4
WATER AND WASTEWATER PROJECTIONS

4.1 WATER USE

The meaning of the term water use has expanded over the years from supply to supply and demand. Water use under this definition includes the following: withdrawals from sources of water supplies, deliveries to meet water demands, releases from points of use, and returns to surface water and groundwater supply sources (Templin et al. 1995).

Water supply sources for the Santa Clarita Valley (SCV) include:

- Imported Water
- Groundwater
- Recycled Water

4.1.1 Significance to Facilities Planning

Weather and water conservation are the two major factors that affect water use. Water use increases when the weather is hot and dry and the amount of increase depends on the number of consecutive years of hot, dry weather and the conservation measures that are imposed. Rising water demand coupled with declining water supplies increases the value and potential role of recycled water. The reuse potential of recycled water is influenced by the quality of the water supply because conventional wastewater treatment processes have little effect on certain water quality parameters such as dissolved solids like chlorides. Water supply with high levels of dissolved solids will produce recycled water with high levels of dissolved solids, which can be detrimental to some plant species and limit irrigation applications. Water supply and quality are important to this facilities planning effort because the primary objective of this Facilities Plan is to comply with the Upper Santa Clara River Chloride Total Maximum Daily Load (Chloride TMDL), a water quality limit.

4.2 WATER SUPPLY

The SCV is served by one water wholesaler, the Castaic Lake Water Agency (CLWA), and four retail water purveyors: Santa Clarita Water Company, Valencia Water Company, Newhall County Water District, and Los Angeles County Waterworks District No. 36. Excluding agricultural and other miscellaneous uses, the 2010 total water demand in the SCV was approximately 64,066 acre-feet (af) (Luhdorff and Scalmanini 2010). The SCV relies on two main sources for its water supply: imported water (principally from the State Water Project

[SWP]) and local groundwater sources. The retail water purveyors obtain their supply by buying imported water from CLWA and/or pumping groundwater.

4.2.1 Imported Water

The SWP is the primary source of imported water in the SCV. The SWP begins in Northern California with water from the Sacramento-San Joaquin River Delta (Delta). This water is pumped south to serve the urban and agricultural centers of much of the state via the 444-mile long California Aqueduct. The West Branch of the aqueduct terminates at Castaic Lake, which is where CLWA takes delivery of SWP water and, after treatment, delivers to the retail water purveyors.

CLWA's water supply contract with Department of Water Resources (DWR) currently allows for a maximum request of 95,200 acre-feet per year (afy) but the quantity of SWP water that is actually available for delivery each year is determined by the DWR. This allocation can vary according to legal, hydrologic, and environmental constraints, and the total amount of water requested by SWP contractors. CLWA's final allocation of SWP water for 2010 was 76,160 af or 80 percent of its contract amount. Depending on conditions in the Delta, the chloride content in SWP water has historically varied from below 40 mg/L to well over 100 mg/L. CLWA observed lower SWP chloride levels in the most recent droughts compared to past droughts. These lower levels have been attributed to recent reduced pumping from the Delta due to Biological Opinions for the protection of endangered species and increased "pump-in" in the California Aqueduct due to the implementation of water banking programs and transfers. In February 2012, CLWA completed the State Water Project Chloride Modeling Analysis (see Appendix 4-A). The purpose of this effort was to forecast chloride concentrations at Castaic Lake based on the projected SWP quality accounting for recent changes in SWP operation (CLWA 2012). The study projected that maximum chloride levels would not exceed 80 mg/L in Castaic Lake, which is lower than historical highs around 130 mg/L. Thus, these pumping reductions are expected to continue into the future and lessen the amount of chloride reduction the Santa Clarita Valley Sanitation District (SCVSD) must provide to comply with the Chloride TMDL.

To improve water supply reliability, CLWA has groundwater banking agreements with several water storage districts in Kern County. During wet years, surplus surface water is stored in a groundwater aquifer. During periods of water shortages, the stored water is pumped and conveyed to CLWA via the California Aqueduct or exchanged for the banking partner's surface water allocation and conveyed to CLWA through the California Aqueduct. CLWA's banking agreements with water storage districts improves reliability of water supplies during dry years in Northern California. (Luhdorff and Scalmanini 2010)

4.2.2 Groundwater

Prior to 1980, local groundwater was the sole source of water in the SCV. Since then, this water supply has been supplemented with imported water. The groundwater basin underneath the SCV, identified by the DWR as the Santa Clara River Valley Groundwater Basin, East Subbasin, is composed of two aquifer systems. One of the systems is the Alluvial Aquifer, which underlies the Santa Clara River (SCR) and several tributaries, and the other is the Saugus Formation, which underlies almost the entire upper SCR area. The groundwater storage capacities of the Alluvial Aquifer and Saugus Formation are approximately 240,000 af and at least 1.65 million af, respectively (Slade 2002). Based on 2010 measurements, the chloride concentration varied from 40 mg/L to 130 mg/L in the Alluvial Aquifer and 30 mg/L to 40 mg/L in the Saugus Formation.

4.2.3 Recycled Water

Another source of water supply is recycled water. Possible uses of recycled water and associated regulations are discussed in Section 3. All of the recycled water produced at the Valencia Water Reclamation Plant (VWRP) and the Saugus Water Reclamation Plant (SWRP) is suitable for a wide range of reuse applications. Historically, the major reason that municipal reuse has not been extensively employed is that recycled water, by law, must be kept in dedicated pipelines separate from the potable water system. The cost of constructing separate distribution systems to deliver recycled water to widespread locations for reuse can be prohibitive. Additionally, demand for landscape irrigation, one of the most common uses of recycled water, is largely seasonal, sometimes requiring storage to balance large summer demands with small winter demands. However, uncertainties regarding the availability of imported water supplies are causing water supply agencies to increasingly consider recycled water as an alternative. Decreased reliance on imported water also reduces energy consumption and the associated air emissions because imported water supplies are often pumped over very long distances.

Municipal reuse of VWRP’s recycled water began in 2003 for irrigation at a local golf course and in roadway median strips. The 2012 recycled water delivery was 301 af but is projected to increase to 22,800 af by 2050 based on the 2010 Urban Water Management Plan (UWMP) adopted by CLWA and three SCV retail water purveyors.

4.3 WATER DEMAND

The 2010 total water demand in the SCV was 80,165 af and represented a decrease of 6,400 af from 2009. This decrease is attributed to slowed growth in the number of new service connections and increased water conservation. (Luhdorff and Scalmanini 2010)

4.3.1 Municipal Water Demand

The 2010 municipal demand in the SCV was 64,066 af and was met with 30,578 af of imported water, 33,152 af of local groundwater, and approximately 336 af of recycled water (Luhdorff and Scalmanini 2010). In normal years, approximately 50 percent of the municipal water demand is met with imported water. When sufficient imported water is unavailable, the remainder is met with local groundwater. The water demand projection, with conservation, for 2050, as summarized in the 2010 Urban Water Management Plan compiled by the four SCV retail water purveyors, is 121,877 af. This projection does not attempt to forecast recessions or droughts.

4.3.2 Other Water Demand

In 2010, the total water demand for agricultural and other miscellaneous water uses was 16,099 af, which was approximately 20 percent of the total water used in the SCV (Luhdorff and Scalmanini 2010). This water demand was met by local groundwater (mainly the Alluvial Aquifer). Although municipal water demand is projected to increase, agricultural and miscellaneous water demands are projected to decrease to 7,500 af for 2050 (Kennedy Jenks 2011).

4.3.3 Water Conservation

In recent years, water conservation has become increasingly important in water supply planning. The California plumbing code requires the installation of ultra-low-flow toilets and low-flow showerheads in new construction. CLWA and retail water purveyors have developed water conservation measures that include public information and education programs. CLWA and local water retailers also provide financial incentives to customers for eligible water management practices and provide rebates for water conserving equipment. (Kennedy Jenks 2011)

Implementation of more aggressive water conservation practices may decrease residential, commercial and industrial water use. The greatest potential for conservation resides in improved efficiency and reduction in landscape irrigation. Irrigation demand can represent as much as 70 percent of residential water demand, which varies based on lot size and amount of irrigated vegetation. The City of Santa Clarita and Los Angeles County have developed a landscape irrigation ordinance for the SCV. These ordinances require new construction to reduce water demand by use of efficient landscape design and delivery systems.

In 2007, CLWA and the retail water purveyors entered into a memorandum of understanding to prepare a Santa Clarita Valley Water Conservation Strategic Plan, which is a long-term plan to promote proven and cost effective conservation practices. This plan was completed in September 2008 and contains a detailed study of existing water use and recommended programs to reduce overall water demand by 2030. (Luhdorff and Scalmanini 2009)

4.4 UNCERTAINTIES AND POSSIBLE EFFECTS ON PROJECTIONS

The previous discussions identified possible changes in water supply and demand that may take place through 2050. Any variables that affect the projections of needed future wastewater facilities can affect the project in this Facilities Plan. The following discussion identifies possible scenarios that could occur, their potential impacts, and responses to these uncertainties.

4.4.1 Growth

Water demand in recent years has been less dependent on weather and more dependent on economic conditions (Luhdorff and Scalmanini 2009). Therefore, economic conditions have become a major factor in determining water demand projections for the SCV. The duration of the current recession and the pace of growth following the recession are unknown. Both factors affect population growth which, in turn, affects water demand and wastewater generation. If the actual growth rate in the SCV is less than what was projected in the Southern California Association of Governments Regional Transportation Plan, 2012 (SCAG 2012), the rate of increase in wastewater flows over the planning horizon would decrease accordingly.

Water purveyors serving the SCV are responsible for responding to water supply issues and ensuring that adequate amounts are available. The SCVSD will plan for uncertainties by developing flexible project alternatives including phased facilities where appropriate. Because this Facilities Plan is not recommending an increase in the quantity of treatment, deviations from the growth projections would not impact the recommended project, but would affect the timing of the next facilities planning effort that addresses treatment capacity.

4.4.2 Imported Water Quality and Availability

The level of advanced wastewater treatment (AWT) required to meet Chloride TMDL requirements is driven by the chloride level in the wastewater, which is largely driven by the chloride level in the water supply. As noted in Section 4.2, the water supply is a blend of imported water and local groundwater. A significant change in the future water supply chloride concentrations of one or more of the underlying water supplies would impact the amount of AWT required.

The main factor that could affect the plant influent chloride level is saltwater intrusion in the Delta, which increases chloride level in SWP water. SWP water quality is not expected to worsen based on the likely continued restrictions to pumping for endangered species protection or construction of a Bay Delta Conveyance Facility. As mentioned in Section 4.2.1, CLWA observed lower SWP chloride levels in the most recent droughts compared to past droughts. These lower levels have been attributed to SWP operational restrictions due to recent Biological Opinions for the protection of endangered species and the implementation of water banking programs. As documented in the February 2012 report by CLWA titled State Water Project Chloride Modeling Analysis (see Appendix 4-A), these reductions are expected to continue into the future and lessen the amount of chloride reduction the SCVSD must provide to comply with the Chloride TMDL. For decades, there have been discussions about providing a new water conveyance facility around the Delta. In 1982, this conveyance was known as the “peripheral canal” and was defeated in a ballot initiative (California Proposition 9, the Peripheral Canal Act, June 1982). The more recent name is the Bay Delta Conveyance Facility. In May 2013, a complete Administrative Draft of the Bay Delta Conservation Plan was released for comment. The information in this draft indicates that implementation of the Bay Delta Conveyance Facility would provide a much smaller improvement in the chloride level of the water delivered to the SCV than previously expected. Consequently, implementation of the Bay Delta Conveyance Facility would not be sufficient to provide compliance with the Chloride TMDL without new facilities.

During future droughts, SCV water agencies intend to meet water supply needs by pumping more water from the Saugus Aquifer (2010 Urban Water Management Plan). Because this aquifer has lower chloride levels than other components of the water supply, such pumping will reduce the chloride level in the overall water supply and in the sewage reaching the SCVSD’s wastewater treatment plants.

Relatively small deviations between projected and actual chloride concentrations could be accommodated by adjusting the operation of the AWT facilities. If chloride concentrations are significantly more than anticipated, the facilities to remove chloride could be expanded. Space would be reserved for expansion of these facilities. Any pipelines associated with chloride removal would be sized to accommodate some future increases in flow.

4.4.3 Graywater Use

Graywater is defined as “untreated household wastewater that has not come into contact with toilet or kitchen waste.” This includes water from washing machines, washbasins, and bathtubs. Graywater use is encouraged within the SCVSD service area. For example, Ordinance No. 112 of the Newhall County Water District encourages consideration be given to graywater or non-potable water systems for new construction or retrofitting existing facilities (Newhall County Water District 2005).

In a graywater system, the water is recycled for outdoor use rather than being discharged to a wastewater treatment facility. Recycling graywater reduces the average amount of wastewater reaching the sewer system per person per day, but also results in a more concentrated wastewater stream. The reduction and concentration of wastewater reduces the overall waste flow generation rate for a given population and may require process adjustments and/or additional facilities at the wastewater treatment plant to handle the more concentrated waste stream. Graywater use is low now and is not anticipated to have any effect on wastewater flows in the near future.

4.4.4 Recycled Water Use

Recycled water is a universally recognized water resource. However, use of recycled water is strictly regulated according to the level of treatment that the wastewater receives (see Section 3 for details of regulations concerning recycled water use). Increased use of recycled water would lessen the demand for potable water and thereby reduce the need for groundwater and imported water. It is not anticipated that recycled water use would have a substantive impact on the quantity or quality of wastewater tributary to the sewers due to it being primarily applied to landscaping.

4.4.5 Climate Change

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

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

In December 2007, the Association of Metropolitan Water Agencies published a report titled Implication of Climate Change for Urban Water Utilities. Included within this report was a summary of the direct impacts of climate change on water utilities. A direct impact is defined as an impact resulting from climate change on a water utility’s function and operation. Relative to the southwest United States, the report predicts warmer and probably drier overall conditions with more extreme droughts and heat waves with the following effects:

- Likely reduced quantities of surface water available from local runoff and water available to recharge groundwater aquifers
- Very likely increased evaporative losses in inter-basin transfers of surface waters
- Changes in vegetation of watershed and aquifer recharge areas
- Increased water temperature and water demand

The report also predicts more intense rainfall events that would increase turbidity, sedimentation, and the risk of direct flood damage to water utility facilities. The challenge to accommodating these changes is to develop a strategy and the infrastructure to provide the needed water volumes at the locations and times they are requested. Reduced availability of water supplies could result in higher costs, increased water conservation within residences, increased water reuse, and reduced per capita wastewater generation. Effects of increased water reuse on the recommended project are discussed in Section 4.4.4. It is likely that water use reductions would result in a more concentrated wastewater flow that may require process adjustments and/or additional facilities at the wastewater treatment plants to handle the more concentrated waste stream. If a lower flow but more concentrated waste stream were to result, then the treatment facilities are anticipated to be sufficient since such facilities are partly designed for mass loadings and water conservation will not increase the mass loading of waste.

4.5 WASTEWATER CHARACTERISTICS

The SCVSD conducts an extensive monitoring program associated with the operation of the VWRP and SWRP. Samples of plant influent and effluent are regularly monitored and annual reports are published that include constituent measurements taken routinely. The following includes the most recently published sampling of constituents measured at the influent and effluent of each plant.

4.5.1 Influent Quality

The monitoring frequency for various constituents within the VWRP and SWRP influent is discussed in Section 5. The most significant constituents are shown in Table 4-1 with their range and average values reported for 2011.

Table 4-1. VWRP and SWRP 2011 Influent Quality Monitoring Results

		Valencia WRP		Saugus WRP	
Constituent	**Unit**	**Range[a]**	**Average[b]**	**Range[a]**	**Average[b]**
TSS	mg/L	324-407	354	240-317	264
Chloride	mg/L	92.7-123.0	112.0	93.6-129.0	110.0
Cyanide	ug/L	<5.0	<5.0	<5.0	<5.0
Ammonia Nitrogen	mg/L	28.5-33.6	31.0	26.2-30.9	28.9
BOD_5	mg/L	231-337	292	222-298	251
Antimony	ug/L	0.55-0.67	0.61	<0.5-0.58	0.41
Arsenic	ug/L	1.28-1.53	1.41	1.36-1.90	1.63
Cadmium	ug/L	<0.02-0.22	0.11	<0.2	<0.2
Chromium	ug/L	1.20-3.96	2.58	1.06-1.73	1.40
Lead	ug/L	0.6-1.2	0.9	0.78-2.08	1.10
Mercury	ug/L	<0.04	<0.04	<0.04-0.05	0.03
Nickel	ug/L	3.29-4.25	3.77	2.27-2.82	2.55
Selenium	ug/L	1.00-1.09	1.05	<1.00-1.28	0.64
Zinc	ug/L	71.9-81.3	76.6	90.4-148	119

BOD_5 = Biochemical Oxygen Demand 5-day
TSS = Total Suspended Solids
"<x" indicates constituent was detected but not quantified because the result was greater than or equal to the lab's method detection limit but less than the reporting limit (x).
[a] Range in detection limits results from differences in sample dilution.
[b] Average constituent concentration is listed as N/A if one or more values are less than the lab detection limit.
Source: Combined NPDES and Reuse Annual Monitoring Report for 2011 for Valencia and Saugus WRPs.

The sources of chloride in the treated wastewater are chloride in the water supply, chloride added by community use, and chloride added during wastewater treatment (primarily in the chlorine-based disinfection process). The chloride level varies based on several factors. First, variations in rainfall affect the water supply because rainfall dilutes the chloride level. Second, imported water that passes through the Delta gains chloride as it mixes with seawater. The amount of flow conveyed through the Delta combined with the amount of precipitation in a given year have a large impact on the chloride increase due to seawater mixing. As a result, the chloride level in imported water has varied from below 40 mg/L to well over 100 mg/L. See §§4.2.1, 4.2.2 and 4.4.2 for more information on water supply chlorides. The variation in chloride level over time in both imported water and local groundwater is shown on Figure 4-1. With the exception of a historic drought from 1988 to 1994, chloride levels in imported water and groundwater have been similar. Last, chloride level varies due to activities at homes and businesses that add different amounts of chlorides such as washing, flushing toilets, and use of certain water softeners.

In a 2002 study, residential automatic water softeners (AWS) were identified as the main addition by the community and the primary controllable source of chloride. Based on this study, the SCVSD adopted an ordinance prohibiting the installation of new residential AWS in 2003. Chloride loading from residential AWS peaked in 2003/2004 at 9,000 pounds per day, representing approximately 59 mg/L in the SCVSD effluent. The SCVSD implemented AWS Rebate Programs in 2005 (Phase I) and 2007 (Phase II), followed by a 2008 voter approved ordinance that required the removal and disposal of all existing residential AWS installed in the SCVSD's service area. These efforts resulted in removal of more than 7,900 residential AWS units and over 50 mg/L of chloride.

As shown on Figure 4-2, the chloride level in the SCVSD's treated wastewater has been consistently above 100 mg/L over the past 30 years. Although the chloride level has decreased significantly due to the SCVSD efforts, the level is still above the state mandated limit most of the time. Unless additional measures are taken to reduce chloride levels, the SCVSD will not be able to consistently meet the state mandated limit.

4.5.2 Effluent Quality

Discharges from the VWRP and SWRP are regulated by National Pollutant Discharge Elimination System (NPDES) permits issued by the California Regional Water Quality Control Board-Los Angeles Region (RWQCB-LA) as discussed in Section 3. The constituents with specific limits are shown in Table 4-2 along with the range and average values reported for 2011. The effluent chloride level is typically 10 to 12 mg/L higher than the influent chloride level because of chlorine added during the disinfection portion of the treatment process.

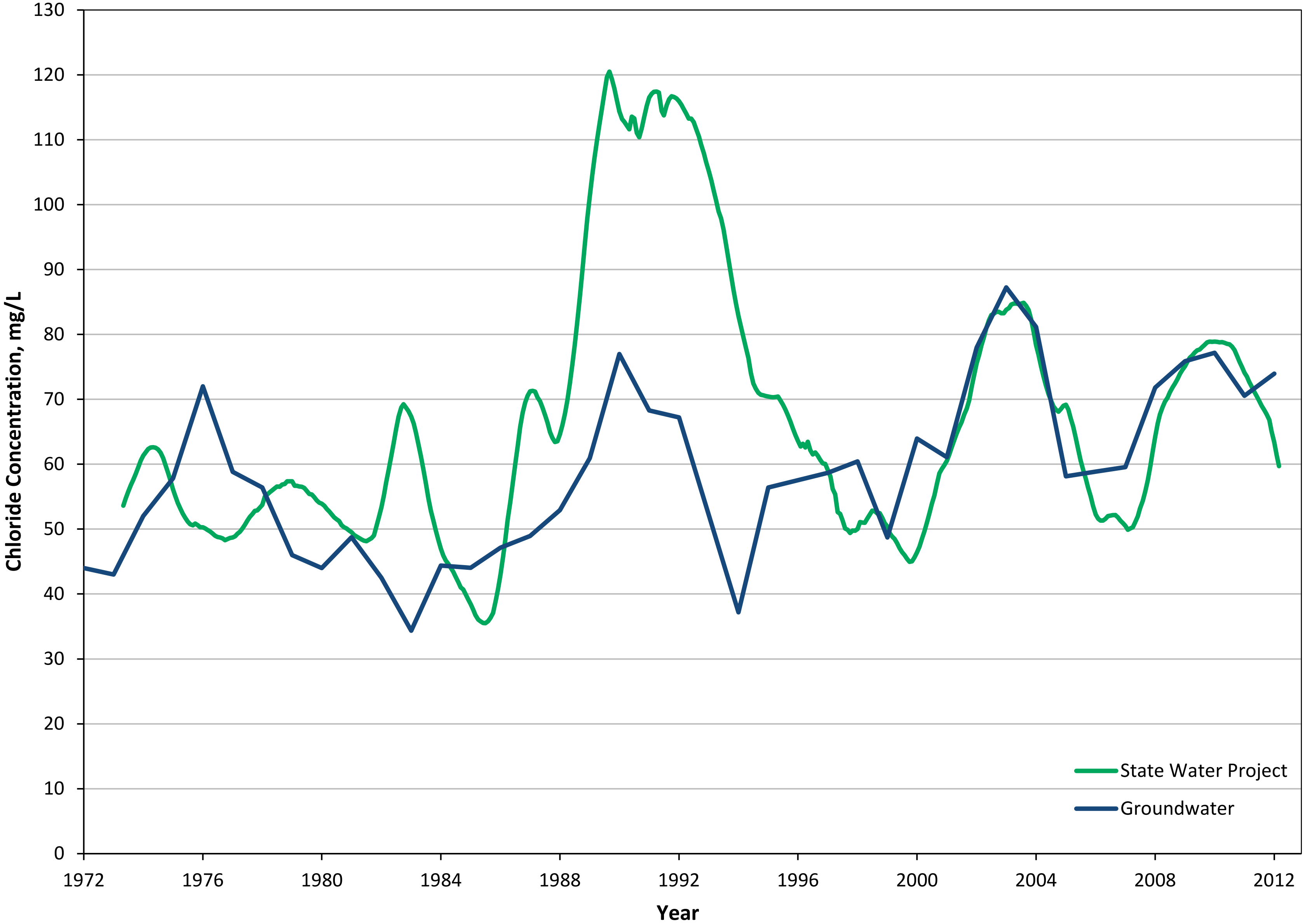


Figure 4-1

State Water Project and Groundwater Chloride Concentrations

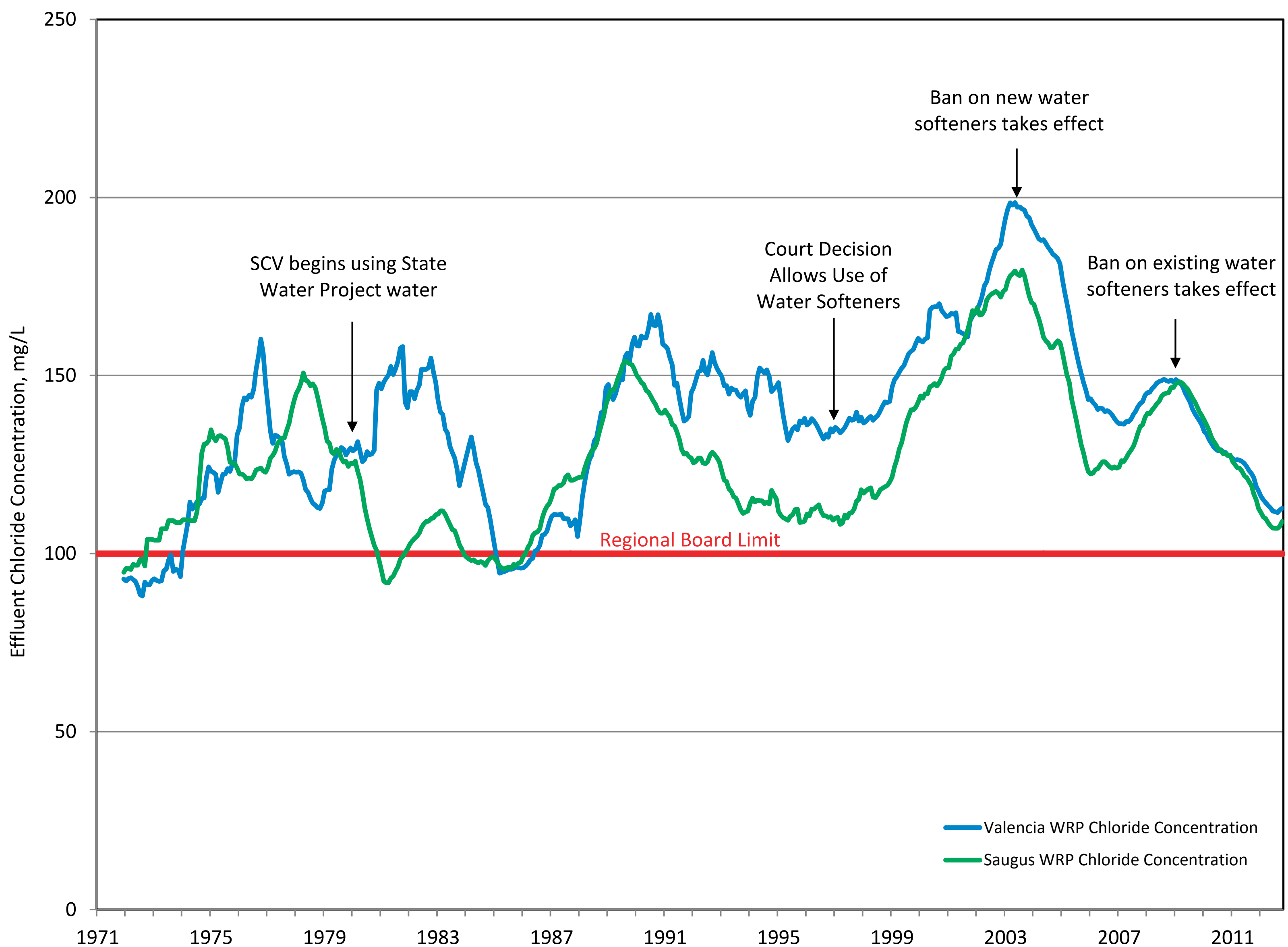


Figure 4-2
Chloride Levels in Treated Wastewater

Table 4-2. VWRP and SWRP 2011 Effluent Quality and Discharge Limits

Constituent[a]	Unit	Valencia WRP Range	Valencia WRP Average	Saugus WRP Range	Saugus WRP Average	NPDES Limits[b,c]
Total Dissolved Solids	mg/L	652-747	684	569-764	645	1000
Chloride	mg/L	92.9-129.0	119.0[d]	100-134	115	230[i]
Sulfate	mg/L	139-200	173	113-163	133	400 (VWRP) 300 (SWRP)
Boron	mg/L	0.53-0.66	0.57	0.54-0.86	0.64	1.5
Surfactants (MBAS)	mg/L	<0.1	<0.1	<0.1	<0.1	0.5
Nitrate+ Nitrite Nitrogen	mg/L	2.06-3.53	2.60	3.94-4.64	4.36	6.8 (VWRP) 7.1 (SWRP)
BOD_5	mg/L	<3	<3	<3	<3	45[g,h]
TSS	mg/L	<2.5	<2.5	<2.5	<2.5	45[g,h]
Settleable Solids	ml/L	<0.1	<0.1	<0.1	<0.1	0.3[g]
Oil and Grease	mg/L	<4.7	<4.7	<4.9	<4.9	15[g]
Antimony	ug/L	<0.5-0.29	0.57	<0.5	<0.5	6[e]
Ammonia Nitrogen	mg/L	0.91-1.16	1.02	1.16-1.54	1.32	5.2[g] (VWRP) 5.6[g] (SWRP)
Arsenic	ug/L	<1	<1	<1-1.24	0.85	10[f]
Cadmium	ug/L	<0.2	<0.2	<0.2	<0.2	5[e]
Cyanide	ug/L	<5	<5	<5	<5	9.4[e,g]
Iron	ug/L	49.3-81.8	60.0	<20	<20	300
Mercury	ug/L	<0.0005-0.00101	0.000401	<0.0005[a]-0.00104	0.000581	0.094[f,g]
Nitrate Nitrogen	mg/L	2.03-3.50	2.58	3.91-4.62	4.33	6.8 (VWRP) 7.1 (SWRP)
Nitrite Nitrogen	mg/L	<0.03-0.035	0.0083	<0.03-0.054	0.02	0.9
Perchlorate	ug/L	<4	<4	<0.5-0.66	0.15	6[e]
Selenium	ug/L	<1	<1	<1	<1	7.3[f,g]
Total Residual Chlorine	mg/L	<0.05	<0.05	<0.05	<0.05	0.1[g]
Total Trihalomethanes	ug/L	33.4-65.2	47.4	31.4-56.8	31.4	80
Total Coliform	MPN/100mL	<1	<1	<1	<1	240[e,g,h]
pH	--	7.1-7.5	7.3	7.6-7.7	7.6	6.5-8.5

BOD_5 = Biochemical Oxygen Demand 5-day
TSS = Total Suspended Solids
MBAS = Methylene Blue Active Substances
MPN = Most Probable Number
"<x" indicates constituent was not detected, with the detection limit being x.

[a] See Section 3.4.2 for discharge requirements.
[b] When multiple frequency limits exist for a constituent, the more frequently measured limit is listed.
[c] All listed constituents have a 30-day average discharge limit except for total residual chlorine.
[d] Subtracting influent chloride from effluent chloride does not yield an accurate measure of the chloride increment at the plant because both samples are taken over the same time span yet influent takes approximately 12 hours to pass through the plant and influent chloride levels change dramatically throughout the day.
[e] Constituent does not have a discharge limit per the VWRP NPDES permit.
[f] Constituent does not have a discharge limit per the SWRP NPDES permit.
Constituent has a daily maximum limit per NPDES permit.
[h] Constituent has a 7-day average maximum limit per NPDES permit.
[i] Chloride interim limit is equal to the chloride concentration of State Water Project water plus 134 mg/L and 114 mg/L for Valencia and Saugus, respectively, not to exceed a daily maximum of 230 mg/L.

4.6 WASTEWATER FLOW PROJECTIONS

Projections of average daily wastewater flow rates are used to determine the design capacity of wastewater treatment facilities. By comparing estimated wastewater flows to existing treatment plant capacity, a determination of when new facilities will be needed and how much capacity is required can be made.

4.6.1 Methodology

An estimate of future wastewater flow within the SCVSD's service area relies primarily on projected population statistics published by SCAG, which is the regional council of governments for a larger area that includes the planning boundary. SCAG uses population information from the Census Bureau, economic forecasts, and local general plans and zoning ordinances to forecast future growth. The most recent projections were adopted by SCAG in April 2012 in their 2012 Regional Transportation Plan through 2020 and 2035. The Districts are required to use SCAG projections when planning for future capacity needs to qualify for loans through the State Revolving Fund (SRF) program.

Calculating future wastewater flows based on population projections requires the development of a per-capita generation rate (PCGR) specific to the SCVSD's service area. The PCGR is the average amount of wastewater generated per person per day, which is based primarily on historical data. The following factors are considered when calculating the PCGR: historical population served by the SCVSD, historical wastewater flows and adjustments, historical industrial waste (IW) flows, contract flows, and infiltration and inflow (I/I).

Before the PCGR can be applied, it is necessary to evaluate what portion of each census tract will be served by the SCVSD for each 5-year planning horizon. This is accomplished by determining the percentage of each census tract's residential land use area within the projected SCVSD service area. Each census tract population is multiplied by its respective percentage and summed to determine the projected population contributing to the SCVSD service area flows. The process also accounts for current septic tank users and planned developments. Future IW and contract flows are added to determine the projected wastewater flow per the following equation:

Projected Wastewater Flow = [Projected Population x PCGR] + [Future IW Flow] + [Future Contract Flow]

where:

- SCAG's Projected Population includes those people who will be served by the SCVSD (i.e., does not include septic tank users) in 2020 and 2035
- PCGR is the average amount of wastewater generated per person per day and accounts for residential and commercial flows
- Future IW Flow includes permitted IW discharges that are tributary to the SCVSD collection and treatment system
- Future Contract Flow includes large amounts of wastewater discharges managed under special agreements that cannot be accounted for with population or IW flows

Each of these components is discussed further in the following sections. The results of this analysis are plotted against existing capacity on Figure 4-3 to determine when additional capacity is needed.

4.6.2 Per-Capita Generation Rate

The PCGR was calculated by the average residential and commercial wastewater flow measured at the VWRP and SWRP divided by the number of people who were served. However, to arrive at this conclusion, separate analyses were needed to identify what portion of wastewater measured at the plant truly originates from people (i.e., residential versus industrial flow) and how many people were being served. Therefore, as mentioned above, the following factors were considered when calculating the PCGR: historical population served by the SCVSD, historical wastewater flows and adjustments, historical IW flows, contract flows, and I/I.

4.6.2.1 Historical Population

The California State Department of Finance (DOF) publishes estimates of the number of people living within cities and unincorporated areas of Los Angeles County. These estimates are the best source of historic and current population within the planning area, but this information must be further analyzed to determine the portions of the City of Santa Clarita and unincorporated Los Angeles County populations served by the SCVSD over the years being examined.

Portions of the city and unincorporated areas of the county lie outside the SCVSD's service area and do not contribute flows to the WRPs. Thus, the population from such areas was excluded from the analysis. Parcels served by onsite septic tanks do not contribute flows to the system; therefore, the estimated residential population on septic was subtracted from the total service area population to yield the total sewered population in the SCVSD service area. The estimated number of people served within the SCVSD from 1998 through 2012 is shown in Table 4-3.

4.6.2.2 Historical Flows and Adjustments

Wastewater flows generated within the SCVSD are determined using historical flow measurements at the influent pump stations of both the VWRP and SWRP. However, some internal plant processes return flow to the influent pump station before flow measurements are taken. Consequently these internal plant process flows were subtracted to accurately determine the influent flows from the sewer system.

IW flows contribute to the overall influent wastewater measured at the VWRP and SWRP, but they are not associated with flow generated by SCVSD residents. When determining the PCGR, IW flows are subtracted from plant influent flows to estimate the flow generated by commercial and residential users. IW flows are estimated from IW permits issued to dischargers within the SCVSD. IW flows fluctuated between 0.3 mgd and 0.4 mgd from years 1998 through 2011 without a clear upward or downward trend.

Contract flows are flows that are managed through a special agreement between the SCVSD and dischargers within the service area. These flows are typically very large and would not be reflected in flows attributed to residential and commercial users or permitted IW dischargers. Like IW flows, contract flows are subtracted from plant influent flows to estimate the flow generated by commercial and residential users. From 1998 to 2011, contract flows varied from 0.8 mgd to 1.4 mgd without a clear upward or downward trend.

Table 4-3. Historical Populations Within the SCVSD Service Area

Year	City Population[a]	Unincorporated County Population[a]	Total Population[a,b]	Percent Population on Septic[c]	Sewered Population[a,d]
1998	136,981	41,617	178,598	0.72%	177,318
1999	140,179	38,635	178,813	0.68%	177,604
2000	145,198	45,386	190,584	0.65%	189,348
2001	148,750	53,647	202,398	0.63%	201,130
2002	152,755	58,165	210,919	0.61%	209,631
2003	156,971	66,390	223,361	0.58%	222,058
2004	158,802	73,206	232,007	0.55%	230,723
2005	160,843	77,400	238,243	0.54%	236,956
2006	160,721	77,533	238,254	0.53%	236,989
2007	169,556	73,332	242,888	0.53%	241,602
2008	169,866	73,963	243,829	0.53%	242,543
2009	170,687	74,486	245,172	0.53%	243,876
2010	171,784	75,282	247,066	0.53%	245,765
2011	170,915	75,503	246,418	0.53%	245,120
2012	171,559	75,692	247,251	0.53%	245,949

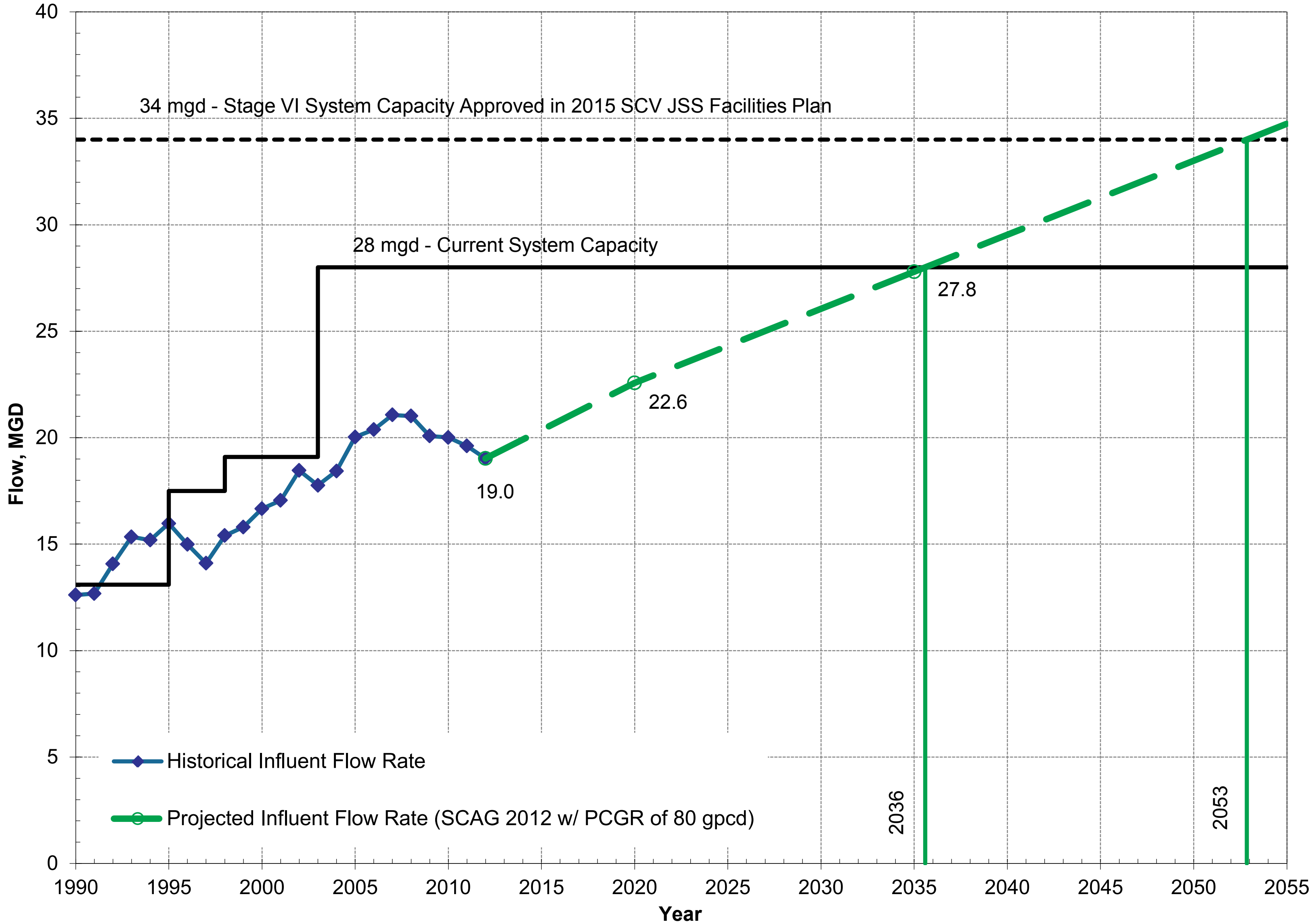
[a] DOF population data are reported as of January 1st of each year. DOF values prior to 2010 were adjusted when 2010 Census data became available.
[b] Value is the addition of the city and unincorporated county area populations within the SCVSD service area.
[c] Percent of the population utilizing septic tanks was based on estimates performed by SCVSD.
[d] Value is Total Population x (1-Percent Population on Septic).

Historical flows are summarized in Table 4-4.

Table 4-4. Historical SCVSD Wastewater Flows

Year	VWRP Adjusted Influent	SWRP Adjusted Influent	Total Adjusted Influent[a]	IW Flow	Contract Flow	Residential and Commercial Flows[b]
1998	8.8	6.6	15.4	0.4	1.2	13.8
1999	9.6	6.2	15.8	0.4	1.2	14.3
2000	10.3	6.4	16.7	0.4	1.1	15.2
2001	10.1	6.9	17.1	0.4	1.0	15.6
2002	11.3	7.2	18.5	0.4	1.0	17.0
2003	12.2	5.5	17.8	0.4	0.9	16.5
2004	13.4	5.1	18.4	0.3	0.8	17.3
2005	14.9	5.1	20.0	0.3	0.9	18.9
2006	14.4	6.0	20.4	0.4	0.9	19.0
2007	15.0	6.1	21.1	0.3	1.0	19.7
2008	14.9	6.2	21.0	0.3	1.4	19.3
2009	14.6	5.5	20.1	0.3	1.4	18.3
2010	14.5	5.5	20.0	0.3	1.3	18.4
2011	14.2	5.4	19.6	0.4	1.1	18.2

All flow are mgd.
Flow values listed have been rounded and may lead to minor arithmetic differences.
[a] Value is the addition of the VWRP Adjusted Influent Flow plus SWRP Adjusted Influent Flow.
[b] Value is Total Adjusted Influent less IW Flow and Contract Flow.



Note: Flows past 2035 were extrapolated assuming growth continued at the same rate as it did between 2020 and 2035.

Figure 4-3
Projected Wastewater Flow for the SCVSD Planning Area

4.6.2.3 Infiltration and Inflow

Infiltration is groundwater that enters the collection system through cracks or leaks in the sewer system. Inflow is stormwater that has entered the sewer system, typically through manhole covers. I/I only affect the amount of influent measured at the VWRP and SWRP when they are excessive. The SRF program defines excessive I/I as (1) a PCGR above 120 gallons per capita per day (gpcd) during the winter months or (2) a PCGR above 275 gpcd during a peak storm event.

The highest rainfall recorded for the SCVSD from 2008 through 2010 occurred during the winter of 2009-10. The average SCVSD flow during that winter was 19.9 mgd. The average amount of flow received at the plant during that season's peak storm event (3-hour peak) was 35.7 mgd. Dividing these flows by the SCVSD sewered population of 245,160 (per January 1, 2010 Department of Finance estimate) for the 2009-10 winter results in a PCGR of 81 gpcd during the winter months (infiltration) and 146 gpcd (inflow) during the peak storm event. These rates fall below the threshold values of 120 gpcd for infiltration and 275 gpcd for inflow and, therefore, are determined to be insignificant.

4.6.2.4 Per-Capita Generation Rate Analysis

As mentioned previously, the PCGR is calculated by dividing the residential and commercial flow by the population served. The PCGR analysis is summarized in Table 4-5.

Table 4-5. SCVSD Per Capita Flow Generation Rates

Year	Average Sewered Population[a]	Residential and Commercial Flows[b] (mgd)	PCGR (gpcd)
1998	177,461	13.8	78
1999	183,476	14.3	78
2000	195,239	15.2	78
2001	205,381	15.6	76
2002	215,844	17.0	79
2003[c]	226,390	16.5	73
2004[c]	233,839	17.3	74
2005	236,972	18.9	80
2006	239,295	19.0	80
2007	242,072	19.7	81
2008	243,209	19.3	79
2009	244,820	18.3	75
2010	245,442	18.4	75
2011	245,535	18.2	74

Flow values listed have been rounded and may lead to minor arithmetic differences.

[a] DOF population data (Table 4-3) are reported as of January 1st. To determine the average sewered population in a given year, the annual historical sewered population was averaged using the January 1st sewered population of one year and January 1st sewered population of the following year.

[b] See Table 4-4 for derivation.

[c] Construction activity at SWRP required temporary bypass of influent flows to VWRP, possibly contributing to the apparently low PCGR.

The average PCGR was 77 gpcd for the period examined. There appears to be a downward trend between 2007 and 2011. However, this trend may be due to the recent economic recession. As a result, the pre-recession value of about 80 gpcd was selected and adopted for planning purposes.

The timeframe for construction of additional treatment capacity will be adjusted if wastewater flows develop at a different rate than projected.

4.6.3 Population Projections

Using data from the SCAG 2012 Regional Transportation Plan, population projections for each census tract within the service area were obtained through the 2035 planning horizon. For the year 2020, pending annexations were added to the existing service area to determine the 2020 SCVSD service area. The existing SCVSD sphere of influence (SOI), which defines the probable future SCVSD service area as discussed in Section 1.2.1, was applied to 2035. A significant portion of the SOI is currently undeveloped and outside the SCVSD service area. SCAG land use data and known future developments were used to project the growth of the SCVSD service area within the SOI. Future service area population was estimated by determining the percentage of each census tract's residential land use area within the projected SCVSD service area. None of the service area's population was assumed to be served by septic tanks by 2030. The resulting projections of the SCVSD sewered population are shown in Table 4-6.

Table 4-6. SCVSD Projected Wastewater Flows for SCAG Planning Horizons

Year	Projected Population	Residential and Commercial Flows[a]	Industrial and Contract Flows	Total Flow[b]
2020	263,555	21.1	1.5	22.6
2035	327,951	26.2	1.6	27.8

All flows are mgd.
Flow values listed have been rounded and may lead to minor arithmetic differences.
[a] Residential and Commercial Flows = Projected Population Average x PCGR.
[b] Total Flow = Residential and Commercial Flows + Industrial and Contract Flows.

Projected wastewater flows are determined by multiplying the projected population by the adopted PCGR (80 gpcd), and adding the projected contract and IW flows as shown in the following equation:

Projected Wastewater Flow = [Projected Population x PCGR] + [Future IW Flow] + [Future Contract Flow]

Contract flows were assumed to remain constant at the 2011 flow rate of 1.1 mgd due to the very limited number of contract flow customers and the lack of indication that additional customers would be contracted. To account for growth in IW flows, which is expected to be limited, an annual increase of one percent was assumed between 2011 and 2030, starting from the 12-year average IW flow rate of 0.36 mgd. Projected wastewater flows are summarized in Table 4-6 and compared against existing plant capacity on Figure 4-3. Note that flows past 2035 were extrapolated by assuming the growth rate between 2020 and 2035 continued.

As shown on Figure 4-3, the existing SCVSD treatment facilities have enough capacity to treat flows to approximately 2036. With the future construction of VWRP Stage VI (bringing total system treatment capacity to 34.1 mgd), the SCVSD facilities are expected to reach capacity by approximately 2053.

4.7 SOLIDS PROJECTIONS

There are two sources of solids requiring treatment in the SCVSD, solids entering the plants and solids produced by the microbial growth in the activated sludge process employed for secondary treatment. Solids entering the plants are mostly removed through screening, grit chambers, primary sedimentation, and skimming. Solids removed at the headworks such as screenings and grit are disposed without any additional treatment. Solids removed from the primary sedimentation tanks are called primary solids. A portion of the solids produced during secondary treatment is continually removed from the system. These removed solids are termed waste activated sludge (WAS). Both the VWRP and SWRP employ an activated sludge process that produces WAS.

Primary solids and WAS require additional treatment. All solids treatment occurs at the VWRP. Primary solids from the SWRP are returned to an interceptor sewer where, along with diverted wastewater, they are conveyed to the VWRP and undergo conventional treatment. The WAS from the SWRP is conveyed via a dedicated force main to the VWRP. There, SWRP and VWRP WAS are thickened by dissolved air flotation before treatment in anaerobic digesters. At the VWRP, primary solids are added directly to the digesters without thickening. After digestion, the solids are dewatered by plate and frame filter presses. The resulting treated and dewatered solids are called biosolids. See Section 5 for a more detailed description of existing solids treatment facilities.

4.7.1 Biosolids Characteristics

The anaerobic digestion process converts approximately 50 percent of the organic matter in the solids (equivalent to 36 percent of total solids) into gas consisting of methane and carbon dioxide. The methane is used as a fuel source as discussed in Section 5.6.1.

Following anaerobic digestion, the resulting slurry is still over 97 percent water. Plate and frame filter presses are used to reduce the water content of the solids. The current dewatering system produces a material containing about 20 percent solids by weight. After dewatering, the solids are in a more readily transportable and reusable form. In 2009, 4,570 dry tons of biosolids were produced at the VWRP. A summary of the metals in the biosolids and the regulatory limits are shown in Table 4-7.

Table 4-7. 2009 Biosolids Metals and Limits

Constituent	Unit	Average Concentration	Limit[a]
Arsenic	mg/kg	7.04	41
Cadmium	mg/kg	1.05	39
Copper	mg/kg	1,100	1,500
Lead	mg/kg	10.8	300
Mercury	mg/kg	0.96	17
Molybdenum	mg/kg	10.7	-
Nickel	mg/kg	28.5	420
Selenium	mg/kg	6.81	100
Zinc	mg/kg	793	2,800

[a] According to 40 CFR 503.13, Table 3.

4.7.2 Projected Solids Production

The quantity of solids requiring treatment and biosolids requiring disposal will increase with population growth. Estimates of future solids quantities were developed using per capita solids generation rates for primary solids and waste activated solids. The solids generation rates were assumed to remain constant over the planning horizon and were estimated to be 0.11 pounds per capita per day (ppcd) for primary solids and 0.09 ppcd for thickened waste activated solids. Approximately 63 percent of the blend of primary and thickened waste activated solids will be converted to biosolids.

The solids and biosolids projections shown on Figure 4-4 were developed using the per capita solids generation rates with the projected SCVSD population (Table 4-5). At 2030, these projections are:

- **Primary Solids:** 0.12 mgd of 3.8 percent solids resulting in 19.8 dry tons per day (dtpd)
- **Thickened Waste Activated Solids:** 0.06 mgd of 6.8 percent solids resulting in 16.6 dtpd
- **Biosolids:** 23.1 dtpd of 21-percent solids

4.8 WATER REUSE AND RECLAMATION

The VWRP and SWRP have jointly produced between 17,000 and 24,000 afy of recycled water for the last 10 years. Since 1995, the maximum recycled water produced at the VWRP was 18,562 af in fiscal year 2005-2006 and at the SWRP was 6,744 af in fiscal year 1995-1996.

Municipal reuse of VWRP's recycled water has averaged about 400 afy for the last five years, but there has never been any municipal reuse of SWRP's recycled water. Municipal reuse began in September 2003 after construction of a transmission line and storage reservoir.

4.8.1 Future Water Reuse

In 2002, CLWA developed a Recycled Water Master Plan (Master Plan) for the use of 17,400 afy of recycled water from the SCVSD system by 2030. In 2010, CLWA adopted an Urban Water Management Plan that refined the recycled water needs to 22,800 afy by 2050. CLWA identified the VWRP as the most likely source of recycled water, but reuse flow quantities are expected to remain the same regardless of the source plant. Implementation of the Master Plan has been delayed since the first phase of the recycled water distribution system went online in 2003. The Master Plan is now being revised.

The SCVSD has identified the following factors as potentially impacting future recycled water reuse:

- **Low Flow Discharge:** The amount of water discharged to the river may be reduced as recycled water demands increase. The potential environmental impacts of any significant flow reduction must be assessed. Significant flow reductions will require prior regulatory approval.
- **Variation in Recycled Water Demand:** Plant influent and effluent flows are relatively constant during the year. However, recycled water use is primarily for irrigation and these

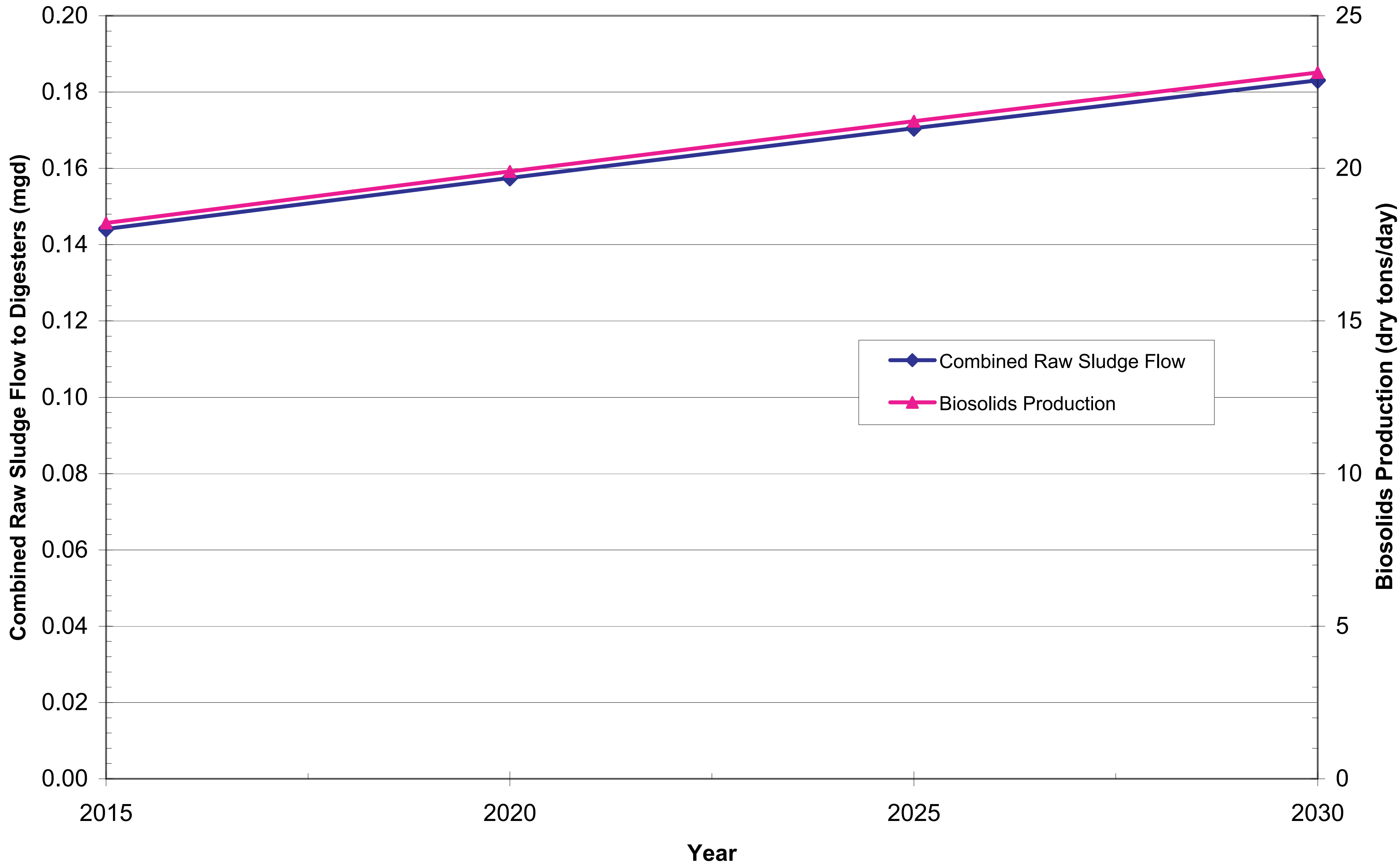


Figure 4-4
Projected Combined Raw Sludge Flow to Digesters and Biosolids Production

demands vary considerably both seasonally and diurnally. Some type of storage or flow balancing may be required to match production and usage.

- **Water Conservation:** The impact of conservation could reduce the demand for recycled water as well as the ability to produce recycled water due to decreased flows to the WRPs.
- **Salt Management:** In February 2009, the State Water Resources Control Board adopted the State Recycled Water Policy, which requires the development of a regional salt and nutrient management plan for each basin or sub-basin within the state by February 2014. These salt and nutrient management plans are intended to address and implement provisions, as appropriate, for all sources of salt and/or nutrients to groundwater basins, including recycled water projects, to manage salts and nutrients on a sustainable basis to attain water quality standards and protect beneficial uses. These efforts may result in additional regulatory requirements for water reuse projects.