller loop. An 8-inch line branches off at Red Plum Street to City Park East at Ironbark Drive where it terminates. The 10-inch line also reduces to 8-inches at this point and it continues south toward Artesia Boulevard, at which point two 4-inch lines branch to the west and east to Saddleback Park and Friendship Park, respectively. When the 8-inch line on Carmenita Road reaches 183rd, a 6-inch line branches off and runs east then south on Stowers Avenue to Cerritos Elementary School, Rainbow Park and Bettencort Park. Also from the 8-inch line at Carmenita and 183rd, a 10-inch line runs west on 183rd Street, then runs south under the freeway to Brookhaven Street. At this point, a 4-inch line branches off southeast to serve another section of the 91 Freeway, and a second 4-inch line branches off to Brookhaven Park. At the intersection of Shoemaker Avenue and 183rd Street, the southern branch of the main loop (the second 24-inch line leaving the WRP) connects with the northern branch to complete the system.

From the WRP, the second 24-inch transmission line runs south along the San Gabriel River. At 183rd Street, a 6-inch line branches east through an Edison easement to the Bellflower Christian School and a section of the 605 Freeway. At South Street, a short 12-inch line branches off west past Westgate Park, providing a connection point for the City of Lakewood.

Approximately 1,000 feet south of 195th Street, the 24-inch line branches off into a 10-inch line to the south to provide a connection point for the City of Lakewood, and a 20-inch line to the east that follows a Southern California Edison (SCE) right-of-way. The 20-inch line passes the Orange County nursery and the SCE-operated nursery and at Gridley Road, a 4-inch line branches off north to Bragg Elementary School. At Pioneer Boulevard, a 6-inch line branches off south to Cabrillo Lane Elementary School. At Jacob Street, a 6-inch line branches off north to Pat Nixon Elementary School. At Norwalk Boulevard, a 6-inch line branches off south to provide the third connection point for the City of Lakewood.

At Norwalk Boulevard, the 20-inch line reduces to 16-inches and continues east to Bloomfield Avenue, where it enters Cerritos Regional County Park. The 16-inch line reduces to 8-inches (with a 16-inch stub out for future connections to other municipalities) and curves north onto Shoemaker Avenue. A 4-inch line at Espinheira Drive branches off to Sunshine Park, and a 4-inch line at Droxford Street branches off to Leal Elementary School. The 8-inch line connects with the rest of the transmission system loop at the intersection of Shoemaker Avenue and 183rd Street.

APPENDIX E

CITY OF LAKEWOOD

The City of Cerritos provided three stub-out locations on one of its 24-inch concrete mortar lined and coated steel distribution lines for connections to the City of Lakewood. Each of these stub-out locations is within the City of Lakewood. A 12-inch stub-out connection is located on South Street, on the west side of the San Gabriel River, and consists of two, 6-inch meters in a manifold structure with isolation valves. A 10-inch stub-out connection is located across Del Amo Boulevard into River Park, approximately 40 feet west of Studebaker Avenue and consists of a single, 6-inch meter. A 6-inch stub-out is located on Norwalk Boulevard, just south of Del Amo Boulevard and approximately 70 feet south of the City of Lakewood boundary. This last stub-out is not in use and currently there are no future plans for it.

From the first stub-out location on South Street, a 12-inch PVC line runs west to a T-section at Woodruff Avenue. From this T-section, a 10-inch PVC line continues west along South Street, ending in a T-section at the Los Cerritos Drainage Channel. There are smaller connections branching off the 10- and 12-inch transmission lines on South Street.

- Approximately 550 feet east of Woodruff Avenue, the 12-inch PVC line along South Street branches at a T-section to a 6-inch PVC line. This line follows Spahn Avenue north, turning west at Edgefield Street and continuing until it reaches Woodruff Avenue. At Woodruff Avenue, the 6-inch line heads north along Woodruff Avenue. There are two, 2-inch connections to parkway irrigation systems along this 6-inch line. A 4-inch connection approximately 600 feet north of Edgefield Street runs approximately 100 feet west to serve St. Joseph's Parish School. Approximately 120 feet north of Arabella Street, the 6-inch line connects to a 4-inch line serving Mayfair High School and Lindstrom Elementary School.

- Along the 12-inch PVC line on South Street there are five, 2-inch connections to parkway irrigation systems east of Woodruff Avenue. Approximately 1,700 feet east of Woodruff, 12-inch PVC line is flanged underground to 12-inch ductile iron pipe on either side of the Palo Verde storm drain. The iron pipe then runs above ground to be suspended over the 14-foot wide channel, with air release valves on either side of the channel.

- A 10-inch PVC line branches off the T-section on South Street at Woodruff Avenue and runs south along Woodruff Avenue, terminating in a T-section at Centralia Street. A 6-inch PVC line branches from the T-section at Centralia Street and runs west along Centralia Street to just past Eastbrook Avenue, where it turns south and feeds a 4-inch connection serving Lakewood High School. There is a 4-inch connection approximately 800 feet south of Arbor Road, to service Jose Del Valle Park. From this 4-inch line there is also a 2-inch connection to service parkway irrigation systems. A 4-inch PVC line branches off a T-section at Arbor Road. The 4-inch line runs west along Arbor Road, ending just before Radnor Avenue with a 4-inch service connection to the City of Lakewood Water Yard. Another 4-inch PVC line branches off a T-section at Dashwood Street. The line runs west along Dashwood, ending in a 4-inch connection on the west side of Ocana Avenue to service Jose San Martin Park. There are six, 2-inch connections to parkway irrigation systems from the 10-inch PVC line along Woodruff Avenue.

- Along the 10-inch PVC line on South Street (west of Woodruff Avenue), there are five 2-inch connections to parkway irrigation systems and one 4-inch PVC line approximately 570 feet east of the Los Cerritos Channel serving Foster Elementary School.

- A 6-inch PVC line branches off the T-section on South Street at Fidler Avenue at a 45-degree angle. The 6-inch line crosses Fidler Avenue at an angle until it reaches the edge of Mayfair Park. From there, the line turns directly south and follows the park's eastern boundary until it reaches Bigelow Street. A 4-inch line branches from a T-section at Bigelow Street and crosses over the Los Cerritos Channel. This 4-inch line serves the west side of Mayfair Park. From the T-section at Bigelow Street, a 6-inch line branches off at a 45-degree angle. The line heads southwest until it reaches the south end of Mayfair Park where it then heads directly south along the east side of the channel. At Candlewood Street, the 6-inch line ends with a T-section. From here, a 2-inch PVC line runs south to the Civic Center and a 6-inch line runs west crossing the channel. The line is flanged underground on either side of the channel to 6-inch ductile iron that runs aboveground to be suspended under a footbridge over the channel. After crossing the channel, the 6-inch line terminates in a T-section, from which a second 2-inch PVC line runs south to serve the Civic Center.

From the second stub-out location on Del Amo Boulevard, a 6-inch PVC line branches from a T-section and runs approximately 640 feet west terminating in a T-section at Mae Boyer Park. Another 10-inch PVC line branches from the T-section at the connection point, running south along the east side of the San Gabriel River channel for approximately 2,000 feet and ending with a 4-inch service connection to the River Park pump station. There are several smaller connections branching off the 6-inch and 10-inch transmission lines from the second connection point to the system.

- Approximately 1,200 feet south of Del Amo Boulevard, a 4-inch PVC line branches from the 10-inch line on the east side of the San Gabriel River. The line runs east, terminating at a T-section with a 2-inch service connection to Rynerson Park.

- A 4-inch PVC line branches from the 6-inch line at a T-section located on the west side of the San Gabriel River. The 4-inch line south, then turns west through the city yard, then south to Monte Verde Park.

- From the T-section at Mae Boyer Park, 4-inch lines run 85 feet under Del Amo Boulevard to either side of the road. These 4-inch lines feed service connections to Mae Boyer Park that is on both the north and south sides of Del Amo Boulevard.

CENTRAL BASIN MWD – CENTURY SYSTEM

Construction of Phase I of the Century Reclamation Program began in March 1991 and was completed in February 1992. The facilities in this phase consist of the 30-inch concrete mortar-lined and coated steel □backbone□pipeline from the Los Coyotes WRP that crosses over the San Gabriel River and runs 18,900 feet north along the western bank to a point north of Firestone Boulevard, where the outfall from the San Jose Creek WRP discharges into the San Gabriel River. At this point, the line reduces to a 24-inch concrete mortar-lined and coated steel line that continues northerly to Florence Avenue, then easterly to Fairview Avenue, where it runs to Dollison Drive. The line then follows Dollison Drive southeasterly to Buell Street, where it crosses under the Santa Ana (5) Freeway to Orr □ Day Road. The line runs north on Orr □ Day back to Florence Avenue, then easterly to Jersey Avenue where it terminates. Several 6- and 8-inch PVC lines branch off the large diameter transmission lines at various points.

- At a point just south of Compton Boulevard, an 8-inch PVC line branches off the 30-inch line and runs northwesterly to Compton Boulevard, where it continues westerly to its terminus at Bellflower High School. A 6-inch PVC line branches off this line at McNab Avenue and runs northerly.

- At a point just north of Columbus High School, another 8-inch PVC line branches off the 30-inch line and runs westerly through an easement to Woodruff Avenue, where it turns south and runs to Everest Street. This line runs westerly to Benedict Avenue, then through Gauldin School to its terminus on Dunrobin Avenue at Independence Park.

- At a point north of Firestone Boulevard, a 6-inch PVC line branches off the 30-inch line and runs westerly through the Rio San Gabriel Park parking lot to Newville Avenue, where it turns north and runs northerly to La Villa Street. The line then runs westerly to Pangborn Avenue, where it turns north and runs to Buell Street. The line runs westerly to its terminus at Casanes Avenue.

- From the 24-inch line on Florence Avenue, a 6-inch PVC line branches off at Little Lake Road and runs southerly to its terminus at Little Lake Park and School.

- At the end of the 24-inch line at Florence Avenue and Jersey Avenue, an 8-inch PVC line runs north on along an easement to Jersey Avenue, then to Joslin Avenue. This line then runs westerly along Joslin Avenue and easterly to its terminus at Fallon Avenue.

In 2007, The City of Downey constructed additional pipelines connecting to the existing CBMWD distribution system at two points: on the 8-inch line on Dunrobin Avenue at Independence Park, and on another 8-inch line on Lakewood Boulevard at Donovan Street (see Construction Schedule 2 of Phase II below).

From the connection point on Lakewood Boulevard, a 12-inch line runs northeasterly along Lakewood Boulevard to its termination point at 5th Avenue. Three smaller lines branch off of this 12-inch line:

- At Firestone Boulevard, a 4-inch line runs west to its termination at Nash Avenue.

- At Stewart □ Gray Road, an 8-inch line runs east to a T-section at Bellflower Boulevard, then easterly to its termination at a point just east of Coldbrook Avenue.

- At Clark Avenue, an 8-inch line runs south along Clark to a newly constructed portion of Congressman

Steve Horn Way, where it turns east and continues to Bellflower Boulevard. There is a T-section at Steve Horn Way and Bellflower Boulevard where two more 8-inch lines branch off. The first line runs north along Bellflower Boulevard to Stewart & Gray Road where it connects to the T-section on the previously described 8-inch line in this street. The second line continues east along Steve Horn Way and through Independence Park where it connects to the existing CBMWD distribution system on Dunrobin Avenue.

Construction of Phase II began in March 1992 and was completed in June 1993. Four construction "schedules" provided for several pipelines to branch off the main 30-inch and 24-inch Phase I line.

Schedule 1: From the end of the 24-inch Phase I line in the City of Santa Fe Springs at Florence Avenue and Jersey Avenue, the Phase II 24-inch line continues east to Bloomfield Avenue, where it terminates in a 4-way X-section. From this point, the 24-inch line runs southerly to Lakeland Road, then easterly to Greenstone Avenue, where it terminates in a T-section. At this point, a 16-inch PVC pipe branches off and runs southerly to Sunshine Avenue, then easterly for to Shoemaker Avenue, then southerly to Leffingwell Avenue where the line jogs to the west into an easement parallel to Shoemaker Avenue. The 16-inch line then continues southerly to a point just south of the AT&SF railroad right-of-way where Shoemaker Avenue begins again. The line continues southerly along Shoemaker Avenue until it reaches Firestone Boulevard where the line turns southeasterly and runs to Excelsior Drive. At this point, the line continues east along Excelsior Drive until the dead-end at Marquardt Avenue. The 16-inch line then follows a storm drain easement easterly, where it was jacked under the Coyote Creek channel. On the east side of the channel, the line turns south and runs along the channel levee, then runs easterly to its terminus at Bona Vista Avenue. At this point, an 8-inch PVC line branches off south along Bona Vista Avenue to the end of the cul-de-sac. There are several other lines that branch off the 24- and 16-inch main line in this schedule.

- From the 24-inch line on Florence Avenue, a 6-inch PVC line branches off at Fulton Wells Avenue (between Pioneer and Norwalk) and runs southerly to Lakeland Road, where it turns west and runs to its terminus at Zeus Avenue.

- As the 16-inch line proceeds southwesterly along Firestone Boulevard, a 6-inch PVC line branches off at Dinard Avenue and runs north to Mapledale Street, where it turns easterly and runs to its terminus just east of Cabrillo Avenue.

- At the intersection of Excelsior Drive and Marquardt Avenue, a 6-inch PVC line branches off the 16-inch line and runs south along Marquardt Avenue to its terminus.

- At the four-way cross-section at Florence Avenue and Bloomfield Avenue, an 8-inch PVC line branches off the 24-inch line and runs south along Bloomfield Avenue to its terminus at Lakeland Avenue. This line was constructed by the City of Santa Fe Springs in 2008.

Schedule 2: This portion of the recycled water system branches off to the east and west from the 30-inch line at Foster Road. The east section begins as a 12-inch cement mortar-lined and coated steel pipe connected to the 30-inch line on the west side of the San Gabriel River, just north of Foster Road. This line crosses the river along the Foster Road Bikeway, then runs southerly back to Foster Road where it turns east again into the City of Norwalk. At Dalwood Avenue, a 6-inch PVC line branches off and runs south to Leffingwell Road where it terminates. The 12-inch line on Foster Road continues east to a T-section at McRae Avenue. From this point, one branch of the Tee, a 6-inch PVC line, runs northerly along McRae Avenue until it terminates at Ratliffe Street. From the T-section at Foster Road and McRae Avenue, a 12-inch steel line runs southerly to Leffingwell Road, then east to Gard Avenue where a T-section was installed. The 6-inch line on Leffingwell Road continues east until it terminates just east of Maidstone Avenue. From the T-section at Leffingwell Road and Gard Avenue, a 6-inch PVC line runs southerly along Gard Avenue to Taddy Street where it turns west and runs to Harvest Avenue where it turns south. The 6-inch line runs along Harvest Avenue to Mapledale Street where a T-section branches to the east and west. From this point, a 6-inch PVC line runs westerly along

Mapledale Street to Graystone Avenue where it turns south and runs to its terminus at Sibley Street. Also, from the Tee at Harvest Avenue and Mapledale Street, another 6-inch line runs easterly to Jersey Avenue. This line turns south and runs until it ends at Excelsior Drive.

The west section also begins as a 12-inch cement mortar-lined and coated steel pipe connected to the 30-inch line on the west side of the San Gabriel River, just south of Foster Road. This line jogs back onto Foster Road and runs westerly along this road, which forms the boundary between the cities of Downey and Bellflower. This line runs to Lakewood Boulevard where it turns north and reduces to 8 inches. The 8-inch line runs along Lakewood Boulevard until it terminates at Meadow Road, just north of Imperial Highway. Two other lines branch off the 12-inch line along Foster at Bellflower Boulevard.

! A 6-inch PVC line comes off a T-section in the middle of the intersection of Foster Road and Bellflower Boulevard and runs southerly until it terminates just south of Arthurdale Street.

! A second 6-inch PVC line comes off a T-section just to the west of the first T-section on Bellflower Boulevard and Foster Road and runs northerly until it terminates near Angell Street.

Schedule 3: In the City of Bellflower, a 24-inch line connects to the 30-inch main line just after it crosses the San Gabriel River from the Los Coyotes WRP. This line runs westerly along Flora Vista Street to an existing Metropolitan Transportation Authority (MTA) right-of-way. At this point the line runs northwesterly toward the Los Angeles River. At this point, an 8-inch branch runs southerly along an SCE right-of-way (just west of Texaco Avenue) to Alondra Boulevard. The 24-inch line turns north and follows the SCE right-of-way to Cortland Avenue, where it runs west to Orange Avenue. The line then runs north on Orange Avenue to Century Boulevard where a T-section was installed. From this point, the 24-inch line runs westerly along Century Boulevard to the Los Angeles River, where it was jacked under the river and the Long Beach (710) Freeway. This line terminates just to the west of the freeway for connection to Construction Schedule 4 (detailed below) at Martin Luther King Jr. Boulevard. From the T-section on Century Boulevard, the line reduces to a 16-inch pipe that runs northeasterly back to the SCE right-of-way, where the line runs northerly then northeasterly to Rio Hondo Drive. The 16-inch line continues northeast along this street to the end of the cul-de-sac. At this point, the line crosses over to the Rio Hondo channel and continues northeast along the flood channel's east side levee. The line reduces to 8-inches and uses an existing footbridge to cross the Rio Hondo channel where it terminates at John Anson Ford Park in the City of Bell Gardens. There are several other lines that branch off the 24- and 16-inch main line in this schedule.

- A 16-inch cement-coated and lined pipe branches off the 24-inch line running along the MTA right-of-way (located just west of the intersection of Somerset Boulevard and Hayter Avenue) and runs southerly along Los Angeles Department of Water and Power (LADWP) right-of-way to a point just north of Flower Street.

- At the point where the 24-inch line ends within the MTA right-of-way and moves into the SCE right-of-way, the 8-inch line (previously mentioned) runs southerly along the east side of the SCE right-of-way by Texaco Avenue where a T-section was installed at San Luis Street. At this point a 6-inch line continues to Somerset Boulevard where it turns west to the west side of the SCE right-of-way. The 6-inch line continues southerly to the south side of Alondra Boulevard where it terminates in a T-section.

- From the 8-inch line, another 6-inch PVC line branches off just north of Exeter Street and runs westerly to Gundry Avenue, where it turns north and runs to its terminus at San Rafael Street.

- At the T-section at San Luis Street, an 8-inch line crosses the SCE right-of-way westerly, continuing along San Luis Street to San Antonio Avenue where another T-section was installed. The 8-inch line continues southerly along San Antonio Avenue to Somerset Boulevard, where the line turns westerly and runs to its terminus at the Los Angeles River.

- From the T-section at San Luis Street and San Antonio Avenue, a 4-inch PVC line runs westerly along San Luis Street to its terminus at Banana Park. A 6-inch PVC line branches off the 8-inch line on San Luis Street at San Jose Avenue (east of San Antonio Avenue) and runs southerly to Mark Keppel Street where it terminates in a T-section. From this point, a 6-inch line runs the west and to the east.

- Farther north along the 16-inch line in the SCE right-of-way, a 6-inch PVC line branches off at Southern Avenue, which becomes Stewart □ Gray Road, and runs easterly to Pernell Avenue. The 6-inch line turns south and runs to Cole Street, where it turns east back to Pernell Avenue. The line turns south and runs to the Los Amigos Country Club, where the line runs easterly to its terminus.

- Also along the 16-inch line in the SCE right-of-way, another 6-inch PVC line branches off at Garfield Avenue and runs southerly to its terminus in a public alley south of Burntwood Street.

- The Bell Gardens Extension was completed in July 1995, and was connected to the 8-inch line that terminated in John Anson Ford Park. A dieccentric reducer was installed to allow for a 16-inch line to be connected. The 16-inch line then runs north through the park to Scout Avenue, where it turns east. The line continues along Scout, which changes to Park Lane, to its terminus at Garfield Avenue.

Schedule 4: A 24-inch cement-lined and coated steel pipe was connected to the 24-inch Schedule 3 line that terminated just west of the 710 Freeway. This line runs westerly along Martin Luther King Jr. Boulevard to a T-section at Wright Road, where two sections of pipeline run to the north and south. The north section begins with a 12-inch line that runs north along Wright Road to Duncan Avenue, where both Wright Road and the 12-inch line turn north. This line runs to Atlantic Avenue, where the line turns northeast and runs to a T-section at Tweedy Boulevard, then west to its terminus.

The south section begins with an 8-inch line from the T-section at Wright Road and Martin Luther King Jr. Boulevard and runs south along Wright Road to McMillan Street. At this point, the line turns west and runs to Gibson Avenue, where it turns south and runs for 1,039 feet to a T-section a San Rafael Street. From this point, the line reduces to a 6-inch pipe and runs easterly along San Rafael Street to its terminus at the 710 Freeway.

In 2008, The City of Lynwood connected an extension to the 8-inch line along the southerly section of the line on Wright Road. An 8-inch PVC line runs westerly along Josephine Street to its termination point at Virginia Avenue where it will serve the relocated Ham Park.

WALNUT VALLEY WATER DISTRICT

A 3,500 gpm pump station and an 8,000 gallon wet well was constructed at the intersection of Valley Boulevard and Grand Avenue, at the end of the 21-inch concrete gravity line from the Pomona WRP. At the pump station, a smaller, 500 gpm booster pump and hydropnuematic system supplies a 12-inch PVC pipe which runs north along Grand Avenue to Snow Creek Drive where it reduces to an 8-inch PVC pipe. The 8-inch line continues north from Snow Creek Drive to Amar Road where it turns west and terminates just before Lemon Avenue. An 8-inch AC line branches off the 12-inch PVC line at Snow Creek Drive and Grand Avenue and runs east, reducing to a 6-inch PVC line at La Puente Road and terminating east of Rodeo Way. A 6-inch AC line branches off from the 8-inch AC line at La Puente Road where it runs north before terminating just south of Bridgewater Lane.

From the pump station, a 20-inch cement mortar-lined and coated steel pipe runs west along Valley Boulevard to Fairway Avenue, where it turns south. This line continues to Colima Road, then south again along Brea Canyon Cutoff Road, where it terminates at the storage reservoirs located at Oakleaf Canyon Road. Several smaller transmission lines branch off the 20-inch main transmission line.

- A 6-inch PVC line branches off the main line on Valley Boulevard at Somerset Drive to serve the Walnut Ridge housing tract.

- An 8-inch PVC line branches off the main line on Valley Boulevard and Pierre Avenue. This line runs north on Pierre Avenue to Puente Avenue, where it reduces to a 6-inch PVC line. The 6-inch line continues east on Puente Avenue, then north on Suzanne Road where it terminates just south of Fuerte Drive.

- A 6-inch PVC line branches off the main line at Valley Boulevard and Lemon Avenue, running north to Vejar Road where it splits into 6-inch PVC lines running east and west. The line continues north on Lemon Avenue and terminates north of La Puente Road. The west line turns north through an easement, then continues west on Avenida Deseo, then south on Avenida Alipaz, where it terminates at Calle Baja. The east line continues along Vejar Road to its termination just east of Scherer Avenue.

- At the point where the 20-inch main line turns south off of Valley Boulevard and onto Fairway Drive, a 12-inch PVC line branches off and continues west along Valley Boulevard to Nogales Street, where it reduces to 8-inches. The line terminates at a T-section at Trafalgar Avenue, allowing for future expansion. Several smaller lines branch off this section of the distribution system. A 6-inch PVC line branches off at Valley Boulevard and Sentous Street, where it runs north to Hollingworth Street. From this point, three 6-inch lines branch off for short distances to serve users located to the east, west and north. A 12-inch PVC line branches off at Valley Boulevard and Nogales Street, where it runs north to its terminus just before La Puente Avenue. In addition to serving Nogales High School, this line allows for possible future service into the City of West Covina. A 6-inch PVC line continues north from the T-section at Valley Boulevard and Trafalgar Avenue, then east on Rorimer Street and north on Deepmead Avenue to its terminus at Sunshine Park.

- Another 12-inch PVC line branches off the line on Fairway Drive, running west along Colima Road to Otterbein Avenue, where it reduces to 8-inches that terminates at Shabarum Regional County Park, just before Azusa Avenue. Several smaller lines branch off this section of the distribution system. A 6-inch PVC line branches off the 12-inch line, running north along Bandida Avenue to its terminus at Rowland

Regional County Park. Two 6-inch PVC lines branch off the 12-inch line at the intersection of Colima Road and Otterbein Avenue. The first line runs north to Addis Street, while the second runs south along Otterbein Avenue, then west along Killian Street, then south on Lerona Avenue. An 8-inch PVC line branches off the 12-inch line, running south along Fullerton Road to a T-section at Galatina Street. One end of the T-section is blind-flanged, while a 6-inch PVC line runs east through an easement, then continuing along Galatina Street. This line then runs north on Cantaria Avenue, east on Farjardo Street to its terminus just before Los Padres Drive. Another 6-inch PVC line runs along Batson Avenue from Farjardo Street.

- A second 12-inch PVC line branches off the main transmission line along Fairway Drive, running east along Colima Road to Lemon Avenue, where a 6-inch PVC line branches off and runs north to serve several users. The 12-inch line continues east along Colima Road to Grand Avenue, where it turns north to a meter at the Diamond Bar Golf Course. The 12-inch line continues north along Grand Avenue, where it reconnects to the 20-inch main line on Valley Boulevard. Two 6-inch PVC lines branch off the 12-inch line to supply a looped-system serving Gateway Corporate Center. Another 6-inch PVC line branches off the 12-inch line at Brea Canyon Road, terminating just north of Golden Springs Drive.

- In a 1994-95 extension of the recycled water system, a 12-inch PVC line was connected to the 20-inch main transmission line on Fairway Drive, running east along Business Parkway and Currier Road, and terminating on Currier Road just before Brea Canyon Road. A 6-inch AC line branches off the 12-inch PVC line and runs north through an easement to join an 8-inch PVC line on Spanish Lane. The 8-inch PVC line runs west where it terminates just west of Brea Canyon Road. The 8-inch line also runs east on Spanish Lane, then north on Cheryl Lane and Brea Canyon Road to its terminus at the WVWD office. This section serves the landscaping around a number of commercial and light industrial buildings.

- In a 1998-99 extension of the recycled water system, the 8-inch PVC line terminating at the WVWD office was extended north to Old Ranch Road. From this point, the line turns east and runs to a frontage road along the Union Pacific Railroad, where it turns and runs north to its terminus at Grand Avenue in the City of Industry. Also during this year, a 12-inch PVC was connected to an existing 12-inch PVC line on Golden Springs Drive, with the new line running south along Adel Avenue and Davan Street. Approximately 100 feet of DIP runs east along a right-of-way to Via Sorella, where the line changes back to PVC and continues south to Brea Canyon Road. The line continues southerly to its terminus at Diamond Lane. This line serves the Diamond Crest Homeowners Association.

CENTRAL BASIN MWD – RIO HONDO SYSTEM

Construction began in April 1993 on a 22,000 gpm pump station, located adjacent to the 66-inch San Jose Creek Outfall on the east side of San Gabriel River Parkway, approximately 900 feet north of Beverly Boulevard. The pump station was completed in March 1994 and went on-line delivering recycled water in July 1994. The first schedule of pipeline construction in the City of Whittier and the City of Santa Fe Springs began in April 1993 and was completed in February 1994, with the Whittier Connector Unit crossing of the 605 Freeway–San Gabriel River being completed in May 1994. Construction on the Vernon Phase 1 and 2A Unit began in June 1993 and was completed in September 1994, while construction on the Pico Rivera, Montebello, Montebello–Vernon, and Vernon 2B units has not yet begun.

Whittier Connector Unit: A 48-inch cement mortar-lined and coated steel pipeline carries recycled water from the Rio Hondo Pump Station toward San Gabriel River Parkway. Just outside the pump station, a 36-inch cement mortar-lined and coated steel pipeline tees off and runs back toward the San Gabriel River levee, where it turns and runs north. The line then turns east and invert siphons under the San Gabriel River channel, where it then crosses an SCE and a Yellow Freight Company railroad right-of-way. The line was then jacked under a Union Pacific Railroad line and the 605 Freeway to Pioneer Boulevard, just south of Strong Avenue. Between the railroad and the freeway, the pipeline was reduced to 24-inches. The 30-inch line is contained in a 42-inch steel casing, and the 24-inch line is contained in a 36-inch steel casing. At Pioneer Boulevard, the 24-inch line expands back to 30-inches, then runs southwest to a point where it is jacked under Beverly Boulevard in a 42-inch steel casing. This portion of the pipeline construction connects to the Whittier Unit on the south side of Beverly Boulevard.

Whittier Unit: The construction for this schedule began where the Whittier Connector Unit ended on Pioneer Boulevard just south of Beverly Boulevard. From this point, the 30-inch line continues southwest along Pioneer Boulevard to Orange Grove Avenue, where it turns southeast. The line continues along Orange Grove Avenue to Norwalk Boulevard, where it turns southwest and runs to El Rancho Drive. At this point, the line turns southeast and runs along El Rancho Drive to a T-section at Broadway Road. From this T-section, an 18-inch line runs east along Broadway Road to Western Avenue where it terminates in a temporary blow-off valve, plug and blind flange. Any future (although currently unplanned) extensions of the recycled water system into the City of Whittier will continue from the point.

From the T-section at El Rancho Drive and Broadway Road, a 16-inch cement mortar-lined and coated steel pipeline continues southwesterly along Broadway Road to Norwalk Boulevard. Along the way, the line was jacked underneath Washington Boulevard. At Norwalk Boulevard, the 16-inch line turns south and runs to a point just south of Walnut Street, where the line connects to the Santa Fe Springs Unit. Along the way, the line was jacked underneath Slauson Avenue.

A second set of pipelines was constructed from the Rio Hondo Pump Station. From the pump station, a 48-inch cement-lined and coated steel pipeline runs to the property line on San Gabriel River Parkway, where it terminates in a T-section. A 12-inch line runs northeasterly from the T-section along the parkway to the intersection of Fairway Drive, where it terminates in a blind-flanged T-section. Also branching from the 48-inch line T-section is a 36-inch cement-lined and coated steel line that runs southwesterly to Beverly Boulevard. At this point, the line reduces to 30-inches and terminates in a T-section at Tobias Avenue, with the 30-inch branch blind-flanged. A 10-inch line runs along Tobias Avenue from the T-section before it also terminates in a blind-flange. Future construction will continue from the blind-flanged sections.

Santa Fe Springs Unit: The main portion of this construction schedule is a 16-inch cement-lined and coated steel that connects to the Whittier Unit on Norwalk Boulevard, between Walnut and Burke Streets. The 16-inch line continues south along Norwalk Boulevard to Florence Avenue, where it connects to a 24-inch line of the Century recycled water distribution system. This is the first of several links between the two distribution systems. Along the 16-inch line on Norwalk Boulevard, two T-sections were installed to allow for construction of other pipelines.

The first T-section on the 16-inch line is located at the intersection of Norwalk Boulevard and Burke Street, with a 12-inch line branching off and running east to its termination at a T-section at Dice Road. From this point, a looped-section of pipelines begins. The northern portion consists of a 12-inch line running north on Dice Road to a T-section, then east through an alley to a T-section on Sorenson Avenue, where the line reduces to 6-inches and continues south to a T-section at Santa Fe Springs Road, then southwest to a T-section at Los Nietos Road. The south portion also begins at the T-section at Burke Street and Dice Road and consists of a 12-inch line running south to Los Nietos Road, then southeast to Santa Fe Springs Road, where it connects to the northern portion at the T-section.

From the T-section at Los Nietos and Santa Fe Springs Roads (the street name changes to Bloomfield Avenue at Telegraph Road), the 12-inch line continues southwest to Florence Avenue, where it connects to a 12-inch line of the Century recycled water distribution system.

The second T-section on the 16-inch Norwalk line is located at Norwalk Boulevard and Los Nietos Road. From this point, an 8-inch line runs west to Pioneer Boulevard, where the line terminates in a temporary blow-off valve and plug.

Vernon Phase 1 and 2A Unit: This section of pipeline connects the west side of the Rio Hondo distribution system to Schedule 4 of the Century distribution system, detailed in Appendix F. The 12-inch line of Schedule 4 terminated at a T-section at the intersection of Atlantic Avenue and Tweedy Boulevard in the City of South Gate. From this point, an 18-inch line runs north along Atlantic Avenue to a T-section at Ardine Street, where a 10-inch line runs west to Quartz Avenue, then south to its terminus at Independence Avenue.

From the T-section at Atlantic Avenue and Ardine Street, the 18-inch line continues north to a T-section at Elizabeth Street. At this intersection, the line turns west and runs to Otis Avenue. The 18-inch line turns north again and runs along Otis Avenue to a T-section at Randolph Street.

From the T-section at Otis Avenue and Randolph Street, a short section of 6-inch line runs east where a blind-flange was installed to allow for future construction. The 18-inch line continues west along Randolph Street to its terminus at Boyle Avenue. Along Randolph Street, an 8-inch line branches off at Newell Street and runs south to its terminus at Saturn Avenue.

PUENTE HILLS/ROSE HILLS

The distribution system consists of 2,956 feet of 36-inch reinforced concrete gravity line that runs east from the 66-inch San Jose Creek WRP Outfall on Workman Mill Road to the original landfill entrance. The first of three pump stations lifts 12,000 gpm of recycled water 500 feet through 2,200 feet of 36-inch force main to an existing 650,000 gallon reservoir located close to the PERG Facility. The second pump station, located at the 650,000 gallon reservoir, lifts the recycled water another 300 feet through 3,700 feet of 30-inch force main to a 1.2 million gallon reservoir constructed by Rose Hills on the border between the landfill and cemetery. The third pump station, located at the Rose Hills storage tank, lifts 2,200 gpm of recycled water through 4,700 feet of 18-inch buried DIP leading to a new 800,000 gallon reservoir located at the former Nike site, with 2,000 feet of aboveground galvanized steel pipe serving the eastern landfill.

Construction of the gravity line was completed in June 1993, with construction of its connection to the San Jose Creek Outfall completed in March 1996. In 2001, construction of the expansion to serve the eastern portions of the landfill and the upper areas of the ever-expanding cemetery was completed.

USGVMWD – WHITTIER NARROWS RECREATION AREA EXTENSION

Recycled water is delivered from the USGVMWD pump station located adjacent to the chlorine contact tanks in the northwest section of the WNWRP. This pump station, designed by Tetra Tech, Inc., is capable of providing 10,000 gpm of recycled water to the transmission and distribution system. This pumping plant consists of one 200 HP, 2,000 gpm and three 350 HP, 4,000 gpm vertical turbine pumps provided by Simflo Pumps Inc. The third 4,000 gpm pump serves as a backup.

From the USGVMWD pump station the recycled water is transported through a 24-inch, Class 200 ductile iron pipeline (DIP) that runs northeasterly, suspended along the eastern side of the WRP's chlorine contact tank. All buried portions of the DIP have been double-bagged with 8 ml purple plastic to protect it against corrosion and to identify it as a recycled water pipeline. The 24-inch pipeline exits the pump station near the northeast corner of the WNWRP site and heads north for approximately 165 feet and turns northwest for 115 feet, tentatively following the property line. The pipeline then turns due west for 195 feet.

Approximately 50 feet south of the northwest corner of the WRP's property and a SCE easement, the 24-inch pipeline exits the WRP site and runs northwest to the southern edge of the SCE easement, then north through the easement. On the north side of the easement, the pipeline is jacked under Mission Creek and encased in an 82-foot long, 36-inch welded steel casing. The 24-inch pipeline continues northward through an archery range and a second SCE easement to a point approximately 33 feet north of the easement where it ends in a T-section (hereinafter identified as "Junction 1").

There is a 24-inch butterfly valve on the western branch of the Tee at Junction 1, after which the 24-inch pipeline continues due west, then northwesterly, then due west again, then northwesterly until it reaches the eastern bank of the Rio Hondo. The 24-inch pipeline then follows the bike path northward along the eastern edge of the river until it passes under the Pomona (60) Freeway right-of-way. Under the freeway, the pipeline is encased in a 36-inch welded steel casing. Just north of the freeway, the 24-inch pipeline turns east and runs parallel to the freeway to Loma Avenue.

Along Loma Avenue, the 24-inch pipeline runs north where it reduces to an 18-inch Class 250 DIP. Along this run, three T-sections with gate valves (two 6-inch and one 12-inch) were installed to serve the existing irrigation systems in what is known as Area "A" of the Whittier Narrows Recreation Area. The 18-inch pipeline continues north along Loma Avenue where it terminates with an 18-inch butterfly valve and a blind-flange for future extension. Three more T-sections with 6-inch gate valves for servicing Area "A" have been installed along the 18-inch pipeline.

In order to interconnect the irrigation systems serving Area "A" (located north of the 60 Freeway and bordered by Loma Avenue on the west and Rosemead Boulevard on the east) and Area "B" (located east of Rosemead Boulevard), a 12-inch Class 350 DIP was installed. On the south side of the Rosemead Boulevard entrance to Area "A", north of the 60 Freeway, a 12-inch tapping sleeve and gate valve was installed on an existing 12-inch AC irrigation pipeline. From this point, a 12-inch DIP runs northeast to the north side of the park entrance where it was jacked under Rosemead Boulevard and encased in 18-inch welded steel casing. From the west side of Rosemead Boulevard, the 12-inch pipeline runs due east to Area "B". At the end of this pipeline, an 8-inch reducer and tapping sleeve with a gate valve were installed on an existing 8-inch irrigation pipeline completing the interconnection of the two recreation areas.

Back at the T-section at Junction 1, the east branch reduces to a 16-inch Class 250 DIP through a butterfly valve, running due east to a T-section with a 6-inch stub-out and gate valve for a future extension. From this Tee, the 16-inch pipeline jogs slightly to the north, then continues due east where a second T-section with a 6-inch stub-out and gate valve for a future extension was installed. From the second Tee, the 16-inch pipeline continues due east where a third T-section with a 6-inch stub-out and gate valve for a future extension was installed. From the third Tee, the 16-inch pipeline continues due east to the west side of Rosemead Boulevard at the southern entrance to the Whittier Narrows Recreation Area, south of the 60 Freeway. At this point, the 16-inch pipeline was jacked under the street and encased in 24-inch welded steel casing.

From the east side of Rosemead Boulevard, the 16-inch pipeline continues due east into Area "D" of the Whittier Narrows Recreation Area where a fourth T-section with a 6-inch stub-out and gate valve for a future extension was installed. From the fourth Tee, the 16-inch pipeline continues due east to the edge of Legg Lake. From this point, the 16-inch pipeline was jacked under the connecting channel between the middle lake and the south lake and encased in 24-inch welded steel casing. From this point, the 16-inch pipeline continues due east where it turns southeast and runs to a T-section at the intersection of Santa Anita Avenue and Lexington Gallatin Road (hereinafter identified as "Junction 2").

There is a 16-inch butterfly valve on the southeastern branch of the Tee at Junction 2, after which the 16-inch pipeline continues southeast, where it terminates in a fifth T-section with a 6-inch stub-out and gate valve for a future extension.

Back at Junction 2 at the Santa Anita Avenue–Lexington Gallatin Road intersection, an 8-inch reducer and gate valve is connected to the T-section, and an 8-inch, Class 350 DIP pipeline runs. This pipeline then turns southeast. The pipeline then runs due east where it terminates at Andrews Street in a T-section with a 6-inch gate valve and an 8-inch lateral that serves a 4-inch stub out to South El Monte High School.

For the Rosemead Extension, 3,633 feet of 12-inch line runs west from the Golf Course along Garvey Avenue between River Avenue and Earle Avenue, with two, short 6-inch laterals running north on Willard Avenue and Earle Avenue (761 and 822 feet, respectively). A 6,393 foot, 8-inch line tees off of the 12-inch line on Garvey and runs south on Walnut Grove Avenue to a point just north of Cameta Drive. From this 8-inch line, a 180 foot, 4-inch lateral branches off to the west at Gravalia Avenue, a 1,440 foot, 6-inch lateral branches off to the east on Klingerman Street, and a 1,258 foot, 6-inch line branches off to the west on Rush Street.

APPENDIX K

LANCASTER EASTERN AGRICULTURAL SITE

To deliver recycled water to this site, approximately 17.2 miles of transmission lines (terminating in a 2 million gallon storage tank) were designed and constructed to supply the proposed agricultural area of approximately 4,650 acres (3,800 acres actually cultivated). A 36-inch steel transmission line runs south from the Lancaster WRP along Sierra Highway, then east along East Avenue E. At 60th Street East, the transmission line transitions down to a 28-inch HDPE line and splits, with one line running down Avenue E then south on 90th Street East to Avenue G, then east again to its terminus halfway between 90th and 100th Streets. The second line runs south on 60th Street East then east on East Avenue F to 90th Street East where it reconnects with the first line.