CHAPTER 5

EXISTING AND PROJECTED WATER AND WASTEWATER CHARACTERISTICS

The Water Supply and Its Characteristics

Wastewater Flow and Projections

Wastewater Characteristics

Current and Projected Biosolids Production

Water Reuse and Reclamation

CHAPTER 5 EXISTING AND PROJECTED WATER AND WASTEWATER CHARACTERISTICS

5.1 THE WATER SUPPLY AND ITS CHARACTERISTICS

As stated in Chapter 2, water supplies provided to the JOS service area are composed of local and imported water resources. Imported water resources, which constitute approximately three quarters of the JOS water supply, are provided by MWD via the Colorado River Aqueduct and the California Aqueduct which delivers water from Northern California. Local water resources consist largely of groundwater, but also include surface water and reclaimed water.

5.1.1 SIGNIFICANCE TO DISTRICTS' WASTEWATER FACILITIES PLANNING

The Districts have aggressively pursued a program of wastewater reclamation and reuse since 1963. Reclaimed water generated at the Districts' JOS WRPs supports a variety of beneficial reuses including landscape and agricultural irrigation, industrial cooling and process water, and groundwater recharge operations. Based on MWD and Department of Water Resources (DWR) reports, it is apparent that, as water resources become more scarce in response to rising demands for and declining supplies of water, Southern California will depend more heavily on reclaimed water and demands for reclaimed water will increase.

The reuse potential of reclaimed water is directly influenced by the quality of the water supply. Conventional wastewater treatment processes such as those employed at the JOS WRPs have very little effect on certain water quality parameters, including mineral quality. The mineral quality of the water supply, which is generally expressed in terms of the total dissolved solids (TDS) level, is one of the constituents about which the Districts are most concerned. High TDS levels in the water supply are directly translated to high TDS levels in reclaimed water which tend to limit available reuse options. Excessive TDS levels in reclaimed water may cause plant kills in some plant species and, therefore, limit irrigational applications, and/or may cause industrial process fouling or inefficiency and, therefore, limit industrial applications. With respect to groundwater recharge, which is the Districts' largest use of reclaimed water, the Water Replenishment District of Southern California has set an upper TDS limit of 700 mg/l for reclaimed water which is used to recharge the groundwater basin.

The quality of the water supply, especially its TDS level, is therefore, relevant to Districts' facilities planning. The viability of continued wastewater reclamation and reuse depends on the delivery of a high quality water supply to the regions served by the WRPs. In addition, the Districts would generally like to locate water reclamation facilities in regions which receive the highest quality water supplies and, therefore, produce the highest quality reclaimed water.

5.1.2 IMPORTED WATER SUPPLIES

State Water Project

Potable water provided by the SWP flows through the Sacramento San Joaquin Delta. Measurements by the DWR and municipal agencies which treat and deliver SWP water to their customers indicate that concentrations of water quality constituents are generally low in relation to drinking water standards. TDS levels in SWP water are also relatively low. Between 1986 and 1992, TDS concentrations in SWP water delivered by the California Aqueduct averaged 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 which employ chlorine as a disinfectant and are suspected human carcinogens which are regulated by state and federal safe drinking water laws. THMs form when halogens, such as chlorine, react with dissolved organic matter present in water. SWP water contains relatively high levels of naturally occurring organic matter 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 the disinfection process. The presence of relatively high concentrations of dissolved organic matter and bromides in SWP water increases the potential for THM formation during chlorine disinfection.

Colorado River Water

The Colorado River watershed is primarily composed of rural or undeveloped lands. Municipal and industrial discharges, therefore, have little effect on Colorado River water quality, and Colorado River water supplies generally exhibit low levels of most water quality constituents. Mineral concentrations of water delivered in the Colorado River Aqueduct have, however, typically been high. Mineralization of Colorado River waters occurs naturally as water tributary to the river flows over and/or through soils within the watershed and as soluble salts are released to this water through natural geologic weathering processes. Farming activities along the Colorado River also contribute significant amounts of salts to river water. Between 1986 and 1992, the level of TDS in water delivered through the Colorado River Aqueduct averaged 580 mg/l.

The MWD has employed a number of strategies to avoid potential problems associated with exclusive use of either of the imported water supplies. To reduce levels of THMs in treated water, the MWD has utilized ozonation to disinfect SWP waters and/or has mixed disinfected SWP water with groundwater or Colorado River water to lower THM concentrations. To lower TDS levels in water supplies derived from the Colorado River, the MWD typically blends Colorado River water with SWP water or groundwaters which are lower in TDS.

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, which are illustrated in Figure 2.5-2, have been interconnected into a distribution loop; thus, 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 (Redondo Beach, Torrance, etc.), 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 generally 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, on the other hand, is derived from a blend of SWP and Colorado River water which may vary from month to month. Average TDS levels of water provided by these facilities over the last five years are listed in Table 5.1-1. Note that the average TDS level of water produced at each facility increased over time between 1989 and 1993 largely due to the effects of the drought which persisted in California during this time.

Table 5.1-1
TDS LEVELS IN TREATED WATER FROM MWD FILTRATION PLANTS

Year	Facility					
	Jensen		Weymouth		Diemer	
	%SWP*	TDS (mg/L)	%SWP	TDS (mg/L)	%SWP	TDS (mg/L)
1989**	95	372	24	504	26	508
1990	100	343	31	517	31	518
1991**	98	374	10	609	11	607
1992	100	409	13	614	14	614
1993	100	439	12	612	9	627

**Percent State Water Project water*

***During January, February and March of 1989, and March of 1991, the Jensen Plant provided pretreatment for City of Los Angeles' Department of Water and Power water.*

Source: MWD, 1994

5.1.3 GROUNDWATER SUPPLIES

The major groundwater basins which provide water to the JOS service area include the Central Basin, the West Coast Basin, the Main San Gabriel Basin, the Raymond Basin, the Claremont Heights Basin, the Live Oak Basin, the Spadra Basin, and the Pomona Basin. These groundwater basins are illustrated in Figure 2.5-4. The water quality in most of these basins is generally good. In most basins, contamination, where it does occur, is highly localized. The most common contaminants are generally industrial solvents and nitrates. Coastal basins also exhibit high salinity or TDS levels in some regions as a result of saltwater intrusion caused by historic overdrafting of aquifers. Freshwater-injection barrier wells have been employed in regions of saltwater intrusion to prevent further degradation of the aquifers.

In contrast to other groundwater basins, contamination of the upper San Gabriel Basin is fairly widespread. The upper San Gabriel Basin has, in fact, been classified as a Superfund site by the EPA. Chlorinated solvents are the most common contaminant found in the upper San Gabriel Basin, but nitrate and metals concentrations are also high in some locations. Remedial activities are currently under way to clean groundwater in the upper San Gabriel Basin.

Groundwaters from all of the basins generally exhibit low concentrations of TDS with the following exceptions. In coastal groundwater basins TDS levels are highly elevated in regions where seawater intrusion has incurred. TDS levels are also elevated in regions impacted by irrigated agriculture, dairy or livestock activities, septic tanks in unsewered areas, and landfill leachates. In general, the average mineral quality of water from the Raymond, San Gabriel, Claremont Heights, Live Oak, Spadra, and Pomona Basins is excellent with TDS levels on the order of 200 to 300 mg/l. Measured TDS levels in West Coast Basin water supply wells were also excellent (range = 277 to 431 mg/l, mean = 341 mg/l), and TDS levels in Central Basin Water supply wells are slightly higher (range = 205 to 874 mg/l, mean = 459 mg/l) (Source: Cooperative Basin-wide Title 22 Groundwater Monitoring Program 1993 Annual Water Quality Report).

5.1.4 FINDINGS

In general, there is no reason to expect that the mineral quality of the water supply delivered to the regions served by any of the JOS WRPs will decline during the planning period. Based on information contained in Section 2.5, the composition of the water supply delivered to the JOS service area under average year conditions may be expected to change as follows during the planning period. The proportion of SWP water consumed will increase, the proportion of Colorado River water consumed will decrease, and the proportion of groundwater consumed will decrease (the actual quantity of groundwater consumed should remain constant). The net effect of these changes, at least with respect to the mineral quality of the water supply, should be a net improvement. There is, therefore, no reason to expect that the quality of reclaimed water produced at any of the JOS WRPs will decline.

The general trend of water quality supplied to JOS WRP service areas and, hence, the general trend of reclaimed water quality produced at JOS WRPs should not change significantly. The highest quality reclaimed water will continue to be produced at the Whittier Narrows and Pomona WRPs. The San Jose Creek and Long Beach WRPs are also expected to continue to produce high quality reclaimed water. Reclaimed water produced at the LCWRP is expected to be of lesser quality than that produced at the other JOS WRPs. Increased diversion of wastewater from the JO "H" Trunk Sewer to the LCWRP via the LCWRP Interceptor would, however, improve the quality of reclaimed water produced at the LCWRP since much of the wastewater tributary to this sewer is generated in the upper portion of the JOS where the quality of water supplies is highest.

5.2 WASTEWATER FLOW AND PROJECTIONS

5.2.1 EXISTING FLOWS AND CAPACITIES

The *design capacity* of a treatment plant is defined in terms of the annual average dry-weather flow which a plant is designed to treat. The *operating capacity* of a treatment plant discharging to navigable waters, on the other hand, is normally considered to be the NPDES-permitted capacity. The design and the operating capacity of each of the JOS treatment facilities are generally the same with the exception of the JWPCP where the design capacity exceeds the NPDES-permitted capacity by 15 mgd. The existing wastewater flow and the capacity of each of the JOS treatment plants are shown in Table 5.2-1.

Table 5.2-1
FLOWS AND CAPACITIES (MGD)

Treatment Plants	Flows[1]	Design Capacity
JOS:		
JWPCP	328	400[2]
San Jose Creek WRP	73	100
Los Coyotes WRP	33	37.5
Long Beach WRP	16	25
Whittier Narrows WRP	11	15
Pomona WRP	13	13
JOS TOTAL	475	590.5

[1] *Average of 1993 calendar year.*
[2] *The JWPCP NPDES permitted capacity is 385 mgd.*

5.2.2 DEMOGRAPHIC DATA

Demographic data for the JOS was obtained from SCAG's 1994 Regional Comprehensive Plan (RCP).[1] The RCP forecasts, which were developed through the SCAG subregional planning process, reflect local jurisdictions' general plans and forecasts. The growth management component of the RCP was adopted by the SCAG Regional Council in June 1994. The population and employment located within each treatment plant drainage area were determined in order to allocate projected wastewater flows to each of the six JOS treatment plants. Because the JOS is a network of interconnected wastewater conveyance and treatment facilities, wastewater flow can often be diverted to more than one treatment facility. As a result, wastewater flows generated within any given drainage area are often tributary to more than one treatment facility.

The JOS population and employment figures were derived from the 1994 RCP for the years 1990 and 2010. The year 1990, rather than 1993, was chosen because SCAG's 1994 RCP employs figures

[1] *The Air and Toxics Division of the EPA has approved the use of these latest planning assumptions (letter dated May 2, 1994) for this facilities plan.*

based on data from the 1990 Census. SCAG developed both the 1990 and 2010 population and employment figures on a subregional level (as shown in Table 5.2-2) based on the census tract level data. SCAG subregions included in the JOS service area include the following: Los Angeles City, Arroyo Verdugo, San Gabriel Valley, West Side Summit, South Bay Cities, and Southeast Los Angeles County. These subregions are shown shaded in Table 5.2-2. Subregional boundaries are shown in Figure 5.2-1. The names of subregions given in this figure differ slightly from those given in Table 5.2-2 in some instances since names given in the figure refer to the names of the agencies that have jurisdiction over those subregions.

Table 5.2-2
1994 RCP GROWTH MANAGEMENT FORECAST

Subregions	Population		Employment	
	1990	2010	1990	2010
North Los Angeles	236,000	629,000	77,000	199,000
Los Angeles City	3,618,000	4,765,000	1,955,000	2,213,000
Arroyo Verdugo	516,000	629,000	320,000	411,000
San Gabriel Valley	1,425,000	1,706,000	583,000	781,000
West Side Summit	221,000	261,000	231,000	261,000
South Bay Cities	792,000	910,000	443,000	596,000
SELAC:S.E. LA	1,913,000	2,160,000	923,000	1,116,000
Orange County	2,411,000	3,108,000	1,301,000	1,886,000
WRCOG:W. Riv.	912,000	1,991,000	261,000	587,000
Coachella Valley	215,000	497,000	87,000	163,000
Riv. Remainder	44,000	68,000	9,000	12,000
VCOG: Ventura County	669,000	872,000	275,000	410,000
VCOG: LA County Cities	138,000	225,000	68,000	93,000
San Bernardino	1,418,000	2,469,000	488,000	888,000
Imperial	109,000	226,000	46,000	74,000
SCAG Total	**14,637,000**	**20,516,000**	**7,076,000**	**9,691,000**
Counties:				
Los Angeles	8,860,000	11,286,000	4,610,000	5,670,000
Orange	2,411,000	3,108,000	1,301,000	1,886,000
Riverside	1,170,000	2,556,000	356,000	762,000
San Bernardino	1,418,000	2,469,000	488,000	888,000
Ventura	669,000	872,000	275,000	410,000
Imperial	109,000	226,000	46,000	74,000
SCAG Total	**14,637,000**	**20,516,000**	**7,076,000**	**9,691,000**

Source: Southern California Association of Governments; 1994 Regional Comprehensive Plan

The 1990 and 2010 population and employment figures were developed for the JOS treatment plant drainage areas by disaggregating this data to the census tract level in order to achieve a more accurate count. Disaggregation refers to the procedure by which large areas are broken down into smaller areas in order to more accurately determine the attributable population and/or employment for a given area. The disaggregation for this Facilities Plan was performed using a Geographical Information System (GIS)[2]. The treatment plant drainage boundaries were digitized over the

[2] *The GIS analysis was performed by Thomas Brothers Maps/CH2M Hill Consultants*

Thomas Brother's computerized base map of Los Angeles County and then overlayed on top of the 1990 census tract boundaries. The demographic data was delivered by SCAG (by census tracts) in a computer format. The GIS manipulated this data geographically and was able to disaggregate the census tracts to generate the 1990 and 2010 population and employment by treatment plant drainage areas. Sewer drainage area studies for the JOS service area were utilized to determine the areas that drain to a certain treatment plant, or a combination thereof. Within the JOS, thirteen drainage areas were defined which drain to the six JOS treatment plants and are shown in Figure 5.2-2. The same figure also shows the overlay of the treatment plant drainage areas with the 1990 census tracts. The outer boundaries shown in the figure in some cases are not the JOS boundaries, since not all areas within the Districts drain to JOS facilities. Some areas drain to the City of Los Angeles or to Orange County Sanitation Districts' treatment facilities. Drainage Area 4 (which includes District No. 28) is not included as part of the JOS since the La Cañada WRP is currently not a part of the JOS, as discussed in Section 7.4.3. The population and employment figures for the treatment plant drainage areas are shown in Table 5.2-3. The detailed disaggregation of the population and employment by census tracts for each drainage area is shown in Appendix A-5.2-1.

According to the RCP, the population of Los Angeles County in the year 2010 is expected to be approximately 11.3 million. Approximately 46 percent of this total, or approximately 5.2 million, will reside within the JOS service area. This represents a 17 percent increase in the JOS population between 1990 and 2010 (as shown in Table 5.2-3). In 2010, JOS employment is expected to approach 2.6 million, an expected increase of half a million employees since 1990. This is an increase of 26 percent.

The largest amount of absolute growth (approximately 42 percent of total growth) shown in Table 5.2-3 is expected to occur in Drainage Area 11 although the percent increase between 1990 and 2010 in this area is one of the lowest (14 percent). This is mainly due to the large size of the area. Another area where a significant amount of growth is expected to occur is in Drainage Area 2 which is tributary to the San Jose Creek WRP. The expected population increase for this area is 22 percent and this increase accounts for approximately 20 percent of all expected JOS growth. Other drainage areas with high growth rates are those tributary to the Pomona, and Long Beach WRPs (24 percent each). This does not, however, indicate that these facilities should be expanded since current treatment capacity at these plants may accommodate this growth or flows may be diverted to other plants. Finally, the largest expected percentage growth in population (69 percent) is in Drainage Area 6, the Puente Hills vicinity. However, this is a relatively small area and this population growth accounts for only 0.4 percent of total JOS growth.

5.2.3 METHODOLOGY USED TO ESTIMATE WASTEWATER FLOW FROM POPULATION DATA

Forecasts of average daily flow rates are necessary to establish the basis for the design capacity and the hydraulics of treatment facilities. Estimates of future peak flows, in addition to average flows, are also required to design treatment facilities. Peak flows may be derived from average flows by applying a peak to average ratio factor which is based on historical data. The methodology for developing average flows for each JOS treatment plant is explained in this section. Peak flows will be estimated based on average flows and appropriate peaking factors.

Table 5.2-3
1990 AND 2010 JOS POPULATION AND EMPLOYMENT
BY TREATMENT PLANT DRAINAGE AREAS

Treatment Plant/s	Drainage Area #	Tributary Population				
		1990	2010	Difference	% Change	% of Total[1]
Pomona WRP	1	172,657	214,577	41,920	24%	5.7%
San Jose Creek WRP	2	667,154	813,284	146,130	22%	19.8
San Jose Creek or Whittier Narrows WRPs	3	327,836	398,255	70,419	21%	9.6%
Whittier Narrows or Los Coyotes WRPs	5	387,638	447,903	60,265	16%	8.2%
JWPCP	6	4,244	7,182	2,938	69%	0.4%
Los Coyotes WRP	7	247,818	286,309	38,491	16%	5.2%
Los Coyotes WRP or JWPCP	8	192,139	210,913	18,774	10%	2.5%
Long Beach WRP	9	54,948	61,923	6,975	13%	0.9%
Long Beach WRP or JWPCP	10	165,990	206,013	40,023	24%	5.4%
JWPCP	11	2,230,737	2,540,411	309,674	14%	42.1%
JWPCP	12	4,397	4,996	599	14%	0.1%
JWPCP	13	693	795	102	15%	0.0%
TOTAL	ALL	4,456,251	5,192,561	736,310	17%	100%

Treatment Plant/s	Drainage Area #	Tributary Employment				
		1990	2010	Difference	% Change	% of Total
Pomona WRP	1	60,309	80,614	20,305	34%	3.8%
San Jose Creek WRP	2	270,207	375,286	105,079	39%	19.7%
San Jose Creek or Whittier Narrows WRPs	3	146,239	174,224	27,985	19%	5.3%
Whittier Narrows or Los Coyotes WRPs	5	201,301	242,134	40,833	20%	7.7%
JWPCP	6	3,853	12,604	8,751	227%	1.6%
Los Coyotes WRP	7	110,802	130,377	19,575	18%	3.7%
Los Coyotes WRP or JWPCP	8	103,329	118,082	14,753	14%	2.8%
Long Beach WRP	9	16,719	21,497	4,778	29%	0.9%
Long Beach WRP or JWPCP	10	63,953	84,965	21,012	33%	3.9%
JWPCP	11	1,100,516	1,369,404	268,888	24%	50.5%
JWPCP	12	587	654	67	11%	0.0%
JWPCP	13	1,626	1,663	37	2%	0.0%
TOTAL	ALL	2,079,441	2,611,504	532,063	26%	100%

Source: SCAG's 1994 RCP.
[1] *Percent of total growth.*

Generally, in order to predict future average daily flows, the following factors must be considered: infiltration and inflow (I/I), the portion of municipal water supply reaching the collection system as wastewater, permanent water conservation measures, current and historical flows, industrial waste flows, and residential/commercial flows. These factors contribute to the derivation of the per capita wastewater generation rate. The per capita generation rate is then applied to the projected population to estimate projected average wastewater flows.

Infiltration occurs when groundwater enters the sewer system through cracks, holes, bad connections, etc. The EPA has established a threshold flow rate of 120 gpcd during periods of high groundwater as indicative of excessive infiltration. Groundwater levels are generally low throughout the JOS service area and sewers are generally constructed above the water tables. In California, the groundwater table would be expected to rise during the winter months (October through April). In the last decade, the highest rainfall occurred in 1992-93. The average JOS flows during the winter months for that year was approximately 480 mgd. Dividing this flow by the JOS sewered population of 4.34 million for 92-93 results in a per capita generation rate of 111 gpcd. This rate falls significantly below the threshold value of 120 gpcd and, therefore, infiltration was assumed to be insignificant.

Inflow, on the other hand, is a result of excessive drainage into a sewer, and usually occurs during and after storms, or from other sources which drain steadily into the sewer system (steady inflow). EPA has established a threshold flow rate of 275 gpcd during storm events for induced peak inflow rates as indicative of excessive inflow. The JOS treatment plants do not receive or treat storm runoff since storm runoff is managed via a separate storm sewer system. Inflow to the JOS through manholes during storms does, however, contribute additional flow to the JOS. The normal rainfall in Southern California is relatively low. Influent rates at JOS treatment plants were monitored during several storm events which occurred between 1983 and 1993 and ranged between 2 and 15 inches of rainfall (see Table 5.2-4; wet weather flow indicates flow occurring during the storm). During these storms, the JOS experienced an increase in average flow between 23 percent and 50 percent, and a 13 percent to 41 percent increase in peak flow, due mainly to inflow through manholes. However, by dividing the wet weather peak flow by the population, the highest per capita generation rate that occurred in 1986 (220 gpcd) is significantly below the threshold value of 275 gpcd. Note that flows identified in Table 5.2-4 do not represent instantaneous system peak flows but rather represent the sum of peak flows which occurred at each JOS treatment plant. These peaks occur at different times at different plants. Since, instantaneous peaks are lower, using the sum of peak flows in Table 5.2-4 is conservative. This would indicate that the per capita peak flow generation rate is really lower than 220 gpcd and that there is no excessive inflow in the JOS.

The portion of municipal water supply which reaches the collection system as wastewater is usually estimated. In general, a considerable portion of the municipal water supply, including product water used by manufacturing establishments, water used for landscape irrigation, system maintenance and fire fighting, leakage from water mains and service pipes, and water used by consumers whose facilities are not connected to sewers (septic use), does not reach the sanitary sewer system. The total portion of the municipal water supply which reaches the collection system as wastewater in semiarid regions of the southwestern United States has been estimated between 60 and 65 percent of the total supply consumed[3]. The methodology used to estimate average daily wastewater flows in this section did not require an assumption of the proportion of the municipal water supply which reaches the JOS collection system since actual metered effluent flows are used.

Table 5.2-4
INFLOW DATA

Storm Period	Total Rainfall (inches)	Daily JOS Flow Dry (MGD)	Daily JOS Flow Wet (MGD)	Daily JOS Flow Increase (%)	Peak JOS Flow Dry[1] (MGD)	Peak JOS Flow Wet (MGD)	Peak JOS Flow Increase (%)	Sewered Population (Millions)	Per Capita Gen. Rate (gpcd)
Feb. 07-08, 1993	2"-4"	457	568	24	662	745	13	4.34	172
Jan. 15-18, 1993	3"-6"	493	674	37	677	873	29	4.34	201
Feb. 10-12, 1992	2"-5"	451	588	30	626	884	41	4.31	205
Feb. 16-17, 1990	2"-4"	520	639	23	660	868	32	4.25	204
Feb. 14-15, 1986	3"-4"	490	711	45	780	888	31	4.04	220
Feb. 27, Mar. 1, 1983	5"-15"	460	691	50	644	877	36	3.95	163

[1]*Dry peaks given are for the most recent non-rain period occurring prior to the storm, and on the same days of the week, and for the same duration as the storm.*

An adjustment for the portion of the population using septic tanks was incorporated in the calculation of the per capita generation rate. A percentage of the JOS population utilizes septic tanks for wastewater disposal. In the JOS service area, areas that are hilly, mountainous, or are sparsely populated (e.g. the cities of Rolling Hills, Rancho Palos Verdes, Rolling Hills Estates, and Diamond Bar), have a relatively large portion of their population utilizing septic tanks. It is assumed that approximately five percent of the JOS population uses septic tanks for wastewater disposal. This percentage of the population was subtracted from the total JOS population in order to calculate the per capita generation rate.

Water conservation measures implemented by local jurisdictions during the recent drought in Southern California, coupled with the recent economic recession have resulted in reduced wastewater flows in many areas of Southern California. The JOS service area has been significantly affected by these conditions. Declining flows were initially observed in fiscal year 1989-90. During the 1990-91 fiscal year, the JOS mean flow was approximately 480 mgd. This represented a six percent drop in total JOS flow from the previous fiscal year in which the mean flow treated was 511 mgd. Furthermore, the JOS flow during the 1991-92 fiscal year was only 454 mgd, a 5.4 percent decrease from the previous year. Following 1992, however, JOS flows began to increase. Between 1991-92 and 1992-93 JOS flows increased by 4.6 percent. Since the MWD rescinded mandatory water conservation measures in March of 1992, and since the drought officially ended in 1993, water consumption and wastewater generation rates have begun to revert back toward higher historic levels.

[3] Wastewater Engineering, Metcalf & Eddy, 3rd Edition

The JOS per capita generation rate used in this facilities plan was calculated by averaging per capita wastewater generation rates derived from measured wastewater flows for six consecutive fiscal years between 1987-88 and 1992-93 as shown in Table 5.2-5. The per capita generation rate represents the average discharge of wastewater per person within the JOS service area. This includes residential and commercial users but excludes septic users and industrial flows. In the past, the per capita generation rate was averaged over a three-year period in order to reflect the most recent trends in wastewater generation. However, the latest three-year period, from 1989-90 to 1992-93, was not indicative of future trends in water consumption and wastewater generation because of the drastic water conservation measures taken during the drought period that began in the late 1980s. Therefore, an average value for the last six years was selected. The Districts believe this value would be representative of conservation levels during the planning period. The total metered flows shown in Table 5.2-5 are the metered effluent flows for the JOS, averaged over a 12-month period for the fiscal year shown. Industrial waste flows are the sum of the reported flows from all industrial users that discharge more than one million gallons per year to the JOS during that fiscal year. The Chino Basin flow is the flow permitted to be discharged by the Chino Basin Municipal Water District into the JOS under a *Waste Water Capacity Agreement* (Contract #1679) between the Water District and the Districts (District No. 21). The total JOS population was derived from SCAG's 1994 RCP, as explained in Section 5.2.2 under *Demographic Data,* and corrected to include only the population receiving sewer service (percent sewered). This percent sewered is assumed to be 95 percent since approximately 5 percent of the JOS population is believed to utilize septic tanks for wastewater disposal as explained earlier in this section. Based on this information, the average per capita generation rate for the JOS is estimated to be 101 gallons per capita per day (gpcd), as shown in Table 5.2-5.

Table 5.2-5
JOS RESIDENTIAL/COMMERCIAL PER CAPITA GENERATION RATE

	Year					
	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93
Total Metered Flow (mgd)[1]	510.8	518.4	510.5	480.1	454.4	475.5
Industrial Flow (mgd)	-69	-71	-64	-57	-59	-58
Chino Basin Flow (mgd)	-4.1	-4.8	-4.4	-2.4	-2.7	-2.9
Total Res/Com Flow (mgd)	**437.7**	**442.6**	**441.1**	**420.7**	**392.7**	**414.6**
Total Population[2]	4.28	4.35	4.47	4.51	4.54	4.57
Percent Sewered	x 0.95	x 0.95	x 0.95	x 0.95	x 0.95	x 0.95
Sewered Population	**4.07**	**4.13**	**4.25**	**4.28**	**4.31**	**4.34**
Res/Com Per Capita Generation Rate (gpcd)	**108**	**107**	**104**	**98**	**91**	**96**
Average (gpcd)	**101**					

[1] *Flows represent twelve month average of the fiscal year.*
[2] *Source derived from: Southern California Association of Government, 1994 RCP. Population in millions.*
Calculation: Per Capita Generation Rate = Total Res/Com Flow ÷ Sewered Population.

5.2.4 REQUIRED CAPACITY PROJECTED FOR THE JOS

The required capacity projected for the JOS is based on a 16-year planning horizon (1994-2010). In order to provide wastewater treatment for the projected 2010 population, the Districts must provide adequate treatment capacity within each of the JOS treatment plant drainage areas to accommodate the projected 2010 wastewater flow or provide capacity in the conveyance system and downstream treatment facilities to accommodate bypassed flows.

The projected wastewater flow for the year 2010 is calculated by employing a flow estimation method outlined in the *Policy For Implementing The State Revolving Fund For Construction of Wastewater Treatment Facilities (93-2 CWP, January 1993)*. This method utilizes the following assumptions:

- The residential/commercial wastewater generation rate is constant.
- The industrial waste (IW) component shall include the current IW flow plus projected future IW flow based on an industrial growth factor adopted by SCAG.

Projected year 2010 wastewater flows for the JOS may, therefore, be calculated as follows:

$$\begin{aligned}
\text{2010 Flow} &= \left[\text{res/comm rate} \times \text{projected population}\right] + \left[\text{projected IW flow}\right] + \left[\text{entitlement flow}\right] \\
&= [101 \text{ gpcd} \times 5{,}200{,}000] + [94{,}200{,}000 \text{ gpd}] + [7{,}600{,}000 \text{ gpd}] \\
&= 525.2 \text{ mgd} + 94.2 \text{ mgd} + 7.6 \text{ mgd} \\
&= 627 \text{ mgd}^{4}
\end{aligned}$$

The projected population and the per capita generation rate shown in the above formula were previously described in Sections 5.2.2 and 5.2.3 respectively. The industrial growth factor is based on SCAG's 1994 RCP and is the product of employment and productivity ratios identified by SCAG for the following industrial sectors: construction, manufacturing, and TCU (transportation, communication, utilities) as shown in Table 5.2-6. The result was a 55 percent increase (2.2 percent increase per year) in total output changes by these three sectors between 1990 and 2010. However, the increase in industrial wastewater flows is not expected to be directly proportional to total output for these industrial sectors. This is due to the anticipated increase in future water conservation and recycling measures taken for cost savings, as well as reduction in the number of employees due to implementation of new technology and automation as shown in Table 5.2-6. Based on this, it was assumed that only 85 percent of the 55 percent total output increase would translate into increased industrial flows. This results in a 47 percent increase in industrial wastewater flows. Table 5.2-7 shows the breakdown of the existing and projected industrial flows by treatment plant drainage areas. This resulted in a projected industrial wastewater flow of 94 mgd for the year 2010.

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[4] The Draft JOS 2010 Master Facilities Plan was based on a 2010 flow of 628 mgd. The 1 mgd difference is due to the latest SCAG population projections adopted in June 1994 as part of the 1994 RCP. This difference is considered negligible. A 2010 flow of 628 mgd has been retained in the final plan.

Table 5.2-6
SCAG'S INDUSTRIAL PROJECTIONS — LOS ANGELES COUNTY

	Employment (X1000)			Productivity (output/hr/employee)		
	1990	2000	2010	1990	2000	2010
Construction	154.0	156.0	177.0	37.1	40.3	44.1
Manufacturing	858.1	828.0	850.1	62.8	84.3	98.8
TCU	219.0	235.4	268.7	49.5	55.6	63.9
TOTAL	**1,231.1**	**1,219.4**	**1,295.8**	**149.4**	**180.2**	**206.8**
	Total Output Changes[1]					
	% INCREASE 1990-2000		% INCREASE 2000-2010		% INCREASE 1990-2010	
Construction	10%		24%		37%	
Manufacturing	30%		20%		56%	
TCU	21%		31%		58%	
TOTAL	**27%**		**22%**		**55%**	

TCU: Transportation, Communication, Utilities
Source: Southern California Association of Governments, 1994 RCP
[1] *Total Output Changes = Product of Employment and Productivity Ratios*
Ratios = 2000/1990, 2010/2000, or 2010/1990

The entitlement flow shown in the formula above is the allocation of 7.6 mgd of capacity to the Chino Basin Municipal Water District provided under the *Waste Water Capacity Agreement* mentioned previously. This entitled flow must be accounted for in JOS flow projections. The flow estimation method outlined above was applied to each JOS drainage area in order to assist in the development and analysis of project alternatives. Projected 2010 wastewater flows for each JOS drainage area are shown in Table 5.2-8.

The JOS wastewater flow projection of 628 mgd is shown in Figure 5.2-3 (for flow and capacity data shown in the figure, see Appendix A-5.2-2). This figure indicates that if no treatment plant expansions are provided, the demand for wastewater treatment in the JOS will reach the current permitted capacity of the JOS in approximately the year 2004. The figure also shows a range based on the lowest and highest per capita generation rates given in Table 5.2-5. This illustrates that the flow projections can vary significantly depending on the assumed per capita generation rate and the sensitivity of these numbers to water conservation practices. If wastewater flows develop more rapidly than flow projections indicate, the proposed facilities would be built sooner to match the growth. If, on the other hand, wastewater flows develop more slowly than flow projections indicate, the construction of proposed facilities would be delayed.

When planning incremental system expansions, treatment plants will be sized and service phased based on engineering and economic considerations. Any incremental expansion of the system could exceed interim population projections, but would be deemed conforming as long as the expansions are consistent with the 2010 population projections.

Table 5.2-7
2010 JOS INDUSTRIAL PROJECTED FLOWS BY TREATMENT PLANT DRAINAGE AREAS

Treatment Plant/s	Drainage Area #	1992-93 Industrial Flow[1] (mgd)	2010 Industrial Flows[2] (mgd)
Pomona WRP	1	0.45	0.72
San Jose Creek WRP	2	2.33	3.75
San Jose Creek or Whittier Narrows WRPs	3	0.99	1.59
Whittier Narrows or Los Coyotes WRPs	5	1.49	2.40
JWPCP	6	0.18	0.29
Los Coyotes WRP	7	1.34	2.16
Los Coyotes WRP or JWPCP	8	0.66	1.06
Long Beach WRP	9	0.08	0.13
Long Beach WRP or JWPCP	10	0.18	0.29
JWPCP	11	50.34	81.05
JWPCP	12	0	0.00
JWPCP	13	0.45	0.72
TOTAL	ALL	58.49	94.17

[1] *Does not include sanitary flows.*

[2] *The percent increase between 1992-93 and 2010 (18 years) is 61 percent (94 mgd - 58 mgd)/58 mgd. Fifty eight mgd is the industrial flow in 1992-93 shown in Table 5.2-5*

Table 5.2-8
TOTAL JOS 2010 PROJECTED FLOWS BY TREATMENT PLANT DRAINAGE AREAS

Tributary Treatment Plant(s)	Drainage Area #	2010 Population	Res/Com Rate (gpcd)	2010 Ind. Flow (mgd)	Total 2010 Flow (mgd)
Pomona WRP	1	214,977	101	0.72	22
San Jos Creek WRP	2	813,284	101	3.75	86
San Jose Creek or Whittier Narrows WRPs	3	398,255	101	1.59	42
Whittier Narrows or Los Coyotes WRPs	5	447,903	101	2.40	49
JWPCP	6	7,182	101	0.29	1
Los Coyotes WRP	7	286,309	101	2.16	31
Los Coyotes WRP or JWPCP	8	210,913	101	1.06	22
Long Beach WRP	9	61,923	101	0.13	6
Long Beach WRP or JWPCP	10	206,013	101	0.29	21
JWPCP	11	2,540,411	101	81.05	338
JWPCP	12	4,996	101	0.00	1
JWPCP	13	795	101	0.72	1
Subtotal	**All**	**5,192,561**	**101**	**94.17**	**621**
JWPCP	CB[1]	NA	NA	7.60	7.60
TOTAL	**All**	**5,192,561**	**101**	**101.77**	**628**

[1] *Chino Basin Industrial Flows*
Population: refer to Table 5.2-3
Res/comm rate: refer to Table 5.2-5
Industrial flow: refer to Table 5.2-7

5.3 WASTEWATER CHARACTERISTICS

Influent characteristics for each of the JOS treatment plants are presented in Table 5.3-1. Concentrations of the majority of wastewater constituents are highest at the JWPCP for three reasons: the JWPCP receives all primary and secondary solids from the upstream WRPs; a greater industrial flow is generated within the JWPCP service area; and poorer quality wastewater is generally routed around the WRPs to the JWPCP to allow production of high quality reclaimed water at the WRPs. This diversion of poorer quality wastewater flows is practiced most commonly at the PWRP and the LCWRP.

Due to the Districts' pre-treatment program, the presence of trace metals and priority pollutants in JOS wastewater is minimal. This program, which was discussed in detail in Chapter 3, regulates all sources of industrial waste discharged to JOS sewers. The majority of metals and priority pollutants in industrial wastewaters are removed during pretreatment prior to discharge to the JOS. A list of organic pollutants detected in the influent at one or more WRPs in 1993 is given in Table 5.3-2. It is important to note that after treatment, all reclaimed water produced at these plants met the drinking water standards for each of the listed compounds and all other constituents for which standards are promulgated.

Loadings of constituents in each plant's influent are expected to increase in proportion to population, and possibly to flow, unless the flow is altered intentionally through treatment plant operations (e.g., through the diversion of flow to the JWPCP or another WRP). Deviations or fluctuations of SS, COD, or BOD loadings from directly proportional increases could result from water conservation, changes in population habits, or other factors mentioned above.

Table 5.3-1
INFLUENT DATA FOR THE JOINT OUTFALL SYSTEM TREATMENT FACILITIES
FY 92-93

Influent Constituent	Units	JOS Treatment Plants					
		JWPCP	SJCWRP	LCWRP	WNWRP	LBWRP	PWRP
Average flow	mgd	328	79	31.3	12.1	17.6	12.6
TSS	mg/l	449	290	449	250	351	245
BOD	mg O/l	360	257	325	216	252	229
COD	mg O/l	794	536	762	458	642	483
Ammonia	mg N/l	29.6	20.7	24.3	21.5	23.7	22.5
Cyanide	mg/l	0.0125	<0.01	<0.01	<0.01	<0.01	<0.01
Total Sb	mg/l	0.0052	0.0012	0.001	0.001	<0.001	<0.003
Total Ba	mg/l		0.13	0.2	0.115	0.325	0.08
Total Be	mg/l	<0.001	<0.01	<0.01	<0.01	<0.01	<0.055
Total Cd	mg/l	0.0032	<0.0065	<0.01	0.015	<0.01	0.055
Total Cr	mg/l	0.0444	0.02	0.025	0.02	0.03	0.06
Total Cu	mg/l	0.1537	0.075	0.13	0.055	0.17	0.075
Total Pb	mg/l	0.0302	0.05	0.045	0.04	0.05	<0.04
Total Mn	mg/l		0.03	0.08	0.03	0.15	0.06
Total Hg	mg/l	0.0008	0.0002	0.0009	0.0005	0.0059	0.0001
Total Ni	mg/l	0.0638	0.03	0.12	<0.03	<0.03	<0.065
Total Se	mg/l	0.0232	0.0177	0.0187	0.0233	0.018	0.0012
Total Ag	mg/l	0.0159	0.01	0.012	0.0065	0.015	0.007
Total Tl	mg/l	<0.05	<0.026	<0.026	<0.026	<0.026	<0.026
Total Zn	mg/l	0.374	0.275	0.385	0.215	0.5867	0.11

Table 5.3-2
TRACE COMPOUNDS DETECTED IN THE
INFLUENT OF JOS WATER RECLAMATION PLANTS

Influent Compound	Drinking Water Standard (μg/l)	Plants at which Compound was Detected	Did Plant Effluent Meet all Drinking Water Standards?
Methylene Chloride	40	LC, Pomona, SJC, WN	Yes
Chloroform	100	LC, Pomona, SJC, WN	Yes
1,1,1-Trichloroethane (TCA)	200	LC, Pomona, SJC, WN	Yes
Tetrachloroethylene (PCE)	5	LC, Pomona, SJC, WN	Yes
Dibromochloromethane	100	SJC	Yes
Ortho-dichlorobenzene	130	SJC	Yes
Para-dichlorobenzene	130	LC, Pomona, SJC, WN	Yes
Benzene	1	LC, Pomona, SJC	Yes
Toluene	100	LC, Pomona, SJC, WN	Yes
Ethylbenzene	680	LC, Pomona, WN	Yes
Xylene	1750	LC, Pomona, SJC, WN	Yes

5.4 CURRENT AND PROJECTED BIOSOLIDS PRODUCTION

5.4.1 CURRENT SOLIDS PRODUCTION IN THE JOS

All solids in the JOS are treated at the JWPCP. The solids removed from the wastewater at the five upstream WRPs are returned to the trunk sewer system for transport to the JWPCP. These solids, combined with solids generated in the JWPCP tributary area, represent the total quantity of solids generated in the JOS service area. In addition, all waste activated sludge (WAS) generated at the JWPCP through secondary treatment must be processed there. Thus, there are two types of solids processed at the JWPCP: influent solids, which are generated by the JOS population, and WAS generated at the JWPCP.

The mass of solids generated in the JOS service area may be calculated using the JWPCP influent suspended solids concentration and plant flow rate. Figure 5.4-1 shows the historic records of annual average solids received at the JWPCP from 1965 through 1993.

The solids entering the JWPCP will be broken into two components for the purpose of making a long term projection. The major component is the solids discharged into the sewer system by the domestic, commercial and industrial users of the JOS. The second component is the WAS generated by biological secondary treatment at the five upstream WRPs. The WAS is returned to the sewer system for treatment at the JWPCP.

Additional solids are generated at the JWPCP from the pure-oxygen biological secondary treatment system. In 1993, the WAS generated at JWPCP from 195 mgd of secondary treatment was 41,000 dry tons per year. Quantities of solids production in the JOS in 1993 are shown below in Table 5.4-1 for each component of solids. All solids quantities are expressed in dry tons of solids per year.

Table 5.4-1
JOS SOLIDS PRODUCTION — 1993

Source	Quantity
Solids Entering JWPCP	
Solids from Service Area	220,000 dry tons/yr
WAS from WRPs	18,000 dry tons/yr
TOTAL ENTERING JWPCP	**238,000 dry tons/yr**
WAS Generated at JWPCP	41,000 dry tons/yr
TOTAL JOS SOLIDS PRODUCTION	**279,000 dry tons/yr**

5.4.2 SOLIDS PROJECTION

The solids projection is based on growth trends in the JOS service area and on increased levels of secondary treatment in the JOS starting in the year 2002. The projected growth in population and wastewater flows is addressed earlier in this chapter. It is assumed that solids produced in the service area will increase at the same rate that wastewater flows increase. The WAS generated at the JOS WRPs will increase at approximately the same rate as wastewater flow treated at the plants. The WAS produced at JWPCP will increase with the flow and the increase in organic strength (COD) of the wastewater receiving secondary treatment. The COD of the primary treated wastewater going to secondary treatment at JWPCP in 1993 was less than 80 percent of the COD of the effluent which received only advanced primary treatment. This was due to differing characteristics of influent wastewater generated in different parts of the JWPCP service area and the physical layout of the primary sedimentation tanks.

Figure 5.4-2 shows the projected solids in the wastewater entering the JWPCP through the year 2010. The projection shows the expected JOS solids production resulting from all of the three possible treatment capacities at the JWPCP (the quantities of solids are approximately equal). The breakdown of the solids for the year 2010 projection follows in Table 5.4-2:

Table 5.4-2
SOLIDS ENTERING JWPCP — 2010 PROJECTION

	350 mgd Option	400 mgd Option	450 mgd Option
Solids from Service Area	288,000 tons/yr	288,000 tons/yr	288,000 tons/yr
WAS from WRPs	41,000 tons/yr	33,000 tons/yr	26,000 tons/yr
Total	**329,000 tons/yr**	**321,000 tons/yr**	**314,000 tons/yr**

By 2002, the JWPCP will provide secondary treatment to all influent wastewater. The WAS produced at the JWPCP will depend on the plant flow rate and the organic strength of primary treated wastewater.

For each option, the organic strength of the wastewater will vary due to the effects of the upstream WRPs. The projection for WAS production at JWPCP in 2010 is shown in Table 5.4-3 below.

Table 5.4-3
JWPCP WAS PROJECTION — 2010 PROJECTION

350 mgd	400 mgd	450 mgd
95,000 tons/yr	100,000 tons/yr	110,000 tons/yr

5.4.3 SOLIDS TREATMENT AND DISPOSAL

The projected quantities of biosolids for ultimate reuse or disposal are based on the level of performance achieved by various unit processes, including: primary sedimentation, secondary treatment, WAS thickening, anaerobic digestion and mechanical dewatering. The values used in this projection are based on the performance levels currently achieved at the JWPCP or on research studies conducted to predict future performance levels.

The JWPCP solids treatment system will consist of anaerobic digestion and mechanical dewatering. The anaerobic digestion process will receive a mixture of solids removed by the primary sedimentation process and WAS from the pure-oxygen secondary treatment system. The anaerobic digestion process converts approximately 50 percent of the organic matter in the biosolids into a gas consisting of methane and carbon dioxide. This gas will continue to be used, as it is today, as a fuel for electrical power production and other energy needs at the JWPCP.

Following anaerobic digestion, the solids are contained in a slurry that is over 97 percent water. Centrifuge dewatering equipment and conditioning chemicals will be used to separate digested solids from the water. The choice of dewatering equipment and the type of conditioning chemicals used are subject to change with advances in technology. The current dewatering system produces a material containing 25 percent solids by weight and 75 percent water by weight. With future increases in the relative amount of WAS due to full secondary treatment at JWPCP, the solids content of the material produced by the dewatering equipment is projected to decrease to 24 percent. After dewatering, the solids are in a reusable form and are referred to as "biosolids."

The projected quantity of biosolids that will be generated at the JWPCP is shown in Figure 5.4-3. The large increase in the year 2002 reflects the impact of full secondary treatment at JWPCP. The expected performance of the various treatment processes for the three treatment capacity options at JWPCP results in virtually identical estimates of the amount of biosolids for ultimate reuse or disposal.

5.5 WATER REUSE AND RECLAMATION

5.5.1 HISTORY OF WATER RECLAMATION AND REUSE BY THE DISTRICTS

The Districts have actively promoted water reclamation for nearly half a century. The Districts' first report on water reclamation was prepared in 1949. It described in detail the basic considerations of water reclamation including the opportunities that existed at that time. The report concluded that the configuration of the Districts' trunk sewer system and the available knowledge of sewage treatment processes would permit the safe and economic reclamation of wastewaters for specific uses to alleviate an impending water shortage and supplement the natural and imported water supply of the area. A second report, which was prepared in 1958, reaffirmed the general findings of the first report and made a specific proposal: to demonstrate to the general public the feasibility of full-scale water reclamation through the construction and operation of a 10 mgd water reclamation plant at Whittier Narrows. Subsequently, "A Plan for Water Re-use" was prepared in 1963 to determine where, when, and how additional water reclamation facilities could and should be constructed. Between 1966 and 1974, four water reclamation plants (PWRP, LCWRP, SJCWRP, and LBWRP) were constructed, thereby increasing the water reclamation capacity in the JOS from 10 mgd to 87.5 mgd. These four water reclamation plants were expanded between 1975 and 1985 to provide an additional 62.5 mgd of water reclamation plant capacity to the JOS. Since 1985 an additional 40.5 mgd of water reclamation plant capacity has been added to the JOS. Appendix A-5.5-1 is a chronology of reuse activities in the Joint Outfall System (JOS). Figure 5.5-1 shows the total effluent flow and total reclaimed water flow in the JOS since 1937.

Figure 5.5-2 shows the increase in reclaimed water produced and the increase in the reuse of reclaimed water over time. All of the reclaimed water produced at the five upstream water reclamation plants (WRPs) is suitable for reuse. Note in Figure 5.5-2 that the quantity of reclaimed water used has risen dramatically in the last 30 years; however, a large quantity of reclaimed water that is produced in the JOS is not reused. The major reasons this water is not used are: 1) demands for landscape irrigation, one of the most common uses, are largely seasonal, 2) demands for landscape irrigation at sites frequented by the public occurs at night when WRP flows are generally lowest, and 3) reclaimed water must by law be kept in pipelines separate from the potable water system, and the cost of constructing distribution systems to deliver reclaimed water to widespread locations suitable for reuse has often been prohibitive. The five JOS WRPs produced approximately 148 mgd of reclaimed wastewater in FY 1993-94. Reuse demands in FY 1993-94 averaged 73.8 mgd, and the remainder of the reclaimed water was released to inland waterways which, in turn, empty into the ocean. Within the last 20 years, the State of California suffered through two serious droughts, and the number of reuse sites has increased from approximately ten sites to 261 sites. The quantity of reclaimed water that has been reused at each water reclamation plant is shown in Figure 5.5-3. The majority of reclaimed water that is reused is reclaimed at the SJCWRP and the WNWRP. Historically, the greatest demand for reclaimed water has been for groundwater recharge, which is largely supplied by these two plants.

The Districts have supported water reclamation with research such as the Pomona Virus Study (1977) and the Health Effects Study (1984). The Pomona Virus Study demonstrated that the current treatment process of adding coagulants prior to inert media filtration was just as effective at removing viruses from secondary effluent as the then-prescribed process of coagulation followed by flocculation sedimentation, and then filtration. The Health Effects Study completed by the Districts in 1984 showed that the use of reclaimed water for groundwater recharge had caused no discernable health problems in those people who had been ingesting groundwater containing about 15 percent treated effluent for 20 years. The Districts addressed concerns over nitrates in groundwater with research (1993) that demonstrated the nitrification-denitrification process occurring underground. It was demonstrated that one-third of the nitrate present in reclaimed water is converted to nitrogen gas and that the rate of denitrification is limited by the availability of organic carbon. Research directed towards alleviating public concerns has bolstered the demand for reclaimed water.

5.5.2 CURRENT MARKETS AND LEVELS OF WATER RECLAMATION AND REUSE BY THE DISTRICTS

The supply of reclaimed water averaged 148.2 mgd (166,000 AFY) in FY 93-94. The FY 93-94 demand, defined by the contracts for reclaimed water, was 98 mgd (109,800 AFY). Table 5.5-1 summarizes JOS contracts for reclaimed water. "Water reclamation" or "reclaimed water" refer specifically to the process of treating wastewater to a point where it is usable. "Water recycling" or "water reuse" refers to the entire process, from treatment to distribution and reuse of the reclaimed water. The actual quantity of water reused in FY 93-94 was 73.8 mgd (82,700 AFY). This is less than the quantity of reclaimed water which the Districts contracted to sell over the same period, due to the seasonal demand for that water. This is demonstrated in Appendix A-5.5-2.

The water purveyors listed in Table 5.5-2 are responsible for the distribution of reclaimed water. Reclaimed water is reused for a variety of applications including landscape and agricultural irrigation, industrial processes, recreational impoundments, and groundwater recharge. In addition, water is reused at the JOS treatment plants for uses including landscape irrigation, washwater, cooling water, chlorine preparation, and centrate dilution. The following sections detail water reuse activities at each of the JOS water reclamation plants.

Long Beach WRP

This treatment facility was constructed in 1973 with a treatment capacity of 12.5 mgd, and expanded to its current capacity of 25 mgd in 1984. In FY 93-94, it produced an average of 17.0 mgd (19,100 AFY) of reclaimed water. The City of Long Beach has the first right of refusal to all reclaimed water produced at this facility.

Beginning in 1980, the Long Beach Water Department (LBWD) embarked on a multi-phase program to distribute reclaimed water throughout the City of Long Beach (Figure 5.5-4).

Table 5.5-1
SUMMARY OF CONTRACTS FOR SALE OF RECLAIMED WATER

Contract No.	Party	No. of Users	Contracted Quantity	Actual Use (FY 93-94)
1374	Central & West Basin Water Replenishment Dist.	1	10 mgd	10.9 mgd
1601	Los Angeles County	1	3 mgd	0.13 mgd
1794	Central & West Basin Water Replenishment Dist.	1	25 mgd	24.4 mgd
1816	City of Long Beach	42	25 mgd	2.65 mgd
2288	California Country Club	1	0.89 mgd	0.34 mgd
2300	City of Cerritos	84	3.6 mgd	1.58 mgd
2311	City of Bellflower	1	0.89 mgd	0.05 mgd
2399	City of Industry	1	4 mgd	1.17 mgd
2520	City of Pico Rivera	0	0.36 mgd	0 mgd
3133	Central Basin MWD	72	7.14 mgd	1.30 mgd
3142	City of Pomona	58	10 mgd	6.79 mgd
3286	San Gabriel Valley Water Co.	2	0.05 mgd	0.04 mgd
	TOTALS	264	90 mgd	49 mgd

Table 5.5-2
LIST OF RECLAIMED WATER PURVEYORS

City of Long Beach	Central Basin Municipal Water District
City of Cerritos	City of Santa Fe Springs
City of Lakewood	City of Downey
City of Bellflower	Park Water Company
City of Industry	Peerless Water Company
City of Pomona	Bellflower-Somerset Water Company
Walnut Valley Water District	Southern California Water Company

Table 5.5-3 lists the users of the LBWD system as of the end of FY 92-93. During this period, the LBWD delivered 2.83 mgd (3,180 AFY), or 15.5 percent of the reclaimed water produced at this plant, through approximately 19.5 miles of pipeline (6- to 24-inches in diameter) to 42 sites encompassing 1,810 acres.

Table 5.5-3
SUMMARY OF RECLAIMED WATER USAGE, FY 1993-94
LONG BEACH WATER DEPARTMENT

REUSE SITE	START-UP DATE	ACREAGE	TYPE OF USE	USAGE (MGD)
El Dorado Park West	Aug 80	135	L	0.116
El Dorado Golf Course	Aug 80	150	L	0.187
Recreation Park and Golf Course	Oct 82	175	L	0.257
Whaley Park	Jun 83	9	L	0.019
El Dorado Park East	Jan 84	300	L	0.490
Nature Center	Jan 84	60	L	0.053
605 Freeway	Feb 84	50	L	0.036
Heartwell Park	Feb 84	120	L	0.133
Skylinks Golf Course	Apr 84	155	L,P	0.252
Douglas Park	Apr 84	3	L	0.003
Kitano Nursery	Apr 84	3	O	0.008
405 Freeway (Atherton)	May 84	5	L	0.004
DeMille Junior High School	Jun 84	5	AF	0.008
Heartwell Golf Park	Jun 84	30	L	0.075
Veteran's Memorial Stadium	Jan 85	6	AF	0.019
Recreation Park Bowling Green	Aug 85	3	L	0.008
Sunrise Growers Nursery-East & West	Sep 85	11	O	0.089
California State University, Long Beach	Dec 85	52	AF	0.069
Long Beach City College	Feb 86	15	AF	0.024
Recreation 9-Hole Golf Course	Mar 86	37	L	0.083
Blair Field	Apr 86	5	AF	0.009
Woodlands Park	Apr 86	7	L	0.012
Colorado Lagoon Park	Apr 86	4	L	0.004
Marina Vista Park	Apr 86	30	L	0.026
Long Beach Naval Hospital	Aug 87	42	L	0.013
Lakewood 1st Presbyterian Church	Sep 88	1	L	0.002
Virginia Country Club	Mar 89	135	L,P	0.281
Lakewood Golf Course	Mar 89	128	L,P	0.067
Scherer Park	Mar 89	24	L	0.018
Sunnyside Memorial Park	Apr 89	35	L	0.078
All Soul's Cemetery	Apr 89	40	L	0.121
Cherry Avenue Park	May 89	10	L	0.012
Los Coyotes Diagonal	Mar 91	1	L	0.003
Wilson High School	Jun 91	5	AF,L	0.020
Long Beach Water Dept. office	Jan 92	2	L	0.007
Long Beach Water Dept. office cooling	Jan 92		I	0
Reservoir Park (Signal Hill)	Feb 92	2	L	0.009
Burroughs Elementary School (Signal Hill)	Feb 92	4	AF,L	0.003
Hughes Middle School	Apr 92	3	AF,L	0.009
405 Freeway (Walnut)	Apr 92	9	L	0.015
Somerset Park	May 92	3	L	0.005
Longfellow Elementary School	May 92	1	AF,L	0.003
TOTALS		**1,816**		**2.652**

NOTES: L = Landscape irrigation, P = Impoundment, WR = Wildlife refuge, AG = Agricultural irrigation, I = Industrial, O = Ornamental plant irrigation, AF = Athletic field irrigation, R = Groundwater replenishment.

Los Coyotes WRP

The LCWRP was constructed in 1970 with a treatment capacity of 12.5 mgd. It was expanded to its current design capacity of 37.5 mgd in 1975. Reclaimed water produced during FY 93-94 averaged 33.92 mgd (38,000 AFY). This was an increase of 8.3 percent over the preceding fiscal year. Through four contracts, an average of 3.33 mgd (2,513 AFY), or 9.8 percent of the reclaimed water produced at this plant, was delivered in FY 93-94 to the cities of Bellflower, Cerritos, Lakewood, and to the Cities of Downey and Santa Fe Springs through the Century Reclamation Project.

City of Bellflower

Reclaimed water deliveries to a single, five acre site (Ruth B. Caruthers Park) in this city began in November 1978 and currently average 0.045 mgd (51 AFY) for landscape irrigation. The park is supplied through 1,900-feet of 4-inch pipe which crosses the San Gabriel River along a footbridge. This site, at some future time, could be disconnected from the existing delivery system and connected to the Century Reclamation Program which is described below.

City of Cerritos

Initial deliveries of reclaimed water 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 directly adjacent to the LCWRP via a pump station dedicated to this use. This system was abandoned in May 1988 when the City of Cerritos completed its city-wide distribution system (Figure 5.5-5). Table 5.5-4 lists all users of reclaimed water on the Cerritos distribution system as of FY 93-94. A 21 mgd pump station adjacent to the northside of the effluent forebay delivers water through 24.6 miles of pipe that loops through the city. Provisions were made so that the neighboring cities could connect to this distribution system sometime in the future and make use of the ultimate system capacity of 4,000 AFY. During FY 93-94, the City of Cerritos used 1.58 mgd (1,650 AFY), or 4.7 percent of the reclaimed water produced at the LCWRP, for landscape irrigation and impoundments at 68 individual sites, and for construction uses and landscape irrigation via private and city water trucks, respectively.

City of Lakewood

In August 1989, the City of Lakewood connected to two of the stub-outs provided in the City of Cerritos reclaimed water distribution system to supply their own distribution system. This system consists 5.4 miles of pipeline serving sixteen sites. Reclaimed water users from the Lakewood distribution system as of the end of FY 93-94 are shown in Figure 5.5-6 and listed in Table 5.5-5. During FY 93-94, the City of Lakewood used 0.40 mgd (450 AFY), or 1.2 percent of reclaimed water produced at the LCWRP, for irrigation of landscaping, athletic fields and vegetable gardens on 191 acres at 16 individual sites.

Table 5.5-4
SUMMARY OF RECLAIMED WATER USAGE, FY 1993-94
CITY OF CERRITOS
(Page 1 of 2)

REUSE SITE (Map Key No.)	START-UP DATE	ACREAGE	TYPE OF USE	USAGE (MGD)
Ironwood 9 Golf Course (20)	Nov 78	25	L,P	0.073
Library/Civic Center (12)	Dec 87	4	L	0.019
Olympic Natatorium (19)	Dec 87	6	L	0.020
Reservoir Hill Park (16)	Dec 87	4	L	0.010
Whitney Learning Center (44)	Dec 87	10	AF,L	0.028
Gonsalves Elementary School (34)	Dec 87	5	AF,L	0.014
Wittman Elementary School (39)	Dec 87	5	AF,L	0.011
Gahr High School (49)	Dec 87	28	AF,L	0.045
Area Development Project No. 2 (22)	Jan 88	11.5	L,P	0.079
Medians/Parkways (25)	Jan 88	33.7	L	0.128
605 Freeway (54)	Jan 88	58.6	L	0.040
91 Freeway (55)	Jan 88	70	L	0.077
Frontier Park (4)	Jan 88	2.5	L	0.009
Carmenita Junior High School (40)	Jan 88	5	AF,L	0.014
Cerritos Elementary School (33)	Jan 88	6	AF,L	0.016
Stowers Elementary School (38)	Jan 88	6	AF,L	0.019
Kennedy Elementary School (45)	Jan 88	7	AF,L	0.021
City Park East (6)	Jan 88	18	L	0.037
Satellite Park (3)	Jan 88	2	L	0.005
Leal Elementary School (36)	Jan 88	6	AF,L	0.007
Cerritos High School (42)	Jan 88	20	AF,L	0.041
Elliott Elementary School (46)	Jan 88	7	AF,L	0.010
Carmenita Park (1)	Jan 88	4.5	L	0.014
Juarez Elementary School (35)	Jan 88	7	AF,L	0.019
ABC Adult School & Office (41)	Jan 88	3	L	0.017
Tracy Education Center (43)	Jan 88	6	AF,L	0.004
Liberty Park (18)	Jan 88	20	L	0.080
Gridley Park (15)	Jan 88	9	L	0.021
Jacob Park (14)	Jan 88	4.5	L	0.012
Heritage Park (11)	Feb 88	12	L	0.037
Bragg Elementary School (32)	Feb 88	7	AF,L	0.017
Haskell Junior High School (48)	Feb 88	18	AF,L	0.023
Pat Nixon Elementary School (37)	Feb 88	5	AF,L	0.010
Cabrillo Lane Elementary School (47)	Feb 88	9	AF,L	0.006
Sunshine Park (13)	Feb 88	3.5	L	0.009
Friendship Park (2)	Feb 88	4	L	0.010
Bettencourt Park (8)	Feb 88	2	L	0.007
Brookhaven Park (9)	Feb 88	2	L	0.006
Saddleback Park (5)	Feb 88	2	L	0.004
Westgate Park (17)	Feb 88	4	L	0.009
Rainbow Park (7)	Mar 88	2.5	L	0.005
Bellflower Christian School (50)	Mar 88	30	AF,L	0.039
Cerritos Community College (51)	Mar 88	55	AF,L	0.094
Cerritos Regional County Park (53)	Apr 88	58.6	L	0.080
Artesia Cemetery District (52)	Apr 88	10.9	L	0.023
Rosewood Park (10)	Apr 88	2.7	L	0.013

NOTES: L = Landscape irrigation, P = Impoundment, WR = Wildlife refuge, AG = Agricultural irrigation, I = Industrial, O = Ornamental plant irrigation, AF = Athletic field irrigation, R = Groundwater replenishment.

Table 5.5-4
SUMMARY OF RECLAIMED WATER USAGE, FY 1993-94
CITY OF CERRITOS (Continued)
(Page 2 of 2)

REUSE SITE (Map Key No.)	START-UP DATE	ACREAGE	TYPE OF USE	USAGE (MGD)
Sports Complex (21)	Mar 89	25	AF,L	0.057
Shoemaker On/Off Ramp - 91 Freeway (23)	Dec 89	1.8	L	0.016
Transpacific Development Co. (26)	Feb 90	6.9	L	0.018
Automated Data Processing (28)	Feb 90	0.7	L	0.007
Sheraton Hotel (27)	Mar 90	0.6	L	0.003
Cerritos Pontiac/GMC Truck (29)	May 90	0.5	L	0.006
Moothart Chrysler (30)	May 90	0.4	L	0.007
Windjammer Off Ramp - 91 Freeway (24)	Sep 90	0.8	L	0.007
Browning Oldsmobile (31)	Sep 90	0.1	L	0.002
City Water Truck	May 91	--	L	0.001
Private Haulers	May 91	--	I	0.005
Parkside Condominiums (56)	May 91	1.8	L	0.009
Concordia Church (58)	Jun 91	4	L	0.006
Church of the Nazarene (59)	Aug 91	1	L	0.005
B&B Stables (60)	Aug 91	18	I	0.003
Shadow Park Homeowner's Association (57)	Nov 91	6	L	0.022
Area Development Project No. 6 (61)	Apr 92	9	L	0.072
Granada Park Homeowners Association (62)	May 92	3.8	L	0.013
Cerritos Post Office (63)	Feb 93	1	L	0.005
Center for the Performing Arts (64)	Mar 93	1	L	0.005
Delta Dental (65)	Nov 93	1.8	L	0.003
Orange County Nursery (66)	Dec 93	13	O	0.024
Varela's Nursery (67)	Mar 94	3.5	O	0.001
Vestar Development (68)	Jun 94	7.5	L	0.002
TOTALS		**730.8**		**1.583**

NOTES: L = Landscape irrigation, P = Impoundment, WR = Wildlife refuge, AG = Agricultural irrigation, I = Industrial, O = Ornamental plant irrigation, AF = Athletic field irrigation, R = Groundwater replenishment.

Table 5.5-5
SUMMARY OF RECLAIMED WATER USAGE, FY 1993-94
CITY OF LAKEWOOD

REUSE SITE (Map Key No.)	START-UP DATE	ACREAGE	TYPE OF USE	USAGE (MGD)
Rynerson Park (1)	Aug 89	40	L	0.107
Monte Verde Park (2)	Aug 89	4	L	0.007
Mae Boyer Park (3)	Aug 89	8	L	0.033
Jose Del Valle Park (4)	Aug 89	12	L	0.028
Jose San Martin Park (5)	Aug 89	9.3	L	0.022
City Water Yard (8)	Aug 89	1	L	0.007
Woodruff Avenue greenbelt (9)	Aug 89	4.1	L	0.010
South Street greenbelt (10)	Aug 89	3.3	L	0.007
Mayfair Park (6)	Dec 89	18	L	0.040
St. Joseph Parish School (11)	Aug 90	3.5	AF,L	0.006
Foster Elementary School (12)	Sep 90	6	AF,L	0.015
Civic Center Way and City Hall (7)	Nov 90	2.8	L	0.015
Mayfair High School (13)	May 91	36.5	AF,L	0.049
City Water Truck	Jun 91		L	0.001
Lindstrom Elementary School (14)	Sep 91	12	AF,L	0.021
Lakewood High School (15)	Sep 91	25	AF,L	0.016
My Hoa Farm (16)	May 93	5	AG	0.014
TOTALS		**190.5**		**0.399**

NOTES: L = Landscape irrigation, P = Impoundment, WR = Wildlife refuge, AG = Agricultural irrigation, I = Industrial, O = Ornamental plant irrigation, AF = Athletic field irrigation, R = Groundwater replenishment.

Central Basin Municipal Water District

The Central Basin Municipal Water District (CBMWD), a regional water purveyor and MWD member agency, is developing the Century reclaimed water distribution system which will serve the cities of Bellflower, Compton, Downey, Lynwood, Norwalk, Paramount, Santa Fe Springs and South Gate. This project will initially consist of 26 miles of pipelines connected to one of the 24-inch distribution lines from the City of Cerritos pump station. Additionally, a four million gallon potable storage reservoir in the City of Santa Fe Springs has been converted for daily operational storage of reclaimed water. At some future date, a separate pump station which will serve this system is expected to be constructed. The backbone of the distribution system is a 30-inch pipeline paralleling the San Gabriel River. This project eventually will deliver up to 7.1 mgd (8,000 AFY) of reclaimed water to over 100 sites for applications such as landscape irrigation at parks, schools and freeway rights of way, nursery stock irrigation and various industrial applications. Provisions have been made to connect this system to the Rio Hondo reclaimed water distribution system which is currently under construction. Figure 5.5-7 shows the location of planned reclaimed water use sites. During FY 93-94, the CBMWD delivered 1.30 mgd (1,460 AFY) of reclaimed water to six water purveyors for landscape and athletic field irrigation on 780 acres at 72 individual sites listed in Table 5.5-6.

Pomona WRP

This treatment facility was constructed in 1966, and was expanded in 1991 to treat up to 13 mgd of wastewater. In FY 93-94, the plant produced 12.00 mgd (13,440 AFY) of reclaimed water. The Pomona Water Department and the Walnut Valley Water District (WVWD) used 6.74 mgd (7,540 AFY) or 56.1 percent of the plant's total production. The remaining reclaimed water is discharged to the unlined San Jose Creek channel where it makes its way to the unlined San Gabriel River. Most PWRP effluent discharged in this manner percolates into the groundwater. Thus, nearly 100 percent of the plant's effluent is reused.

Pomona Water Department

Use of treated wastewater in the Pomona area dates back to 1904 when effluent treated to various levels was used on many farms and ranches in the area. The City of Pomona Water Department began using reclaimed water from the PWRP in December 1973 when agricultural irrigation systems at California Polytechnic University, Pomona, its satellite farming operation at Lanterman State Hospital, and a landscape irrigation system along South Campus Drive Parkway were connected to a reclaimed water distribution system. In later years, two freeway interchanges, two paper mills, and a county regional park were added. The distribution system consists of a 13 mgd pump station which feeds two 21-inch transmission lines. A 21-inch unreinforced concrete gravity line from the WRP serves the Spadra Landfill, Lanterman Hospital and the WVWD system. During FY 93-94, the Pomona Water Department delivered 5.57 mgd (6,240 AFY), or 46.4 percent of the reclaimed water from the PWRP, to its nine retail customers shown in

Table 5.5-6
SUMMARY OF RECLAIMED WATER USAGE, FY 1993-94
CENTURY RECLAMATION PROGRAM

REUSE SITE (City)	START-UP DATE	ACREAGE	TYPE OF USE	USAGE (MGD)
Andy's Nursery (Bellflower)	Feb 92	23	O	0.052
Lake Center Park (Santa Fe Springs)	Mar 92	16	L	0.039
Clarkman Walkway (Santa Fe Springs)	Mar 92	0.1	L	0.001
Towne Center Walkway (Santa Fe Springs)	Apr 92	0.1	L	0.0004
Lakeview Child Care (Santa Fe Springs)	May 92	0.2	L	0.002
Orr & Day Road medians (Santa Fe Springs)	May 92	0.1	L	0.0001
Florence Avenue medians (Santa Fe Springs)	Jun 92	3	L	0.019
Gauldin School (Downey)	Jun 92	8.4	AF,L	0.008
Rio San Gabriel School (Downey)	Jun 92	14.8	AF,L	0.012
Bellflower High School (Bellflower)	Jul 92	28.4	AF,L	0.076
Ernie Pyle High School (Bellflower)	Aug 92	4.9	AF,L	0.015
Higo Nursery (Bellflower)	Aug 92	5	O	0.004
Telegraph Road medians (Santa Fe Springs)	Aug 92	0.4	L	0.006
Lakeview Park (Santa Fe Springs)	Aug 92	6.7	L	0.016
Clark Estate (Santa Fe Springs)	Aug 92	4.3	L	0.004
Towne Center Green (Santa Fe Springs)	Aug 92	2.3	L	0.010
Pioneer Road medians (Santa Fe Springs)	Sep 92	0.4	L	0.004
Police Station (Santa Fe Springs)	Sep 92	0.2	L	0.001
Aqua Center (Santa Fe Springs)	Sep 92	0.5	L	0.004
Lewis School (Downey)	Nov 92	4.6	AF,L	0.012
Wilderness Park (Downey)	Nov 92	24	L	0.070
605 Freeway at Foster (Bellflower)	Jan 93	12	L	0.010
Promenade Walkway (Santa Fe Springs)	Jan 93	0.3	L	0.002
Rio San Gabriel Park (Downey)	Jan 93	6.4	L	0.027
East Middle School (Downey)	Jan 93	26	AF,L	0.014
Zinn Park (Bellflower)	Jan 93	1.7	L	0.004
605/105 Interchange (Bellflower)	Feb 93	22	L	0.018
Bellflower Golf Course (Bellflower)	Feb 93	22.5	L	0.042
Santa Fe Springs High School (Santa Fe Springs)	Feb 93	14.5	AF,L	0.023
605 Freeway at Florence (Santa Fe Springs)	Feb 93	24	L	0.020
Old Downey Cemetery (Downey)	Apr 93	7.8	L	0.008
Thompson Park (Bellflower)	Apr 93	15	L	0.018
105 Freeway at Bellflower (Downey)	May 93	17.9	L	0.024
Palms Park (Lakewood)	May 93	20	L	0.020
Crawford Park (Downey)	Jul 93	2.1	L	0.011
Avila Nursery (Downey)	Aug 93	11	O	0.004
105 Freeway at Lakewood (Downey)	Sep 93	25	L	0.024
Tuftex Carpet Mill (Santa Fe Springs)	Sep 93		I	0.320
Palms Elementary School (Lakewood)	Sep 93	3.5	AF,L	0.007
Artesia High School (Lakewood)	Sep 93	20.9	AF,L	0.023
West Middle School (Downey)	Oct 93	19.5	AF,L	0.013
Circle Park (South Gate)	Oct 93	4	L	0.006
Hollydale Park (South Gate)	Nov 93	46	L	0.056
Robertson's Ready-Mix (Santa Fe Springs)	Dec 93		I	0.013
710/105 Interchange (Paramount)	Dec 93	18.5	L	0.016
Downey/Contreras greenbelt (Paramount)	Dec 93	0.1	L	0.0004
Compton Golf Course (Paramount)	Dec 93	13	L	0.015

NOTES: L = Landscape irrigation, P = Impoundment, WR = Wildlife refuge, AG = Agricultural irrigation, I = Industrial, O = Ornamental plant irrigation, AF = Athletic field irrigation, R = Groundwater replenishment.

Table 5.5-6
SUMMARY OF RECLAIMED WATER USAGE, FY 1993-94
CENTURY RECLAMATION PROGRAM (Continued)
(Page 2 of 2)

REUSE SITE (Map Key No.)	START-UP DATE	ACREAGE	TYPE OF USE	USAGE (MGD)
Alondra Junior High School (Paramount)	Dec 93	14	AF,L	0.014
Mokler Elementary School (Paramount)	Dec 93	10	AF,L	0.003
Los Cerritos Elementary School (Paramount)	Dec 93	8	AF,L	0.005
Wirtz Elementary School (Paramount)	Dec 93	9	AF,L	0.009
Keppel Elementary School (Paramount)	Dec 93	4	AF,L	0.005
Senh Hau Liu Nursery (Paramount)	Dec 93	3.3	O	0.006
Menh Hau Liu Nursery (Paramount)	Dec 93	2	O	0.005
Kathy Thach Nursery (Paramount)	Dec 93	5.8	O	0.009
Billy Lee Nursery (Paramount)	Dec 93	2.5	O	0.004
Lan Vong Nursery (Paramount)	Dec 93	2	O	0.003
105 Freeway at Wright (Lynwood)	Jan 94	19.6	L	0.008
710 Freeway at M.L. King (Lynwood)	Jan 94	15.5	L	0.010
710 Freeway at San Rafael (Compton)	Jan 94	24.2	L	0.014
Independence Park (Downey)	Feb 94	10.4	L	0.005
Paramount Park (Paramount)	Feb 94	9	L	0.014
Paramount High School (Paramount)	Feb 94	19	AF,L	0.017
Rosecrans/Paramount medians (Paramount)	Mar 94	0.2	L	0.001
Somerset medians (Paramount)	Apr 94	0.4	L	0.001
Rio Hondo Golf Course (Downey)	Apr 94	92.4	L	0.050
Zimmerman Park (Norwalk)	Apr 94	9.5	L	0.004
Vista Verde Park (Norwalk)	Apr 94	6.5	L	0.005
Gerdes Park (Norwalk)	Apr 94	8.6	L	0.005
Clearwater Junior High School (Paramount)	Apr 94	4	AF,L	0.010
Park N' Ride Lot at 605 Fwy./Foster (Norwalk)	May 94	2	L	0.001
Steam Engine Park (Paramount)	Jun 94	0.6	L	0.0004
TOTALS		**783.4**		**1.304**

NOTES: L = Landscape irrigation, P = Impoundment, WR = Wildlife refuge, AG = Agricultural irrigation, I = Industrial, O = Ornamental plant irrigation, AF = Athletic field irrigation, R = Groundwater replenishment.

Figure 5.5-8. Table 5.5-7 lists the users of the Pomona system as of the end of FY 93-94. The Districts' Spadra Landfill is included in Figure 5.5-8 and Table 5.5-7, but is not served by the Pomona Water Department.

Walnut Valley Water District (WVWD)

In March 1986, the WVWD completed its reclaimed water distribution system which includes a 5 mgd pump station located at the end of the 21-inch concrete gravity line from the PWRP, 27 miles of pipeline and a two million gallon reservoir. Construction of a second two-million gallon reservoir was completed in mid-1992 in order to provide more storage for nighttime irrigation. The distribution system is supplemented during the peak summer demand periods with non-potable water from a well located adjacent to the reclaimed water line on Fairway Avenue and with MWD water, when necessary. Initially, 26 individual sites were served following completion of the distribution system, and another 15 sites have since been added. Figure 5.5-9 and Table 5.5-8 present the users of the WVWD system as of the end of FY 93-94. During FY 93-94, the WVWD purchased 1.22 mgd (1,370 AFY), or 10.2 percent of the reclaimed water produced at the PWRP, from the Pomona Water Department, and served 41 customers which irrigate 750 acres.

San Jose Creek WRP

The first stage of the SJCWRP was constructed in 1973 with a design capacity of 37.5 mgd. It was expanded by 25 mgd to 62.5 mgd in 1982, and by another 37.5 mgd to 100 mgd in 1992. Approximately 67.5 percent of the 74.83 mgd (83,810 AFY) of reclaimed water produced during FY 93-94 was reused. The remainder of the effluent was discharged to the concrete-lined portion of the San Gabriel River below Firestone Boulevard. Reclaimed water from this WRP was used at five sites (one temporary) which are shown in Figure 5.5-10 and listed in Table 5.5-9.

San Gabriel Coastal Basin Spreading Grounds/Rio Hondo Coastal Basin Spreading Grounds

The majority (95 percent) of reclaimed water from the SJCWRP which is actively used is used to recharge the Central Basin aquifer. This water is purchased from the Districts by the Water Replenishment District of Southern California, and is spread at groundwater recharge facilities operated by the Los Angeles County Department of Public Works. In FY 93-94, 49.51 mgd (55,450 AFY) of SJCWRP reclaimed water was directed either to the San Gabriel Coastal Basin Spreading Grounds via the plant's 66-inch outfall pipe (34 percent), or to the Rio Hondo Coastal Basin Spreading Grounds via the plant's discharge point to the San Jose Creek channel (66 percent). SJCWRP West also may discharge reclaimed water into the San Gabriel River upstream of the Zone 1 Ditch for transport to the Rio Hondo Coastal Basin Spreading Grounds. The groundwater recharge operation is limited to a three-year running average of 50,000 AFY (60,000 AFY maximum in any one year) of reclaimed water. Reclaimed water from the SJCWRP is used to make up the difference between this limit and the discharges of reclaimed water from the WNWRP and the PWRP which reach the recharge areas. From time to time, the entire daily production from this plant is reused. In FY 93-94, this occurred on 143 days, or approximately 39 percent of the time.

Table 5.5-7
SUMMARY OF RECLAIMED WATER USAGE, FY 1993-94
POMONA WATER DEPARTMENT

REUSE SITE	START-UP DATE	ACREAGE	TYPE OF USE	USAGE (MGD)
Cal Poly, Pomona-Kellogg	Dec 73	500	AG,L,O,P,AF	1.005
Lanterman Hospital	Dec 73	100	AG	0
South Campus Drive Parkway	Dec 73	8	L	0.022
Route 57 and 10 Freeways	May 75	18	L	0.028
Bonelli Regional County Park	Apr 77	800	L	0.755
Smurfit Newsprint	Oct 79	–	I	3.285
Route 71 and 10 Freeways	Apr 81	12	L	0.009
Simpson Paper Company	Aug 83	–	I	0.241
Spadra Landfill	Jul 84	53	L	0.226
TOTALS		1,491		5.571

NOTES: L = Landscape irrigation, P = Impoundment, WR = Wildlife refuge, AG = Agricultural irrigation, I = Industrial, O = Ornamental plant irrigation, AF = Athletic field irrigation, R = Groundwater replenishment.

Table 5.5-8
SUMMARY OF RECLAIMED WATER USAGE, FY 1993-94
WALNUT VALLEY WATER DISTRICT

REUSE SITE (City)	START-UP DATE	ACREAGE	TYPE OF USE	USAGE (MGD)
Suzanne Park (Walnut)	Oct 80	12	L	0.018
Suzanne Middle School (Walnut)	May 86	4	AF,L	0.013
Walnut High School (Walnut)	May 86	15	AF,L	0.038
Vejar School (Walnut)	May 86	3	AF,L	0.014
Morris School (Walnut)	May 86	9	AF,L	0.014
Snow Creek Park (Walnut)	May 86	7	L	0.025
Snow Creek Landscape Maintenance Dist. (Walnut)	May 86	13.5	L	0.099
Lemon Creek Park (Walnut)	May 86	5	L	0.006
Friendship Park (West Covina)	May 86	6	L	0.009
Hollingworth School (West Covina)	May 86	3	AF,L	0.014
Lanesboro Park (West Covina)	May 86	2	L	0.003
Rincon Middle School (West Covina)	May 86	3	AF,L	0.022
Sunshine Park (L.A. County)	May 86	4	L	0.010
Rowland School (Rowland Heights)	May 86	3	AF,L	0.009
Farjardo School (Rowland Heights)	May 86	4	AF,L	0.005
Farjardo Park (Rowland Heights)	May 86	4	L	0.009
Route 57 and 60 Freeways (Rowland Heights)	May 86	15	L	0.013
Rowland Heights Regional Co. Park (Rowland Heights)	May 86	11	L	0.013
Rowland High School (Rowland Heights)	May 86	9	AF,L	0.029
Killian School (Rowland Heights)	May 86	3	AF,L	0.011
Walnut Elementary School (Walnut)	May 86	4	AF,L	0.002
WUSD Administrative Service Center (Walnut)	May 86	4	L	0.007
Walnut Ranch Park (Walnut)	Jun 86	26	L	0.045
Amar Road Landscape Maintenance Dist. (Walnut)	Jun 86	16	L	0.036
Nogales High School (L.A. Co.)	Jun 86	11	AF,L	0.035
Queen of Heaven Cemetery (Rowland Heights)	Jun 86	35	L	0.075
Diamond Bar Golf Course (Diamond Bar)	Jul 86	174	L,P	0.245
Walnut Valley Water Dist. pump station (Walnut)	Jul 86	1	L	0.001
Schabarum Regional Co. Park (L.A. Co.)	Sep 86	250	L	0.105
Walnut Ridge Landscape Maintenance Dist. (Walnut)	Mar 87	25.5	L	0.095
Morningside Park (Walnut)	Mar 87	4	L	0.011
Gateway Corporate Center (Diamond Bar)	Jun 87	45	L	0.119
Sunshine Growers (Walnut)	May 88	7	O	0.006
Westhoff Elementary School (Walnut)	Sep 88	8	AF,L	0.012
Temple Avenue greenbelt (Walnut)	Jan 90	1	L	0.001
Valley Business Center (Walnut)	Apr 90	1	L	0.003
Lemon Avenue greenbelt (Walnut)	Sep 91	3.5	L	0.009
South Coast AQMD Headquarters (Diamond Bar)	Nov 91	2	L	0.008
Walnut Valley Water Dist. reservoir (Diamond Bar)	May 92	1	L	0.002
First Chinese Baptist Church (Walnut)	Dec 92	0.3	L	0.004
Calle Baja slopes (Walnut)	Aug 93	0.5	L	0.004
Grand Ave/60 Freeway on-ramp (Diamond Bar)	Aug 93	4.7	L	0.002
Burger King restaurant (Diamond Bar)	Oct 93	0.2	L	0.001
GTE Building (Walnut)	Nov 93	7.2	L	0.005
Rodeo Ridge Landscape Maintenance Dist. (Walnut)	Dec 93	6.3	L	0.005
Golden Springs Drive median (Diamond Bar)	Jan 94	0.5	L	0.005
Isidro Cendejas strawberry farm (Walnut)	Mar 94	1.8	AG	0.001
Walnut Hills Village Shopping Center (Walnut)	Mar 94	2.4	L	0.003
TOTALS		**778.4**		**1.220**

NOTES: L = Landscape irrigation, P = Impoundment, WR = Wildlife refuge, AG = Agricultural irrigation, I = Industrial, O = Ornamental plant irrigation, AF = Athletic field irrigation, R = Groundwater replenishment.

Table 5.5-9
SUMMARY OF RECLAIMED WATER USAGE, FY 1993-94
SJCWRP

REUSE SITE (City)	START-UP DATE	ACREAGE	TYPE OF USE	USAGE (MGD)
Water Replenishment District	Jun 71	--	R	49.51
California Country Club (Industry)	Jun 78	120	L,P	0.345
Industry Hills Recreation Area (Industry)	Aug 83	600	L,P	0.828
Arbor Nursery (Whittier)	Apr 86	5	O	0.008
TOTALS		725		50.691

NOTES: L = Landscape irrigation, P = Impoundment, WR = Wildlife refuge, AG = Agricultural irrigation, I = Industrial, O = Ornamental plant irrigation, AF = Athletic field irrigation, R = Groundwater replenishment.

City of Industry

In August 1983, the City of Industry completed a reclaimed water distribution system to serve the Industry Hills Recreation and Conservation Area. This system includes a 10 mgd pump station at the SJCWRP East and seven miles of 36-inch pipe paralleling the San Jose Creek Channel to a two million gallon reservoir with a 5 mgd booster pump station at Anaheim and Puente Roads. During FY 93-94, this distribution system delivered 0.83 mgd (930 AFY) of reclaimed water to the 600-acre reuse site, where it was used for landscape irrigation of two 18-hole golf courses and an equestrian area, and as a source of supply for eight ornamental lakes and storage impoundments.

California Country Club

Deliveries of reclaimed water to this 120-acre golf course located directly across the San Jose Creek Channel from the SJCWRP East began in June 1978. Chlorinated reclaimed water is delivered to the golf course's 0.75 acre Lake No. 2 by means of an 8-inch polypropylene line inside a 24-inch reinforced concrete pipe siphon under the channel. The golf course irrigation system is supplied by two pumps which can deliver a maximum of 2.6 mgd of reclaimed water from the lake. During FY 93-94, an estimated 0.34 mgd (390 AFY) of reclaimed water was delivered to this site.

Arbor Nursery

In April 1986, this five acre nursery began operations under a Department of Water and Power right-of-way adjacent to Districts' property which is now the site of the SJCWRP West plant. Reclaimed water is delivered to this site via a 6-inch steel pipe. During FY 93-94, 0.010 mgd (12 AFY) of reclaimed water was delivered to this site and used for the irrigation of ornamental plants.

Whittier Narrows WRP

This treatment facility was the first water reclamation plant built by the Districts and was completed in 1962. It was originally designed for 12 mgd, and it currently has a design capacity of 15 mgd. Of the 10.52 mgd (11,780 AFY) of reclaimed water produced during FY 93-94, most was reused; but an average of 0.04 mgd (45 AFY) was bypassed to the concrete-lined portion of the Rio Hondo below the Rio Hondo Coastal Basin Spreading Grounds in Montebello and flowed to the ocean during heavy storm flow periods from January to March 1993. Reclaimed water from this WRP is used at two sites shown on Figure 5.5-11.

San Gabriel Coastal Basin Spreading Grounds/Rio Hondo Coastal Basin Spreading Grounds

The majority (99 percent) of reclaimed water produced at the WNWRP was used to recharge the Central Basin aquifer. Like the water from SJCWRP, this water is purchased by the Water Replenishment District of Southern California, but is recharged at facilities which are operated by the Los Angeles Department of Public Works. In FY 93-94, 10.48 mgd (12,236 AFY) was directed either to the Rio Hondo Coastal Basin Spreading Grounds via the plant's discharge point to the Rio Hondo (90 percent) or to the San Gabriel Coastal Basin Spreading Grounds via the plant's outfall pipe to the San Gabriel River (10 percent). A third discharge point, the Zone 1 Ditch leading to the Rio Hondo Coastal Basin Spreading Grounds, was not used during FY 93-94.

F.L. Norman's Nursery

In March 1983, the Flora Nursery leased from the Districts a 17-acre parcel located northwest of the junction of the 60 and 605 Freeways, and contracted for the purchase of reclaimed water for the irrigation of nursery stock. This operation was sold to F.L. Norman's Nursery in March 1986. The Stage III (West) expansion of the SJCWRP required that the nursery operations be relocated from this site to land leased by the Districts from the Army Corps of Engineers adjacent to the WNWRP. This relocation began in December 1988 and was completed on May 27, 1989. Reclaimed water is supplied to the nursery operation from the WNWRP final effluent forebay through the nursery's own pump. During FY 93-94, 0.033 mgd (37 AFY) of reclaimed water was delivered for the irrigation of ornamental plants.

5.5.3 PROJECTED SIZES AND LOCATIONS OF WATER REUSE MARKETS IN THE JOS AREA

Studies have been conducted to identify additional users of reclaimed water. Various projects are presently under development in areas where the market potential makes projects economically feasible. Additionally, this section discusses a few of the impediments and benefits to meeting future reclaimed water demands.

Markets for Reclaimed Water

Over the past 15 years, several studies have been conducted to examine the market potential for water reuse within the Districts' JOS service area. Many of these studies were prepared under the direction of water districts and water purveyors in response to droughts that occurred in the late 1970's and 1980's. The most comprehensive of these studies, the Orange and Los Angeles Counties (OLAC) Water Reuse Study, was completed in 1982. The OLAC Study evaluated the technical, economic and regulatory aspects of using reclaimed water and defined a sequence of projects that could be developed to use reclaimed water over a 20- to 30-year time period. Although the study is somewhat outdated, several of the projects or variations of the projects identified have been developed and several others are still valid and continue to be considered for future development.

More recent and project-specific studies have examined the further use of reclaimed water from Districts' facilities. Projects considered include: expanded recharge of reclaimed water in the Montebello Forebay by the Water Replenishment District; an extension of the City of Industry's distribution system to serve the Walnut Valley Water District, the Rowland Water District and the City of West Covina; the Upper San Gabriel Valley Water Reclamation Program; the Century and Rio Hondo Reclamation Programs; the use of reclaimed water for the Whittier Narrows Recreation Area; the Alamitos Seawater Intrusion Barrier Project; an expansion of the Long Beach Water Department's Distribution System; and the Puente Hills/Rose Hills Project. Feasibility studies for these projects have identified demands for reclaimed water shown in Table 5.5-10, which could be served by Districts' JOS water reclamation plants. The demand for reclaimed water on a maximum day could be higher than the demand listed in Table 5.5-10. Using a typical maximum day to annual average ratio of 1.5, the water reuse demand from presently identified projects could reach 317 mgd on a maximum day in the year 2010. A few studies involving potential uses of reclaimed water in the southwestern portion of the County (District No. 5, South Bay Cities Sanitation District and District No. 8) and the City of Los Angeles, have identified the JWPCP or a future WRP site as possible sources of reclaimed water. The Long Beach Water Department Master Plan included 9 mgd of demand from the Dominguez Water Corporation in Carson. This demand could be met by JWPCP if the effluent could be treated to an acceptable level.

A Coordination Study sponsored by the Districts and four water agencies was completed in May 1993 to identify operational strategies and capital improvements required to meet the identified demands for reclaimed water from the Pomona, San Jose Creek, Whittier Narrows and Los Coyotes WRPs through the year 2010. The improvements discussed included both expansions to WRPs and modifications to the distribution systems. To meet demands through the year 2010, expansions would be required at either the WNWRP, the SJCWRP or the PWRP. The LCWRP was considered to have excess capacity that could be pumped upstream to satisfy some of the demands in the vicinity of the SJCWRP and the WNWRP. The Districts are currently preparing a plan for the beneficial reuse of its reclaimed wastewater. This plan, which will be completed in 1995, will identify and evaluate the potential for reuse of all of the reclaimed water produced by the Districts.

Further investigations also should examine areas which are not currently encompassed by any water reuse planning activities. As costs of imported water increase, the feasibility of reclaimed water projects will improve in areas beyond the scope of current planning. There may also be opportunities for water reuse outside the county and possibly out of the region that could increase the demand to produce additional reclaimed water. Orange County Water District has considered the possibility of connecting to the Cerritos reclaimed water distribution system to purvey water to La Palma, Cypress, and Buena Park; currently, the Water District considers this scenario unlikely because of the high cost.

Table 5.5-10
FUTURE POTENTIAL FOR RECLAIMED WATER USE

Plant	EXISTING (MGD)				Future demand (MGD)[2]		
	Flow[1]	Capacity	Reuse[1]	Peak Monthly Reuse[5]	2000	2010	2020
Long Beach	17.1	25.0	2.8	6.3	22[3]		
Los Coyotes	31.3	37.5	2.6	4	9	12	13
Pomona	12.6	13.0	6.7	9	12	16	18
San Jose Creek I, II & III	67.1	100.0	25.7	[4]	117	125	129
Whittier Narrows	12.1	15.0	10.9				
JWPCP[6]	0	0	0		36[7]		
TOTAL	140.2	190.5	48.8		196	211	218

(1) *Annual Status Report on Reclaimed Water Use (Fiscal Year 1992-93).*
(2) *Regional Wastewater Reclamation and Reuse Operations Coordination Study; prepared by Engineering-Science for Central Basin Municipal Water District*
(3) *Long Beach Water Department - Reclaimed Water Master Plan; excludes 9 mgd to Dominguez Water Company in Carson.*
(4) *Peak monthly is complicated at these plants because water that is not directly reused can be used for recharge.*
(5) *Based on FY 92-93 data.*
(6) *Zero flow and capacity because JWPCP effluent does not meet minimum criteria to meet the demand.*
(7) *From Dominguez Gap Barrier Water Reuse Feasibility Study.*

Water Reuse Study

As a condition of the Consent Decree, the Districts agreed to use their best efforts to attain and maintain a goal of 150 mgd of beneficial reuse of reclaimed water by December 31, 2002. In addition, the Districts agreed to prepare a plan for the beneficial reuse of reclaimed wastewater produced at Districts' facilities. As required by the Consent Decree, the plan shall:

- Identify and evaluate the potential for reuse of reclaimed water produced by the Districts;
- Delineate and examine the impediments to use of reclaimed water, including technical, regulatory, and institutional barriers; and
- Propose a strategy for avoiding or overcoming identified impediments.

Preparation of this plan will parallel preparation of the JOS 2010 Master Facilities Plan and, as required, the plan will be submitted to the EPA and the RWQCB on or before December 31, 1995.

Projects Currently in the Development Stage

A number of reclaimed water distribution projects throughout the Districts' service area are in various stages of development. These projects are listed in Table 5.5-11 along with the WRP which will be the source of reclaimed water and the estimated quantities of reclaimed water which the project will demand. The listed projects will demand over 62.4 mgd (70,000 AFY) on an average basis.

Long Beach WRP

Alamitos Seawater Injection Barrier Project. Due to overdraft of the Central Basin aquifer, the groundwater level in the basin has dropped below sea level, which has allowed seawater to move inland into the aquifer at various points along the coastline. In an effort to stem seawater intrusion into this aquifer, the Los Angeles County Department of Public Works (DPW) has constructed freshwater injection barriers in front of the advancing seawater at three locations in Los Angeles County. One of these barrier projects is located two miles south of the LBWRP and straddles the San Gabriel River and the Los Angeles/Orange county line. Approximately 7,000 AFY of non-interruptible imported water jointly purchased from MWD by the Water Replenishment District of Southern California and the Orange County Water District is presently injected into the Alamitos Barrier. In 1991, the facilities at the Barrier were expanded to accept 9 mgd (10,000 AFY).

A consortium consisting of these three agencies along with the Districts and the City of Long Beach was formed in October 1989 to examine the feasibility of using effluent from the LBWRP in place of the imported water in the injection barrier. A draft Engineering Report was completed in February 1992, which detailed the construction of operational storage followed by an advanced treatment process consisting of single stage lime clarification, recarbonation and dual media filtration in series, followed by parallel treatment with reverse osmosis and granular activated carbon adsorption. The proposed initial project would produce 4.5 mgd (5,000 AFY) of reclaimed water which has received advanced treatment that would be blended with an equal amount of MWD water at a 9.0 mgd pump station that will utilize the existing 27-inch MWD supply line to the Barrier. The purpose of blending is to demonstrate reliability of water quality and non-degradation of groundwater, with the eventual construction of the remainder of the treatment processes to enable the injection of 100 percent reclaimed water. On June 25, 1992, a permit application for the 50 percent project was filed with both the Los Angeles and Santa Ana Regional Water Quality Control Boards. In June 1993, a Site Investigation and Predesign Study was completed by Camp Dresser and McKee Consulting Engineers, which provided a layout for the treatment train described in the Engineering Report on four acres of land directly north of the LBWRP. If funding can be obtained in the near future, the first phase of this project could be on-line in 1995-96.

Table 5.5-11
SUMMARY OF FUTURE RECLAIMED WATER PROJECTS

Project Name	Reclaimed Water Source	Quantity (acre-feet/year)
Alamitos Intrusion Barrier	LBWRP	5,000-10,000
Long Beach Water Department	LBWRP	4,780
Puente Hills/Rose Hills	SJCWRP	3,000
Rio Hondo Project	SJCWRP	5,000-10,000
Upper San Gabriel Valley MWD	SJCWRP	34,200
City of Industry	SJCWRP	8,600
Water Replenishment District of Southern California	SJCWRP	10,000
Whittier Narrows Recreation Area	WNWRP	3,000

Long Beach Water Department Master Plan. The LBWD, in conjunction with Black and Veatch Consulting Engineers, has completed the preliminary engineering for a master plan to extend reclaimed water service throughout the entire city, supplying up to an additional 4.3 mgd (4,780 AFY) to approximately 120 new reuse sites. The plan calls for 25 miles of 6- to 36-inch diameter pipelines for a "looped" distribution network with an additional 28.5 mgd pump station, chlorination facilities, 2.2 millon gallons of equalization storage at the

LBWRP and a possible 4-mile, 16-inch intertie with the CBMWD's Century project to the north. Included in this plan is the abandonment of open lake storage and the establishment of 20 million gallons of seasonal, closed storage at the LBWD's water tank farm on Alamitos Reservoir Hill, by conversion of four or five of the 3.3 million gallon potable water tanks to reclaimed water storage and by the construction of additional reclaimed water storage tanks. This plan will be undertaken in conjunction with the Alamitos Seawater Intrusion Barrier reclaimed water project discussed in the previous section. This plan could be implemented over a four-year period with design of the first phase scheduled to begin in 1994.

San Jose Creek WRP

Puente Hills/Rose Hills. A distribution system is planned which will deliver approximately 2.7 mgd (3,000 AFY) of reclaimed water from the SJCWRP for landscape irrigation and dust control at the Districts' Puente Hills Landfill, for cooling tower water supply at the Districts' Puente Hills Energy Recovery from Landfill Gas (PERG) Facility, and for landscape irrigation at the adjacent Rose Hills Memorial Park. The distribution system will consist of a 36-inch gravity line that will tie into the 66-inch San Jose Creek Outfall on Workman Mill Road and run east to the original entrance to the landfill. The first of two pump stations will lift 17 mgd of reclaimed water 500-feet through a 36-inch force main to an existing 650,000 gallon reservoir located in close proximity to the PERG Facility. The second pump station will lift the reclaimed water another 300-feet through a 30-inch force main to a 1.2 million gallon reservoir that was constructed by Rose Hills on the border between the landfill and cemetery. Construction of the gravity line was completed on June 25, 1993.

Upper San Gabriel Valley Municipal Water District. This MWD member agency is planning a 33 mile long distribution system of 8- to 60-inch pipelines running north along the San Gabriel River with a 3.3 million gallon storage reservoir to deliver as much as 30 mgd (34,000 AFY) or more of reclaimed water from the Districts' SJCWRP West. Up to 25 mgd (28,000 AFY) of this water is planned to be used for groundwater replenishment of the Main San Gabriel Basin. Another 5.5 mgd (6,205 AFY) is planned to be used for direct use for irrigation, industry, and gravel pit operations. Since groundwater recharge will take place during winter months, the extra capacity of the transmission line can be utilized during the summer months to deliver reclaimed water to water purveyors for direct use for landscape irrigation and industrial processes. In a legal decision rendered by the Los Angeles Superior Court on February 26, 1991, the Upper San Gabriel Basin adjudication was amended to allow the use of reclaimed water for groundwater replenishment. A Feasibility Study and Implementation Program was completed by HYA Engineering Consultants in May 1992. Groundwater modeling on the effects of replenishment with reclaimed water has been performed showing minimal and mitigatable effects on the groundwater and nearby production wells.

Rio Hondo Reclamation Project. The Central Basin Municipal Water District is proceeding with a second regional distribution system to deliver an estimated 4.5 to 9 mgd (5,000 to

10,000 AFY) of reclaimed water from the SJCWRP to sites in the upper portion of their service area in the cities of Montebello, Pico Rivera, Commerce, Vernon, Santa Fe Springs and Whittier. This project is patterned after the regional concept of the "Century Project" now served by the LCWRP. The first completed sections will be connected to the Century distribution system, until the Rio Hondo distribution system and a pump station along the effluent outfall from the SJCWRP at Beverly Boulevard and San Gabriel River Parkway are completed. The connections to the Century system will remain, allowing for a looped system that is served by two independent treatment plants for additional reliability and system pressures.

Water Replenishment District of Southern California. Currently, this agency is the largest user of the Districts' reclaimed water. An average of 44.6 mgd (50,000 AFY) is currently used to recharge the Central Basin aquifer. This agency contracted with Black and Veatch to study the feasibility of constructing advanced treatment for total organic carbon removal, which would be required by the State Department of Health Services to allow an additional 9 mgd (10,000 AFY) of reclaimed water to be recharged. The recommended project in the July 1992 final report was the construction of separate granular activated carbon (GAC) contactors adjacent to the WNWRP to treat 10 mgd of WNWRP effluent, with the additional 9 mgd (10,000 AFY) of effluent for recharge being diverted to the Montebello Forebay spreading grounds from the SJCWRP. The results of pilot GAC column studies at the WNWRP indicated that separate GAC contactors could be built and operated at a comparable cost of purchasing untreated water from MWD. No completion date has yet been set for this project.

City of Industry. The City plans to extend its reclaimed water distribution system coming from the Districts' SJCWRP in the next two to three years to deliver an additional 3.6 mgd (4,000 AFY) to West Covina, Diamond Bar, the Rowland Water District and to the Walnut Valley Water District's reclaimed water system emanating from the Districts' PWRP, with an ultimate demand of 7.7 mgd (8,600 AFY). The project, as detailed in a March 1992 report by Stetson Engineers, requires the construction of 8.5 miles of a 36-inch "backbone" line, four mainline booster stations and four zone reservoirs. The City of Industry is also investigating the feasibility of locating a 3,300 MG (10,000 AF) open reservoir in the Tres Hermanos area of Diamond Bar for seasonal storage of reclaimed water, which could also serve as a recreational area; however, construction of this reservoir is several years away.

Whittier Narrows WRP

Whittier Narrows Recreation Area. The Districts have been working with the Los Angeles County Department of Parks and Recreation to ultimately supply approximately 2.9 mgd (3,200 AFY) of reclaimed water from the Districts' WNWRP to the adjacent Whittier Narrows Recreation Area, Golf Course and Legg Lake. The Department of Parks and Recreation retained Boyle Engineers to examine the feasibility of implementing this project, with a preliminary completion date of 1995.

Meeting Additional Demand

In future years, the demand for and value of reclaimed water will be largely dependent on the cost of alternative supplies. Since all new water to Southern California must be imported and given possible constraints on SWP water supplies, it can be assumed that the marginal cost of water is significantly higher than the present wholesale rate. Currently, MWD's wholesale rate for potable water is $385 per acre foot. Increases in this rate are projected to be greater than ten percent per year over the next few years and less than five percent thereafter. The current cost of reclaimed water distribution varies from $100 per acre foot to $400 per acre foot. Additionally, water wholesalers are eligible to receive rebates of $154/AF from MWD. As long as inflation in construction and energy costs remain moderate, the cost of potable water should increase at a significantly faster rate than the cost of developing reclaimed water. This in turn should make more reclaimed water projects feasible and thus increase the demand for additional reclaimed water. The closer that the WRP's are to areas of demand, the lower the distribution cost. The economic viability of reclaimed water rises as distribution costs decrease and as the costs of potable water supplies increase.

Discharge to Water Courses

Since it is highly unlikely that all reclaimed water produced at water reclamation plants can be used all of the time, it will always be necessary to provide outfall facilities to discharge reclaimed water to rivers or water courses. Therefore, siting of new water reclamation plants or expansions of existing facilities should consider the feasibility of discharging excess reclaimed water.

Secondary Benefits of Water Reuse

In addition to augmenting potable water supplies, the use of reclaimed water has several other benefits. First, the use of reclaimed water lowers upstream treatment expenses by reducing dechlorination costs. Reclaimed water which is pumped to a distribution system does not need to be dechlorinated, whereas effluent that is discharged to rivers must be partially or fully dechlorinated at the treatment plant. Secondly, the Districts derive income from the sale of reclaimed water. In FY 93-94 the Districts earned $1,225,000. Although this is only a small percentage of the total wastewater budget, the revenue from the sale of reclaimed water could become significant in the future as the value of water increases.

Water reuse also provides environmental benefits to the region and state. Because the use of locally produced water reduces the need to pump imported water supplies over long distances, energy is conserved. Reductions in energy use also results in reductions of air emissions.