Attachment A to Resolution No. R16-008

Amendment to the Water Quality Control Plan for the Los Angeles Region to Incorporate a Program of Implementation Consisting of Groundwater Quality Management Measures for Salts and Nutrients in the Upper Santa Clara River Basin

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Adopted by the California Regional Water Quality Control Board, Los Angeles Region on December 8, 2016.

Approved by:

The State Water Resources Control Board on [Insert Date].
The Office of Administrative Law on [Insert Date].

The program of implementation[1] described below is based on the Salt and Nutrient Management Plan (SNMP) for the Upper Santa Clara River Basin (also known as the Eastern Santa Clara Groundwater Basin or East Sub-basin) developed by the Castaic Lake Water Agency (CLWA) and other agencies, including City of Santa Clarita, CLWA Santa Clarita Water Division (SCWD), Los Angeles County Flood Control District (LACFCD), Newhall County Water District (NCWD), San Gabriel & Lower Los Angeles Rivers and Mountains Conservancy, Santa Clarita Valley Sanitation District (SCVSD) and Valencia Water Company (VWC). The Salt and Nutrient Management Plan and this program of implementation satisfy the State Water Resources Control Board's Recycled Water Policy requirements for Salt and Nutrient Management Plans. This program of implementation applies to groundwater basin(s) with the designated beneficial use of municipal and domestic supply (MUN).

The SNMP was developed to provide the framework for water management practices in the East Subbasin, including the use of recycled water, to ensure protection of beneficial uses and allow for the sustainable use of groundwater resources, consistent with the Regional Board's water quality objectives.

The following summarizes essential elements of the SNMP for the Upper Santa Clara River Basin. Further details may be found in the full document at:
http://www.waterboards.ca.gov/losangeles/water_issues/programs/salt_and_nutrient_management/index.shtml

[1] The Recycled Water Policy refers to "revised implementation plans" for adoption into regional basin plans pursuant to Water Code section 13242. Water Code section 13242 uses the term "program of implementation." Pursuant to Water Code section 13242, "[t]he program of implementation for achieving water quality objectives shall include, but not be limited to:
(a) A description of the nature of actions which are necessary to achieve the objectives, including recommendations for appropriate action by any entity, public or private.
(b) A time schedule for the actions to be taken.
(c) A description of surveillance to be undertaken to determine compliance with objectives."

Background

The Upper Santa Clara River Basin (or East Subbasin) is located in northwest Los Angeles County and is part of the larger Santa Clara River Valley Groundwater Basin. The Basin encompasses an area of approximately 103 square miles[2], and comprises two primary aquifers that are used for groundwater production, and provide about 50-60% of the water supply for the Santa Clarita Valley residents: a shallow Alluvial Aquifer and an older, underlying geologic unit called the Saugus Formation. The main surface drainage features in the area include the Santa Clara River (which provides most of the annual groundwater recharge to the groundwater system), Bouquet Creek, and Castaic Creek.

The Alluvial Aquifer generally underlies the Santa Clara River and its several tributaries. It is deepest along the center of the river channel, with a maximum depth of about 200 ft, and thins toward the flanks of the adjoining hills and toward the eastern and western boundaries of the basin[3]. The Saugus Formation underlies practically the entire Upper Santa Clara River area, to depths of at least 2,000 ft in the central part of the valley. Groundwater in the subbasin is generally unconfined in the alluvium, but may be confined, semi-confined, or unconfined in the Saugus Formation[2].

For management purposes, the Upper Santa Clara River Basin is subdivided into six subunits/management zones (MZs), which exhibit consistent hydrological, water quality or overlying land use characteristics (Figure 8.4-1). Five of these subunits (Management Zones 1 through 5: Santa Clara-Mint Canyon Subunit, South Fork Subunit, Placerita Canyon Subunit, Santa Clara-Bouquet and San Francisquito Canyon Sunbunit, and Castaic Subunit, respectively) comprise the shallow Alluvial Aquifer, and provide a majority of the groundwater production. The sixth subunit (Management Zone 6) consists of the Saugus Formation, which provides the balance of groundwater production.

Surface water flowing into the subbasin percolates into the highly permeable alluvial sediments, which underlie the Santa Clara River. Groundwater generally moves westward toward the outlet of the Alluvium, which is also the outlet of the Upper Santa Clara River Hydrologic Area. Thus, groundwater movement in the Alluvium beneath the tributaries is toward their confluence with the Santa Clara River and then westward. As the Alluvium thins and narrows towards the outlet of the basin, groundwater is forced to rise, keeping the depth to water at or approaching land surface.

Groundwater in the alluvial units percolates farther downward into the Saugus Formation, which underlies the alluvium. The geologic structure controls the movement of groundwater in the Saugus Formation -- downward in the eastern portion of the subbasin and upwards in the western portion. Groundwater in the Saugus Formation in the western portion of the basin rises into the alluvial portion of the Castaic Subunit, becoming surface water again and flowing westerly out of the East Subbasin. Therefore, percolation of either natural surface water and/or treated wastewater is minimal in the western portion of the subbasin due to rising water.

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[2] DWR. 2002. Santa Clara River Valley Groundwater Basin, Santa Clara River Valley East Subbasin. California's Groundwater Bulletin 118. Last Update: January 2006.

[3] CLWA. 2003. Groundwater Management Plan. Santa Clara River Valley Groundwater Basin, East Subbasin, Los Angeles County, California.

Basin Management

The Upper Santa Clara River Basin (USCRB) is actively managed through a local Memorandum of Understanding process between the Castaic Lake Water Agency (CLWA), the retail water purveyors, and the United Water Conservation District (which operates downstream of the USCRB in Lower Santa Clara River Basins). These retail water purveyors are the Santa Clarita Water Division of CLWA (SCWD), Newhall County Water District (NCWD), Valencia Water Company (VWC) and Los Angeles County Waterworks District 36 (LACWWD 36). The MOU is a collaborative and integrated approach to water resource management, integrating database management, monitoring and reporting and groundwater modelling and analysis. The cooperating agencies developed and adopted a Groundwater Management Plan that includes:

- Monitoring of groundwater levels, quality, production and subsidence
- Monitoring and management of surface water flows and quality
- Determination of Basin yield and avoidance of overdraft
- Development of regular and dry-year emergency water supply
- Continuation of conjunctive use operations
- Long-term salinity management
- Integration of recycled water
- Identification and mitigation of soil and groundwater contamination, including involvement with other local agencies in investigation, cleanup and closure
- Development and continuation of local, state and federal agency relationships
- Groundwater management reports
- Continuation of public education and water conservation programs
- Identification and management of recharge areas and wellhead protection areas
- Identification of well construction, abandonment and destruction policies
- Provisions to update the groundwater management plan

The CLWA has a contract with the State of California, through DWR, to acquire and distribute State Water Project (SWP) water to its four local retail water purveyors in the Upper Santa Clara River Basin area: CLWA Santa Clarita Water Division (SCWD), Newhall County Water District (NCWD), Valencia Water Company (VWC) and Los Angeles County Waterworks District No. 36 (LACWWD 36).

Pumping in the groundwater basins is governed by an analysis of local hydrologic conditions for the Alluvium Aquifer, and by the availability of other water supplies, particularly from the SWP. The water supply and water resource management practices applied by the purveyors aim at maximizing the use of the Alluvial Aquifer and imported water during years of normal or above-normal availability of these supplies, while limiting the use of the Saugus Formation. During years when supplemental imported water supplies are significantly reduced due to drought conditions, Saugus Formation pumping will be temporarily increased.

Participating Agencies

The SNMP was developed with broad-based stakeholder involvement. Participants included a Task Force consisting of Castaic Lake Water Agency (CLWA), City of Santa Clarita, Los Angeles County Flood Control District (LACFCD), Newhall County Water District (NCWD), Rivers and Mountains Conservancy (RMC), Santa Clarita Water Division of CLWA (SCWD), Santa Clarita

Valley Sanitation District of Los Angeles County (SCVSD), Santa Clarita Valley, and Sanitation District of Los Angeles County (SCVSD). Additional stakeholders represented Municipal and County Government Agencies, Water Suppliers/Wastewater Management/Special Districts, Business Organizations, Recreational and Open Space Entities, Regulatory and Resource Agencies- State and Federal, and Non-Profit Organizations.

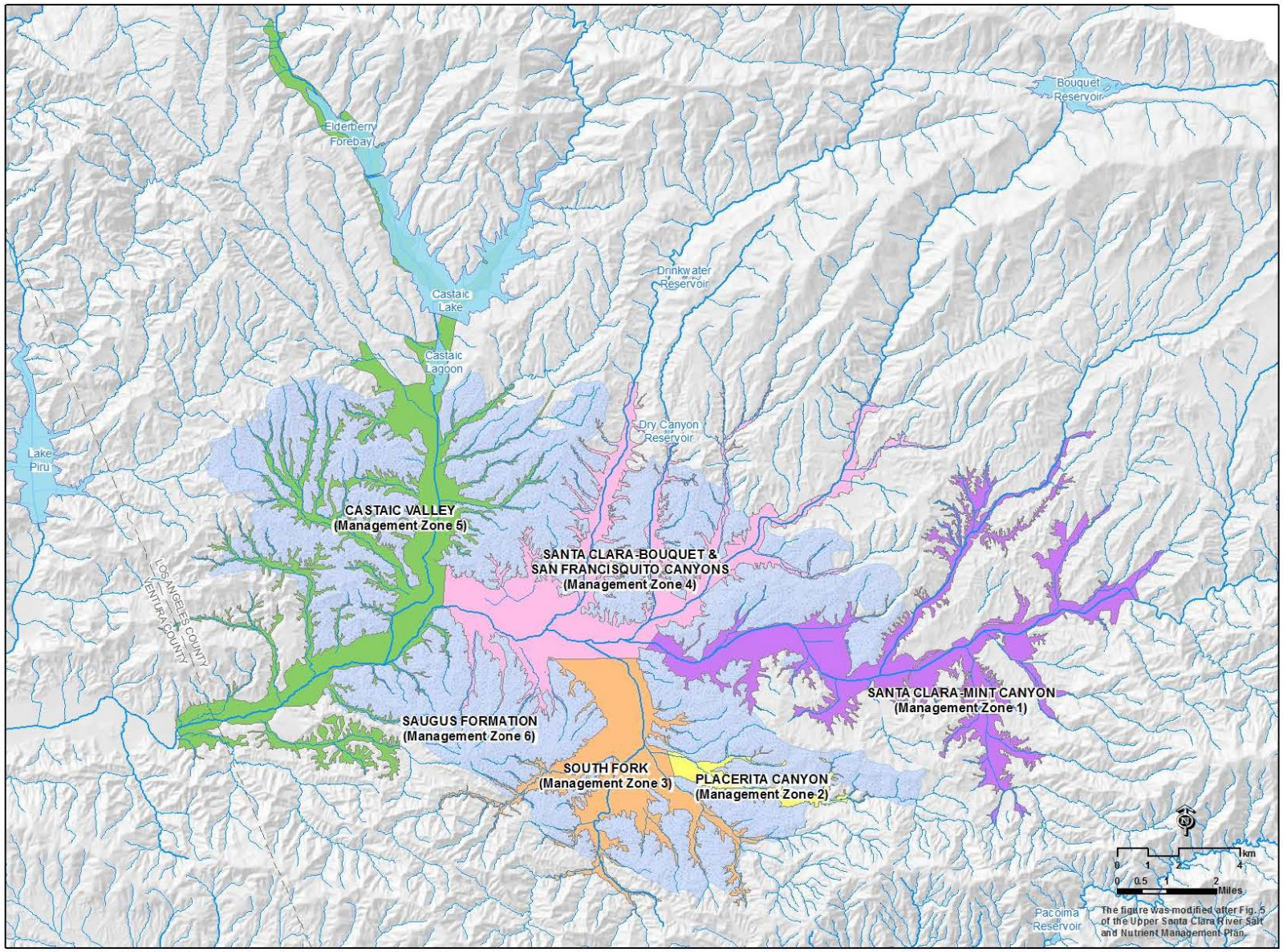

Figure 8.4-1. Upper Santa Clara River Salt and Nutrient Management Plan (SNMP) Area.

Sources of Water in the Upper Santa Clara River Basin

Sources of water for use and recharge in the Upper Santa Clara River Basin include surface water/stormwater, imported water, groundwater, and recycled water. Other minor potential sources of groundwater recharge include leakage from septic systems.

TABLE 8.4-1: CONTRIBUTIONS OF SOURCE WATERS TO THE UPPER SANTA CLARA RIVER BASINS

TYPE	SOURCE	CONTRIBUTION TO GROUNDWATER
Surface water	Santa Clara River and tributaries (Castaic Creek, San Francisquito Canyon, Bouquet Canyon, Mint Canyon, South Fork of the Santa Clara River)	Infiltration of surface waters takes place in unlined tributary channels and in the Santa Clara River bed as a result of natural flows and water releases from Castaic Dam.
Recycled Water	Tertiary-treated recycled water from Valencia and Saugus Water Reclamation Plants (WRPs)	Irrigation of nearby landscapes and discharge to the Santa Clara River
Stormwater	Precipitation from overlying area	Due to the high permeability of the Santa Clara River channel, surface flows percolate quickly into the groundwater system. Stormwater is also recharged naturally at unpaved areas (e.g., parks, golf courses, landscaped areas, dirt lots, residential lawns and gardens, etc.) where the geology promotes deep percolation.
Imported water	State Water Project (SWP), Buena Vista Water Storage District (BVWSD) and Rosedale Rio-Bravo Water Storage District (RRBWSD)	Groundwater percolation and recharge via releases from Castaic Dam following storage in Castaic Lake, as well as leakage beneath the dam. Water supply within the Upper Santa Clara Basin
Groundwater	Extracted from the Upper Santa Clara River Basin	Water supply and irrigation
	Mountain Front recharge from adjacent highland areas	Recharge of the Upper Santa Clara River Basin
	Subsurface flow from adjacent groundwater basins (including inflow from upgradient management zones, upward/downward leakage to/from the Saugus Formation, and underflow from the Acton Basin)	Recharge of the Upper Santa Clara River Basin

Groundwater outflow from the Upper Santa Clara River Basin includes:

- Pumping
- Subsurface outflow to adjacent basins, and
- Groundwater discharge to surface water.

Salt and Nutrient Loading to the Upper Santa Clara River Basin

The mass balances (inputs and outflows) for total dissolved solids (TDS), chloride, nitrate-N and sulfate from the various water sources are presented below for the upper Santa Clara River Basins, in Tables 8.4-2A through 8.4-2F. These values were model-derived based on historical hydrology[4]. Values for Management Zones 1 through 5 represent a 10-year baseline period (2001-2011), while those for Management Zone 6 (Saugus Formation) represent estimates for the 2012 year. Loads from the imported water, while not specifically listed, are reflected in the loads from applied water and stream leakage.

Management Zone 1 (Santa Clara-Mint Canyon subunit) was separated into Zones 1a and 1b (see Tables 8.4-2A and 8.4-2B) to isolate a localized area (approximately 10% of Management Zone 1) of elevated TDS and sulfate concentrations. This area with elevated concentrations was designated Zone 1b, while the rest of Management Zone 1 was designated as Management Zone 1a. The purpose of this separation was to help define the impaired area for any future groundwater quality management efforts.

[4] Discrepancies in underflow values between basins are an artifact of model calibration. More streamlined values will be obtained through future SNMP monitoring.

TABLE 8.4-2A: SALT AND NUTRIENT BALANCE IN MANAGEMENT ZONE 1A (SANTA CLARA-MINT CANYON SUBUNIT) (2001 THROUGH 2011)

Source Water	TDS		Chloride		Nitrate		Sulfate	
	(tons)	%	(tons)	%	(tons)	%	(tons)	%
Percolation from precipitation	384	1.7	153	5.7	7.7	5.6	153	3.2
Percolation from septic systems	968	4.3	141	5.3	13	9.2	154	3.2
Percolation from applied water	3,190	14.0	464	17.3	5.2	3.8	510	10.6
Stream leakage	11,062	48.6	1363	50.8	69	50.5	2138	44.2
Upward leakage from Saugus Basin plus net lateral inflow from adjoining units	4,586	20.1	213	7.9	29	21.0	1490	30.8
Underflow from Acton Basin	2,585	11.4	351	13.1	14	9.9	387	8.0
Total Inflow	**22,775**	**100**	**2,685**	**100**	**137**	**100**	**4,832**	**100**
Groundwater Production	11,480	50.9	1314	51.0	74	50.9	2372	50.8
Underflow to Management Zone 4	8,816	39.1	1008	39.1	57	39.2	1822	39.0
Downward leakage to Saugus Formation	27	0.1	3	0.1	0.2	0.2	6	0.1
Groundwater discharge to streams	2,235	9.9	250	9.7	14	9.8	469	10.0
Total Outflow	**22,558**	**100**	**2,575**	**100**	**146**	**100**	**4,669**	**100**
Annual Change in Mass	**217**	**-**	**110**	**-**	**-9**	**-**	**163**	**-**

*Contributions from the irrigation of nearby landscapes with recycled water and from discharges of recycled water to the Santa Clara River are included in the percolation from applied water and recharge from stream leakage, respectively.

TABLE 8.4-2B: SALT AND NUTRIENT BALANCE IN MANAGEMENT ZONE 1B (SANTA CLARA-MINT CANYON SUBUNIT) (2001 THROUGH 2011)

Source Water	TDS		Chloride		Nitrate		Sulfate	
	(tons)	%	(tons)	%	(tons)	%	(tons)	%
Percolation from precipitation	26	1.7	11	5.9	0.5	4.8	11	3.3
Percolation from septic systems	66	4.2	10	5.4	0.9	9.5	11	3.3
Percolation from applied water	219	14.0	32	17.3	0.5	4.8	35	10.5
Stream leakage	758	48.6	93	50.3	4.7	50.0	147	44.3
Upward leakage from Saugus Basin plus net lateral inflow from adjoining units	314	20.1	15	8.1	2.0	21.4	102	30.7
Underflow from Acton Basin	177	11.3	24	13.0	0.9	9.5	26	7.8
Total Inflow	**1,560**	**100**	**185**	**100**	**9**	**100**	**332**	**100**
Groundwater Production	859	50.9	67	51.1	6.1	51.9	276	50.8
Underflow to Management Zone 4	659	39.1	51	38.9	4.5	38.5	212	39.0
Downward leakage to Saugus Formation	2	0.1	0	0.0	0.0	0.0	1	0.2
Groundwater discharge to streams	167	9.9	13	9.9	1.1	9.6	54	9.9
Total Outflow	**1,687**	**100**	**131**	**100**	**12**	**100**	**543**	**100**
Annual Change in Mass	**-127**	**-**	**54**	**-**	**-2**	**-**	**-211**	**-**

*Contributions from the irrigation of nearby landscapes with recycled water and from discharges of recycled water to the Santa Clara River are included in the percolation from applied water and recharge from stream leakage, respectively.

TABLE 8.4-2C: SALT AND NUTRIENT BALANCE IN MANAGEMENT ZONE 2 (PLACERITA SUBUNIT) (2001 THROUGH 2011)

Source Water	TDS		Chloride		Nitrate		Sulfate	
	(tons)	%	(tons)	%	(tons)	%	(tons)	%
Percolation from precipitation	40	1.9	16	6.9	0.7	4.8	16	3.3
Percolation from septic systems	615	28.7	68	29.2	7.9	55.6	129	26.8
Percolation from applied water	497	23.2	55	23.6	0.9	6.3	105	21.8
Stream leakage	561	26.1	69	29.6	1.6	11.1	108	22.5
Upward leakage from Saugus Basin plus net lateral inflow from adjoining units	433	20.2	25	10.7	3.2	22.2	123	25.6
Underflow from upstream tributaries	0	0.0	0	0.0	0.0	0.0	0	0.0
Total Inflow	**2,146**	**100**	**233**	**100**	**14**	**100**	**481**	**100**
Groundwater Production	0	0.0	0	0.0	0.0	0.0	0	0.0
Underflow to Management Zone 3	549	36.2	60	36.4	3.8	36.2	113	36.1
Downward leakage to Saugus Formation	969	63.8	105	63.6	6.8	63.8	200	63.9
Groundwater discharge to streams	0	0.0	0	0.0	0.0	0.0	0	0.0
Total Outflow	**1,518**	**100**	**165**	**100**	**11**	**100**	**313**	**100**
Annual Change in Mass	**628**	**-**	**68**	**-**	**4**	**-**	**168**	**-**

*Contributions from the irrigation of nearby landscapes with recycled water and from discharges of recycled water to the Santa Clara River are included in the percolation from applied water and recharge from stream leakage, respectively.

TABLE 8.4-2D: SALT AND NUTRIENT BALANCE IN MANAGEMENT ZONE 3 (SOUTH FORK SUBUNIT) (2001 THROUGH 2011)

Source Water	TDS		Chloride		Nitrate		Sulfate	
	(tons)	%	(tons)	%	(tons)	%	(tons)	%
Percolation from precipitation	251	2.2	100	8.3	5.0	9.1	100	3.7
Percolation from septic systems	425	3.7	48	4.0	5.4	10.0	91	3.4
Percolation from applied water	3,449	30.2	395	33.0	5.4	10.0	736	27.6
Stream leakage	3,152	27.6	388	32.4	9.5	17.4	608	22.8
Upward leakage from Saugus Basin plus net lateral inflow from adjoining units	3,565	31.2	206	17.2	25	46.5	1013	38.0
Underflow from Management Zone 2	567	5.0	61	5.1	3.8	7.1	120	4.5
Total Inflow	**11,409**	**100**	**1,198**	**100**	**54**	**100**	**2,668**	**100**
Groundwater Production	0	0.0	0	0.0	0.0	0.0	0	0.0
Underflow to Management Zone 4	4,543	43.9	481	43.9	24	44.1	978	43.7
Downward leakage to Saugus Formation	5,812	56.1	614	56.1	31	55.9	1262	56.3
Groundwater discharge to streams	0	0.0	0	0.0	0.0	0.0	0	0.0
Total Outflow	**10,355**	**100**	**1,095**	**100**	**55**	**100**	**2,240**	**100**
Annual Change in Mass	**1,054**	**-**	**103**	**-**	**-1**	**-**	**428**	**-**

*Contributions from the irrigation of nearby landscapes with recycled water and from discharges of recycled water to the Santa Clara River are included in the percolation from applied water and recharge from stream leakage, respectively.

TABLE 8.4-2E: SALT AND NUTRIENT BALANCE IN MANAGEMENT ZONE 4 (SANTA CLARA – BOUQUET AND SAN FRANCISQUITO CANYON SUBUNIT) (2001 THROUGH 2011)

Source Water	TDS		Chloride		Nitrate		Sulfate	
	(tons)	%	(tons)	%	(tons)	%	(tons)	%
Percolation from precipitation	385	1.3	154	4.0	7.7	4.0	154	2.0
Percolation from septic systems	326	1.1	45	1.2	4.1	2.1	59	0.7
Percolation from applied water	3,393	11.0	472	12.1	5.4	2.8	621	7.9
Stream leakage	9,746	31.7	1830	47.0	66	34.4	2593	32.9
Upward leakage from Saugus Basin plus net lateral inflow from adjoining units	3,918	12.8	157	4.0	25	13.3	1315	16.7
Underflow from Management Zone 1	9,457	30.8	1,092	28.1	60	31.4	1970	25.0
Underflow from Management Zone 3	3,504	11.4	140	3.6	23	11.9	1176	14.9
Total Inflow	**30,729**	**100**	**3,890**	**100**	**190**	**100**	**7,888**	**100**
Groundwater Production	11,082	36.5	1366	36.5	73	36.3	2815	36.5
Underflow to Management Zone 5	7,649	25.2	940	25.1	51	25.2	1941	25.2
Downward leakage to Saugus Formation	1,103	3.6	136	3.6	7.2	3.6	280	3.6
Groundwater discharge to streams	10,547	34.7	1296	34.7	70	34.9	2675	34.7
Total Outflow	**30,381**	**100**	**3,738**	**100**	**201**	**100**	**7,711**	**100**
Annual Change in Mass	**348**	**-**	**152**	**-**	**-11**	**-**	**177**	**-**

*Contributions from the irrigation of nearby landscapes with recycled water and from discharges of recycled water to the Santa Clara River are included in the percolation from applied water and recharge from stream leakage, respectively.

TABLE 8.4-2F: SALT AND NUTRIENT BALANCE IN MANAGEMENT ZONE 5 (CASTAIC SUBUNIT) (2001 THROUGH 2011)

Source Water	TDS		Chloride		Nitrate		Sulfate	
	(tons)	%	(tons)	%	(tons)	%	(tons)	%
Percolation from precipitation	469	1.3	188	4.7	9.3	7.7	188	1.6
Percolation from septic systems	218	0.6	31	0.8	2.7	2.3	42	0.3
Percolation from applied water	6,958	18.9	977	24.5	10	8.7	1324	11.0
Stream leakage	9,634	26.1	1374	34.5	20	16.6	3211	26.8
Upward leakage from Saugus Basin plus net lateral inflow from adjoining units	9,466	25.7	258	6.5	39	32.4	4044	33.7
Underflow from Management Zone 4	9,492	25.7	994	25.0	38	31.3	3076	25.6
Underflow from Castaic Dam	633	1.7	161	4.0	1.4	1.1	118	1.0
Total Inflow	**36,870**	**100**	**3,983**	**100**	**120**	**100**	**12,003**	**100**
Groundwater Production	15,637	44.0	1673	44.0	50	44.0	5103	43.9
Underflow to Blue Cut (County Line)	6,943	19.5	742	19.5	22	19.5	2266	19.5
Downward leakage to Saugus Formation	446	1.3	48	1.3	1.4	1.2	146	1.3
Groundwater discharge to streams	12,550	35.3	1341	35.3	40	35.3	4096	35.3
Total Outflow	**35,576**	**100**	**3,804**	**100**	**115**	**100**	**11,611**	**100**
Annual Change in Mass	**1,294**	**-**	**179**	**-**	**5**	**-**	**392**	**-**

*Contributions from the irrigation of nearby landscapes with recycled water and from discharges of recycled water to the Santa Clara River are included in the percolation from applied water and recharge from stream leakage, respectively.

TABLE 8.4-2G: SALT AND NUTRIENT BALANCE IN MANAGEMENT ZONE 6 (SAUGUS FORMATION) (2012)

Source Water	TDS		Chloride		Nitrate		Sulfate	
	(tons)	%	(tons)	%	(tons)	%	(tons)	%
Percolation from precipitation	3,953	21.8	1,581	46.6	80	61.0	1,581	34.2
Percolation from septic systems	1,340	7.4	179	5.3	16	12.5	256	5.5
Percolation from applied water	8,591	47.3	1,144	33.7	14	10.4	1,641	35.5
Stream leakage	9.1	<0.1	1.2	<0.1	0.0	<0.1	2.4	>0.1
Downward leakage from the Alluvium + net lateral inflow from adjoining units	4,256	23.4	485	14.3	21	16.1	1,137	24.6
Total Inflow	**18,148**	**100**	**3,391**	**100**	**132**	**100**	**4,617**	**100**
Groundwater Production	11,384	82.4	681	82.3	79	82.3	4,714	82.4
Upward leakage to the Alluvium	2,439	17.6	146	17.7	17	17.7	1,010	17.6
Total Outflow	**13,822**	**100**	**827**	**100**	**96**	**100**	**5,724**	**100**
Annual Change in Mass	**4,326**	**-**	**2,564**	**-**	**36**	**-**	**-1,107**	**-**

*Contributions from the irrigation of nearby landscapes with recycled water and from discharges of recycled water to the Santa Clara River are included in the percolation from applied water and recharge from stream leakage, respectively.

Groundwater Quality and Assimilative Capacity in Upper Santa Clara River Basin

Water quality conditions in each of the management zones of the Upper Santa Clara River Basin were evaluated from the period 2001 through 2011, using groundwater quality data obtained from the following sources: California Department of Public Health, the United States Geologic Service Water Information System, the Los Angeles Regional Water Quality Control Board, SCVSD, LACFCD, CLWA Santa Clarita Water Division, City of Santa Clarita Public Works Department, Newhall County Water District, VWC, Newhall Land and Farming, and the Groundwater Surface Water Interaction Model database Hydrodesktop – from the Consortium of Universities for the Advancement of Hydrologic Sciences (CUAHSI) Hydrologic Information System (HIS).

The average (2001-2011) TDS, chloride, and nitrate and sulfate concentrations for each area of the Upper Santa Clara River Basin were compared to the applicable basin water quality objectives (WQO) to determine the existing available assimilative capacity (Table 8.4-3). Assimilative capacity is estimated as the difference between the water quality objectives and the existing groundwater quality for each basin/subarea. Because Management Zone 6 does not have established WQOs for TDS, chloride, nitrate, and sulfate, the most conservative basin objective of the alluvial management zones was used for the calculation of assimilative capacity for TDS, chloride and nitrate. Due to the lack of supporting historical data for sulfate, no decision has been made with regards to the WQO for sulfate in Management Zone 6.

Analysis of salt concentrations in Management Zone 1 (Santa Clara-Mint Canyon subunit) indicated the presence of a localized area (approximately 10% of Management Zone 1) of elevated TDS and sulfate concentrations. Previous analyses by the water purveyors have ruled out historical land use as a source of the elevated TDS and sulfate. The elevated levels of these constituents are thought to be associated with groundwater flow in the native geologic materials. For the purpose of groundwater quality assessment and determination of available assimilative capacity and future water quality conditions, this area was designated as Management Zone 1b, while the rest of Management Zone 1 was designated as Management Zone 1a.

TABLE 8.4-3: GROUNDWATER QUALITY IN THE UPPER SANTA CLARA RIVER BASIN (2001-2011)

Management Zone	Groundwater subunit		TDS (mg/L)	Cl (mg/L)	Nitrate-N(mg/L)	Sulfate (mg/L)
1a	Santa Clara-Mint Canyon	Water Quality Objective	800	150	10	150
		Water Quality	728	89	4.5	138
		Available Assimilative Capacity	**72**	**61**	**5.5**	**12**
1b	Santa Clara-Mint Canyon	Water Quality Objective	800	150	10	150
		Water Quality	833	72	4.7	269
		Available Assimilative Capacity	**-33**	**78**	**5.3**	**-119**
2	Placerita Canyon[1]	Water Quality Objective	700	100	10	150
		Water Quality	NA	NA	NA	NA
		Available Assimilative Capacity	**NA**	**NA**	**NA**	**NA**
3	South Fork[2]	Water Quality Objective	700	100	10	200
		Water Quality	NA	NA	NA	NA
		Available Assimilative Capacity	**NA**	**NA**	**NA**	**NA**
4	Santa Clara-Bouquet and San Francisquito Canyons	Water Quality Objective	700	100	10	250
		Water Quality	710	77	3.6	189
		Available Assimilative Capacity	**-10**	**23**	**6.4**	**61**
5	Castaic Valley	Water Quality Objective	1000	150	10	350
		Water Quality	727	77	1.8	246
		Available Assimilative Capacity	**273**	**73**	**8.2**	**104**
6	Saugus Formation[3]	Water Quality Objective	700	100	10	NA
		Water Quality	636	28	3.2	235
		Available Assimilative Capacity	**64**	**72**	**6.8**	**NA**

[1] No data.

[2] Limited data (1 well).

[3] WQOs have not been established for the Saugus Formation. The most conservative of the alluvial management zone WQOs was used for calculation of assimilative capacity for TDS, chloride and nitrate.

Salt and Nutrient Management Measures in the Upper Santa Clara River Basin

The region has long been concerned about salinity and nutrient discharges in order to, among other things, allow for the use of recycled water. In particular, high levels of chloride in the sewage system originate from potable water supply, self-regenerating water softeners (SRWSs), treatment plant disinfection using chlorine, and other miscellaneous residential, commercial and industrial sources. Table 8.4-4A provides a summary of historic and existing activities conducted to reduce salt and nutrient loads in the Upper Santa Clara River Basin, broadly categorized into stormwater/runoff management, wastewater salinity/nutrient source control, source water salinity control, institutional measures, regulatory/non-regulatory measures, land use regulation, conservation measures and TMDLs.

TABLE 8.4-4A: CURRENT SALT AND NUTRIENT MANAGEMENT MEASURES IN THE UPPER SANTA CLARA RIVER BASIN

Category	Specific Measure	Description
Stormwater/Runoff Management	MS4 Permitting Program	Regulates stormwater discharges from municipal separate storm sewer systems (MS4s) through permits issued by the Regional Board. NPDES stormwater permits have been adopted for medium (serving between 100,000 and 250,000 people) and large (serving 250,000 people) municipalities that require the discharger to develop and implement a Storm Water Management Plan/Program. In the current Los Angeles County MS4 Permit (Order No. R4-2012-0175) Permittees are implementing their SWMP through an Enhanced Watershed Management Program (EWMP) that emphasizes implementation of regional stormwater retention and infiltration projects. In addition, per the provisions of this permit, new development and significant redevelopment must retain on-site the stormwater runoff volume associated with the 85th percentile, 24-hour storm. Alternatively, off-site mitigation through another stormwater retention project must be implemented, while also providing on-site treatment of volume associated with the 85th percentile, 24 hour event.
Wastewater Salinity/Nutrient Source Control	Treatment Process Upgrade at the Valencia and Saugus WRPs	Upgrades include nitrification/denitrification. As a result, nutrient concentrations in the effluent have decreased.
	Industrial Wastewater Source Control Programs	Ongoing source control programs that allow WRPs to achieve NPDES permit compliance.
	SCVSD Automatic Water Softener Rebate Program	Public Education/Outreach program that provides reimbursement to SRWS owners for their removal. Phase I of the program commenced in November, 2005 and resulted in the removal of 431 units. Phase II commenced in May, 2007.
Source Water Salinity Control	LACDPW Stormwater “First Flush” Policy	Low Impact Development Guide that lists requirements for infiltration and other stormwater quality.
Institutional	1999 SCVSD Ordinance Prohibiting Installation of New Residential SRWSs	Ordinance that took effect in March 2003 and prohibits the installation of new SRWSs.
	SCVSD Measure S	Measure on the November, 2008 ballot that requires the removal and disposal of all remaining active SRWSs

Category	Specific Measure	Description
		connected to SCVSD's sewage system. Responsible for the removal of approximately 8,000 SRWSs.
	SCVSD Commercial and Industrial Sector Regulations	Program added to the source control program for NPDES permit compliance. Enforces the SRWS ban and implementation of chloride discharge limits of 100 mg/L, or performance-based chloride limits that reflect the implementation of chloride reduction practices.
Regulatory/Non-Regulatory	Wastewater, Recycled Water, Surface Water/Stormwater, Imported Water and Groundwater Monitoring	Compliance with requirements of SB7x-6 and the Sustainable Groundwater Management Act.
	State Regulations for Groundwater Replenishment Using Recycled Water	Facilitation of artificial recharge for purposes of groundwater recovery to supplement Eastside wells.
	Regional Board Permits for Groundwater Recharge	Facilitation of artificial recharge for purposes of groundwater recovery.
	Recycled Water Non-Potable Reuse Regulations, Guidelines and Permits	Facilitation of non-potable reuse by defining limits of human contact and streamlining permitting for projects.
	California Statewide Groundwater Elevation Monitoring (CASGEM) Monitoring	Enhanced monitoring and reporting ensures compliance with requirements of SB7x-6 and coordinates groundwater level monitoring among all of the users in the subbasin.
Land Use Regulation	City/County Model Water Efficient Landscape Ordinance	Ordinances requiring new development to minimize exterior water use are required to be implemented by land use planning agencies and local water retailers.
Conservation	Water Conservation Act of 2009 (Senate Bill X7-7)	Requires all water providers above a minimum size to increase water use efficiency by demonstrating a 10% reduction in potable water demand by 2015 and 20% reduction by 2020. The bill also requires, among other things, that DWR, in consultation with other state agencies, develop a single standardized water use reporting form, which would be used by both urban and agricultural water agencies.
	Emergency Drought Mandates	Emergency measures to reduce water use and minimize drought impacts on customers while conforming to statewide drought mandates. Includes a list of prohibited activities.
TMDLs	TMDLs for Chloride, Bacteria and Nitrogen	Requires the management of all sources of pollutants in a watershed to attain applicable water quality standards.

Other methods of salt reduction have included a pilot water softening treatment for drinking water for the VWC service area. This system precipitates out ions of magnesium and other salts. The objective of the program is to encourage individual homeowners to not install, or to remove existing SRWSs.

In addition, imported water is normally blended with groundwater supplies to reduce hardness. The relatively low TDS, chloride and nitrate concentrations in the imported water, particularly

during wet years, results in lower salts and nutrient concentrations in supplied water than would occur if only local sources were used.

Planned Salt and Nutrient Management Measures in the Upper Santa Clara River Basin
Planned implementation projects include increased groundwater recharge and wastewater salinity/nutrient source control (Table 8.4-4B). These projects are expected to be completed by 2035.

TABLE 8.4-4B: MAJOR PLANNED (FUTURE) SALT AND NUTRIENT PROJECTS AND MANAGEMENT STRATEGIES

Category	Specific Measure	Estimated Dates	Description
Groundwater Recharge	Vista Canyon WRP	2014/2019	Project will generate 439 acre-ft/yr of treated wastewater that will be used for landscape irrigation. Any excess treated effluent not being recycled will be conveyed to the downstream facilities of the Santa Clarita Valley Sanitation District (SCVSD).
Wastewater Salinity/Nutrient Source Control	Newhall Ranch WRP	2023/2033	WRP to service development in the Newhall Ranch Specific Plan and Westside communities, thereby also serving as a Wastewater Salinity/Nutrient Source Control program. It will also provide water for landscape irrigation.
	SCVSD Wastewater Treatment Plant Chloride Compliance Program	2015/2019	Reverse Osmosis treatment and blending of treated wastewater to produce a combined discharge of chloride from the Saugus and Valencia WRPs equal to 100 mg/L as a three-month average.
Source Water Salinity Control (and Conservation)	SCV Water Use Efficiency Programs	2012/2015	Suite of water conservation programs/projects to be implemented from the updated Santa Clarita Valley Water Use Efficiency Plan.
	SCWD Water Use Efficiency Programs	2014/2020	Ten (10) programs designed to conserve water and reduce residential and urban use, runoff and sewage flows.
Conservation	CLWA Recycled Water Master Plan	2014/2035	Plans to incorporate additional recycled water for use in landscape irrigation

Projected Impacts of Future Projects on Water Quality

Groundwater quality over the planning period (2012-2035) was estimated using a spreadsheet model. This mixing model was developed in Microsoft Excel and is a set of linked spreadsheets used to represent 'instantaneously mixed' groundwater volumes. Salt and nutrient loadings were quantified by determining the potential volume of water coming from each source and applying an appropriate loading factor based on water quality sampling data and the distribution of potential salt loads by land use. The water balance for all inflow and outflow terms was quantified using a groundwater model that took into account the various hydrologic variables that affect the water resources within the Upper Santa Clara River Basin. The salt and nutrient loads were then applied to the annual

water balances for each management zone to evaluate the annual and overall changes in salt and nutrient concentrations for the study period.

Eight scenarios were considered to evaluate the effects of planned future projects on overall groundwater quality and use of assimilative capacity:

(1) No project implemented, with existing conditions projected into the future, taking into account future changes in land use and associated water use;

(2-7) Each of the proposed projects implemented individually, taking into account future changes in land use and associated water use;

(8) All projects implemented, taking into account future changes in land use and associated water use.

Results of the no project and all project scenarios are provided in Tables 8.4-5A-D.

The results indicate that in some cases, some of the assimilative capacity of the USCRB will be used under existing conditions, due to projected land use changes (no project scenario). With the exception of sulfate in Zone 1b, and TDS in Zone 4, the concentrations of all salts would remain under the water quality objectives. The completion of all proposed projects would have varying, but generally beneficial, effects by decreasing the amount of assimilative capacity used, compared to the no project scenario.

TABLE 8.4-5A: PROJECTED IMPACT OF DIFFERENT PROJECT SCENARIOS ON ASSIMILATIVE CAPACITY FOR TDS

Management Zone	Groundwater subunit	Current Water Quality	No Project Scenario		All Projects Scenario	
		2011	2035			
		TDS (mg/L)	TDS (mg/L)	Assimilative Capacity created (%)*	TDS (mg/L)	Assimilative Capacity created (%)*
1a	Santa Clara-Mint Canyon	728	739	**-15**	717	**14**
1b	Santa Clara-Mint Canyon	833	790	**129**	786	**143**
2	Placerita Canyon	NA	NA	**NA**	NA	**NA**
3	South Fork	NA	NA	**NA**	NA	**NA**
4	Santa Clara-Bouquet and San Francisquito Canyons	710	709	**12**	703	**70**
5	Castaic Valley	727	728	**0**	719	**3**

6	Saugus Formation	636	636	**-1**	636	**-1**

*Negative values indicate assimilative capacity used

TABLE 8.4-5B: PROJECTED IMPACT OF DIFFERENT PROJECT SCENARIOS ON ASSIMILATIVE CAPACITY FOR CHLORIDE

Management Zone	Groundwater subunit	Current Water Quality	No Project Scenario		All Projects Scenario*	
		2011	2035			
		Chloride (mg/L)	Chloride (mg/L)	Assimilative Capacity created (%)*	Chloride (mg/L)	Assimilative Capacity created (%)*
1a	Santa Clara-Mint Canyon	89	89	**0**	85	**6**
1b	Santa Clara-Mint Canyon	72	72	**0**	71	**1**
2	Placerita Canyon	NA	NA	**NA**	NA	**NA**
3	South Fork	NA	NA	**NA**	NA	**NA**
4	Santa Clara-Bouquet and San Francisquito Canyons	77	93	**-71**	88	**-49**
5	Castaic Valley	77	79	**-3**	75	**3**
6	Saugus Formation	28	46	**-24**	46	**-25**

*Negative values indicate assimilative capacity used

**An additional “All Project” management scenario, using recycled water with higher chloride concentrations for irrigation, results in a projected chloride concentration of 89 mg/l and a 52% use of assimilative capacity in Management Zone 4.

TABLE 8.4-5C: PROJECTED IMPACT OF DIFFERENT PROJECT SCENARIOS ON ASSIMILATIVE CAPACITY FOR NITRATE

Management Zone	Groundwater subunit	Current Water Quality	No Project Scenario		All Projects Scenario	
		2011	2035			
		Nitrate-N (mg/L)	Nitrate-N (mg/L)	Assimilative Capacity created (%)*	Nitrate-N (mg/L)	Assimilative Capacity created (%)*
1a	Santa Clara-Mint Canyon	4.5	4.3	**3**	4.3	**2**
1b	Santa Clara-Mint Canyon	4.7	5.2	**-9**	5.2	**-9**
2	Placerita Canyon	NA	NA	**NA**	NA	**NA**
3	South Fork	NA	NA	**NA**	NA	**NA**
4	Santa Clara-Bouquet and San Francisquito Canyons	3.6	4.3	**-10**	4.3	**-11**
5	Castaic Valley	1.8	2.5	**-8**	2.5	**-8**
6	Saugus Formation	3.2	4.3	**-17**	4.3	**-17**

*Negative values indicate assimilative capacity used

TABLE 8.4-5D: PROJECTED IMPACT OF DIFFERENT PROJECT SCENARIOS ON ASSIMILATIVE CAPACITY FOR SULFATE

Management Zone	Groundwater subunit	Current Water Quality	No Project Scenario		All Projects Scenario	
		2011	2035			
		Sulfate(mg/L)	Sulfate (mg/L)	Assimilative Capacity created (%)*	Sulfate (mg/L)	Assimilative Capacity created (%)*
1a	Santa Clara-Mint Canyon	138	150	**-102**	147	**-76**
1b	Santa Clara-Mint Canyon	269	225	**37**	225	**37**
2	Placerita Canyon	NA	NA	**NA**	NA	**NA**
3	South Fork	NA	NA	**NA**	NA	**NA**
4	Santa Clara-Bouquet and San Francisquito Canyons	189	166	**39**	164	**41**
5	Castaic Valley	246	248	**-2**	248	**-2**
6	Saugus Formation	235	251	**-**	251	**-**

*Negative values indicate assimilative capacity used

Salt and Nutrient Load Limits

Salt and nutrient loads to the Upper Santa Clara River Basin will be managed with the existing and planned programs/projects discussed above, in conjunction with other existing water quality protection measures described in Table 8.4-6. Additional conceptual implementation measures include groundwater recharge in the Saugus Formation using State Water Project water during wet years with recovery during dry years, and a proposed brine line in the lower sections of the Santa Clara River Valley that could be extended to Los Angeles County. These measures are

expected to maintain water quality that is protective of beneficial uses. Existing TDS and sulfate impairments in localized areas are being addressed through blending of extracted groundwater. Assignment of allocations for salt and nutrient loading is not warranted at this time

TABLE 8.4-6: OTHER PLANNED FUTURE MANAGEMENT MEASURES

Category	Specific Measure	Description
Stormwater/Runoff Management	Low Impact Development (LID) and Stormwater Best Management Practices (BMPs)	The main goals of LID and stormwater BMPs are to increase groundwater recharge and improve stormwater quality. On April 7, 2015 the City of Santa Clarita adopted Resolution No. P15-02, approving the Unified Development Code Amendment 15-001, the Low Impact Development Ordinance. LID projects/practices decrease salt and nutrient loading and concentrations in groundwater.
Groundwater Recharge	Projects from Recon Study	Includes possible rubber dams and moving up to 10,000 acre-ft/yr of SWRP and VWRP water to discharge points in the eastern part of the subbasin for groundwater recharge.
	City/County MS4 Stormwater Infiltration Basins	In December 2012, the Regional Board adopted a new Los Angeles County MS4 Permit (Order No. R4-2012-0175), replacing the 2001 Los Angeles County MS4 Permit. The 2012 MS4 Permit encourages permittees to infiltrate stormwater as a fundamental aspect of permit implementation. Compliance with this permit will decrease salt and nutrient loading and concentrations in groundwater.
	Enhanced Watershed Management Program	The Upper Santa Clara Watershed Management Group prepared an Enhanced Watershed Management Plan (EWMP) to implement the requirements of the Los Angeles County MS4 Permit, described above. The EWMP allows Permittees to comprehensively evaluate opportunities, within the participating Permittees' collective jurisdictional area, for collaboration among Permittees and other partners on multi-benefit regional EWMP projects that, wherever feasible, retain (i) all non-storm water runoff and (ii) all storm water runoff from the 85th percentile, 24-hour storm event for the drainage areas tributary to the projects, while also achieving other benefits including flood control and water supply. The approved USCR EWMP applies to the Permittees within the Integrated Regional Watershed Management Group, and describes how the IRWMG intends to implement a program that will address water quality issues within the geographical scope of their EWMP area.
Regulatory / Non-Regulatory	SNMP Monitoring	Increased groundwater level and water quality monitoring. The monitoring program data will allow preparation of updated ambient water quality for the management zones every three years.
	Sustainable Groundwater Management Act Plan/Programs	Long term planning and monitoring to ensure sustainable yield of the subbasin by all of the groundwater stakeholders.

Monitoring Program

While, historically, there have been some monitoring programs in an effort to develop a database for the Upper Santa Clara River area, there has been no unified monitoring system for groundwater levels and groundwater quality. Groundwater levels and groundwater quality sampling and analysis are currently conducted by various agencies. The SNMP monitoring program will allow consistent on-going collection of data to monitor the actual effects of land use changes and groundwater management measures on groundwater quality in the Upper Santa Clara River Basin. The Program will collect samples from a set of thirty six monitoring wells and eight surface water sites in the subbasins, as well as incorporate data from existing sampling programs. Elements of the program are laid out in Table 8.4-7.

TABLE 8.4-7: MONITORING PROGRAM ELEMENTS

<table>
<tr><th>Element</th><th>Description</th></tr>
<tr><td>Responsible Agency</td><td>Castaic Lake Water Agency</td></tr>
<tr><td>Program Origin</td><td>State Water Board’s Groundwater Ambient Monitoring and Assessment Program
California Statewide Groundwater Elevation Monitoring Plan (CASGEM)
Ventura County Watershed Protection District Comprehensive Water Quality Monitoring Plan for the Santa Clara River Watershed
Santa Clarita Valley Sanitation District of Los Angeles County – Santa Clara River Watershed- Wide Monitoring Program and Implementation Plan</td></tr>
<tr><td>Parameters and Monitoring Frequency</td><td>
<table>
<tr><th>Parameter</th><th>Monitoring Frequency</th></tr>
<tr><td>Total Dissolved Solids</td><td rowspan="4">Annually</td></tr>
<tr><td>Chloride</td></tr>
<tr><td>Nitrate</td></tr>
<tr><td>Sulfate</td></tr>
<tr><td>Groundwater level</td><td>Monthly</td></tr>
</table>
</td></tr>
<tr><td>Monitoring locations</td><td>Groundwater quality monitoring will be accomplished using thirty six (36) monitoring wells located throughout the Alluvial Aquifer and the Saugus Formation. The wells were selected to: (1) provide a sampling location downgradient of potential salt and nutrient contributors such as treated effluent discharge locations, stormwater outfalls, septic tank areas, and land use areas with planned long-term application of recycled water, and (2) allow evaluation of the contribution to groundwater quality from individual subunits downgradient of the confluence of the subbasins moving to the western end of the Upper Santa Clara River Basin.</td></tr>
</table>

Element	Description
	In addition to groundwater, eight (8) surface water monitoring stations located along the Santa Clara River will be used to evaluate the impacts of surface water trends on groundwater conditions.
Reporting Requirements	Monitoring results will be reported at least every three years. All data collected from the SNMP monitoring wells will be uploaded to the State Water Board's online GeoTracker database.
Additional Resources	Existing programs will be used to provide additional information. These programs include surface water, groundwater and effluent discharge quality monitoring by the Santa Clarita Valley Sanitation District of Los Angeles County, and stormwater quality monitoring conducted by Los Angeles County Department of Public Works (LACDPW) and the City of Santa Clarita.
Review Period and Re-opener	Data collected from the SNMP monitoring wells and other monitoring programs will be reviewed periodically to validate model predictions regarding changes to basin water quality.

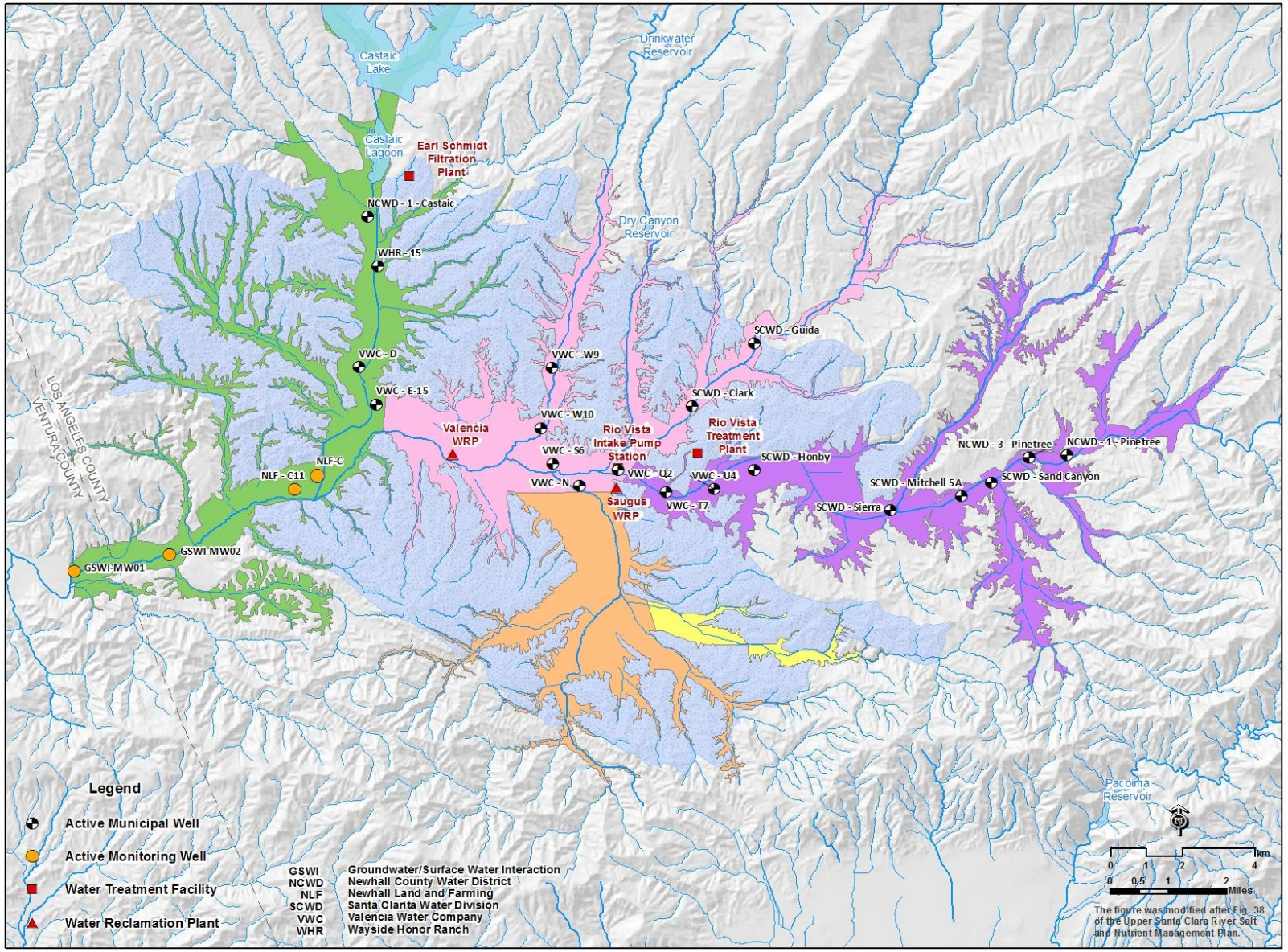

Figure 8.4-2. Location of SNMP Monitoring Wells in the Alluvial Aquifer of the Upper Santa Clara River Basin.

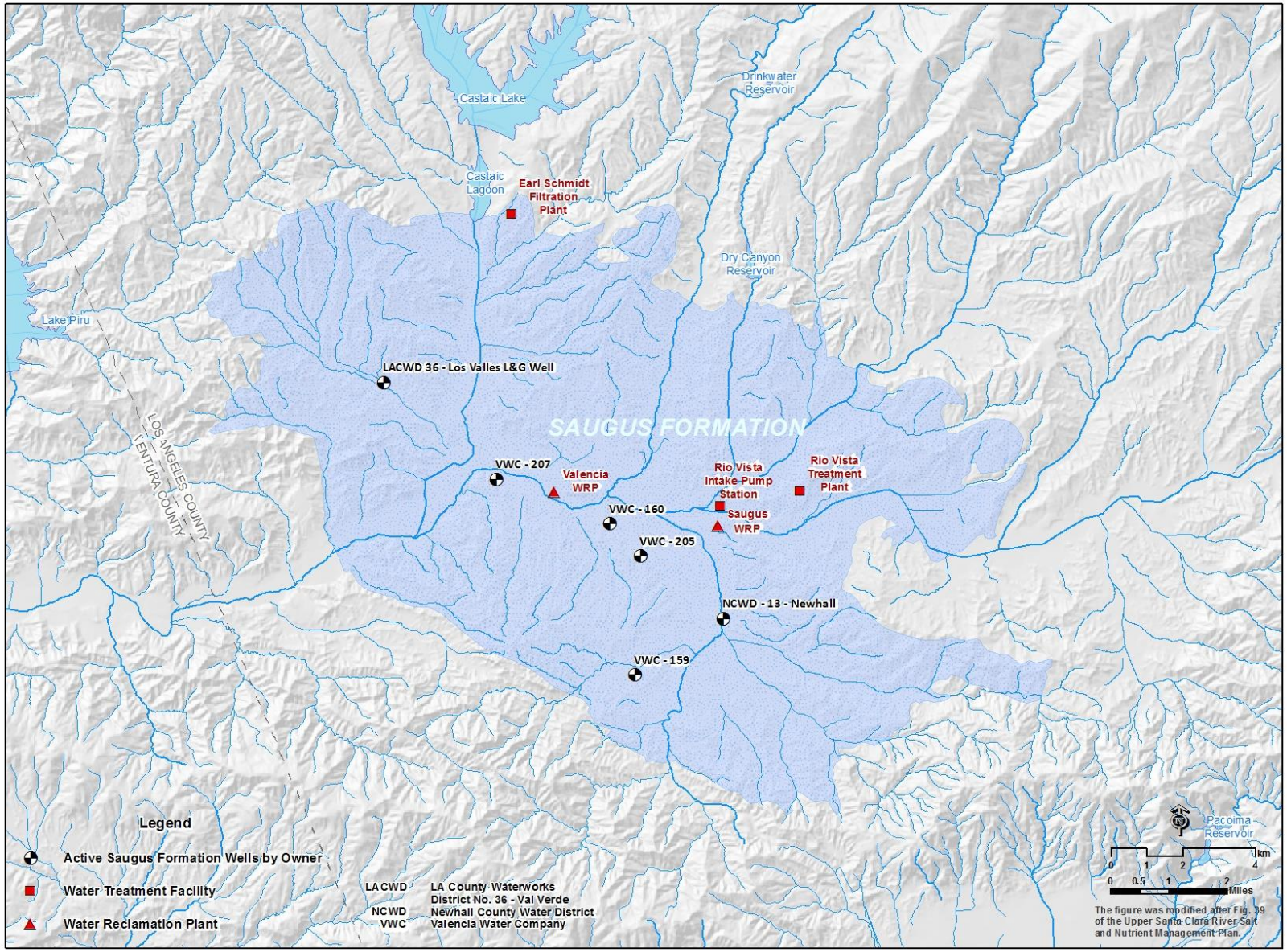

Figure 8.4-3. Location of SNMP Monitoring Wells in the Saugus Formation of the Upper Santa Clara River Basin.

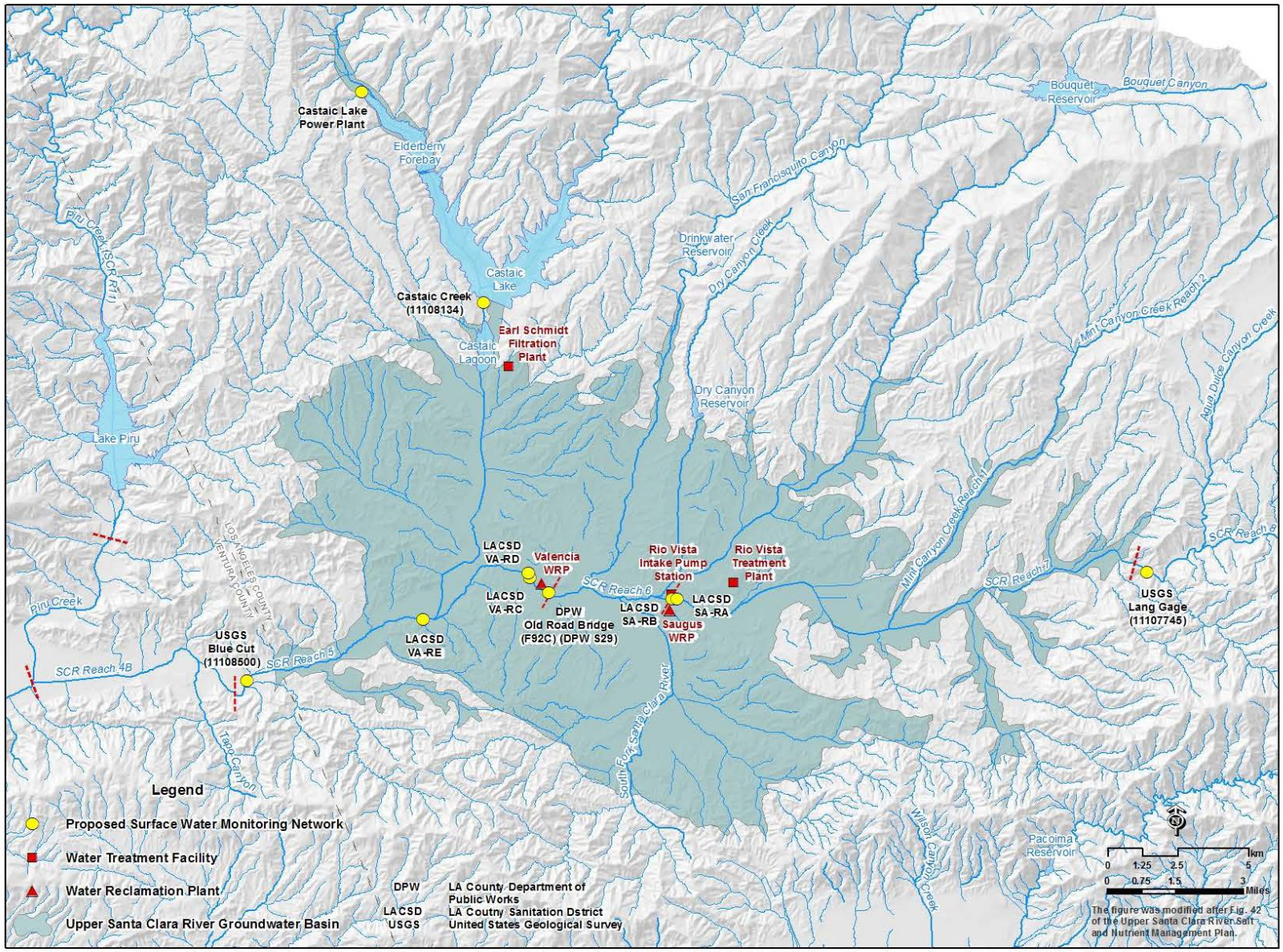

Figure 8.4-4. Location of SNMP Surface Water Monitoring Stations in the Upper Santa Clara River Basin.

Updates to the Salt and Nutrient Management Measures

Salt and nutrient management measures will be updated (i) as necessary to reflect changing conditions in the Upper Santa Clara River Basin (i.e. in accordance with actions that have been taken or in response to proposed actions not taken), (ii) where results from the SNMP Monitoring Program indicate that revisions/modifications are warranted, and/or (iii) at the end of a 10-year planning horizon (i.e. 2025).

Regulatory Implications

The salt and nutrient management strategies developed by local water entities in the Upper Santa Clara River Basin are voluntary measures that are designed to maintain water quality that is protective of beneficial uses, while increasing recycled water use and allowing for the sustainable use of groundwater. These strategies will be applied in conjunction with already existing water quality protection measures in the planning area (e.g. TMDLs).

Where projects have the potential to impact salt and/or nutrient loads to a basin, consideration will be given to water quality conditions and the corresponding assimilative capacity in localized areas during the permitting process or the development of other Regional Board regulatory actions. Except for the permitting of existing and proposed facilities/projects, further Regional Board action pertaining to these implementation measures geared toward controlling salt and nutrient loading to these basins will only be necessary where data and/or other information indicate that the projected water quality conditions are not being met.