2016 SANTA CLARITA VALLEY WATER REPORT

June, 2017

Prepared by

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CONSULTING ENGINEERS

Castaic Lake Water Agency
CLWA Santa Clarita Water Division
Los Angeles County Waterworks District 36
Newhall County Water District
Valencia Water Company

2016
Santa Clarita Valley
Water Report

prepared for:

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List of Abbreviations and Acronyms

af	acre-feet
afy	acre-feet per year
BMPs	Best Management Practices
Bos	Biological Opinion
BV/RRB	Buena Vista/Rosedale-Rio Bravo
BVWSD	Buena Vista Water Storage District
CEQA	California Environmental Quality Act
CGPS	Continuous Global Positioning System
CIMIS	California Irrigation Management Information System
CLWA	Castaic Lake Water Agency
County	Ventura County State Water Project Contractors
CUWCC	California Urban Water Conservation Council
DDW	Division of Drinking Water
DPR	Direct Potable Reuse
DTSC	California Department of Toxic Substances Control
DWR	California Department of Water Resources
GPCD	gallons per capita per day
GRR	Groundwater Replenishment Reuse
GSI	GSI Water Solutions, Inc.
GSP	Groundwater Sustainability Plan
GWMP	Groundwater Management Plan
IPR	Indirect Potable Reuse
LACFCD	Los Angeles County Flood Control District
LACWD 36	Los Angeles County Waterworks District 36
LADPW	Los Angeles County Department of Public Works
LADWP	Los Angeles County Department of Water and Power
LSCE	Luhdorff and Scalmanini Consulting Engineers

mg/L	milligrams per liter
MOU	Memorandum of Understanding
NCEI	National Centers for Environmental Information
NCWD	Newhall County Water District
OU	Operating Unit
PCE	Tetrachloroethylene
RAP	Remedial Action Plan
RD	Remedial Design
RRBWBP	Rosedale-Rio Bravo Water Banking Program
RRBWSD	Rosedale-Rio Bravo Water Storage District
RWMP	Recycled Water Master Plan
SCVWUESP	Santa Clarita Valley Water Use Efficiency Strategic Plan
SCWD	Castaic Lake Water Agency's Santa Clarita Water Division
Semitropic	Semitropic Water Storage District
SGMA	Sustainable Groundwater Management Act
SPTF	Saugus Perchlorate Treatment Facility
SVE	Soil Vapor Extraction
SWA	Surface Water Augmentation
SWP	State Water Project
SWRCB	State Water Resources Control Board
SWRU	Stored Water Recovery Unit
TCE	Trichloroethylene
TDS	Total Dissolved Solids
µg/L	micrograms per liter
UNAVCO	University NAVSTAR Consortium
USEPA	United States Environmental Protection Agency
UWMP	Urban Water Management Plan
Valley	Santa Clarita Valley

VOC	Volatile Organic Compound
VWC	Valencia Water Company
WKWD	West Kern Water District
WRP	Water Reclamation Plant

EXECUTIVE SUMMARY

This annual report, which is the nineteenth in a series that began to describe water supply conditions in 1998, provides current information approximately the water requirements and water supplies of the Santa Clarita Valley (Valley). The report was prepared for the imported water wholesaler, Castaic Lake Water Agency (CLWA), and for the four local retail water purveyors (Purveyors) that serve the Valley: CLWA Santa Clarita Water Division, Los Angeles County Waterworks District 36, Newhall County Water District, and Valencia Water Company. These entities and representatives from the City of Santa Clarita and the County of Los Angeles Department of Regional Planning meet as required as the Santa Clarita Valley Water Committee to coordinate the management of imported water with local groundwater and recycled water to meet water requirements in the Valley.

This report provides information approximately local groundwater resources, State Water Project (SWP) and other imported water supplies, water conservation, and recycled water. The report reviews the sufficiency and reliability of supplies in the context of existing water demand, with focus on actual conditions in 2016, and it provides a short-term outlook of water supply and demand for 2017.

ES.1 2016 Water Requirements and Supplies

In 2016, total water requirements in the Valley were approximately 72,300 acre-feet (af), of which approximately 58,000 af (80 percent) were for municipal use and the remainder (14,300 af) was for agricultural and other (miscellaneous) uses, including individual domestic uses. Total demand in 2016 was almost nine percent higher than in 2015, 11 percent higher than the estimate in the 2015 Water Report (65,000 af), and approximately 3 percent higher than the projection in the 2015 Urban Water Management Plan (UWMP) (69,900 af). Total water requirements in 2016 were met by a combination of approximately 40,700 af from local groundwater resources (approximately 26,300 af for municipal and approximately 14,300 af for agricultural and other uses), approximately 31,100 af of SWP and other imported water, and approximately 500 af of recycled water.

Of the 40,700 af of total groundwater pumping in the Valley in 2016, approximately 28,800 af were pumped from the Alluvium and approximately 11,800 af were pumped from the underlying, deeper Saugus Formation. Alluvial pumping in 2016 was approximately 2,000 af less than in 2015, and Saugus pumping was higher than in 2015, by approximately 500 af. Neither pumping volume resulted in any notable long term, overall change in groundwater conditions (water levels, water quality, etc. as discussed herein) in either aquifer system. Imported water deliveries to the Purveyors increased by approximately 7,000 af from the previous year. Water uses and supplies in 2016 are summarized in the following Table ES-1.

Table ES-1: Santa Clarita Valley
Summary of 2016 Water Supplies and Uses (af)

Municipal		
SWP and other Imported Supplies		31,130
Groundwater (Total)		26,329
Alluvium	*15,244*	
Saugus	*11,085*	
Recycled Water		507
Subtotal		**57,966**
Agriculture/Miscellaneous		
SWP and other Imported		-
Groundwater (Total)		14,359
Alluvium	*13,605*	
Saugus	*754*	
Subtotal		**14,359**
Total		***72,325***

In accordance with the California Urban Water Management Planning Act, the current Valley-wide UWMP was finalized in 2015 and adopted in 2016. This plan extends projected water demands through 2050, and describes the combination of local groundwater, imported water supplies from the SWP and other sources, local recycled water supplies, and other water supplies planned to meet those projected water demands in the Valley. The 2015 UWMP describes the reliability of local groundwater resources and the adequacy of groundwater supplies to meet groundwater demand. It also describes the ongoing efforts leading to integrated control of perchlorate migration and restoration of perchlorate-impacted groundwater supply along with occurrence of other constituents of concern like volatile organic compounds (VOCs).

Notable details approximately each component of water supply in the Valley and the water supply outlook for 2017 are included in the following sections.

ES.2 Alluvium

Based on an updated evaluation of groundwater basin yield, completed in 2009, the groundwater operating plan in the 2015 UWMP includes pumping from the Alluvium in the range of 30,000 to 40,000 acre-feet per year (afy) following wet/normal years, and slightly reduced pumping (30,000 to 35,000 afy)

following dry years. Groundwater pumping in 2016 was consistent with the Operating Plan dry year ranges. Pumping from the Alluvium in 2016 was approximately 28,800 af, which is at the lower end of the operating plan range for the Alluvium following dry years. There were no adverse effects on groundwater levels and storage in the basin that have not normally occurred during previous dry periods in the basin. On average, pumping from the Alluvium has been approximately 33,100 afy since supplemental imported water became available in 1980. That average annual amount remains near the lower end of the range of operational yield for a wet/normal year and approximately mid-range for a dry period.

On a long-term basis (multi-decades), continuing through 2016, there is no evidence of any trend toward permanent water level or storage decline as discussed in the Chapter 3 section approximately conditions in the Alluvium and Saugus Formation. In general, throughout a large part of the basin, groundwater levels in the Alluvium have generally varied within predictable ranges that are associated with climatic fluctuations during the last 35 years with short-term declines during dry periods followed by recoveries during wet periods. Above-average precipitation in late 2004 and 2005, and more recently in 2010 and early-2011, resulted in significant water level recovery in the eastern part of the basin despite the recent multi-year dry period (2006-2009, 2011-2016), when water levels declined to the low end of the historic range of groundwater levels. This continues the overall trend of fluctuating groundwater levels within a generally constant range over the last 35 years. These ongoing data indicate that the Alluvium remains in good operating condition and can continue to support pumping in the operating range included in the 2015 UWMP, or slightly higher, without adverse results (e.g., long-term water level decline or degradation of groundwater quality.)

Based on an integration of water quality records from multiple wells completed in the Alluvium, there have been historical fluctuations in groundwater quality, typically associated with variations in precipitation and streamflow. However, like groundwater levels, there has been no long-term trend toward groundwater quality degradation; groundwater produced from the Alluvium remains a viable municipal and agricultural water supply.

In 2002, as part of ongoing monitoring of wells for perchlorate contamination, perchlorate was detected in one Alluvial well (the SCWD Stadium Well) located near the former Whittaker-Bermite facility. The detected concentration was slightly below the then-applicable Notification Level for perchlorate (6 micrograms per liter (µg/L), which was subsequently established as the Maximum Contaminant Level for perchlorate in October 2007). The Stadium Well was destroyed and the well was replaced (in a different location) to restore that component of municipal water supply that was impacted by perchlorate. In early 2005, perchlorate was detected in a second Alluvial well, VWC's Well Q2. After an interim period of wellhead treatment, that well has now been returned to regular water supply service. All other Alluvial wells operated by the Purveyors continue to be used for municipal water supply service. All Alluvial municipal wells are sampled in accordance with drinking water regulations and perchlorate has not been detected. As summarized in the 2015 UWMP, the replacement and reactivation of the formerly impacted wells adds to the overall ability to meet the groundwater component of total water

supply in the Valley. The ongoing characterization and plan for containment and cleanup of perchlorate in the Valley has focused on the Saugus Formation along with soil and groundwater cleanup on the Whittaker-Bermite site that begin in 2006.

ES.3 Saugus Formation

The groundwater operating plan in the 2015 UWMP includes pumping from the Saugus Formation in the range of 7,500 to 15,000 afy in normal years; it also includes planned dry-year pumping from the Saugus of 15,000 to 35,000 afy for one to three consecutive dry years. Similar to the operation plan for the Alluvium, the ranges of pumping from the Saugus Formation are based on the updated evaluation of groundwater basin yield, completed in 2009, which found those ranges of pumping to be sustainable on a long-term basis.

Pumping from the Saugus Formation was approximately 11,800 af in 2016; this included approximately 3,400 af that were pumped from CLWA's Saugus 1 and Saugus 2 Wells as part of the perchlorate pump and treat program. On average, pumping from the Saugus Formation has been approximately 7,300 afy since 1980. Both the 2016 amount and the long-term average rates remain near the mid to lower end of the ranges included in the groundwater operating plan. As a result of long-term relatively low pumping from the Saugus Formation, groundwater levels in that aquifer have remained generally constant to slightly increasing over the last 40 to 45 year time horizon. On a short-term time frame, there have been declining trends in groundwater elevations in the Saugus Formation since 2006 that likely reflect the generally dry climatic conditions that have existed during that time with the exception of 2010 and the early part of 2011 which were generally wet.

In 1997, ammonium perchlorate was discovered in four wells (Saugus 1, Saugus 2, VWC-157 and NC-11) completed in the Saugus Formation in the vicinity of the former Whittaker-Bermite facility located generally toward the east, on the south side of the Valley. In 2006, a very low level of perchlorate was detected in another Saugus municipal well (NC-13). And in 2010, it was detected further downgradient in a sixth Saugus well (VWC-201). To date, one of the impacted wells has been destroyed (VWC-157) and replaced, three have remained in or been returned to service with treatment as required (NC-13, Saugus 1, and Saugus 2), one remains out of service with its capacity replaced by an alternate source (NC-11), and the most recently impacted well (VWC-201) remains out of service with plans in development for restoration. As part of regular operation, those wells that remain in service are sampled in accordance with California drinking water regulations. All other Saugus Formation wells owned and operated by the Purveyors remain available for municipal water supply service.

Work toward the remediation of perchlorate contamination, including the restoration of impacted groundwater supply, was continued in 2016. The focus of the work was developing a perchlorate restoration and containment plan to continue to pump and treat contaminated water from two of the originally impacted wells (Saugus 1 and 2) and initiate pump and treat operations at VWC-201 to contain the migration of the contaminant plume, and to deliver treated water for municipal supply to partially replace impacted well capacity. Beginning with the restoration of Saugus 1 and 2, CLWA's Saugus

Perchlorate Treatment Facility (SPTF) has been online since 2011 and numerous monitoring tests are performed each week in order to ensure the water leaving the SPTF meets drinking water standards. In 2016, 3,407 af of groundwater were pumped from Saugus 1 and 2. After treatment for perchlorate removal, the groundwater is blended with treated imported water and delivered to the Purveyors through the CLWA distribution system. With this additional production at Saugus 1 and 2, the Purveyors continue to have sufficient pumping capacity to meet the planned normal range of Saugus pumping as described in the 2015 UWMP. Restoration of VWC Well 201 to service by 2017, along with the resumption to service of VWC Well 205 will also increase available production capacity from the Saugus Formation.

Additionally, low concentrations of volatile organic compounds (VOCs), Trichloroethylene (TCE) and Tetrachloroethylene (PCE), have been detected at Saugus 1 and Saugus 2. Although the concentrations have always been below the Maximum Contaminant Level, the State Water Resources Control Board (SWRCB) Division of Drinking Water (DDW) has set an operational goal in CLWA's Operating Permit of no VOCs above the detection limit for reporting in its distribution system and is working with the Purveyors and the California Department of Toxic Substances Control (DTSC) to address the VOC impacts to groundwater.

ES.4 Imported Water

Historically consisting of only its SWP Table A Amount, CLWA's imported water supplies now consist of a combination of SWP water, water acquired from the Buena Vista Water Storage District (BVWSD) and Rosedale-Rio Bravo Water Storage District (RRBWSD) in Kern County, and Yuba County Water Agency purchases and banked water. CLWA's contractual Table A amount is 95,200 af of water from the SWP. Under the 2007 Water Acquisition Agreement with the BVWSD and the RRBWSD, BVWSD's high flow Kern River entitlements (and other acquired waters that may become available) are captured and recharged within the RRBWSD service area on an ongoing basis. CLWA receives 11,000 af of these supplies annually through either exchange of BVWSD's and RRBWSD's SWP supplies or through direct delivery of water to the California Aqueduct via the Cross Valley Canal. In 2008, CLWA entered into the Yuba Accord Agreement, which allows for the purchase of water from the Yuba County Water Agency through the Department of Water Resources (DWR). Up to 850 af of non-SWP supply is available to CLWA in critically dry years. Also, in addition to these available supplies, CLWA has access to 4,684 af of "flexible storage" in Castaic Lake. In 2015, CLWA negotiated a ten-year extension of an agreement with the Ventura County SWP contractors (County) to allow CLWA to utilize the County's flexible storage account of 1,376 af. CLWA may withdraw water from the County's flexible storage on an as-needed basis; however any water withdrawn from this storage account must be replaced within five years. The combined flexible storage from CLWA's and the County's accounts provides total flexible storage of 6,060 af, which is maintained in Castaic Lake for use in a future dry period or an emergency.

CLWA has entered into four long-term groundwater banking and water exchange programs and has, in aggregate, more than 145,000 af of recoverable water outside the local groundwater basin at the end of 2016. The first component of CLWA's overall groundwater banking program is with Semitropic Water

Storage District (Semitropic) whereby, CLWA can withdraw up to 5,000 afy from the current balance of almost 36,000 af of water that was stored in Semitropic to meet Valley demands when needed in dry years. The second component, the Rosedale-Rio Bravo Water Banking Program (RRBWBP) in Kern County, has a recoverable total of approximately 100,000 af in storage with an existing withdrawal capacity of 3,000 afy. Efforts are underway to increase the withdrawal capacity over the existing amount. The third and fourth components are the Two-For-One Exchange Programs that CLWA initiated with RRBWSD and West Kern Water District (WKWD) that now have almost 10,000 af of recoverable water.

Since SWP water deliveries are subject to reduction when dry conditions occur in northern California, the 2015 UWMP includes programs, like the Semitropic and Rosedale-Rio Bravo programs, for enhancing water supply reliability during such occurrences. A capital improvement program funded by CLWA has been established to provide facilities and additional water supplies to firm up SWP water supplies during times of drought.

CLWA's final allocation of SWP water for 2016 was 60 percent of its Table A Amount, or 57,120 af. The total available imported water supply in 2016 was 90,019 af, including the 57,120 af of Table A supply, 11,000 af purchased from BVWSD and RRBWSD, and 21,899 af of 2015 carryover available in 2016. CLWA deliveries to the Purveyors were 31,130 af. Following disposition of available water supplies in 2016, there was a carryover of 51,571 af into 2017 from 2016 and previous years' supplies. A substantial amount of the carryover was subsequently spilled (approximately 36,000 af) leaving approximately 15,500 af available for 2017 water supply. In 2016, 5,060 af were banked in the RRBWBP, and another 1,500 af were sold to Santa Barbara Flood Control and Water Conservation District.

ES.5 Recycled Water

Recycled water service was initiated in July 2003 in accordance with CLWA's Draft Reclaimed Water System Master Plan (2002). The amount of recycled water used for irrigation purposes, at a golf course and in roadway median strips and other non-potable uses, was approximately 500 af in 2016, generally consistent with recycled water deliveries that have ranged between 300-500 afy over the past fourteen years. In 2016, CLWA and the Purveyors updated the Recycled Water Master Plan containing revised estimates of projected recycled water use and outlined near-term, mid-term, and long-term objectives for increasing the use of recycled water where it is economically feasible.

ES.6 2017 Water Supply Outlook

In 2017, total Valley-wide water demand is projected by LSCE to be approximately 75,000 af, approximately 2,000 af above the water demand projections in the 2015 UWMP. It is expected that water demands in 2017 will continue to be met with a mix of water supplies that primarily includes local groundwater, SWP Table A with carryover and other imported supplies, and recycled water. Ongoing conservation programs are expected to continue to reduce demands on water supplies in 2017 although some increase in demands may occur with the easing of the SWRCB mandatory reductions.

Announced on April 14, 2017, the latest allocation of water from the SWP in 2017 is 85 percent of CLWA's Table A Amount, or 80,920 af. Combined with local groundwater from the two aquifer systems (40,000 af), net carryover of SWP Table A allocation from 2016 (51,571 af), annual acquisition through the Buena Vista Water/Rosedale Rio-Bravo Water Acquisition Agreement (11,000 af), and recycled water (450 af), the total available water supplies for 2017 is approximately 183,900 af. As a result, CLWA and the Purveyors anticipate having more than adequate supplies to meet all water demands in 2017.

In August 2007, a federal court ruled that certain operational changes were required of the SWP in order to protect the endangered Delta smelt. With the objective of protecting endangered fish such as the Delta smelt and spring-run salmon, the court order resulted in the preparation of new Biological Opinions (BOs) requiring DWR to implement mitigation requirements with resultant impacts on SWP water supply reliability. The current SWP 2015 Delivery Capability Report, issued in July 2015, maintains the restrictions on SWP operations according to the BOs of the U.S. Fish and Wildlife Service and the National Marine Fishery Service issued in December 2008 and June 2009, respectively. In December 2010, a federal judge overruled most of the federal agencies BOs and invalidated several of the criteria that reduced SWP's water supply. These matters were appealed to the U.S. Court of Appeals for the Ninth Circuit. The Ninth Circuit ruling upheld the BOs of the federal agencies. Therefore, the operational rules defined in these BOs continue to be legally required and were used by DWR in the analyses supporting its SWP 2015 Delivery Capability Report.

The SWP 2015 Delivery Capability Report also considers the impacts on SWP delivery capability due to climate change, sea level rise, and multiple Delta-specific concerns. Further, consideration is also given to the major Delta policy planning efforts currently underway; the Delta Plan and the Bay Delta conservation Plan (now called California WaterFix). With these factors, the Capability Report projects under existing conditions, the average annual delivery of Table A water is estimated at 61%. CLWA staff has assessed the impact of the current SWP Delivery Capability Report on the CLWA analysis of projected water supplies contained in the Valley's 2015 UWMP and concluded that current and planned supplies are available to meet anticipated water supply needs through the year 2050.

CLWA, the Purveyors, Los Angeles County, and the City of Santa Clarita have formed the Santa Clarita Valley Water Committee (Committee). The specific purpose of the Committee is to work collaboratively to ensure the progressive implementation of water use efficiency programs and manage the conjunctive use of the water supplies in the Santa Clarita Valley. In terms of short-term water supply availability, the Committee has determined that, while current operational changes of the SWP are in effect, there are sufficient supplemental water supplies in 2017 to augment local groundwater and other water supplies such that overall water supplies will be sufficient to meet projected 2017 water requirements as reflected herein.

In any given year, SWP supplies may be reduced due to dry weather conditions or regulatory factors. During such an occurrence, the remaining water demands are planned to be met by a combination of

alternate supplies such as returning water from CLWA's accounts in the Semitropic Groundwater Storage Program, the RRBWBP, and two Exchange Programs (with total banked water at more than 145,000 af), deliveries from CLWA's flexible storage account in Castaic Lake Reservoir, local groundwater pumping, short-term water exchanges, and participation in DWR dry-year water purchase programs.

Drought periods may affect available water supplies in any single year and even for a duration that spans multiple consecutive years. It is important to note that hydrologic conditions vary from region to region throughout the state. Dry conditions in northern California affecting SWP supply may not affect local groundwater and other supplies in southern California, and the reverse situation can also occur (as it did in 2002 and 2003). For this reason, CLWA and the retail water suppliers have emphasized developing a water supply portfolio that is diverse, especially in dry years along with water conservations programs. Diversity of supply is considered a key element of reliability, giving CLWA and the Purveyors the ability to draw on multiple sources of supply to ensure reliable service during dry years, as well as during normal and wet years.

ES.7 Water Conservation

The California Urban Water Conservation Council (CUWCC) was formed in 1991 through the Memorandum of Understanding Regarding Urban Water Conservation in California (MOU). The urban water conservation Best Management Practices (BMPs) included in the MOU are intended to reduce California's long-term urban water demands. In 2001, the CLWA Board approved signing the CUWCC's MOU on behalf of both the wholesale and retail service areas (CLWA and SCWD). Following that action, Los Angeles County, NCWD, and VWC signed the MOU. In 2009, the CUWCC changed its policy to specify that each signatory had to join individually and that a wholesaler could no longer be a signatory on behalf of its retailers. SCWD therefore signed the MOU independently in 2011. CLWA and the Purveyors are subject to the Urban Water Management Planning Act, AB1420 and SBX7-7 requirements, in addition to the commitment of compliance with the BMPs as signatories to the MOU. In the CLWA service area, demand management is addressed at both the local (retail agency) and regional (Santa Clarita Valley-wide) levels.

The MOU and BMPs were revised by the CUWCC in 2008. The revised BMPs now contain a category of "Foundational BMPs" that signatories are expected to implement as a matter of their regular course of business. A key intent of the MOU revision was to provide retail water agencies with more flexibility in meeting requirements and allow them to choose program options most suitable to their specific needs. Therefore, as alternatives to the traditional Programmatic BMP requirements, agencies may also implement the MOU Flex Track or gallons per capita per day (GPCD) options.

In 2007, VWC coordinated the development and execution of a MOU with CLWA and the other purveyors that led to the preparation of the Santa Clarita Valley Water Use Efficiency Strategic Plan (2008 SCVWUESP). The 2008 SCVWUESP was recently updated in 2015. The purpose of the effort was to prepare a comprehensive long-term conservation plan for the Santa Clarita Valley by adopting objectives, policies and programs designed to promote proven and cost-effective conservation practices.

The preparation of the SCVWUESP included input from stakeholders and the community at large. The updated SCVWUESP completed in 2015 incorporated the SBX7-7 targeted reductions of 20 percent by 2020. The updated SCVWUESP was supported by a thorough economic analysis that will guide water conservation efforts planned and implemented by CLWA and the Purveyors in the coming years. The economic analysis concluded that water conservation measures were cost effective when compared to other incremental supplies such as recycled water. The updated SCVWUESP is consistent with CLWA's and the Purveyors Strategic Plan Objectives including:

- Ensure long-term average water supply meets current and future demand
- Meet local water demands
- Achieve the water conservation target of 20 percent per capita by 2020

CLWA and the Purveyors are committed to a water conservation program that is composed of several conservation measures that will lower projected demand by 2020, building on what has already been implemented over the past two decades. The conservation measures incorporate education, incentives, and conservation mandates among all the various customers present in the Valley. As described in the 2015 UWMP, each retail purveyor must demonstrate SBX7-7 compliance by an interim 2015 Daily Per Capita Water Use Target; in 2015 the Purveyors met their Interim Water Use Target and their 2020 Target; this achievement continued in 2016.

2016 was the fifth consecutive calendar year of exceptional and extreme drought conditions for most of California, including the Santa Clarita Valley. In July 2014, SWRCB adopted temporary, emergency water conservation regulations that required water agencies to implement the actions of their water shortage contingency plans that imposed mandatory restrictions on urban water suppliers. The residents, businesses, and city and county government agencies have responded to the calls for conservation by significantly reducing their 2016 water use by 15,494 af compared to 2013 (approximately a 21 percent reduction). However, with the easing of SWRCB emergency water conservation measures, some portion of this reduced demand is anticipated to rebound.

1 INTRODUCTION

1.1 Background

For most residents of the Santa Clarita Valley (Valley), domestic water service is provided by four retail water purveyors: Castaic Lake Water Agency's Santa Clarita Water Division (SCWD), Los Angeles County Waterworks District 36 (LACWD 36), Newhall County Water District (NCWD), and Valencia Water Company (VWC). Together, the four retail water purveyors (Purveyors) provide water to approximately 73,800 service connections. Castaic Lake Water Agency (CLWA) contracts for State Water Project (SWP) and other sources of imported water, which are delivered from Castaic Lake, after which it is treated, filtered, and disinfected at two CLWA treatment plants before distribution to the Purveyors; CLWA also contracts with the Santa Clarita Valley Sanitation District for recycled water, which is currently delivered to VWC. Staff of CLWA and the Purveyors meet regularly to coordinate the supply of water in the Valley. Their respective service areas are shown in **Figure 1-1**.

While municipal water supply has grown to become the largest category of water use in the Valley, there remains an agricultural and other small private water demand that is dependent on local groundwater for its water supply. Accordingly, ongoing agricultural water requirements and the use of local groundwater to meet those requirements are considered in analyses of water requirements and supplies as reported herein. Also, in addition to municipal and agricultural water uses in the Valley, water supply for a small fraction of Valley residents is provided by individual private water supply wells. Information on the locations, construction details, annual pumping and other information approximately these private wells are not collected by any agency. In the absence of detailed information approximately private wells and associated water use, pumping as reported herein includes an estimate of groundwater pumped from private wells. It is recommended that this estimate of private pumping be refined in the future as information approximately private wells and water use is obtained.

For more than 35 years, CLWA and the retail water Purveyors have reviewed and reported on the availability of water supplies to meet all water requirements in the Valley. Those reports have also addressed local water resources, most notably groundwater, in the region. Past studies have assessed the condition of local groundwater aquifers, their hydrogeologic characteristics, aquifer storage capacity, operational yield and recharge rate, groundwater quality and contamination, and the ongoing conjunctive use of groundwater and imported water resources.

Other efforts have included developing drought contingency plans, coordinating emergency response procedures and implementing Valley-wide conservation programs. In 1985, NCWD, on behalf of the Purveyors, prepared the area's first report on urban water supplies and water management. Beginning in 1995, formalized versions of Urban Water Management Plans (UWMP) have been developed and have included CLWA. Information in the plans was coordinated among CLWA and the Purveyors to provide accurate, comprehensive and consistent water supply and demand information for long term planning purposes. In accordance with the California Urban Water Management Planning Act, the

UWMP was updated (2015 UWMP) and submitted by CLWA and the Purveyors to the Department of Water Resources (DWR) in July 2016. The 2015 UWMP includes water demand projections through projected build out of the Valley in 2050 and describes the combination of local groundwater, imported water supplies from the SWP and other sources, local recycled water supplies, and other planned water supplies to meet the existing and projected water demands in the Valley. The 2015 UWMP describes the reliability of local groundwater resources and the adequacy of groundwater supplies to meet that component of overall water supply; and it also describes the mitigation of perchlorate contamination which has impacted several municipal water supply wells, and the implementation of integrated control of perchlorate migration and full restoration of perchlorate-impacted groundwater supply.

In 2009, primarily in preparation of the 2010 UWMP, an updated analysis of groundwater basin yield was completed to guide the ongoing use of groundwater and the associated distribution of pumping to maintain groundwater use at a sustainable rate while also addressing localized issues such as restoration of groundwater contamination that have impacted local groundwater supplies since 1997. The results of the updated groundwater basin analysis are summarized in the groundwater basin yield discussion (Section 3.1) of this Water Report.

1.2 Purpose and Scope of the Report

The purpose of this report, which is the 19th in a series of annual water reports that began to describe water supply conditions in 1998, is to provide current information approximately water requirements and available water supplies to meet those demands in the Santa Clarita Valley. CLWA and the Purveyors began preparation of this series of reports in response to a request made by the Los Angeles County Board of Supervisors in 1998. Over the last two decades, this series of reports has also served as an annual summary of groundwater conditions in the Valley in fulfillment of the commitment in the Santa Clarita Valley Groundwater Management Plan (CLWA, 2003) (GWMP), adopted in 2003, to regularly report on implementation of that Plan. With the implementation of the Sustainable Groundwater Management Act (SGMA), a Groundwater Sustainability Plan (GSP) that will contain a description of groundwater conditions in the Santa Clara River Valley East Subbasin will be submitted to the DWR by January 31, 2022. The GSP will replace the GWMP.

This report was prepared for CLWA, SCWD, LACWD 36, NCWD, and VWC. It continues a format for providing information regarding water uses and the availability of water supplies on an annual basis, along with a summary of groundwater conditions. It is intended to be a helpful resource for use by water planners and local land use planning agencies. This report is complemented by the 2015 UWMP for the area, which provides longer-term water supply planning over a 35-year period, and by several other technical reports, some of which are specifically referenced herein.

1.3 Santa Clarita Valley Water Purveyors

As introduced above, four retail water Purveyors provide water service to most residents of the Santa Clarita Valley. Brief summary descriptions of those four Purveyors are as follows.

Castaic Lake Water Agency Santa Clarita Water Division has a service area that covers 34,700 acres and includes a portion of the City of Santa Clarita and unincorporated portions of Los Angeles County in the communities of Saugus, Canyon Country, and Newhall with approximately 31,200 service connections. Water has been supplied from both imported water from sources outside the Valley and groundwater from the Alluvium and Saugus Formation in varying proportions over the last 35 years, with the majority of supply currently being met by imported sources (75 percent in 2016).

Los Angeles County Waterworks District 36 has a service area that encompasses approximately 6,800 acres in the Hasley Canyon area and the unincorporated community of Val Verde. LACWD 36 has approximately 1,350 service connections. Prior to 2012, LACWD 36 had typically obtained its full water supply from a connection to the CLWA's Castaic Conduit. However, beginning in 2012 and continuing through 2016, that imported water supply was initially reduced to approximately one-third of the overall water supply; more recently, it has been temporarily replaced with all groundwater pumped from the Saugus Formation.

Newhall County Water District's service area is approximately 28,400 acres and includes portions of the City of Santa Clarita and unincorporated portions of Los Angeles County in the communities of Newhall, Canyon Country, Valencia, Tesoro and Castaic with approximately 9,750 service connections. NCWD supplies water from both groundwater and imported water sources (with groundwater historically being the more predominant source of supply), and in 2016 groundwater accounted for 65 percent of supply.

Valencia Water Company's service area serves approximately 31,500 service connections in a portion of the City of Santa Clarita and in the unincorporated communities of Castaic, Newhall, Saugus, Stevenson Ranch, Mission Village, and Valencia representing an area of approximately 19,000 acres. VWC has typically supplied water from both groundwater and imported water sources. The two sources have historically been supplied in even proportions with slightly more supply generally coming from imported sources (except recently, in 2014, 2015, and 2016, when groundwater was 58 to approximately 70 percent of supply). VWC also has a small amount of recycled water for non-potable use.

1.4 The Upper Santa Clara River Hydrologic Area and East Groundwater Subbasin

The Upper Santa Clara River Hydrologic Area (HA), as defined by the DWR, is located almost entirely in northwestern Los Angeles County (**Figure 1-2**). The area encompasses approximately 654 square miles of flat valley land (approximately 6 percent of the total area) and hills and mountains (approximately 94 percent of the total area) that border the valley area. The mountains include the Santa Susana and San Gabriel Mountains to the south, and the Sierra Pelona and Leibre-Sawmill Mountains to the north. Elevations range from approximately 800 feet on the valley floor to approximately 6,500 feet in the San Gabriel Mountains. The headwaters of the Santa Clara River are at an elevation of approximately 3,200 feet at the divide separating the HA from the Mojave Desert. The HA comprises four subareas as shown on **Figure 1-2**. Of the four, the Eastern Hydrologic Subarea has been the study area of prior investigations, and will remain the focus of the Water Report.

The Santa Clara River and its tributaries flow intermittently from Lang Station westward approximately 35 miles to just west of the Los Angeles-Ventura County line, where the River is the outlet from the HA. The principal tributaries of the Santa Clara River in the Santa Clarita Valley are Castaic Creek, San Francisquito Creek, Bouquet Creek, and the South Fork of the Santa Clara River. In addition to intermittent natural tributary inflow, the Santa Clara River receives treated wastewater discharge from the Saugus and Valencia Water Reclamation Plants, which are operated by the Santa Clarita Valley Sanitation District of Los Angeles County. The Santa Clara River flows westward through Ventura County to its mouth near Oxnard. Along that route, the River traverses all subbasins of the Santa Clara River Valley Groundwater Basin (Basin). There are six subbasins that compose the Basin and they span across Los Angeles and Ventura counties. From east to west the subbasins are the Santa Clara River Valley East, Piru, Fillmore, Santa Paula, Mound, and Oxnard as shown in **Figure 1-3**. The Santa Clara River Valley East Subbasin (Subbasin), beneath the Santa Clarita Valley, is the source of essentially all local groundwater used for water supply in the Santa Clarita Valley and the focus of this report.

There are four active precipitation gages in the Subbasin. Two gages have long-term records, the Newhall Fire Station #73 gage and the Newhall County Water District gage, while the other two, #204 Santa Clarita (established in 2006) and Canyon Country (established in 2010), have shorter-term records that can be used for comparative purposes (**Figure 1-4**). The Los Angeles County Department of Public Works (LADPW) has maintained records for the Newhall Fire Station #73 gage since 1931. NCWD has maintained records for the NCWD gage since 1979. The cumulative records from these two gages correlate very closely, although the NCWD gage historically records a higher amount (consistently approximately 30 percent more precipitation) than the Newhall Fire Station #73 gage over the entire NCWD gage period of record (1979-2016). The overall offset is likely due to the differences in location between the two gages, with the NCWD gage situated farther south in the hills rimming the southern edge of the Santa Clarita Valley at an elevation of approximately 1,390 feet, while the Newhall Fire Station #73 gage is located northwest of the NCWD gage and further away from the hills at an elevation of approximately 1,330 feet.

The third gage, #204 Santa Clarita, was established in December 2006 near the Rio Vista Treatment Plant (elevation 1,410 feet) near the main Santa Clara River channel and on the north side of the Valley (**Figure 1-4**). This gage is operated by CLWA and is part of the California Irrigation Management Information System (CIMIS) managed by DWR. Daily precipitation data at this location are available beginning in January 2008, and these data correlate well with the other two precipitation gages in the Valley over the period of 2008 through 2016 with the exception of data for the month of December 2010. The fourth gage, Canyon Country, reported by National Centers for Environmental Information (NCEI), is located farther east in the Valley near Sand Canyon Road and the Santa Clara River. Daily precipitation data at this location are available beginning in January 2010, and these data correlate well with the other two long-term precipitation gages in the Valley and the CIMIS gage over the period of record (2010-2016). Comparison of historical data collected from all four gages between 2010 through 2016 indicates that the CIMIS Station #204 gage located in the central part of the Valley near the river receives approximately 70% of the rainfall of the Newhall Fire Station #73 gage and approximately 50%

of the NCWD gage, while the Canyon Country gage receives approximately 80% of the rainfall of the Newhall Fire Station #73 gage and approximately 60% of the NCWD gage.

The Santa Clarita Valley and the Subbasin is characterized as having an arid climate. Historically, intermittent periods of below-average precipitation have typically been followed by periods of above-average precipitation in a cyclical pattern, with each above average or below average period typically lasting from one to five years. The longer-term precipitation records for the Newhall Fire Station #73 gage are illustrated in **Figure 1-5**. Long-term annual (calendar year) average precipitation at that gage is 17.3 inches calculated for the 1931 through 2016 period. **Figure 1-5** also shows the cumulative departure from mean annual precipitation which shows periods of above average rainfall (increasing slope or trend with time) and below average rainfall (declining trend or slope with time). In general, periods of below-average precipitation have been longer and more moderate than periods of above average precipitation. Historically, the periods from 1947 to 1951, 1959 to 1964, 1971 to 1976, 1984 to 1991 and 1999 to 2003 have generally been drier than average; the periods from 1938 to 1946, 1965 to 1970, 1977 to 1983, 1992 to 1996, and 2004 to 2005 have been wetter than average. Recently, the dry or below average period that began in 2006, has generally persisted through 2016 with all but two of those years (2008 and 2010) having below average rainfall totals. 2012 and 2013 were significantly below average with approximately 9.0 and 3.7 inches, respectively, and 2013 experienced the lowest amount of precipitation that has been recorded since 1931. 2015 precipitation was significantly low at 6.1 inches for the year (approximately 35% of the long-term average), and precipitation in 2016 was again below average at 13.3 inches. Early 2017 has seen above average rainfall in the Santa Clarita Valley, and demand has seen a slight rebound after the drought mandates were lifted in May 2016. These conditions combined with water supply considerations and continued water conservation measures, discussed in Chapters 3, 4, and 5 are expected to result in 2017 water requirements being slightly more than the water requirements in 2016.

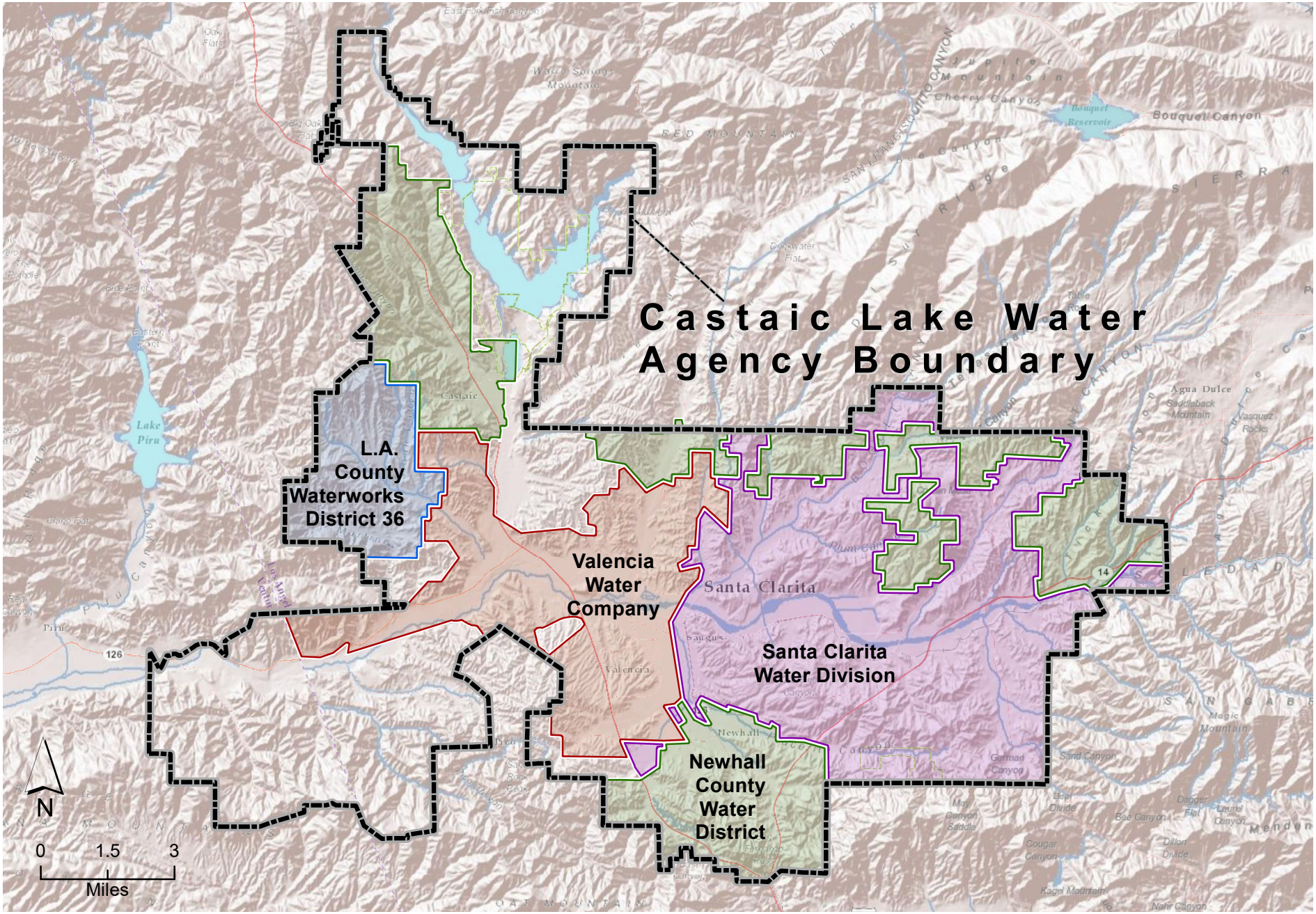

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Figure 1-1
CLWA and Purveyor Service Areas
Santa Clarita Valley Water Report

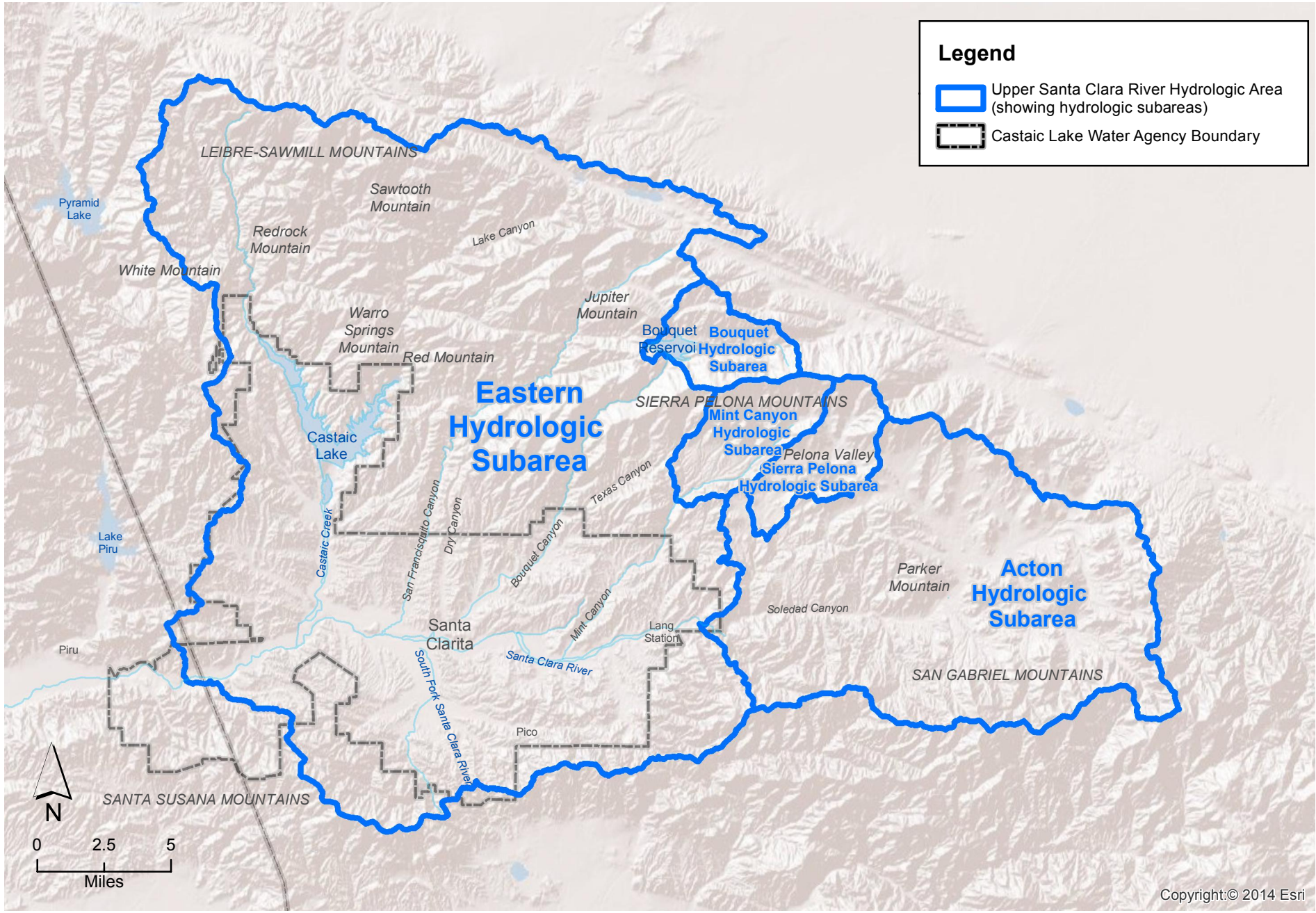

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Figure 1-2
Upper Santa Clara River Hydrologic Area
Santa Clarita Valley Water Report

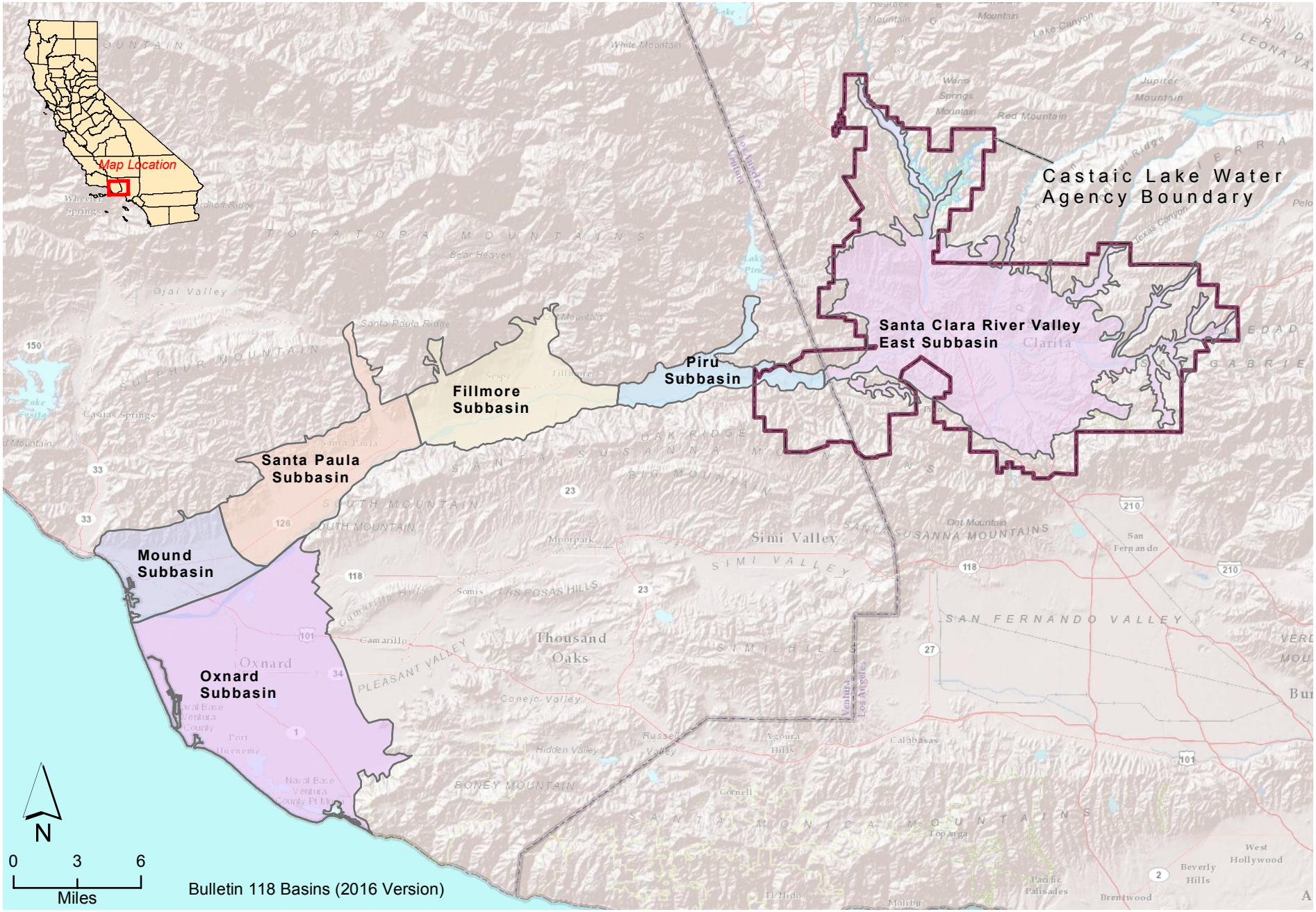

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Figure 1-3
Santa Clara River Valley Groundwater Basin and Subbasins
Santa Clarita Valley Water Report

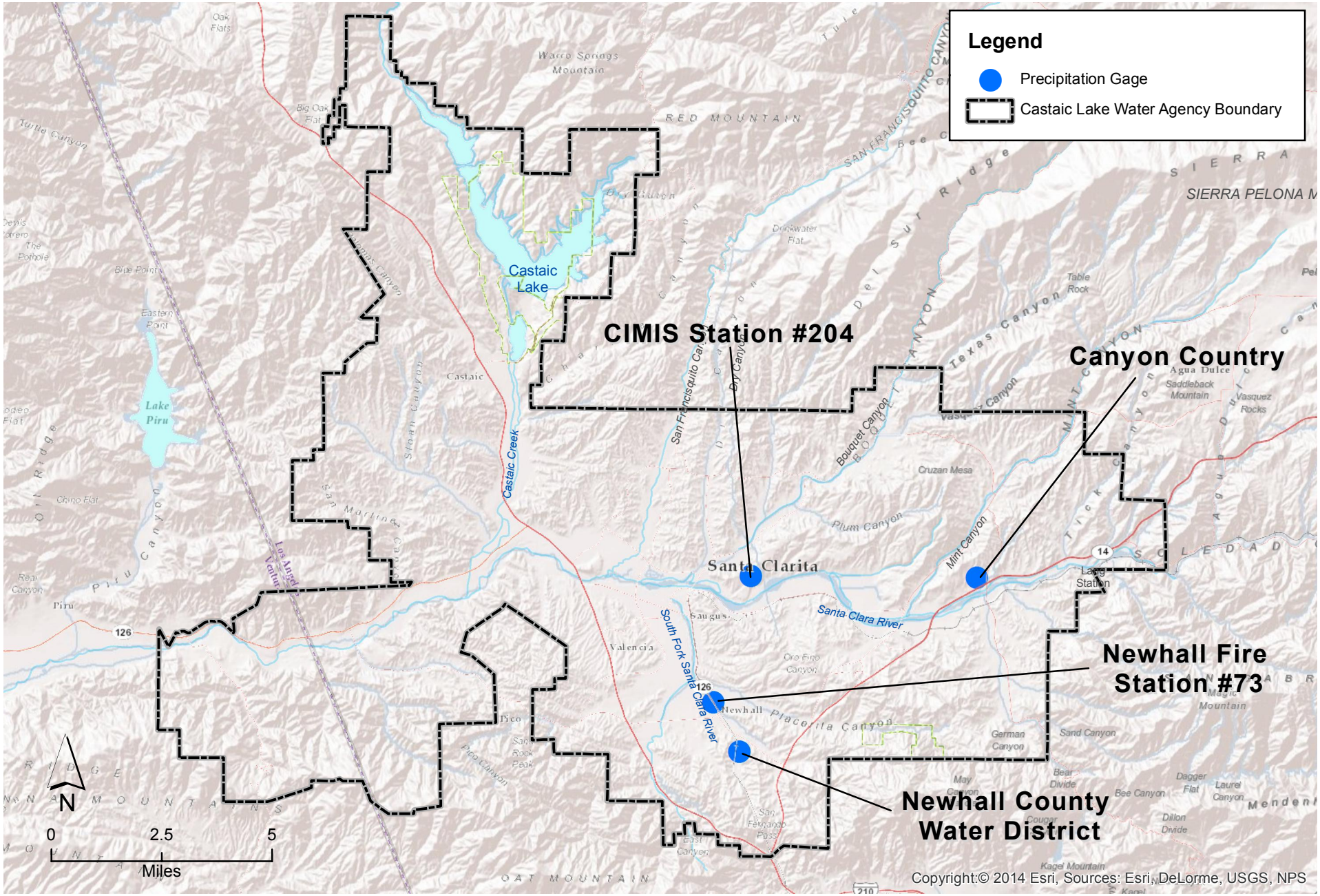

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Figure 1-4
Precipitation Gage Locations
Santa Clarita Valley Water Report

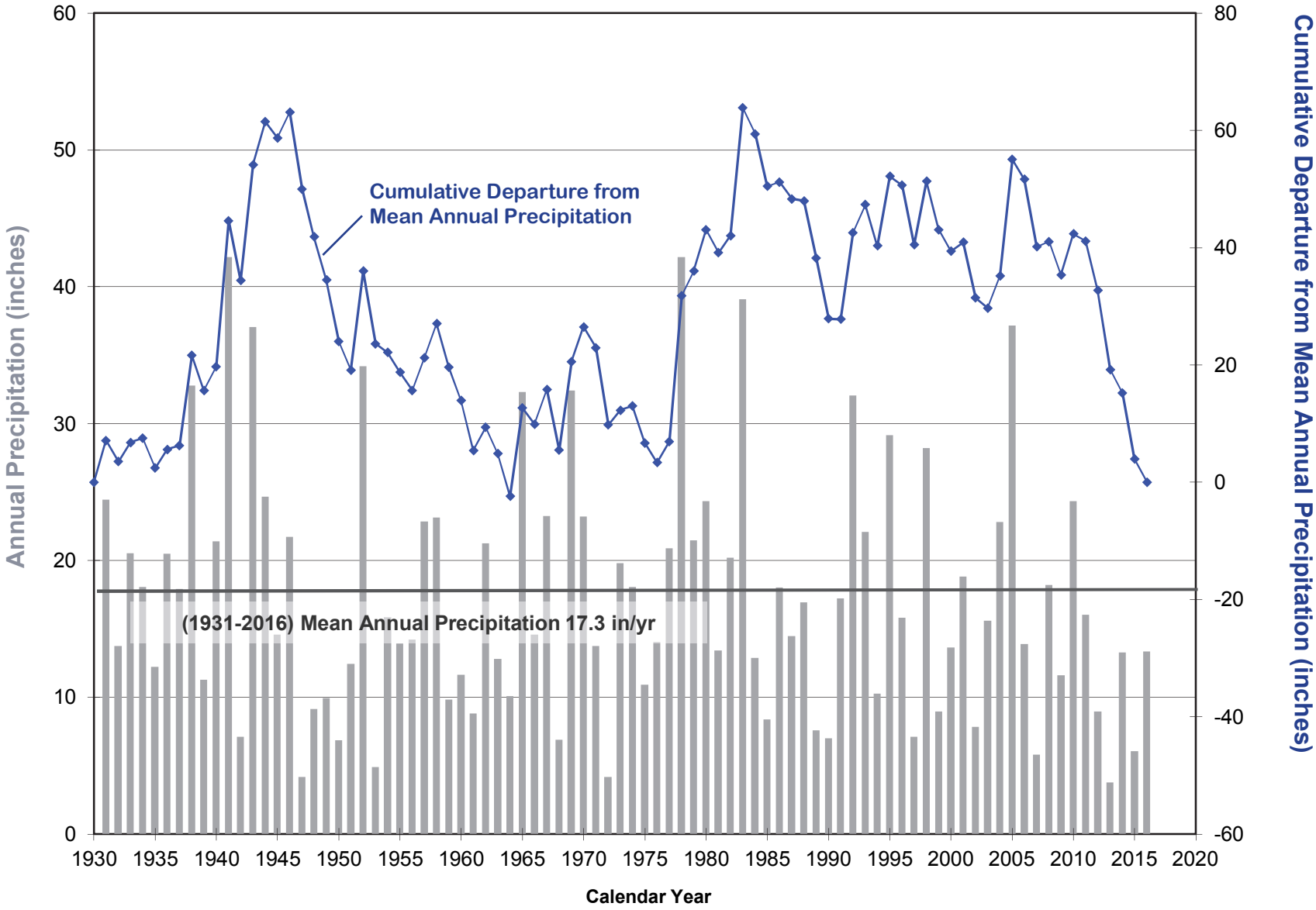

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Figure 1-5
Annual Precipitation and Cumulative Departure from Mean Annual Precipitation at Newhall Fire Station #73 Gage
Santa Clarita Valley Water Report

2 2016 WATER SUPPLIES AND USE

Water supplies in Santa Clarita Valley are utilized for municipal, agricultural, private domestic, and miscellaneous purposes. The sources of water are varied and include imported water from the State Water Project (SWP) and other sources, along with local supplies from treated groundwater, recycled water, and groundwater.

2.1 2016 Water Supplies

Total water use in the Santa Clarita Valley was 72,300 af in 2016. Of the total, 58,000 af (approximately 80 percent) were for municipal use (**Table 2-1**) and the remaining 14,300 af (20 percent) were for agricultural and other (miscellaneous) uses (**Table 2-2**), including estimated individual domestic uses. Total water use was met by a combination of approximately 40,700 af from local groundwater resources (approximately 26,300 af for municipal supply and 14,300 af for agricultural and other uses), 31,100 af from SWP and other imported water sources, and approximately 500 af from recycled water (**Table 2-3**).

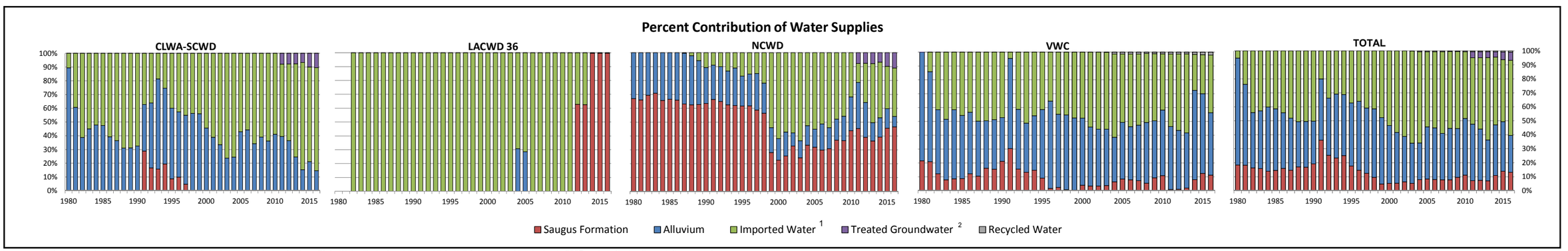
Compared to 2015, total water use in the Santa Clarita Valley in 2016 was almost nine percent higher, and it was above the short-term projected water requirement estimated in last year's Annual Water Report. The increase in water use in 2016 follows a two-year total reduction in municipal water use of almost 26%, that was primarily attributed to aggressive conservation as the Purveyors and the local community were aware of ongoing drought conditions and compliance with State-mandated water conservation targets. The increase in 2016 was attributed to a continued but lessened conservation effort by consumers due to the State emergency water conservation measures shifting from mandatory to voluntary compliance.

2.2 Total Water Use Historical Trends

Water supply utilization for all uses in the Santa Clarita Valley, again for the period 1980 through 2016, is summarized in **Table 2-3**. The trends in utilization of local groundwater and imported water, complemented by the addition of recycled water, are graphically illustrated in **Figure 2-1**. As can be seen by inspection of **Table 2-3** and **Figure 2-1**, total water use in the Valley was nearly linearly increasing from the early 1980's (approximately 36,000 to 42,000 afy) through 2007 (92,000 af), with some climatic-related fluctuations in certain years. Since 2007, total water use has generally declined back to levels last seen in the late 1990s. Overall, since the inception of supplemental SWP supplies, total annual water use has increased from approximately 37,000 af in 1980 to between 80 to 90,000 af per year from 2002 through 2014, and has since declined to approximately 70,000 afy in the 2015 and 2016 period. The relatively stable 13-year trend (2002 through 2014) had been mostly attributed to the expansion of water conservation efforts having a greater effect on demand than the continued growth in service connections (**Table 2-3** and **Figure 2-1**). The subsequent decline in water demand since 2014 is attributed to more stringent conservation efforts that were implemented to reduce water demands and to comply with state-mandated reductions in water usage of 25 percent from 2013 levels. These

Table 2-1
Water Supply Utilization by Municipal Purveyors
Santa Clarita Valley Water Report
(Acre-Feet)

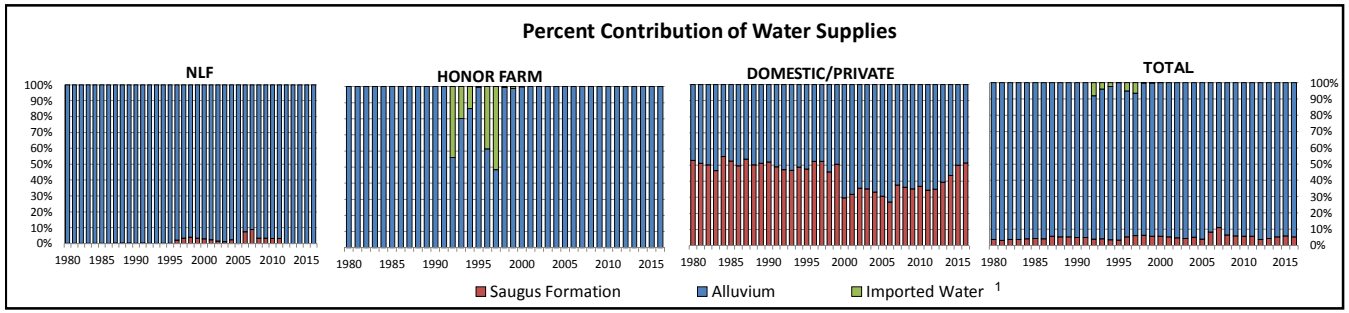
	CLWA Santa Clarita Water Division					Los Angeles County Waterworks District 36				Newhall County Water District					Valencia Water Company					All Municipal Purveyors					
	Purchased from CLWA		Local Production			Purchased from CLWA	Local Production			Purchased from CLWA		Local Production			Purchased from CLWA	Local Production		Other		Purchased from CLWA		Local Production		Other	
Year	*Imported Water*[1]	*Treated Groundwater*[2]	*Alluvium*	*Saugus Formation*	**Total**	*Imported Water*[1]	*Alluvium*[3]	*Saugus Formation*[4]	**Total**	*Imported Water*[1]	*Treated Groundwater*[2]	*Alluvium*	*Saugus Formation*	**Total**	*Imported Water*[1]	*Alluvium*	*Saugus Formation*	*Recycled Water*[5]	**Total**	*Imported Water*[1]	*Treated Groundwater*[2]	*Alluvium*	*Saugus Formation*	*Recycled Water*	**Total**
1980	1,126	-	9,467	0	**10,593**	0	-	-	**0**	0	-	1,170	2,363	**3,533**	0	5,995	1,644	-	**7,639**	1,126	-	16,632	4,007	-	**21,765**
1981	4,603	-	7,106	0	**11,709**	0	-	-	**0**	0	-	1,350	2,621	**3,971**	1,214	5,597	1,808	-	**8,619**	5,817	-	14,053	4,429	-	**24,299**
1982	6,454	-	4,091	0	**10,545**	145	-	-	**145**	0	-	1,178	2,672	**3,850**	3,060	3,415	897	-	**7,372**	9,659	-	8,684	3,569	-	**21,912**
1983	5,214	-	4,269	0	**9,483**	207	-	-	**207**	0	-	1,147	2,787	**3,934**	3,764	3,387	611	-	**7,762**	9,185	-	8,803	3,398	-	**21,386**
1984	6,616	-	6,057	0	**12,673**	240	-	-	**240**	0	-	1,549	2,955	**4,504**	4,140	4,975	854	-	**9,969**	10,996	-	12,581	3,809	-	**27,386**
1985	6,910	-	6,242	0	**13,152**	272	-	-	**272**	0	-	1,644	3,255	**4,899**	4,641	4,633	885	-	**10,159**	11,823	-	12,519	4,140	-	**28,482**
1986	8,366	-	5,409	0	**13,775**	342	-	-	**342**	0	-	1,842	3,548	**5,390**	5,051	5,167	1,427	-	**11,645**	13,759	-	12,418	4,975	-	**31,152**
1987	9,712	-	5,582	0	**15,294**	361	-	-	**361**	22	-	2,127	3,657	**5,806**	6,190	4,921	1,305	-	**12,416**	16,285	-	12,630	4,962	-	**33,877**
1988	11,430	-	5,079	63	**16,572**	434	-	-	**434**	142	-	2,283	4,041	**6,466**	7,027	4,835	2,300	-	**14,162**	19,033	-	12,197	6,404	-	**37,634**
1989	12,790	-	5,785	0	**18,575**	457	-	-	**457**	428	-	2,367	4,688	**7,483**	7,943	5,826	2,529	-	**16,298**	21,618	-	13,978	7,217	-	**42,813**
1990	12,480	-	5,983	40	**18,503**	513	-	-	**513**	796	-	1,936	4,746	**7,478**	7,824	5,232	3,516	-	**16,572**	21,613	-	13,151	8,302	-	**43,066**
1991	6,158	-	5,593	4,781	**16,532**	435	-	-	**435**	675	-	1,864	4,994	**7,533**	700	9,951	4,642	-	**15,293**	7,968	-	17,408	14,417	-	**39,793**
1992	6,350	-	8,288	2,913	**17,551**	421	-	-	**421**	802	-	1,994	5,160	**7,956**	6,338	6,615	2,385	-	**15,338**	13,911	-	16,897	10,458	-	**41,266**
1993	3,429	-	12,016	2,901	**18,346**	465	-	-	**465**	1,075	-	1,977	5,068	**8,120**	8,424	5,815	2,182	-	**16,421**	13,393	-	19,808	10,151	-	**43,352**
1994	5,052	-	10,996	3,863	**19,911**	453	-	-	**453**	906	-	2,225	5,103	**8,234**	7,978	6,847	2,565	-	**17,390**	14,389	-	20,068	11,531	-	**45,988**
1995	7,955	-	10,217	1,726	**19,898**	477	-	-	**477**	1,305	-	1,675	4,775	**7,755**	7,259	8,698	1,586	-	**17,543**	16,996	-	20,590	8,087	-	**45,673**
1996	9,385	-	10,445	2,176	**22,006**	533	-	-	**533**	1,213	-	1,803	4,871	**7,887**	6,962	12,433	326	-	**19,721**	18,093	-	24,681	7,373	-	**50,147**
1997	10,120	-	11,268	1,068	**22,456**	785	-	-	**785**	1,324	-	2,309	5,168	**8,801**	9,919	11,696	516	-	**22,131**	22,148	-	25,273	6,752	-	**54,173**
1998	8,893	-	11,426	0	**20,319**	578	-	-	**578**	1,769	-	1,761	4,557	**8,087**	9,014	10,711	149	-	**19,874**	20,254	-	23,898	4,706	-	**48,858**
1999	10,772	-	13,741	0	**24,513**	654	-	-	**654**	5,050	-	1,676	2,622	**9,348**	10,806	11,823	106	-	**22,735**	27,282	-	27,240	2,728	-	**57,250**
2000	13,751	-	11,529	0	**25,280**	800	-	-	**800**	6,024	-	1,508	2,186	**9,718**	12,004	12,179	1,007	-	**25,190**	32,579	-	25,216	3,193	-	**60,988**
2001	15,648	-	9,941	0	**25,589**	907	-	-	**907**	5,452	-	1,641	2,432	**9,525**	13,362	10,518	835	-	**24,715**	35,369	-	22,100	3,267	-	**60,736**
2002	18,916	-	9,513	0	**28,429**	1,069	-	-	**1,069**	5,986	-	981	3,395	**10,362**	15,792	11,603	965	-	**28,360**	41,763	-	22,097	4,360	-	**68,220**
2003	20,665	-	6,424	0	**27,089**	1,175	-	-	**1,175**	6,572	-	1,266	2,513	**10,351**	16,004	11,707	1,068	50	**28,829**	44,416	-	19,397	3,581	50	**67,444**
2004	22,045	-	7,146	0	**29,191**	854	380	-	**1,234**	5,896	-	1,582	3,739	**11,217**	18,410	9,862	1,962	420	**30,654**	47,205	-	18,970	5,701	420	**72,296**
2005	16,476	-	12,408	0	**28,884**	857	343	-	**1,200**	5,932	-	1,389	3,435	**10,756**	14,732	12,228	2,513	418	**29,891**	37,997	-	26,368	5,948	418	**70,731**
2006	16,548	-	13,156	0	**29,704**	1,289	-	-	**1,289**	5,898	-	2,149	3,423	**11,470**	16,313	11,884	2,449	419	**31,065**	40,048	-	27,189	5,872	419	**73,528**
2007	20,488	-	10,686	0	**31,174**	1,406	-	-	**1,406**	6,478	-	1,806	3,691	**11,975**	16,779	13,140	2,367	470	**32,756**	45,151	-	25,632	6,058	470	**77,311**
2008	18,598	-	11,878	0	**30,476**	1,354	-	-	**1,354**	5,428	-	1,717	4,195	**11,340**	16,325	14,324	1,770	311	**32,730**	41,705	-	27,919	5,965	311	**75,900**
2009	17,739	-	10,077	0	**27,816**	1,243	-	-	**1,243**	4,832	-	1,860	3,868	**10,559**	14,732	12,459	2,836	328	**30,355**	38,546	-	24,396	6,704	328	**69,974**
2010	15,188	-	10,607	0	**25,795**	1,141	-	-	**1,141**	3,035	-	2,323	4,173	**9,531**	11,214	13,054	2,995	336	**27,599**	30,578	-	25,984	7,168	336	**64,066**
2011	13,593	2,038	10,195	0	**25,826**	1,172	-	-	**1,172**	1,325	746	3,216	4,389	**9,676**	14,718	12,775	265	373	**28,131**	30,808	2,784	26,186	4,654	373	**64,805**
2012	15,600	2,164	10,192	0	**27,956**	471	-	794	**1,265**	2,965	792	2,631	4,081	**10,469**	16,522	12,770	302	428	**30,022**	35,558	2,956	25,593	5,177	428	**69,712**
2013	20,059	2,275	7,262	0	**29,596**	485	-	811	**1,296**	4,488	833	1,405	3,835	**10,561**	18,249	12,764	594	400	**32,007**	43,281	3,108	21,431	5,240	400	**73,460**
2014	21,478	1,832	4,220	0	**27,530**	4	-	1,238	**1,242**	3,942	671	1,383	3,849	**9,845**	7,668	19,080	2,339	474	**29,561**	33,092	2,503	24,683	7,426	474	**68,178**
2015	15,019	2,167	4,597	0	**21,783**	3	-	973	**976**	2,478	794	1,131	3,697	**8,100**	6,648	13,605	2,929	450	**23,632**	24,148	2,961	19,333	7,599	450	**54,491**
2016	17,943	2,494	3,485	0	**23,922**	3	0	1,047	**1,050**	2,876	913	626	3,842	**8,257**	10,308	11,133	2,789	507	**24,737**	31,130	3,407	15,244	7,678	507	**57,966**



1. Reflects State Water Project through 2006; includes imported water from State Water Project and Buena Vista WSD Agreement beginning in 2007 and continuing through the present year.
2. In January 2011, CLWA began operation of its Saugus groundwater containment project as part of municipal water supply. After treatment for perchlorate removal, that water was blended with treated imported water and delivered to the Purveyors through the CLWA distribution system. The amounts of treated groundwater from Saugus 1 and 2 utilized by each Purveyor reflect the estimated distribution to each Purveyor consistent with the proportions in the December, 2006 MOU that establishes amounts to be delivered and sold by CLWA to SCWD and NCWD at a reduced rate. Although the MOU and the CLWA subsidized rate structure indicates all the treated Saugus 1 and 2 water is delivered to NCWD and SCWD, a minor, unquantifiable amount of the water may have been delivered to the other purveyors as a result of varying distribution system operations.
3.Groundwater purchased from LA County Honor Farm.
4.Groundwater production began at a new LA County Waterworks District 36 Saugus well in December 2011.
5. Recycled water totals for 2012 and 2013 are estimates based on the water treament plant production meter; estimates were necessary due to customer meter failure.

Table 2-2
Individual Water Supply Utilization by Agricultural and Other Users
Santa Clarita Valley Water Report
(Acre-Feet)

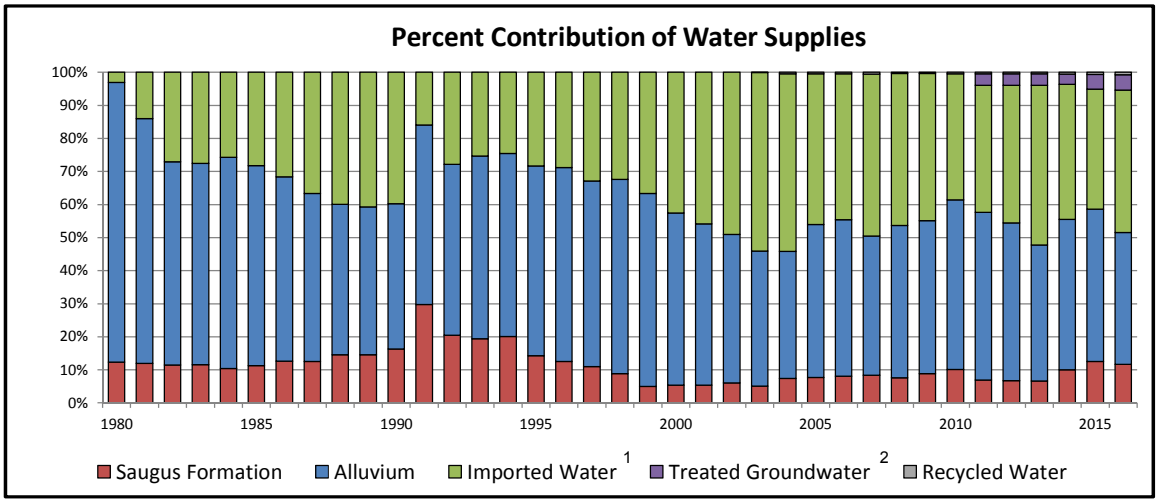
Year	Five Points			Los Angeles County Honor Farm			Small Private Domestic, Irrigation, and Golf Course Uses			All Agricultural and Other Users			
	Local Production		Total	Purchased from CLWA	Local Production	Total	Local Production		Total	Purchased from CLWA	Local Production		Total
	Alluvium	*Saugus Formation*		*Imported Water* [1]	*Alluvium*		*Alluvium* [2]	*Saugus Formation* [3]		*Imported Water* [1]	*Alluvium*	*Saugus Formation*	
1980	11,331	20	**11,351**	0	3,000	**3,000**	500	562	**1,062**	0	14,831	582	**15,413**
1981	13,237	20	**13,257**	0	3,000	**3,000**	500	521	**1,021**	0	16,737	541	**17,278**
1982	9,684	20	**9,704**	0	3,000	**3,000**	500	501	**1,001**	0	13,184	521	**13,705**
1983	7,983	20	**8,003**	0	3,000	**3,000**	500	434	**934**	0	11,483	454	**11,937**
1984	11,237	20	**11,257**	0	3,000	**3,000**	500	620	**1,120**	0	14,737	640	**15,377**
1985	9,328	20	**9,348**	0	3,000	**3,000**	500	555	**1,055**	0	12,828	575	**13,403**
1986	8,287	20	**8,307**	0	3,000	**3,000**	500	490	**990**	0	11,787	510	**12,297**
1987	6,512	20	**6,532**	0	3,000	**3,000**	500	579	**1,079**	0	10,012	599	**10,611**
1988	5,951	20	**5,971**	0	3,000	**3,000**	500	504	**1,004**	0	9,451	524	**9,975**
1989	6,243	20	**6,263**	0	3,000	**3,000**	500	522	**1,022**	0	9,743	542	**10,285**
1990	8,225	20	**8,245**	0	2,000	**2,000**	500	539	**1,039**	0	10,725	559	**11,284**
1991	7,039	20	**7,059**	0	2,240	**2,240**	500	480	**980**	0	9,779	500	**10,279**
1992	8,938	20	**8,958**	987	1,256	**2,243**	500	446	**946**	987	10,694	466	**12,147**
1993	8,020	20	**8,040**	443	1,798	**2,241**	500	439	**939**	443	10,318	459	**11,220**
1994	10,606	20	**10,626**	311	1,959	**2,270**	500	474	**974**	311	13,065	494	**13,870**
1995	11,174	20	**11,194**	6	2,200	**2,206**	500	453	**953**	6	13,874	473	**14,353**
1996	12,020	266	**12,286**	780	1,237	**2,017**	500	547	**1,047**	780	13,757	813	**15,350**
1997	12,826	445	**13,271**	1,067	1,000	**2,067**	500	548	**1,048**	1,067	14,326	993	**16,386**
1998	10,250	426	**10,676**	12	2,000	**2,012**	500	423	**923**	12	12,750	849	**13,611**
1999	13,824	479	**14,303**	20	1,842	**1,862**	500	509	**1,009**	20	16,166	988	**17,174**
2000	11,857	374	**12,231**	3	1,644	**1,647**	1,220	513	**1,733**	3	14,721	887	**15,611**
2001	12,661	300	**12,961**	0	1,604	**1,604**	1,224	573	**1,797**	0	15,489	873	**16,362**
2002	13,514	211	**13,725**	0	1,602	**1,602**	1,063	589	**1,652**	0	16,179	800	**16,979**
2003	10,999	122	**11,121**	0	2,273	**2,273**	931	504	**1,435**	0	14,203	626	**14,829**
2004	10,991	268	**11,259**	0	2,725	**2,725**	1,071	535	**1,606**	0	14,787	803	**15,590**
2005	8,648	6	**8,654**	0	2,499	**2,499**	1,133	499	**1,632**	0	12,280	505	**12,785**
2006	11,477	934	**12,411**	0	3,026	**3,026**	1,369	506	**1,875**	0	15,872	1,440	**17,312**
2007	9,968	971	**10,939**	0	2,085	**2,085**	1,088	656	**1,744**	0	13,141	1,627	**14,768**
2008	9,191	330	**9,521**	0	3,506	**3,506**	1,100	623	**1,723**	0	13,797	953	**14,750**
2009	11,061	379	**11,440**	0	3,432	**3,432**	1,097	595	**1,692**	0	15,590	974	**16,564**
2010	10,772	366	**11,138**	0	3,446	**3,446**	957	558	**1,515**	0	15,175	924	**16,099**
2011	10,323	344	**10,667**	0	3,226	**3,226**	1,013	533	**1,546**	0	14,562	877	**15,439**
2012	11,296	0	**11,296**	0	2,722	**2,722**	1,090	586	**1,676**	0	15,108	586	**15,694**
2013	12,091	0	**12,091**	0	2,309	**2,309**	1,061	690	**1,751**	0	15,461	690	**16,151**
2014	9,262	0	**9,262**	0	2,082	**2,082**	869	672	**1,541**	0	12,213	672	**12,885**
2015	8,868	0	**8,868**	0	1,768	**1,768**	723	720	**1,443**	0	11,359	720	**12,079**
2016	11,276	0	**11,276**	0	1,616	**1,616**	713	754	**1,467**	0	13,605	754	**14,359**



1. *Reflects State Water Project through 2006; includes imported water from State Water Project and Buena Vista WSD Agreement beginning in 2007.*
2. *Robinson Ranch Golf Course irrigation and estimated private pumping.*
3. *Valencia Country Club and Vista Valencia Golf Course irrigation.*

Table 2-3
Total Water Supply Utilization for Municipal, Agricultural and Other Uses
Santa Clarita Valley Water Report
(Acre-Feet)

Year	Purchased from CLWA		Local Production		Other	
	Imported Water [1]	*Treated Groundwater* [2]	*Alluvium*	*Saugus Formation*	*Recycled Water*	**Total**
1980	1,126	-	31,463	4,589	-	**37,178**
1981	5,817	-	30,790	4,970	-	**41,577**
1982	9,659	-	21,868	4,090	-	**35,617**
1983	9,185	-	20,286	3,852	-	**33,323**
1984	10,996	-	27,318	4,449	-	**42,763**
1985	11,823	-	25,347	4,715	-	**41,885**
1986	13,759	-	24,205	5,485	-	**43,449**
1987	16,285	-	22,642	5,561	-	**44,488**
1988	19,033	-	21,648	6,928	-	**47,609**
1989	21,618	-	23,721	7,759	-	**53,098**
1990	21,613	-	23,876	8,861	-	**54,350**
1991	7,968	-	27,187	14,917	-	**50,072**
1992	14,898	-	27,591	10,924	-	**53,413**
1993	13,836	-	30,126	10,610	-	**54,572**
1994	14,700	-	33,133	12,025	-	**59,858**
1995	17,002	-	34,464	8,560	-	**60,026**
1996	18,873	-	38,438	8,186	-	**65,497**
1997	23,215	-	39,599	7,745	-	**70,559**
1998	20,266	-	36,648	5,555	-	**62,469**
1999	27,302	-	43,406	3,716	-	**74,424**
2000	32,582	-	39,937	4,080	-	**76,599**
2001	35,369	-	37,589	4,140	-	**77,098**
2002	41,763	-	38,276	5,160	-	**85,199**
2003	44,416	-	33,599	4,207	50	**82,273**
2004	47,205	-	33,757	6,503	420	**87,885**
2005	37,997	-	38,648	6,453	418	**83,516**
2006	40,048	-	43,061	7,312	419	**90,840**
2007	45,151	-	38,773	7,685	470	**92,079**
2008	41,705	-	41,716	6,918	311	**90,650**
2009	38,546	-	39,986	7,678	328	**86,538**
2010	30,578	-	41,159	8,092	336	**80,165**
2011	30,808	2,784	40,748	5,531	373	**80,244**
2012	35,558	2,956	40,701	5,763	428	**85,406**
2013	43,281	3,108	36,892	5,930	400	**89,611**
2014	33,092	2,503	36,896	8,098	474	**81,063**
2015	24,148	2,961	30,692	8,319	450	**66,570**
2016	31,130	3,407	28,849	8,432	507	**72,325**



1. Reflects State Water Project through 2006; includes imported water from State Water Project and Buena Vista WSD Agreement beginning in 2007.
2. In January 2011, CLWA began operation of its Saugus Formation groundwater containment project. After treatment for perchlorate removal, that water was blended with treated imported water and delivered to the Purveyors through the CLWA distribution system.

efforts have been successful in dramatically reducing demand in recent years to levels not seen since the late 1990s.

As can also be seen by inspection of **Table 2-3** and **Figure 2-1**, most of the historical increase in water demand from 1980 through 2007 has been met with generally greater proportions of imported SWP water, complemented by other imported water sources. Variations in water demand over the past ten years (since 2007) have been met with a corresponding increase or decrease in the use of imported water while total groundwater use has generally remained unchanged (with the exception of 2015 and 2016), ranging from approximately 46,000 to 49,000 afy. In 2015 and 2016, groundwater use declined to the low 40,000 afy, similar to levels in the 1990s and early 2000s.

2.3 Municipal Water Use

The retail water Purveyors use of local groundwater, augmented by water supplies purchased from CLWA (imported SWP and non-SWP water supplies and treated Saugus Formation groundwater), and also slightly augmented by the use of recycled water, are summarized in **Table 2-1**. Municipal water requirements in 2016 (58,000 af) were above the interpolated projections for 2016 in the 2015 UWMP by approximately 800 af (approximately one percent).

The increase in water use in 2016 occurred in conjunction with a one percent increase in service connections in 2016 (approximately 73,800 connections) as compared to 2015 (approximately 73,100 connections). The largest number of additional service connections occurred in the SCWD (approximately 550 new connections) and VWC (approximately 130 new connections) service areas. There were approximately 700 new service connections in 2016 compared to approximately 200 to 500 new annual connections in the 2009 through 2012 period. The number of new service connections in 2016 is still less than the number and rate of new connections that occurred annually during the late 1990s through 2008 period. Municipal water demand has fluctuated between approximately 55,000 to 77,000 afy since 2001 (**Table 2-1**) even though there are currently approximately 21,500 more service connections in 2016 as compared to 2001 (**Table 2-4**) and **Figure 2-2**.

Table 2-4: Service Connections by Purveyor

Year	SCWD	VWC	NCWD	LACWD 36	TOTAL
2001	22,000	22,000	7,200	1,111	52,311
2002	24,175	25,286	7,700	1,187	58,348
2003	25,175	26,810	8,650	1,301	61,936
2004	26,161	28,296	9,010	1,319	64,786
2005	27,000	28,800	9,200	1,321	66,321
2006	27,582	29,111	9,346	1,338	67,377
2007	27,911	29,445	9,525	1,343	68,224
2008	28,547	29,924	9,540	1,357	69,368
2009	28,687	29,948	9,580	1,350	69,565
2010	28,904	30,080	9,637	1,332	69,953
2011	29,089	30,217	9,670	1,337	70,313
2012	29,352	30,411	9,693	1,343	70,799
2013	29,713	30,796	9,702	1,350	71,561
2014	30,229	31,101	9,710	1,345	72,385
2015	30,681	31,353	9,736	1,345	73,115
2016	31,229	31,485	9,758	1,349	73,821

2.4 Agricultural and Other Water Uses

Water supply utilization for agricultural and other non-municipal uses is summarized in **Table 2-2**. The category of Small Private Domestic, Irrigation and Golf Course Uses in **Table 2-2** includes an estimated 500 afy of small individual private pumping from the Alluvium. Annual water supply utilization for all agricultural and other non-municipal uses has generally remained stable and has averaged approximately 15,200 af since the mid-1990s and was approximately 14,300 af in 2016.

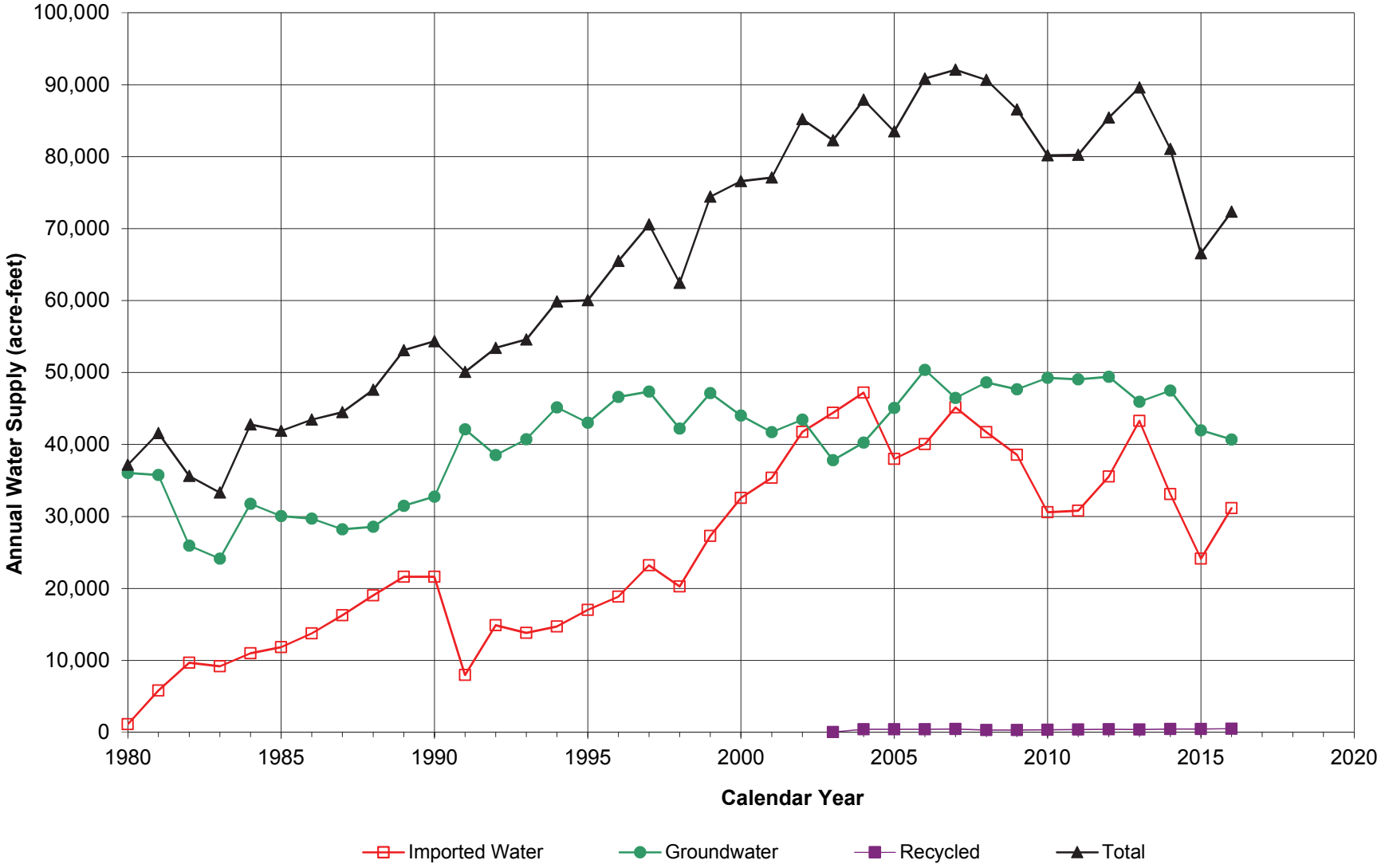


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Figure 2-1
Total Water Supply Utilization
Santa Clarita Valley Water Report

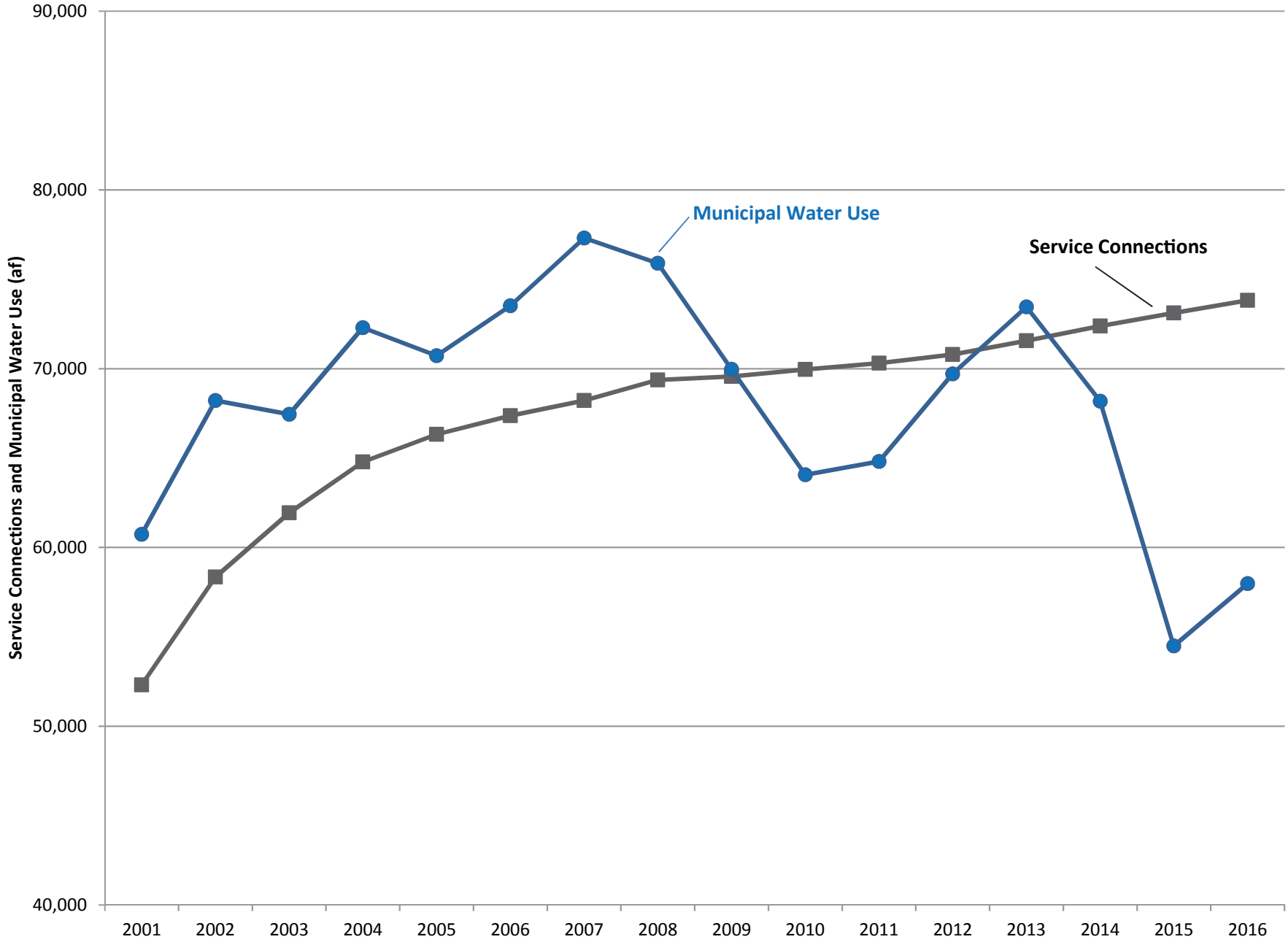

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Figure 2-2
Service Connections and Total Water Use
Santa Clarita Valley Water Report

3 WATER SUPPLIES

Prior to 1980, local groundwater extracted from the Alluvium and the Saugus Formation was the sole source of water supply in the Santa Clarita Valley. Since 1980, local groundwater supplies have been supplemented with imported SWP water supplies, augmented in 2007 by acquisition of additional supplemental water imported from the Buena Vista Water Storage District (BVWSD) and Rosedale-Rio Bravo Water Storage District (RRWSD), and Yuba Accord water in 2008. Those water supplies have also been slightly augmented by deliveries from CLWA's recycled water program since 2003. This section describes the groundwater resources of the Santa Clarita Valley, SWP and other imported water supplies, and the recycled water program in the Valley.

3.1 Groundwater Basin Yield

The groundwater basin beneath the Santa Clarita Valley, identified in the DWR's interim update to Bulletin 118 (DWR, 2016) as the Santa Clara River Valley Groundwater Basin, East Subbasin (Basin No. 4-4.07), comprises two aquifer systems, the Alluvium and Saugus Formation. The Alluvium generally underlies the Santa Clara River and its several tributaries, and the Saugus Formation underlies practically the entire Upper Santa Clara River area. The mapped extent of the Santa Clara River Valley East Groundwater Subbasin in DWR Bulletin 118 and its relationship to the extent of the CLWA service area are illustrated in **Figure 3-1**. The mapped subbasin boundary approximately coincides with the outer extent of the Alluvium and Saugus Formation.

3.1.1 Historical Investigations

Since 1986, there have been several efforts which have evaluated and reported on the Alluvium and Saugus Formations, interpreted hydrologic conditions, and estimated sustainable yields from both formations (Slade, 1986; Slade, 1988; Slade & Associates, 2002; CLWA, 2003; CH2M Hill, 2004; CH2M HILL, 2005; CH2M HILL and LSCE, 2005; CLWA, 2005; and LSCE and GSI, 2009). Generally, these investigations have concluded similarly approximately the basin conditions and yield:

- Analysis of groundwater levels and production indicates that there have been no conditions that would be illustrative of groundwater overdraft.
- The utilization of operational yield (as opposed to perennial yield) as a basis for managing groundwater production would be more applicable in this basin to reflect the fluctuating utilization of groundwater in conjunction with imported SWP water.
- The operational yield of the Alluvium would typically be 30,000 to 40,000 afy for wet and normal rainfall years, with an expected reduction into the range of 30,000 to 35,000 afy in dry years.
- The operational yield of the Saugus Formation would typically be in the range of 7,500 to 15,000 afy on a long-term basis, with possible short-term increases during dry periods into a range of 15,000 to 25,000 afy, and to 35,000 afy if dry conditions continue.

These points became the foundation of the initial Groundwater Operating Plan (initial Plan) first developed in 2004 after the adoption of a formal Groundwater Management Plan (GWMP) in 2003 (CLWA, 2003). The groundwater component of overall water supply in the Valley was derived from this initial Plan to meet water requirements (municipal, agricultural and other non-municipal, and small individual domestic) while maintaining the basin in a sustainable condition (i.e., no long-term depletion of groundwater or interrelated surface water). This initial Plan also addressed groundwater contamination issues in the basin, all consistent with the GWMP. The initial Plan was based on the concept that pumping can vary from year to year to generally rely on increased groundwater use in dry periods and increased recharge during locally wet periods, and to collectively assure that the groundwater basin is adequately replenished through various wet/dry cycles.

The initial Plan described the following:

Alluvium – Pumping from the Alluvial in a given year is related to local hydrologic conditions in the eastern Santa Clara River watershed. Pumping is expected to typically range between 30,000 and 40,000 afy following normal and above-normal rainfall years. Due to hydrogeologic constraints in the eastern part of the basin, pumping is expected to be typically reduced to between 30,000 and 35,000 afy following multiple locally dry years.

Saugus Formation – Pumping from the Saugus Formation in a given year is related to the availability of imported water supplies, particularly from the SWP. During average-year conditions within the SWP system, pumping from the Saugus Formation is expected to range between 7,500 and 15,000 afy. Planned dry-year pumping from the Saugus Formation is expected to range between 15,000 and 25,000 afy during a drought year and can increase to between 21,000 and 25,000 afy if SWP deliveries are reduced for two consecutive years. For three or more consecutive years of reduced SWP deliveries, pumping from the Saugus Formation can range between 21,000 and 35,000 afy. Such high pumping is expected to typically be followed by periods of reduced (average-year) pumping, at rates between 7,500 and 15,000 afy, to enhance the effectiveness of natural recharge processes that would cause groundwater levels to recover.

3.1.2 Current Operating Plan

The initial Plan was updated in 2008 to evaluate the yield of the basin and present a sustainable operating plan for utilizing groundwater resources from the Alluvium and the Saugus Formation under wet, normal, and dry conditions (LSCE and GSI, 2009), summarized in **Table 3-1**. This effort to update the initial Plan was conducted partly in preparation for the 2010 UWMP and continued in the 2015 UWMP, and in part because of events that can be expected to impact the future reliability of the supplemental water supply from the SWP. The Purveyors initiated this updated analysis (Current Operating Plan) to further assess groundwater development potential and possible augmentation of the initial Plan. A further consideration in conducting the updated analysis of the basin was that climate change could alter local rainfall and associated recharge patterns, thus affecting local groundwater supplies, i.e. the yield of the basin. Finally, the Los Angeles County Flood Control District (LACFCD) was

planning a number of small flood control projects in the Santa Clarita Valley that would result in an increase in recharge to the groundwater system. The Purveyors had interest in whether that potential for increased recharge from the LACFCD projects could appreciably augment the yield of the basin.

Table 3-1: Groundwater Operating Plan for the Santa Clarita Valley

Aquifer	Groundwater Production (af)			
	Normal Years	Dry Year 1	Dry Year 2	Dry Year 3
Alluvium	30,000 to 40,000	30,000 to 35,000	30,000 to 35,000	30,000 to 35,000
Saugus	7,500 to 15,000	15,000 to 25,000	21,000 to 25,000	21,000 to 35,000
Total	37,500 to 55,000	45,000 to 60,000	51,000 to 60,000	51,000 to 70,000

The updated basin yield analysis (LSCE and GSI, 2009), completed in August 2009, had the following conclusions:

- The Current Operating Plan, with currently envisioned pumping rates and distribution and comparable to the initial Plan described above, will not cause detrimental short- or long-term effects to the groundwater and surface water resources in the Valley and is, therefore, sustainable (**Table 3-1**). Further, local conditions in the Alluvium in the eastern end of the basin can be expected to repeat historical groundwater level declines during dry periods, necessitating a reduction in desired pumping from the Alluvium due to decreased well yield and associated actual pumping capacity during those periods. However, those reductions in pumping from the Alluvium can be made up by an equivalent amount of increased pumping in other parts of the basin without disrupting basin-wide sustainability or local pumping capacity in those other areas. For the Saugus Formation, the modeling analysis indicated that it can sustain the pumping that is embedded in the Current Operating Plan.
- A Potential Operating Plan (pumping between 41,500 and 47,500 afy from the Alluvium) would result in lower groundwater levels, failure of the basin to fully recover (during wet hydrologic cycles) from depressed storage that would occur during dry periods, and generally declining trends in groundwater levels and storage. Long-term lowering of groundwater levels would also occur in the Saugus Formation (pumping between approximately 16,000 and nearly 40,000 afy) with only partial water level recovery occurring in the Saugus Formation. Thus, the Potential Operating Plan would not be sustainable over a long-term period.
- Several climate change models were examined to estimate the potential impacts on local hydrology in the Santa Clarita Valley. The range of potential climate change impacts extends from a possible wet trend to a possible dry trend over the long term (from 2010 through 2095). The trends that range from an approximate continuation of historical average precipitation, to something wetter than that, would appear to result in continued sustainability of the Current Operating Plan, again with intermittent constraints on full pumping in the eastern part of the basin. The potential long-term dry trend arising out of climate change would be expected to

decrease local recharge to the point that lower and declining groundwater levels would render the Current Operating Plan unsustainable. Ultimately it was recognized that a wide range of potential climate change scenarios produce a range of non-unique results with respect to local hydrologic conditions and associated sustainable groundwater supply. Notable in the wide range of possibilities, however, was the output that, over the planning horizon of the 2010 and 2015 UWMP (through 2050), the range of relatively wet to relatively dry hydrologic conditions would be expected to produce sustainable groundwater conditions under the Current Operating Plan.

Based on the preceding conclusions, groundwater utilization generally has continued in accordance with the Current Operating Plan; and the Potential Operating Plan is not being considered for implementation.

As the Purveyors and CLWA move toward implementation of the Sustainable Groundwater Management Act (SGMA), a Groundwater Sustainability Plan (GSP) will be developed to replace the GWMP by 2022. The Purveyors will continue to monitor groundwater conditions in the Basin and evaluate the sustainability of the Current Operating Plan.

3.2 Alluvium – General

The spatial extent of the aquifers used for groundwater supply in the Valley, the Alluvium and the Saugus Formation, are illustrated in **Figure 3-1**. Geologic descriptions and hydrogeologic details related to both aquifers are included in several technical reports including Slade (1986, 1988, and 2002), CH2M Hill (2005) and LSCE (2005), the 2005 UWMP (CLWA, 2005) and the 2010 UWMP (CLWA, 2011), and the 2015 UWMP.

Consistent with the 2001 Update Report (Slade, 2002), the 2005 Basin Yield Report (CH2M Hill and LSCE, 2005), the 2009 Updated Basin Yield Report (LSCE and GSI, 2009), and the UWMPs (2005, 2010, and 2015), the management practice of the Purveyors continues to be reliance on groundwater from the Alluvium for part of the overall municipal water supply, whereby total pumping from the Alluvium (by municipal, agricultural, and private pumpers) is in accordance with the Current Operating Plan, 30,000 to 40,000 afy in wet and normal years, with possible reduction to 30,000 to 35,000 afy during multiple dry years. Such operation will maximize use of the Alluvium because of the aquifer's ability to store and produce good quality water on a sustainable basis, and because the Alluvium is capable of rapid recovery of groundwater storage in wet periods. As with many groundwater basins, it is possible to intermittently exceed a long-term average yield for one or more years without long-term adverse effects. Higher pumping for short periods may temporarily lower groundwater storage and related water levels, as has been the case in the Alluvium several times since the 1930's. However, subsequent decreases in pumping limit the amount of water level decline. Normal to wet-period recharge results in a rapid return of groundwater levels to historic highs. Historical groundwater level data collected from the Alluvium over numerous hydrologic cycles continue to provide assurance that groundwater

elevations, if locally lowered during dry periods, recover in subsequent average or wet years. Such water level response to rainfall is a significant characteristic of permeable, porous, alluvial aquifer systems that occur within large watersheds. In light of these historical observations, complemented by the long-term sustainability analysis using the numerical groundwater flow model in 2008, there is ongoing confidence that groundwater will continue to be a sustainable source of water supply at the rates of pumping as described in the 2009 Updated Basin Yield Report, and incorporated in the Valley's recent UWMPs.

Long-term adverse impacts to the Alluvium could occur if the amount of water extracted from the aquifer were to exceed the amount of water that recharges the aquifer over an extended period. However, the quantity and quality of water in the Alluvium and all significant pumping from the Alluvium are routinely monitored, and no long-term adverse impacts have ever been evident. Ultimately, the Purveyors have identified cooperative measures to be taken, if needed, to ensure sustainable use of the aquifer's groundwater resources. Such measures include but are not limited to the continuation of conjunctive use of SWP and other imported supplemental water with local groundwater, artificial recharge of the aquifer with local runoff or other surface water supplies, expanded use of other water supplies such as recycled water, and expanded implementation of demand-side management, including conservation.

3.2.1 Alluvium – Current Conditions

Total pumping from the Alluvium in 2016 was approximately 28,800 af, approximately 2,000 af less than was pumped in 2015 and below the Current Operating Plan range for a dry year. Of the total Alluvial pumping in 2016, approximately 15,200 af (53 percent) was for municipal water supply, and the balance, approximately 13,600 af (47 percent), was for agriculture and other private uses, including individual domestic uses.

3.2.2 Alluvium – Historical Conditions

Interpretation of longer term, historical groundwater levels and pumping indicate that the amount of groundwater pumping in 2016 has remained consistent with historically observed conditions, with recent trends in groundwater levels consistent with dry period declines. Since 1980, when SWP deliveries began, there has been a change in municipal/agricultural pumping distribution toward a higher fraction for municipal water supply from approximately 50 percent to more than 65 percent of Alluvial pumpage, reflecting general land use changes in the Valley. However, in 2016, the ratio changed with a higher fraction for agricultural pumping due to the reduced municipal pumping from the Alluvium. This was due to the Purveyors' utilization of more imported water, resulting in agriculture and municipal groundwater pumping in nearly equal proportions. Ultimately, on a long-term average annual basis since the initiation of SWP deliveries in 1980, total Alluvial pumping has been approximately 33,100 afy, which is at the lower end of the range of operational yield of the Alluvium during normal years and in the middle of the range for dry years. That annual average has been higher over the last ten years, approximately 37,600 afy, which remains within the range of operational yield of the Alluvium

on a long term annual average basis representing normal hydrologic conditions. The overall historic record of Alluvial pumping is shown in **Table 2-3** and illustrated in **Figure 3-2**.

Groundwater levels in various parts of the basin have historically exhibited different responses to both pumpage and climatic fluctuations. During the last 20 to 30 years, depending on location, groundwater levels in the Alluvium have remained fairly stable with small seasonal variations (generally toward the western end in the main part of the Valley), or have fluctuated from near the ground surface when the subbasin is full in wet periods, to as much as 100 feet lower during intermittent dry periods of reduced recharge (generally toward the eastern end of the subbasin). For illustration of the various groundwater level conditions in the subbasin, the Alluvial wells have been grouped into areas with similar groundwater level patterns, as shown in **Figure 3-3**. The groundwater level records have been organized into hydrograph form showing groundwater elevation on a time series basis as illustrated in **Figures 3-4 and 3-5**. Also shown on these plots is a marker indicating whether any year had below-average rainfall. The wells shown on these plots are representative of the respective areas, showing the range of values (highest to lowest groundwater elevation) through each area, and containing a sufficiently long-term record to illustrate trends over time.

Situated along the upstream end of the Santa Clara River Channel, the Mint Canyon area, located at the far eastern end of the groundwater subbasin, and the nearby Above Saugus Water Reclamation Plant (WRP) area generally exhibit similar groundwater level responses (**Figure 3-4**) to hydrologic and pumping conditions. Groundwater elevations in wells located in the Mint Canyon area generally show pronounced water level recoveries during wet periods compared to groundwater levels in the Above Saugus WRP area. These eastern parts of the Valley have historically experienced a number of alternating wet and dry hydrologic conditions during which groundwater level declines have been followed by returns to high or mid-range historic levels. When water levels are low, well yields and pumping capacities in this and other eastern areas can be impacted. The affected Purveyors typically respond by decreasing or ceasing pumping from the Alluvium and increasing the use of groundwater from the Saugus Formation and imported (SWP and other) supplies, as shown in **Table 2-3**. The Purveyors also shift a fraction of the Alluvial pumping that would normally be supplied by the eastern areas to areas further west, where well yields and pumping capacities remain fairly constant because of smaller groundwater level fluctuations in response to wet and dry hydrologic periods. Long-term pumping in the Mint Canyon area has averaged approximately 7,300 afy (1985-2016). However, since a high of over 12,000 afy in 2006, pumping in the Mint Canyon area has since generally declined and in 2016 pumping was approximately 1,900 af, or approximately a quarter of the long-term average. Recent wet and dry periods illustrate the groundwater level response to managed Alluvial pumping. The five-year period of 2006 through 2010 saw water level declines on the order of 50 to 60 feet; pumping was gradually reduced and water levels stopped declining (**Figure 3-6).** Subsequent wet conditions in late 2010, continuing into 2011, resulted in a nearly full recovery of groundwater levels and aquifer storage. With such high groundwater levels, pumping briefly increased in 2011/2012. However, dry conditions in 2012 through 2016 prompted pumping reductions in each subsequent year; groundwater

levels declined through 2013 and since have shown a stable trend through 2016. Groundwater levels in the Mint Canyon area are generally at or near historic lows due in part to the inability of the existing wells to operate with the reduction in aquifer storage in this area of the basin. It is expected that aquifer storage and groundwater levels in the Mint Canyon area will recover once normal and/or wet conditions resume in the Valley.

Just west of the Mint Canyon area, the Above Saugus WRP area has shown similar hydrologic trends. Pumping trends are historically similar to the Mint Canyon area, with the pumping fluctuating in response to wet/dry periods. However, long-term average annual pumping in the Above Saugus WRP area has been less than half the pumping rate in Mint Canyon, as shown in **Figure 3-6**, at approximately 3,500 afy (1985-2016). Since the most recent high pumping rate of almost 6,000 af in 2010, pumping in this area has steadily declined, and in 2016 was 1,400 af. Groundwater level response is similar to the Mint Canyon area in that groundwater levels are sensitive to variations in rainfall and pumping. Groundwater levels have exhibited a decline since 2005/2006 (except for a moderate rise in 2010/2011 in response to the above normal rainfall in that period) through 2013. Currently, groundwater levels in the Above Saugus WRP area have been relatively stable since 2014 and are at the lower end of the range of long-term levels that are representative of historical dry periods.

In the Bouquet Canyon area, groundwater levels, as represented by the Guida and Clark wells in **Figure 3-4**, are influenced by a number of factors, including groundwater pumping and recharge from rainfall, natural streamflow in Bouquet Canyon Creek and releases from Bouquet Reservoir into Bouquet Canyon Creek. Long-term annual groundwater pumping has averaged 1,600 afy (1985-2016) and has steadily declined since 2006 from a high of approximately 2,400 af to approximately 900 af in 2016 (similar to the pumping rates of the late 1980s). Since 2005, groundwater elevations had increased in response to a wet rainfall year in 2005 and to resumed 'normal' releases of water from Bouquet Reservoir to Bouquet Canyon Creek that occurred in 2009 through 2011[1]. However, the dry conditions and a

[1] Flow in Bouquet Canyon Creek is regulated by releases from Bouquet Reservoir, which is operated by Los Angeles Department of Water and Power. Per an agreement with United Water Conservation District, minimum releases from Bouquet Reservoir are specified. These releases had been maintained until a series of storms in 2005 created substantial runoff and altered the streambed so that even small amounts of flow spills out of the creek and onto Bouquet Canyon Road. Efforts to prevent flow onto the road while maintaining specified releases have not been completely successful, and therefore releases from Bouquet Reservoir have continued to be reduced during March through October since 2006 through 2016 (except for 2009-2011). Currently, the Los Angeles County Department of Public Works has proposed the Bouquet Canyon Creek Restoration Project with the primary objective to restore in-stream and riparian habitat by re-establishing creek flows, and the Initial Study/Mitigated Negative Declaration (AECOM, 2016) to assess the impact of the proposed project are pending approval by the Los Angeles County Board of Supervisors.

continued reduction in Bouquet Reservoir releases (related to streambed issues – not drought related) over the past five years, have resulted in groundwater elevations declining a total of 30 to 40 feet.

Wells located in the San Francisquito Canyon area and presented in **Figure 3-5** (W5, W9 and W11 wells) generally exhibit similar long-term groundwater level trends that respond to variations in rainfall and pumpage with seasonal declines and partial recovery in dry years or full recovery to historical highs in wet years, similar in nature to other eastern areas of the Valley. In this area, groundwater levels have declined approximately 50 feet from historic highs between 2011 and 2015, and in 2016 groundwater levels generally did not exhibit additional declines. Groundwater level response in 2016 may have been influenced by a decline in pumping. The long-term average annual pumping rate has been approximately 1,800 afy (1985-2016) with a peak of approximately 3,900 af in 2005. Since 2005, pumping has been relatively constant, averaging approximately 3,100 afy, however, total pumping in this area declined to approximately 1,900 af in 2016.

In the western part and lower elevation portion of the subbasin, groundwater levels in the Alluvium respond to pumping and precipitation in a similar manner, but to an attenuated or limited extent compared to those situated in the eastern, higher elevation areas. As shown in the group of groundwater elevation hydrographs in **Figure 3-5** the magnitude of groundwater level fluctuations in the Below Saugus WRP area are less than those observed in the eastern areas of the Valley.

Wells located in the Below Saugus WRP area in **Figure 3-5** (VWC's I and Q2 wells), along the Santa Clara River immediately downstream of the Saugus Water Reclamation Plant generally show declining groundwater levels from 2006 through 2016. Groundwater levels in this area did not have the short-term increase in levels in 2010-11 as seen in other areas, and they have had a more rapid rate of decline since 2011, although that rate of decline has slowed in 2015 and 2016. Groundwater levels are currently 30 to 55 feet below historic high levels. And in 2016, groundwater levels showed a decline of less than 5 feet. Although the groundwater levels in the Below Saugus WRP area are relatively low, the water levels are still at or substantially above well screen intake sections and they remain higher than historic lows observed in the 1960s. Pumping in this area had been generally constant at approximately 6,000 afy from the mid-1990s to the early 2000s, followed by more variable (and overall increasing) annual pumping that ranged from 4,000 af in 2005/2006 to 10,500 af in 2014 and at or below 8,000 in 2015 and 2016.

Groundwater levels in the Castaic Valley area, located along Castaic Creek below Castaic Lake, have been relatively stable since the 1950s to approximately 2011. Since 2011, there has been a decline of approximately 30 feet. These declines are likely in response to dry climatic conditions (**Figure 3-5**). The annual pumping rate of wells in this area has been approximately 5,100 afy (1985-2016) (**Figure 3-6**). Since 2011, pumping has been steadily declining to approximately 3,200 af in 2016. Although groundwater levels have declined approximately 20 to 35 feet since 2011, they are still higher than levels observed in the 1960s. Wells in the lower elevations saw a decline during 2016 of less than 5 feet,

while water levels in higher elevations were basically unchanged. These recent declines in groundwater levels are consistent with other short-term historical fluctuations around the Valley.

In the area downstream of the Valencia Water Reclamation Plant (WRP), which discharges treated effluent to the Santa Clara River, groundwater pumping increased from below 5,000 afy in the 1980s to above 10,000 afy in the late-1990s. Since then, pumping has increased at a slower rate averaging approximately 11,200 afy since 2000 and was approximately 12,200 af in 2016 (**Figure 3-6**). Long-term groundwater levels in this area have generally been stable and have exhibited slight response to pumping and climatic fluctuations, although in the last ten years a slight decline of approximately 10 feet has been observed in some wells in this area. These slight declines may be attributed to a number of factors including generally dry conditions and related decrease in recharge since 2005/2006 and an increase in pumping (**Figure 3-5**).

In summary, groundwater levels over the last 35 years in the Alluvium have exhibited historic highs as recent as 2011. In some locations, there are intermittent, short-term dry-period declines (resulting from use of some groundwater from storage) followed by shorter wet-period recoveries of groundwater levels and storage. Since importation of supplemental SWP water since 1980, or over the last 50 to 60 years (since the 1950s - 60s), groundwater levels in the Alluvium shows no chronic trend toward decreasing water levels and storage (overdraft), although the recent long term drought has had an influence on groundwater levels in many areas of the subbasin. Consequently, pumping from the Alluvium has been and continues to be sustainable, well within the operational yield of that aquifer on a long-term annual average basis.

3.3 Saugus Formation – General

Wells constructed in the Saugus Formation are operated by the Purveyors and CLWA in a manner consistent with the Current Operating Plan and historical investigations that include the 2001 Update Report (Slade, 2002), the 2005 Basin Yield Report (CH2M Hill and LSCE, 2005), and the 2009 Updated Basin Yield Report (LSCE and GSI, 2009). These wells are primarily located in the southern and western portions of the basin (**Figure 3-7**). The Current Operating Plan targets pumping from the Saugus Formation in the range of 7,500 to 15,000 afy in average/normal years, with planned dry-year pumping of 15,000 to 35,000 afy for one to three consecutive dry years, when shortages to CLWA's SWP water supplies could occur. The Current Operating Plan envisioned that high pumping during dry periods would be followed by periods of lower pumping in order to allow recovery of water levels and storage in the Saugus Formation. Maintaining the substantial volume of water in the Saugus Formation remains an important strategy to help maintain water supplies in the Santa Clarita Valley during drought periods. The ability of the Purveyors to pump the Saugus Formation at dry-year levels has been historically impaired due to perchlorate contamination issues and resultant reduced production capacity. Both of these issues are expected to be resolved over the near future.

3.3.1 Saugus Formation – Current Conditions

Total pumping from the Saugus Formation in 2016 was approximately 11,800 af, or approximately 500 af more than in the preceding year. This included 3,400 af that were pumped from CLWA's Saugus 1 and Saugus 2 wells as part of the perchlorate pump and treat program as described herein. Thebulk of Saugus Formation pumping in 2016 (approximately 11,100 af) was for municipal water supply, and the balance (800 af) was for agricultural and other uses.

3.3.2 Saugus Formation – Historical Conditions

Since the importation of SWP water beginning in 1980, total pumping from the Saugus Formation has ranged between 3,700 afy in 1999 to a high of nearly 15,000 afy in 1991. Average annual pumping from 1980 through 2016 has been approximately 7,300 af. These pumping rates remain well within, and generally at the lower end of the range of the Current Operating Plan for the Saugus Formation. The overall historic record of pumping from the Saugus Formation is illustrated in **Figure 3-8**.

Since the early 1990s, when groundwater pumping from the Saugus Formation peaked, there had been a steady decline in pumping through the remainder of that decade. Since then, Saugus Formation pumping has been trending upward from approximately 4,000 in the early 2000s to more than 11,800 afy last year, with the recent 5-year average at approximately 10,300 afy.

Unlike the Alluvium, which has an abundance of wells with extensive water level records, the water level data for the Saugus Formation are limited by both the geographic distribution of the wells in that Formation and the period of record. This has changed over the last several years with the addition of monitoring wells west of the Whittaker Bermite facility in the vicinity of wells VWC-201 and VWC-160. However, the wells that do have a historical water level record that exists prior to the initiation of SWP deliveries in 1980, indicate that groundwater levels in the Saugus Formation were relatively low in the 1960s and experienced a gradual increase by the mid-1980s, followed by a decline that ended in the early 1990s. Since then, groundwater levels increased over the next 10 to 15 years and over the past 8 or 9 years have experienced a decline (**Figure 3-9**). The most recent downward trend has been experienced since 2006 through 2016 which also corresponds to a long-term climatic dry period. In the southern-most Saugus Formation wells (South Area plot), groundwater level declines during this dry period have ranged from 50 to 100 feet, and in the central and western Saugus Formation wells (Central/West Area plot), declines have ranged from 30 to 50 feet. Since these declines have occurred during a long-term dry period with reduced recharge, they are not representative of a permanent trend in water level decline. There continues to be fluctuations in groundwater levels attributed to seasonal and climatic fluctuations along with pumpage, but the prevalent long-term trend is one of general stability.

Consistent with the 2001 Update Report (Slade, 2002), the 2005 Basin Yield Report (CH2M Hill and LSCE, 2005), the 2005 UWMP, the 2009 Updated Basin Yield Report (LSCE and GSI, 2009), the 2010 UWMP, and the 2015 UWMP the Purveyors continue to maintain groundwater storage and associated water

levels in the Saugus Formation so that supply is available during drought periods, when supplies from the Alluvium, the SWP, and/or other supplemental supplies may be reduced. The period of increased pumping during the early 1990s is a good example of this management strategy. Most notably, in 1991, when SWP deliveries were substantially reduced, increased pumping from the Saugus Formation made up almost half of the decrease in SWP deliveries. The increased pumping over several consecutive dry years (1991-1994) resulted in short-term groundwater level declines, reflecting the use of water from storage. However, groundwater levels subsequently recovered in the Saugus Formation when pumping declined in the late 1990s to early 2000s to around 4,000 afy, reflecting recovery of groundwater storage.

3.4 Imported Water

CLWA obtains the majority of its imported water supplies from the SWP, which is owned and operated by the DWR. CLWA is one of 29 contractors holding long-term SWP contracts with DWR. SWP water originates as rainfall and snowmelt in the Feather River watershed in northern California. Runoff from the watershed is stored in Lake Oroville, which is the SWP's largest storage facility. The water is then released from Lake Oroville down the Feather River to the Sacramento River and through the Sacramento-San Joaquin Delta. Water is diverted from the Delta into the Clifton Court Forebay, and then pumped into the 444-mile long California Aqueduct. SWP water delivered to southern California is temporarily stored in San Luis Reservoir, which is jointly operated by DWR and the U.S. Bureau of Reclamation. Prior to delivery to CLWA, SWP supplies are stored in Castaic Lake, a terminal reservoir located at the end of the West Branch of the California Aqueduct.

CLWA's service area covers approximately 195 square miles (124,800 acres), including the City of Santa Clarita and surrounding unincorporated communities. Water from the SWP and other sources located outside the Valley is treated, filtered and disinfected at CLWA's Earl Schmidt Filtration Plant and Rio Vista Water Treatment Plant, which have a combined treatment capacity of 122 million gallons per day. Treated water is delivered from the treatment plants to each of the four retail Purveyors through a distribution network of pipelines and turnouts. At present, CLWA delivers water to the four Purveyors through 26 potable turnouts as schematically illustrated in **Figure 3-10**.

In 2016, CLWA fulfilled the following major accomplishments in order to enhance, preserve, and strengthen the quality and reliability of existing and future supplies:

- continued participation in long-term water banking programs with RRBWSD and Semitropic,
- continued to participate in two-for-one exchange programs with RRBWSD and WKWD,
- continued implementation of the AB 3030 Groundwater Management Plan,
- completed the 2015 UWMP,
- completed an update to the Valley-wide Recycled Water Master Plan
- continued implementation of the water conservation Best Management Practices, including measures in the Santa Clarita Valley Water Use Efficiency Plan,

- continued participation in the Santa Clarita Valley Water Committee,
- pumped and treated approximately 3,400 af from the Saugus 1 and 2 wells in 2016 as part of the remediation of the Saugus Formation groundwater perchlorate contamination,
- continued cooperative effort with the U.S. Army Corps of Engineers for characterization studies of the former Whittaker-Bermite site and in a task force effort with the City of Santa Clarita, local legislators, and state agencies to effect the cleanup and remediation of all aspects of the former Whittaker-Bermite site, including perchlorate contamination of local groundwater, and
- continued involvement in the expansion of existing perchlorate containment and treatment program with the design of treatment facilities to remove perchlorate from VWC Well 201.

3.4.1 State Water Project Table A and Imported Water Supplies

Each SWP contractor has a specified water supply amount shown in Table A of its contract that currently totals approximately 4.1 million af. The term of the CLWA contract is through 2038 and is renewable after that year. Although the SWP has not been fully completed, the SWP can deliver nearly all 4.1 million af of Table A Amounts during certain wet years.

3.4.2 2016 Imported Water Supply and Disposition

CLWA has a contractual Table A Amount of 95,200 afy of water from SWP. As shown in **Table 3-2**, the allocation process proceeded as follows: the initial allocation for 2016 was announced as 10 percent on December 1, 2015, and the final allocation of 60% was announced on April 21, 2016. CLWA's final allocation of Table A Amount for 2016 was 60 percent, or 57,120 af. Additional supply in 2016 included 21,899 af of Table A carryover from 2015 and previous years, and 11,000 af from Buena Vista/Rosedale-Rio Bravo[2]. CLWA's total available supply in 2016 was 90,019 af.

The disposition of water by CLWA in 2016 to various entities included delivery to the Purveyors, banking programs and sales of water to other entities is described herein and summarized in **Table 3-2**. The largest portion was delivered to the Purveyors (31,130 af), 1,500 af were sold to Santa Barbara Flood Control and Water Conservation District, 5,060 af were banked in the RRBWBP, and the remaining 25,973 af were carried over in SWP storage (with 758 af associated with differences in meter readings) for potential use in 2017. In addition to that 25,973 af, CLWA also has 19,658 af of pre-2016 Table A carryover (after using 2,241 af of 21,899 af in 2016), and another 5,940 af (from the 11,000 BV/RRB non-

[2] See 2007 Water Acquisition Agreement with the Buena Vista Water Storage District (BVWSD) and the Rosedale-Rio Bravo Water Storage District (RRBWSD) in Kern County.

Table 3-2
2016 CLWA Imported Water Supply and Disposition
(acre-feet)

Supply		
2016 Final SWP Table A Allocation[1]		57,120
SWP Carryover to 2016 [2]		21,899
Buena Vista/Rosedale Rio-Bravo		11,000
Total 2016 Imported Water Supply		**90,019**
Disposition		
Purveyor Deliveries		31,130
CLWA Santa Clarita Water Division	*17,943*	
Valencia Water Company	*10,308*	
Newhall County Water District	*2,876*	
Los Angeles County WD 36	*3*	
CLWA/DWR/Purveyor Metering[3]		758
Rosedale-Rio Bravo Water Banking Program[4]		5,060
Santa Barbara Flood Control and Water Conservation District Sale[5]		1,500
Total Carryover to 2017[6]		51,571
Total 2016 Imported Water Disposition		**90,019**

[1] Final 2016 allocation was 60% of contractual Table A amount of 95,200 af, which progressed as follows:

Initial allocation, December 1, 2015	10%	9,520 af
Allocation increase, January 26, 2016	15%	14,280 af
Allocation increase, February 24, 2016	30%	28,560 af
Allocation increase, March 17, 2016	45%	42,840 af
Allocation increase, April 21, 2016	60%	57,120 af
Final allocation (no change)	60%	57,120 af

[2] Carryover from 2015 available in 2016 was 21,899; of that amount 2,241 af was used by CLWA, based on final DWR delivery accounting, and the difference (19,658 af) remained available for carryover into 2017.

[3] Reflects water loss and meter reading differences.

[4] From 2016 BV/RRB supply. Remainder (5,940 af) put into San Luis reservoir as carryover to 2017.

[5] 1,500 AF was sold to Santa Barbara Flood Control and Water Conservation District through the Central Coast Water Authority (SWPAO 16-034). This was an unbalanced 2:1 exchange and Santa Barbara will return to CLWA 750 AF by December 31, 2026.

[6] Total carryover available in 2017 consists of previous years' Table A carryover (19,658 af), unused 2016 Table A (25,973 af), and 5,940 of non-project water (from BV/RRB 11,000 af).

project water) stored in San Luis Reservoir available for carryover, with the total potential carryover into 2017 of 51,571 af.

3.4.3 Other Imported Water Supplies

In early 2007, CLWA finalized a Water Acquisition Agreement with the BVWSD and the RRBWSD in Kern County. Under this Program, Buena Vista's high flow Kern River entitlements (and other acquired waters that may become available) are captured and recharged within Rosedale-Rio Bravo's service area on an ongoing basis. CLWA receives 11,000 af of these supplies annually through either exchange of Buena Vista's and Rosedale-Rio Bravo's SWP supplies or through direct delivery of water to the California Aqueduct via the Cross Valley Canal.

In addition to Table A supplies, the SWP Contract provides for additional types of water that

may periodically be available, including "Article 21" water and Turnback Pool water. Article 21 water is made available on an unscheduled and interruptible basis and is typically available only in average to wet years, generally only for a limited time in the late winter. Article 21 water and Turnback Pool water were not available in 2016.

Additionally, CLWA has access to 4,684 af of "flexible storage" in Castaic Lake. In 2015, CLWA negotiated a 10-year extension of an agreement with the Ventura County SWP contractors (County) to allow CLWA to utilize the County's flexible storage account of 1,376 af. CLWA may withdraw water from the County's flexible storage on an as-needed basis; however, any water withdrawn from this storage account must be replaced within five years. The combined flexible storage from CLWA's and the County's accounts provides total flexible storage of 6,060 af, which is maintained in Castaic Lake for use in a future dry period or an emergency. Flexible storage was utilized in 2014, and 4,424 af had been withdrawn by the end of the year. In 2015, 4,339 af were backfilled to the flexible storage account, leaving 85 af to be backfilled in the future. Flexible storage was not utilized in 2016.

As described in the 2015 UWMP, the Newhall Land and Farming Company (now Fivepoint Holdings, LLC) acquired a water transfer from Kern County sources known as the Nickel water. This source of supply totals 1,607 afy. The Nickel water comes from a firm source of supply. This source of supply was acquired in anticipation of the development of Newhall Ranch, and is a supply that is contractually committed by Newhall Land under the Newhall Ranch Specific Plan approved by the Los Angeles County Board of Supervisors. Under its acquisition agreement, Newhall Land may assign its rights to this supply to VWC or CLWA, and in the meantime, may sell on an annual basis any or all of this supply. Prior to any sale, it is assumed that CLWA may purchase this supply from Newhall Land, in a year in which additional supply may be needed.

In 2008, CLWA entered into the Yuba Accord Agreement, which allows for the purchase of water from the Yuba County Water Agency through the Department of Water Resources to 21 State Water Project contractors (including CLWA) and the San Luis and Delta-Mendota Water Authority. Up to 850 af of

non-SWP supply is available to CLWA in critically dry years. Under certain hydrologic conditions, additional water may be available to CLWA from this program. CLWA did not purchase water from this source in 2016.

3.4.4 Banked Water Supplies

CLWA maintains supply in various banking programs, and thereby has diverse supply options when needed. In 2005, CLWA completed an agreement to participate in a long-term water banking program with RRBWSD in Kern County. This long-term program allows storage of up to 100,000 af at any one time. CLWA delivered 20,000 af of its excess Table A water into storage in both 2005 and 2006. In 2007, pursuant to the Water Acquisition Agreement with BVWSD and RRBWSD as described below, CLWA was also back-credited a total of 22,000 af for 2005 and 2006 (11,000 af of BV/RRB in each year). In 2007, CLWA delivered 8,200 af of SWP water and another 33,668 af (25,418 af of SWP water and 8,250 BV/RRB water) in 2010. In 2011, CLWA delivered 986 af of SWP water into storage and in 2012 delivered another 6,031 af of SWP water into storage. At the beginning of 2014, the recoverable storage in the program after groundwater and other losses was approximately 100,000 af. In 2014, 2,824 af of water were withdrawn from the bank, and in 2015, another 2,998 af were withdrawn leaving a balance of approximately 95,000 af. In 2016, 5,060 af were banked, and by the end of 2016, approximately 100,000 af remain in storage. CLWA's current existing withdrawal capacity is 3,000 afy, but additional facilities are under development to increase that capacity and are anticipated to be operational in 2018.

In 2011, CLWA executed a water Two-for-One Exchange Program with RRBWSD whereby CLWA can recover one acre-foot of water for each two acre-feet delivered (less losses). In 2011, CLWA delivered 15,602 af to the program (4,602 af of carryover and 11,000 af of BV/RRB water), delivered another 3,969 af of SWP water in 2012 and, after program losses, has 9,441 af of recoverable water. No water was withdrawn from or contributed to the RRBWSD Two-for-One Exchange Program in 2014, 2015 or 2016, and this program remains at/near capacity. CLWA also has a Two-for-One Exchange Program with the WKWD in Kern County and delivered 5,000 af in 2011, resulting in a recoverable total of 2,500 af. In 2014, 2,000 af of water was withdrawn from the WKWD Two-for-One exchange program leaving a balance of 500 af. No water was withdrawn from or contributed to this program in 2016.

Another banking component of CLWA's imported water supply reliability program is composed of two agreements with Semitropic whereby CLWA banked surplus Table A water supply in 2002 and 2003 (24,000 af and 32,522 af, respectively). The first withdrawal of water occurred in 2009 from the 2002 account in the amount of 4,950 af. Of the 4,950 af withdrawn in 2009, 1,650 af was delivered for water supply in the Valley in 2009, and the 3,300 af balance was delivered in 2010. An additional 4,950 af of water was withdrawn from the Semitropic Water Banking Program in 2014 (with another 5,000 given to Newhall Land in consideration for CLWA's use of their first priority extraction capacity). No transactions occurred in this program in 2016.

Semitropic has recently expanded its groundwater banking program to incorporate its Stored Water Recovery Unit (SWRU). In 2015 CLWA entered into an agreement with Semitropic to participate in the SWRU (as an additional source of dry-year supply). Under this agreement, the 2002 and 2003 accounts containing 35,970 AF were transferred into this new program. Under the SWRU agreement, CLWA can store and recover additional water within a 15,000 AF storage account. The term of the Semitropic Banking Program extends through 2035 with the option of a 10-year renewal. CLWA may withdraw up to 5,000 afy from its account.

3.4.5 Imported Water Supply Capability

The current SWP 2015 Delivery Capability Report, issued in July 2015, maintains the restrictions on SWP operations according to the Biological Opinions (BOs) of the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fishery Service (NMFS) issued on December 15, 2008 and June 4, 2009, respectively. In December 2010, a federal judge overruled most of the 2008 federal BOs and invalidated several of the criteria that reduced SWP's water supply. These matters were appealed to the U.S. Court of Appeals for the Ninth Circuit. The Ninth Circuit rulings (in March 2014 and December 2014 for the USFWS BO and the NMFS BO, respectively) upheld the BOs of the federal agencies. Therefore, the operational rules defined in these BOs continue to be legally required and were used by DWR in the analyses supporting its 2015 Delivery Capability Report. The SWP 2015 Delivery Capability Report also considers the impacts on SWP delivery capability due to climate change, sea level rise, and multiple Delta-specific concerns: the variability of Delta inflows seasonally and annually, the vulnerability of the Delta's conveyance system and structure due to floods and earthquakes, and water quality objectives that address Delta ecosystem health. Consideration is also given to the major Delta policy planning efforts currently underway: the Delta Plan and the Bay Delta Conservation Plan[3] . With these factors, the 2015 Delivery Capability Report projects that under existing conditions (2015), the average annual delivery of Table A water is estimated at 61%. CLWA staff has assessed the impact of the 2015 Delivery Capability Report on the CLWA water supply and concluded that the 2015 UWMP's statement that current and future supplies are available to meet anticipated water supply needs through the year 2050 remains correct.

Groundwater banking and conjunctive use offer significant opportunities to improve water supply reliability for CLWA. Groundwater banking is the process of storing available supplies of water in groundwater basins during wet years or when supplemental water is otherwise available. During dry

[3] In April 2015, after completion of the SWP 2015 Final Delivery Capability Report, the Bay Delta Conservation Plan was reorganized into two separate co-equal measures: California WaterFix (for the conveyance facility) and California EcoResStore (for habitat restoration). This report will retain the former single Plan name to be consistent with the issued Capability Report.

periods, or when imported water supply availability is reduced, banked water can be recovered from groundwater storage to replace, or firm up, the imported water supply deliveries.

As described herein, CLWA has entered into four groundwater banking and water exchange programs and has, in aggregate, more than 145,000 af of recoverable water outside the local groundwater basin at the end of 2016. The first component of CLWA's overall groundwater banking program is between CLWA and Semitropic, whereby CLWA can withdraw up to 35,970 af water that it stored in Semitropic to meet Valley demands when needed in dry years. The second component of the program, the long-term RRBWSD Water Banking Program in Kern County, has a recoverable total of approximately 100,000 af in storage. The third and fourth components are the Two-For-One Exchange Programs that CLWA initiated with RRBWSD and WKWD in 2011 that now have a total of 9,941 af of recoverable water (9,441 af in RRB two for one and 500 af in WKWD two for one).

Conjunctive use is the purposeful integrated use of surface water and groundwater supplies to maximize water supply from the two sources. CLWA and the Purveyors have been conjunctively utilizing local groundwater and imported surface water since the initial importation of SWP water in 1980. The groundwater banking programs described above allow CLWA to firm up the imported water component of conjunctive use in the Valley by storing surplus SWP and other water in groundwater basins outside the Valley in wet years. This allows recovery and importation of that water as needed in dry years to maintain a greater overall amount of imported surface water to be used conjunctively with local groundwater, further supporting the sustainable use of local groundwater at the rates detailed in the Current Operating Plan.

3.5 Water Quality

Water delivered by the Purveyors consistently meets drinking water standards set by the United States Environmental Protection Agency (USEPA) and the State Water Resources Control Board (SWRCB) Division of Drinking Water (DDW). An annual Water Quality Report is provided prior to July 1st to all Santa Clarita Valley residents who receive water from one of the four water retailers. There is detailed information in that report approximately the results of quality testing of the groundwater and treated SWP water supplied to the residents of the Santa Clarita Valley.

3.5.1 Water Quality – General

3.5.1.1 Perchlorate

Perchlorate is a regulated chemical in drinking water. In October 2007, the California Department of Public Health (CDPH), which currently is the State Water Resources Control Board Division of Drinking Water (DDW), established a maximum contaminant level (MCL) for perchlorate of 6 micrograms per liter (µg/L). Perchlorate has been a water quality concern in the Valley since 1997 when it was originally detected in four wells operated by the Purveyors in the eastern part of the Saugus Formation, near the former Whittaker-Bermite facility. In late 2002, perchlorate was detected in a fifth municipal well, in this

case an Alluvial well (SCWD's Stadium Well), also located near the former Whittaker-Bermite site. Currently, two of those wells (VWC's Well 157 and SCWD's Stadium Well) have been sealed and replaced by new wells, and two wells (CLWA's Saugus 1 and 2 Wells) were returned to service in January 2011 as described below. NCWD's Well NC-11 has remained out of service with a portion of its capacity replaced by a combination of imported water from CLWA and treated water from CLWA's Saugus Perchlorate Treatment Facility (described further below) through a SWP turnout. In early 2005, perchlorate was detected in a second Alluvial well (VWC's Well Q2) near the former Whittaker-Bermite site. Following the installation of wellhead treatment for the removal of perchlorate in the same year, the well was returned to regular water supply service. After two years of subsequent operation with no detections of perchlorate, the wellhead treatment was removed and the well has since remained in active water supply service.

In 2006, perchlorate was detected in low concentrations below the Detection Limit for Reporting (less than 4.0 µg/l) in another Saugus well (NCWD's Well NC-13), near one of the originally impacted wells. Saugus Well NC-13 has remained in service with regular sampling per the DDW requirements and no subsequent detections of perchlorate. In August 2010, perchlorate was detected further down gradient in an eighth well, VWC's Well 201 that is completed in the Saugus Formation. While the initial detection was below the MCL, the well was immediately taken out of active supply service. VWC is currently pursuing restoration alternatives at Saugus Well 201 that are expected to involve methodologies already employed at other previously impacted wells. It is planned that the approved DDW restoration alternative will be implemented in 2017, resulting in the return of VWC's Well 201 to service in 2017. Following the detection of perchlorate in Well 201 in 2010, VWC elected to minimize pumping from Well 205 through 2011. Since 2011, the well was voluntarily taken out of service entirely when perchlorate was detected in low concentrations below the Detection Limit for Reporting (<4.0 µg/l) in April 2012. This well is planned to resume service as part of the implementation of the restoration and containment program at Well 201. As described in the 2015 UWMP, the replacement and reactivation of the impacted wells, augmented by planned and funded replacement wells, adds to the overall ability to meet the groundwater component of total water supply in the Valley.

In February 2003, the California Department of Toxic Substances Control (DTSC) and the impacted Purveyors entered into a voluntary cleanup agreement entitled *Environmental Oversight Agreement* (amended in 2012). Under the Agreement, DTSC is providing review and oversight of the response activities being undertaken by the Purveyors related to the detection of perchlorate in the impacted wells. Under the Agreement's Scope of Work, the impacted Purveyors prepared a Work Plan for sampling the production wells, a report on the results and findings of the production well sampling, a Human Health Risk Assessment, and a Remedial Action Workplan. In addition, CLWA and the Purveyors conducted an evaluation of treatment technologies and an analysis showing the integrated effectiveness of a project to restore impacted pumping capacity, extract perchlorate-impacted groundwater from two Saugus wells for treatment, and control the migration of perchlorate in the Saugus Formation. Environmental review of that project was completed in 2005 with adoption of a mitigated Negative

Declaration. The Final Interim Remedial Action Plan for containment and extraction of perchlorate was completed and approved by DTSC in January 2006. Design and construction of the treatment facilities and pipelines to implement the pump and treat program and to also restore inactivated municipal well capacity was completed in May 2010. Water from Saugus 1 and Saugus 2 was initially treated and discharged into the Santa Clara River. DDW issued an amendment to CLWA's Operating Permit in December 2010, and the wells were placed back in water supply service on January 25, 2011.

As part of the operation of CLWA's Saugus Perchlorate Treatment Facility (SPTF), numerous monitoring tests are performed on a continuous basis in order to ensure the safety of the treated water leaving the SPTF. Groundwater samples are collected semi-weekly at several locations, including at the Saugus 1 and Saugus 2 wells, both at the influent and effluent water points, at the lead and lag vessels, and at several distribution locations. The samples are analyzed at different frequencies for numerous constituents, including chlorate, perchlorate, chloride, nitrate, nitrite and sulfate. In addition, samples are analyzed for microbiological growth, radiological and volatile organic compounds. In 2016, 3,407 af of groundwater were pumped from Saugus 1 and Saugus 2. After treatment for perchlorate removal, the groundwater was blended with treated imported water and delivered to the Purveyors through the CLWA distribution system. In October 2011, Saugus 2 experienced a failure in its casing/screen assembly and associated damage to its pump, causing the well to be taken out of service for mechanical rehabilitation and pump replacement. An inner liner assembly was installed in the well, followed by installation of a new pump. The well was returned to service in April 2012. To avoid the failure that Saugus 2 experienced, Saugus 1 was taken out of service in May 2014 for rehabilitation similar to that performed on Saugus 2. A new liner was installed and Saugus 1 was returned to service in November 2014.

Since 2007, the impacted Purveyors (SCWD, NCWD, and VWC) and CLWA continued working toward the now-implemented plan that combines pumping from two of the impacted wells (Saugus 1 and 2) and a water treatment process (the SPTF) to restore the impacted pumping capacity and control the migration of contamination in the aquifer. The development and implementation of a cleanup plan for the Whittaker-Bermite site and the impacted groundwater is being coordinated among CLWA, the impacted Purveyors, Whittaker Corporation, the State DTSC, and U.S. Army Corps of Engineers. DTSC remains the lead agency responsible for regulatory oversight of the Whittaker-Bermite site.

These entities have also coordinated to extend targeted monitoring of the Alluvium and Saugus Formation off-site of the former Whittaker Bermite Facility, and more recently to the west of Saugus 1 and 2 and VWC's Well 201 as shown in **Figure 3-11**. Off-site monitoring wells were installed near Saugus 1 and 2 between 2006 and 2009; two more were installed in 2012, and another two in 2015. Monitoring and sampling of these wells occurs on a regular basis, and the data are being evaluated to assess groundwater conditions west of Whittaker-Bermite and to monitor the effectiveness of perchlorate containment. Additionally, the Purveyors' basin groundwater model that was developed for use in analyzing the basin yield and sustainability of the Current Operating Plan was also used to assess off-site perchlorate containment.

Under the direction of DTSC, Whittaker has submitted a comprehensive site-wide remediation plan for the contaminants of concern in soil and groundwater detected on the property. A Draft Remedial Action Plan (RAP) for Operating Units (OU) 2 through 6 that focused on soil cleanup was submitted to DTSC in 2009, and the final plan was approved in December 2010. The site-wide Remedial Design (RD) was approved by DTSC in January 2013 for OU units 2 through 6, and remediation of soils through the OUs is in various stages of initiation and completion. In addition to soil remediation, soil vapor extraction (SVE) operations have occurred since May 2012 to remove volatile organic compounds from selected areas of OUs 2 through 6 with plans currently in development to expand to full scale SVE operations in all areas identified in the RAP and RD.

The RAP for groundwater (OU7) and associated CEQA document were approved by DTSC in December 2014. The RAP focuses on three areas where groundwater at the site is impacted. The three areas are the Northern Alluvium, the Saugus Formation, and perched groundwater. The RAP includes an evaluation of remedial alternatives to contain and clean up impacted groundwater in these three areas. Pilot studies and interim measures have been initiated in the Saugus Formation and the Northern Alluvium and are at different stages of progress. Operation of an on-site remediation system to treat perchlorate contamination in the Saugus Formation is planned for 2017. It is expected that up to 800 afyof groundwater will be pumped and treated once the system is fully operational on the Whittaker-Bermite site.

3.5.1.2 Volatile Organic Compounds

Organic chemical contaminants, including synthetic and volatile organic chemicals, are byproducts of industrial processes and petroleum production, and can also come from gas stations, urban storm water runoff and septic systems. Organic compounds also include pesticides and herbicides, which may come from a variety of sources such as agriculture, urban storm water runoff and residential uses. Local wells are tested at least annually for VOCs (Saugus 1 and Saugus 2 are tested weekly) and periodically for SOCs, and Castaic Lake water is checked annually for VOCs and SOCs. The most frequently detected VOCs, Trichloroethylene (TCE) and Tetrachloroethylene (PCE), and the less frequently detected compounds, Chloroform and 1,1-dichloroethene, have been detected in trace amounts below the MCL in groundwater in the Santa Clarita Valley. Therefore, the Valley's water supply complies with state and federal drinking water standards.

Because CLWA's Water Supply Permit sets an operational goal of no VOCs above the detection limit for reporting in its distribution system and because CLWA is concerned approximately any detection of VOCs, CLWA performed a VOC source identification study (CH2mHill, 2015). The October 2015 study concluded that the likely source was either the Whittaker-Bermite site or the Saugus Industrial Center and additional monitoring would be necessary to identify the specific source. CLWA and the Purveyors are currently working with DTSC to develop additional monitoring requirements for both sites.

3.5.2 Groundwater Quality – Alluvium

Groundwater quality is, of course, a key factor in assessing the Alluvium as a source for municipal and agricultural water supply. Groundwater quality details and long-term conditions, examined by integration of individual records from several wells completed in the same aquifer materials and in close proximity to each other, have been discussed in previous annual Water Reports and in the 2015 UWMP. Historical groundwater quality, including available 2016 data, is illustrated in **Figures 3-12 and 3-13**. These figures show historical total dissolved solids (TDS) concentrations, which is a measure of the amount of dissolved minerals and salts in water expressed in milligrams per liter (mg/L) as a unit of measure. These plots include the historical records for representative wells in each area of the Valley, and the data are shown relative to the DDW Secondary Maximum Levels ("Recommended Level" and "Upper Level") for reference. Over the last 10 years, concentrations of TDS generally respond to wet periods by exhibiting a downward trend, followed by an increasing trend during a dry period.

In the Mint Canyon and Above Saugus WRP areas (**Figure 3-12**), TDS concentrations increased in the early 2000s, followed by a downward trend in the mid-2000s, a result of the 2004 and 2005 wet period. This downward trend was followed by an upward trend in the late 2000s, a downward trend in 2010 through 2011 (Wells T7 and Pinetree 3) and an upward trend through 2013/2014 (Well U4, and Pinetree 3). In 2016, TDS ranged from 530 to 1,300 mg/L.

In Bouquet Canyon, variations in historical TDS concentrations are more gradual than those in Mint Canyon and may be correlated with periods of flow in Bouquet Canyon Creek (**Figure 3-12**). TDS concentrations in Bouquet Canyon have ranged from approximately 400 to almost 900 mg/L historically. In 2016, TDS concentrations were within the historical range with a value of 750 mg/L represented by SCWD's Clark well.

TDS concentrations in the western areas of the Valley exhibited similar patterns and responses to wet and dry periods as those observed in the eastern portions of the Valley (**Figure 3-13**). TDS concentrations in San Francisquito Canyon and Below Saugus WRP areas historically have ranged from approximately 300 to 1,100 mg/L. In 2016, TDS concentrations were within historical ranges and ranged from approximately 720 to 950 mg/L.

In Castaic Valley and Below Valencia WRP areas, TDS concentrations have historically ranged between 300 to 1,100 mg/L. At times, variations in TDS concentrations appear to be related to wet and dry periods along with discharge from Castaic Lake. In 2016, TDS concentrations ranged from approximately 600 to 900 mg/L, which is within the historic range.

In summary, water quality in the Alluvium exhibits no long-term increasing trends. TDS concentrations in 2016 are within historical ranges with the exception of a slightly higher result from VWC Well U4, which was also the case in 2015. There have been periodic fluctuations in some parts of the basin, where groundwater quality has generally inversely varied with precipitation and streamflow. The fluctuations often occur during dry and wet periods when low streamflow and recharge during dry periods result in

increased salinity and high streamflow and recharge during wet periods results in decreased salinity. In 2016, of the 30 sampled alluvial wells throughout the Valley, two were found to be in exceedance of the Upper Limit of the DDW Secondary Maximum Level for TDS, for the second consecutive year. Both of these wells are located in the above Saugus WRP area. Testing by the Purveyors in accordance with DDW requirements demonstrates that groundwater meets acceptable drinking water standards.

The presence of long-term consistent water quality patterns, although intermittently affected by wet and dry cycles, supports the conclusion that the Alluvium remains a viable ongoing water supply source in terms of groundwater quality.

3.5.3 Groundwater Quality – Saugus Formation

As discussed above for the Alluvium, groundwater quality is a key factor in also assessing the Saugus Formation as a source for municipal and agricultural water supply. As with groundwater level data, long-term Saugus Formation groundwater quality data are not sufficiently extensive to permit any sort of basin-wide analysis or assessment of pumping-related impacts on quality. However, integration of individual records from several wells has been used to examine general water quality trends. Based on those records, water quality in the Saugus Formation has not historically exhibited the precipitation-related fluctuations seen in the Alluvium. Based on available data over the last 50 years, groundwater quality in the Saugus Formation has exhibited a slight overall increase in TDS concentrations as illustrated in **Figure 3-14**. Beginning in 2000, several wells within the Saugus Formation have exhibited an increase in TDS concentrations, similar to short-term changes in the Alluvium, possibly as a result of recharge to the Saugus Formation from the Alluvium. Since 2006, however, these concentrations had been steadily declining through 2010, but have since increased through 2016. TDS concentrations in the Saugus Formation remain within the range of historic concentrations and below the Secondary (aesthetic) Upper Long-Term Maximum Contaminant Level. Groundwater quality within the Saugus Formation will continue to be monitored to ensure that degradation to the long-term viability of the Saugus Formation as a component of overall water supply does not occur.

3.5.4 Imported Water Quality

CLWA operates two surface water treatment plants, the Earl Schmidt Filtration Plant located near Castaic Lake and the Rio Vista Water Treatment Plant located in Saugus. CLWA produces water that meets drinking water standards set by the USEPA and DDW. SWP water has different aesthetic characteristics than groundwater with lower dissolved mineral concentrations (total dissolved solids) of approximately 250 to 300 mg/L, and lower hardness (as calcium carbonate) of approximately 105 to 135 mg/L.

Historically, the SWP delivered only surface water from the Sacramento-San Joaquin River Delta. However, CLWA and other SWP users, in anticipation of drought, many years ago began “water banking” programs where SWP water could be stored or exchanged during wet years and withdrawn in dry years. During the dry-year periods, a greater portion of water in the SWP has been banked water. The banked

water has met all water quality standards established by DWR under its anti-degradation policy for the SWP.

3.6 Recycled Water

Recycled water is an important and reliable source of additional water; the use and planned expansion of existing facilities enhances water supply reliability in that it provides an additional source of supply and allows for more efficient utilization of groundwater and imported water supplies. Deliveries of recycled water began in 2003 for irrigation water supply at a golf course and in roadway median strips has expanded somewhat since then, with recent uses that include additional irrigation sites and supply for grading operations via water trucks. Recycled water use has remained relatively constant over the last fourteen years at approximately 450 afy, and in 2016, recycled water deliveries were approximately 500 af.

Recycled water is currently available from two water reclamation plants (WRPs) operated by the Santa Clarita Valley Sanitation District of Los Angeles County: the Valencia WRP and the Saugus WRP with respective average annual production of 15,500 afy and 6,100 afy. Most of the treated effluent from these two plants is discharged to the Santa Clara River to maintain instream flow requirements for the protection of biological resources (LACSD, 2013) leaving approximately 7,000 afy of recycled water available for use. Distribution capability of the recycled water is limited, however, and work by the Purveyors is currently underway to expand the recycled water distribution system.

In addition to the distribution system expansion, Valencia WRP is planned to increase its recycled water production by 30 percent, and other water recycling facilities are also in development. Vista Canyon Water Factory is anticipated to come online in 2017 and eventually produce up to 440 afy of recycled water use for new and existing users in the SCWD service area. The proposed Newhall Ranch WRP is anticipated to produce 4,200 afy at buildout, meeting more than half of the anticipated non-potable demands for the development.

An update to the 2002 Recycled Water Master Plan (RWMP) was conducted in 2016 (Kennedy/Jenks Consultants, 2016). The updated RWMP included near-term, mid-term, and long-term objectives for increasing the use of recycled water where it was economically feasible. The previous and current master plans considered various factors affecting recycled water sources, supplies, users and demands so that CLWA could develop a cost-effective recycled water system within its service area.

Types of recycled water considered for use include: non-potable reuse primarily through irrigation, indirect potable reuse (IPR) through groundwater replenishment reuse (GRR) and surface water augmentation (SWA), and direct potable reuse (DPR) through the introduction of highly purified recycled water into a drinking water supply system. Four specific alternatives in the near, mid, and long-term timeframes were described and evaluated, and recommendations were prioritized:

- the near-term recommended projects (<5 years) include non-potable reuse expansion projects (Phase 2) to increase the recycled water delivery to 2,310 afy, and a GRR Feasibility Study,

- the mid-term recommended projects (5-10 years) include non-potable reuse expansion into Westside Communities (Newhall Ranch) or into existing northern or southern communities, and groundwater recharge projects if GRR is feasible, otherwise to proceed with advanced treatment for potable reuse and DPR feasibility study, and
- the long-term recommended projects (>10 years) proceed with DPR if feasible or explore other water supplies.

3.7 Santa Clara River

The Memorandum of Understanding (MOU) between the Santa Clarita Valley Purveyors and the United Water Conservation District (UWCD), which manages surface and groundwater resources in seven groundwater subbasins in the Lower Santa Clara River Valley Area, was a significant accomplishment when it was prepared and executed in 2001. The MOU initiated a collaborative and integrated approach to data collection; database management; groundwater flow modeling; assessment of groundwater basin conditions, including determination of basin yield amounts; and preparation and presentation of reports. The preparation and presentation of reports included continued annual reports such as this one for current planning and consideration of development proposals, and also more technically detailed reports on geologic and hydrologic aspects of the overall stream-aquifer system. Meetings of the MOU participants have continued, and coordination of the Upper (Santa Clarita Valley) and Lower (UWCD) Santa Clara River databases has been accomplished. As discussed above, a numerical groundwater flow model of the entire Santa Clarita groundwater basin was initially developed and calibrated in 2002-2004. Subsequent to its initial use in 2004 for assessing the effectiveness of various operating scenarios to restore pumping capacity impacted by perchlorate contamination (by pumping and treating groundwater for water supply while simultaneously controlling the migration of contaminated groundwater), the model was used in 2005 for evaluation of basin yield under varying management actions and hydrologic conditions. The results completed the determination of sustainable operating yield values for both the Alluvium and the Saugus Formation, which were incorporated in the 2005 UWMP. The updated analysis of basin yield, completed in 2009, indicates that the Current Operating Plan will maintain river flows at higher levels than occurred prior to urbanization of the Valley; the resultant operating yield values for both the Alluvium and the Saugus Formation are incorporated in the 2015 UWMP.

On occasion, issues have been raised approximately whether use and management of groundwater in the Santa Clarita Valley have adversely impacted surface water flows into Ventura County. Part of the groundwater modeling work has addressed the surface water flow question as well as groundwater levels and storage. While the sustainability of groundwater has logically derived primarily from projected long-term stability of groundwater levels and storage, it has also derived in part from modeled simulations of surface water flows and stream-aquifer interactions from groundwater pumping in the central and western portions of the Valley. In addition, the long-term history of groundwater levels in the western and central part of the basin, as illustrated in **Figures 3-4** and **3-5**, supports the modeled

analysis and suggests that groundwater levels have not declined to a degree in which recharge from the Santa Clara River has impacted streamflow to Ventura County.

Historical annual streamflow in the Santa Clara River, into and out of the Santa Clarita Valley has been monitored at an upstream gage at Santa Clara River above Lang Railroad Station at Lang gage and Capra Road Railroad Crossing and two downstream gages (County Line and SCR at Piru) (**Figure 3-15**). The Lang gage (F93B-R) shows a wide range of average annual streamflow into the basin; however the data from the gage has not always been very accurate. In 2010, Los Angeles County Department of Public Works (LADPW) removed the transducer that previously collected streamflow data due to operational problems with the transducer and the location of the gage not being adequate to allow for accurate streamflow measurements. Between 2010 and 2012, LADPW have conducted manual measurements of streamflow, however, the measurements were not frequent enough to account for the range of streamflows that likely occurred. In 2013, CLWA had discussions with LADPW regarding the reinstallation or relocation of the Lang gage to a more suitable location and by June 2013, the gage was moved and operational 150 feet upstream on the Santa Clara River and renamed Capra Road Railroad Crossing (F93C-R). The downstream gage, County Line gage (11108500), was moved in 1996 to its present location near Piru and renamed SCR at Piru (11109000), approximately two miles downriver. The combined record (1953-2016) of these two downstream gages indicates an annual stream discharge of approximately 45,500 afy (**Figure 3-16**). These data gaged near the County line show notably higher flows from the Santa Clarita Valley into the uppermost downstream subbasin, the Piru subbasin, over the last 35 to 40 years.

3.8 Subsidence

According to the U.S. Geological Survey, land subsidence is a phenomenon found across the United States, affecting the land surface of over 17,000 square miles in 45 states (Galloway et al., 1999). Land subsidence in California is commonly a result of fluid withdrawal (oil and/or groundwater). The principal causes of land subsidence are aquifer system compaction, drainage of fine-grained and organic soils, underground mining, hydrocompaction, natural compaction, sinkholes, and thawing permafrost. The majority of identified subsidence is a result of groundwater

exploitation (Galloway et al., 1999). Land subsidence caused by the compaction of aquifer systems is often overlooked as a potential hazard and an environmental consequence of groundwater withdrawal in many areas. Some of the more costly consequences include damage to engineered structures, including buildings, roadways, pipelines, aqueducts, and well casings (Hoffmann et al., 2003).

When discussing land subsidence in any area, it is important to consider the subsurface materials which may be contributing to elastic and/or inelastic subsidence. The aquifer units that are used by municipal and agricultural wells for groundwater production can sometimes provide insight into which stratigraphic units might be causing land surface deformation due to groundwater extraction and resultant compaction of fine-grained materials (non-aquifer materials). The geologic or stratigraphic

setting combined with pumping records and the physical response of the aquifer to the pumping stresses as observed in groundwater level measurements through a substantial period of record can be used to analyze subsidence for a particular area. Through the nineteen years of reviewing and reporting on the geology and water resources in Santa Clarita Valley, there has not been evidence of groundwater level decline that would indicate that subsidence has occurred due to groundwater extraction.

As of December 2016, land surface elevation is being monitored at two continuous global positioning system (CGPS) sites in the Santa Clarita Valley as reported by UNAVCO from its Data Archive Interface (http://www.unavco.org/data/data.html). The locations of these stations are shown on **Figure 3-17.** The upward trend of these plots indicate that the area is not exhibiting land subsidence, rather these trends indicate that the land is rising. Another station called VNCX, which is south and east of the two UNAVCO sites shows the same trends. Within the context of complex southern California geology, the elevation change (less than 0.2 feet vertical change over the last 15 years) seen at the two UNAVCO stations is likely due to tectonic activity rather than groundwater level-related changes.

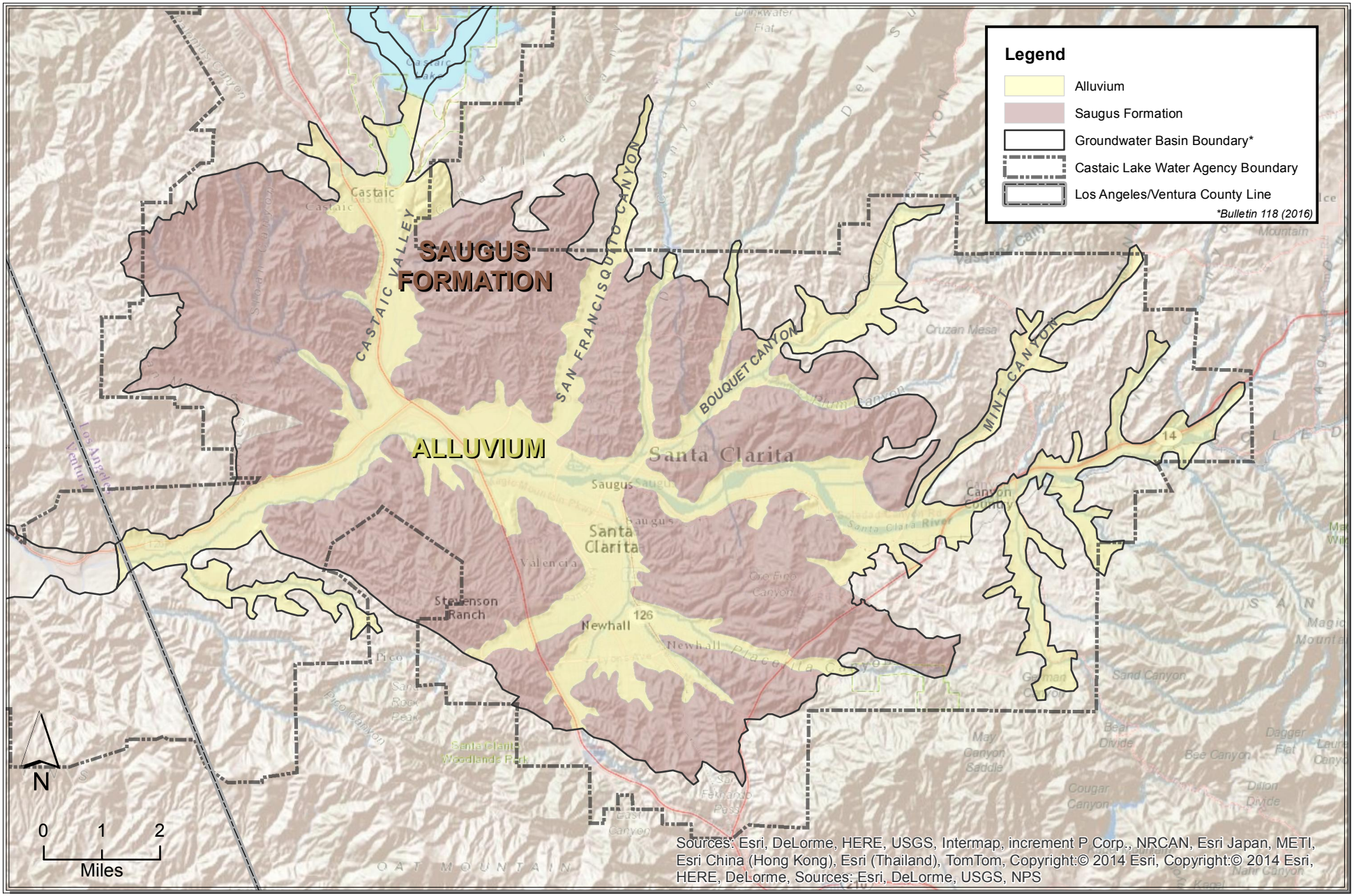

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Figure 3-1
Alluvium and Saugus Formation
Santa Clarita Valley Water Report

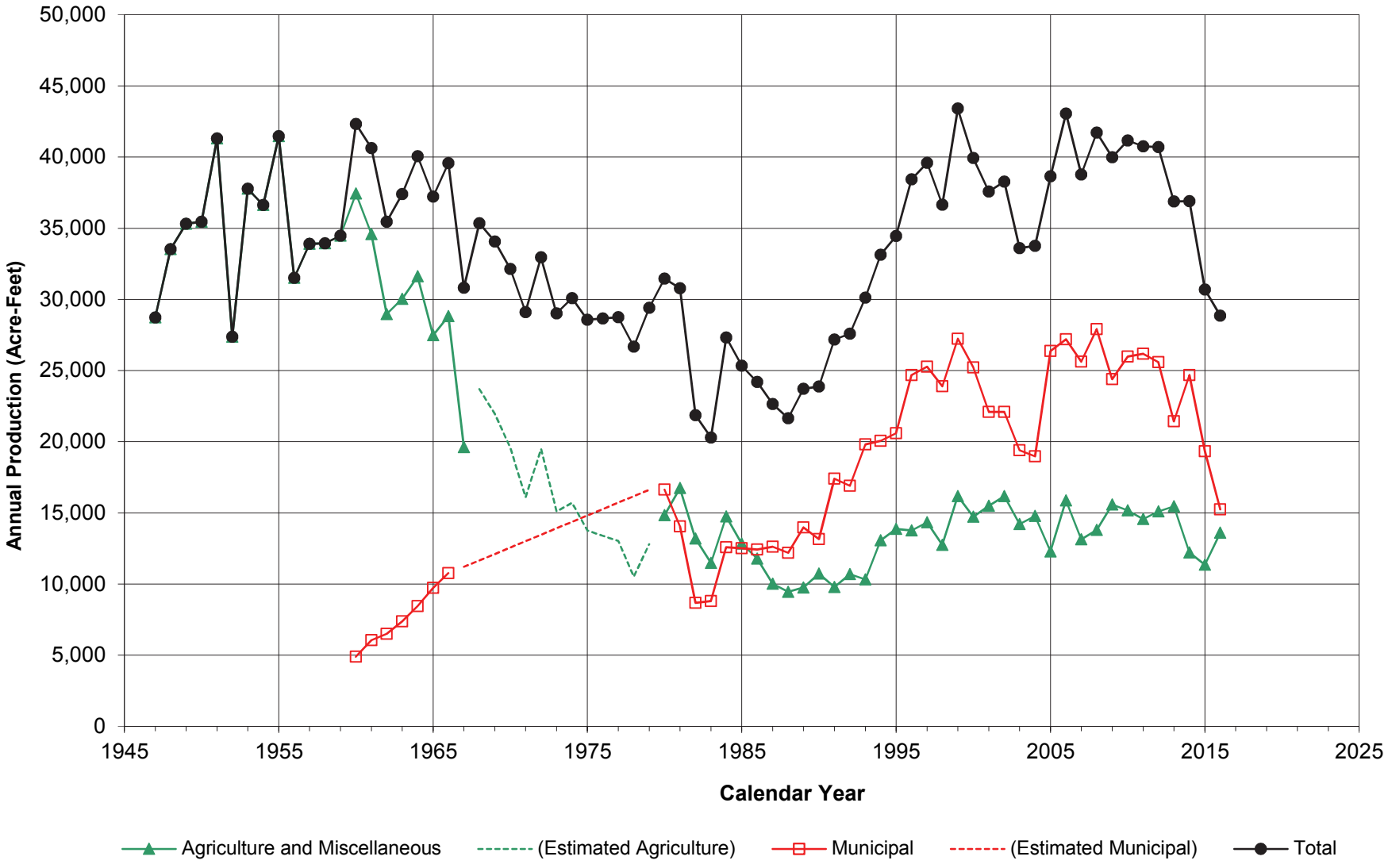

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Figure 3-2
Groundwater Production - Alluvium
Santa Clarita Valley Water Report

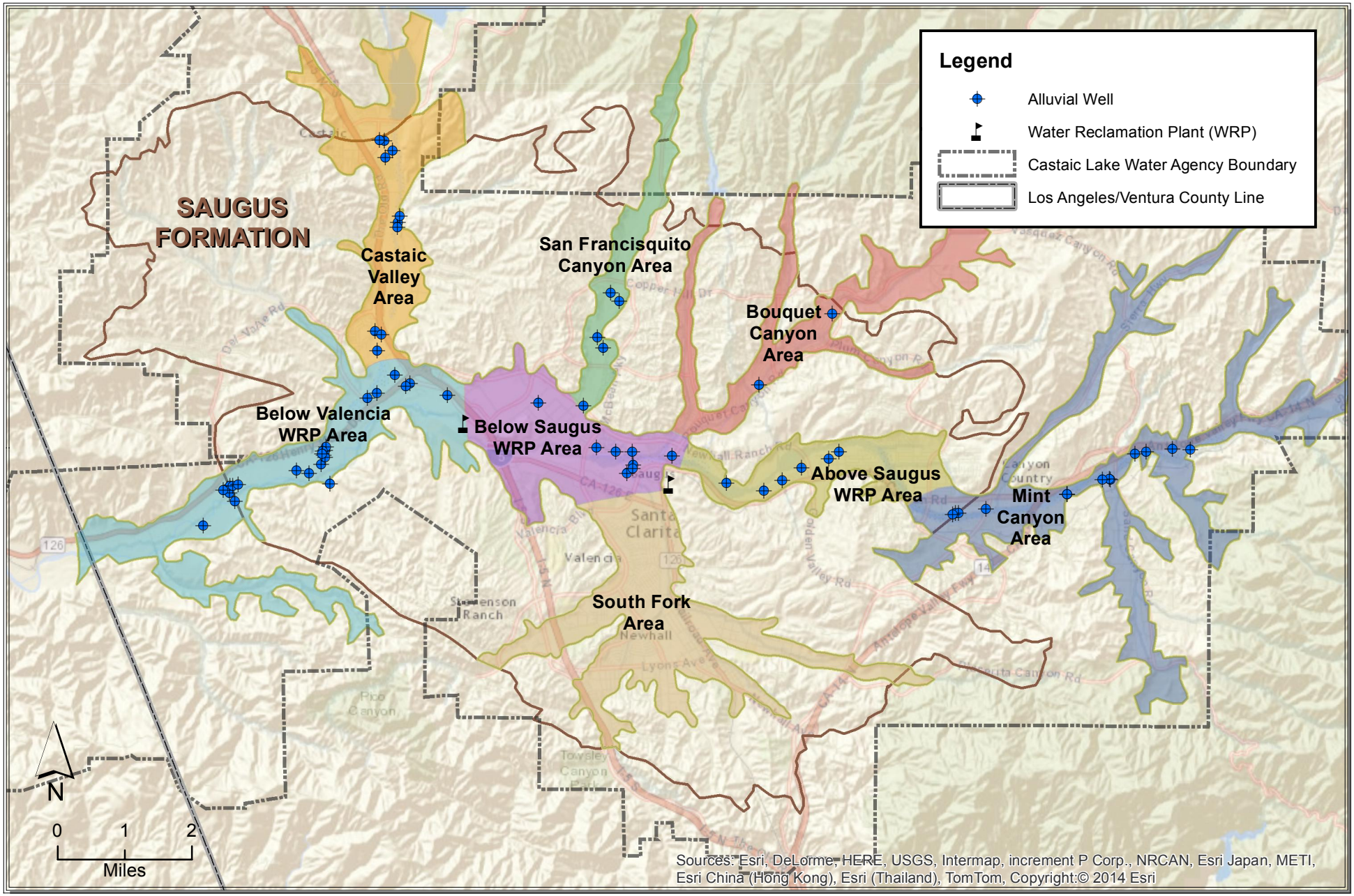

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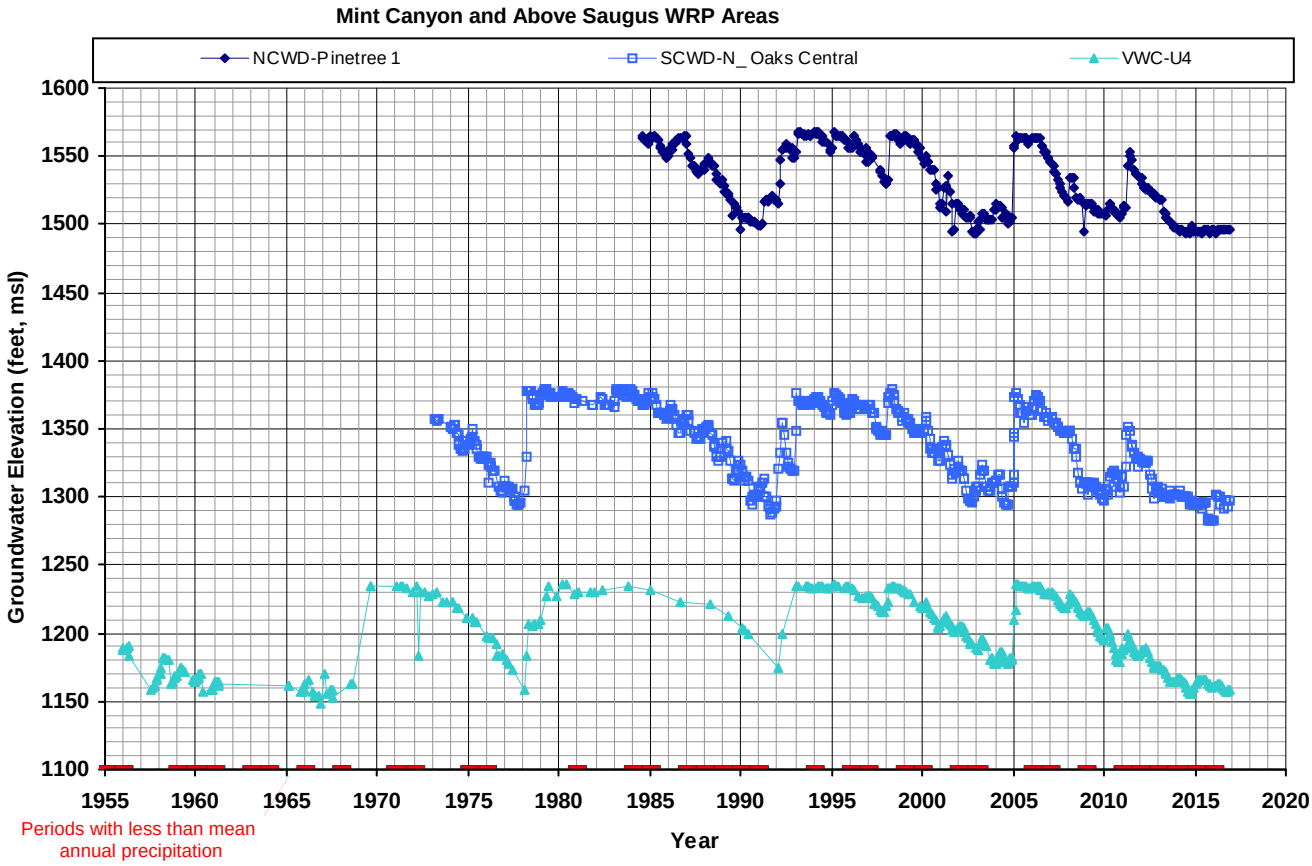
Figure 3-3
Alluvial Well Locations By Area
Santa Clarita Valley Water Report



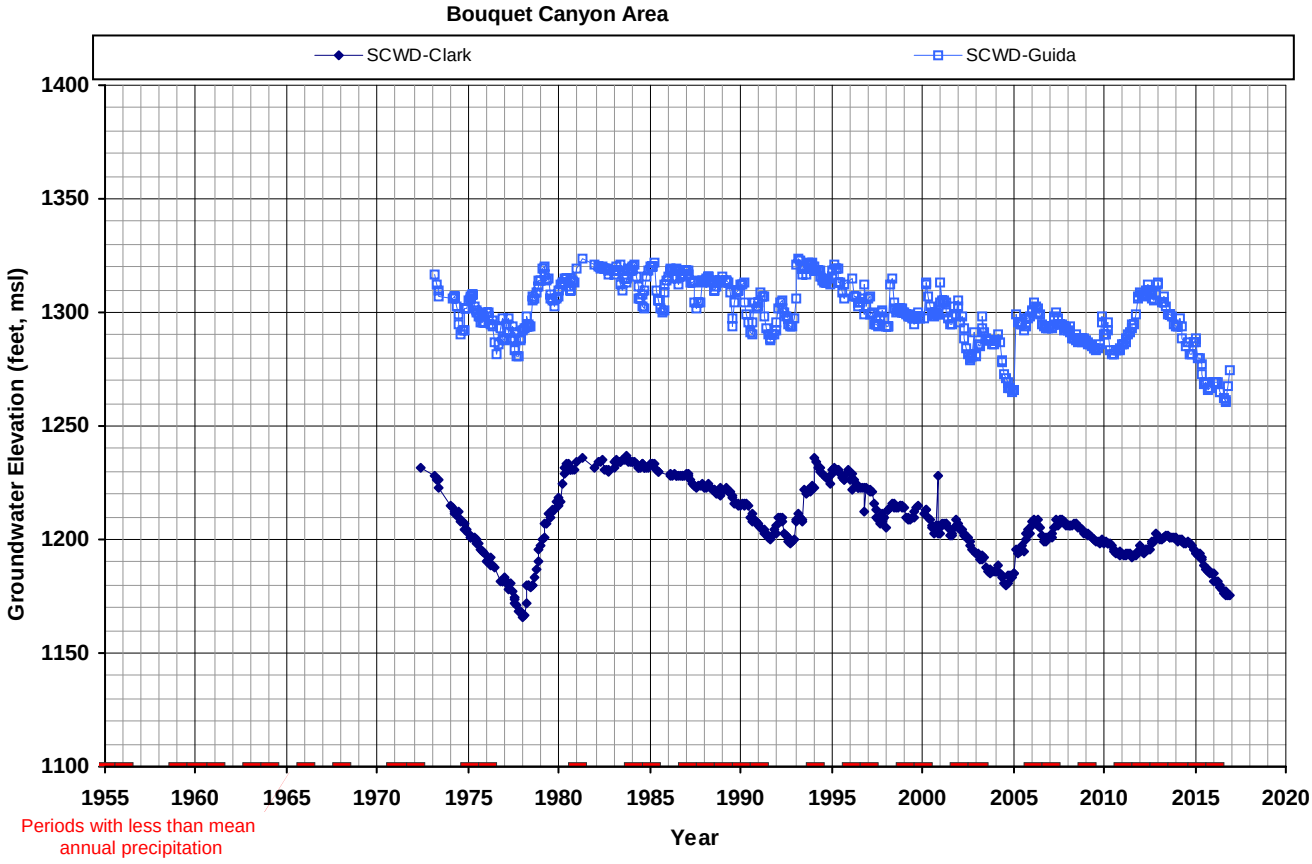


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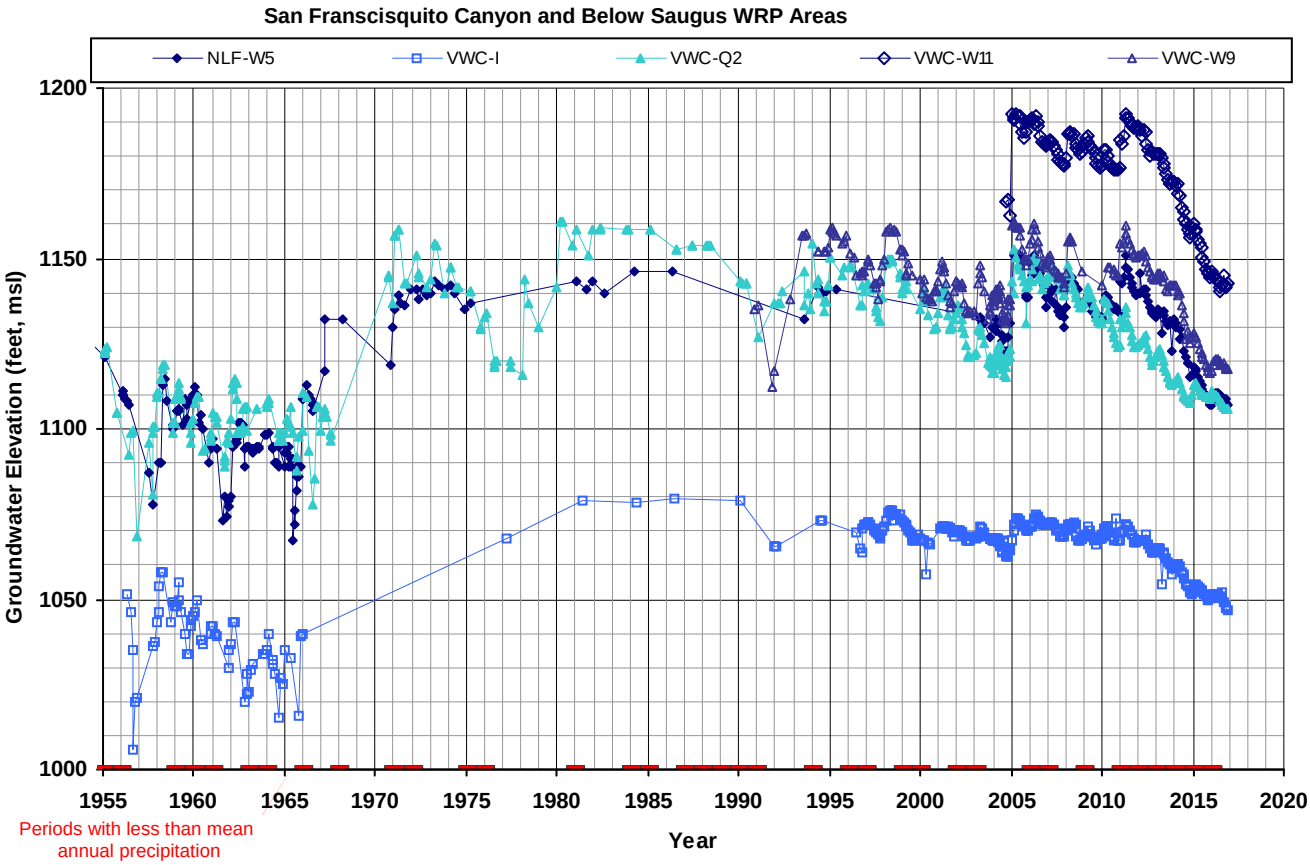
Figure 3-4
Groundwater Elevations in Eastern Santa Clarita Valley Alluvial Wells
Santa Clarita Valley Water Report



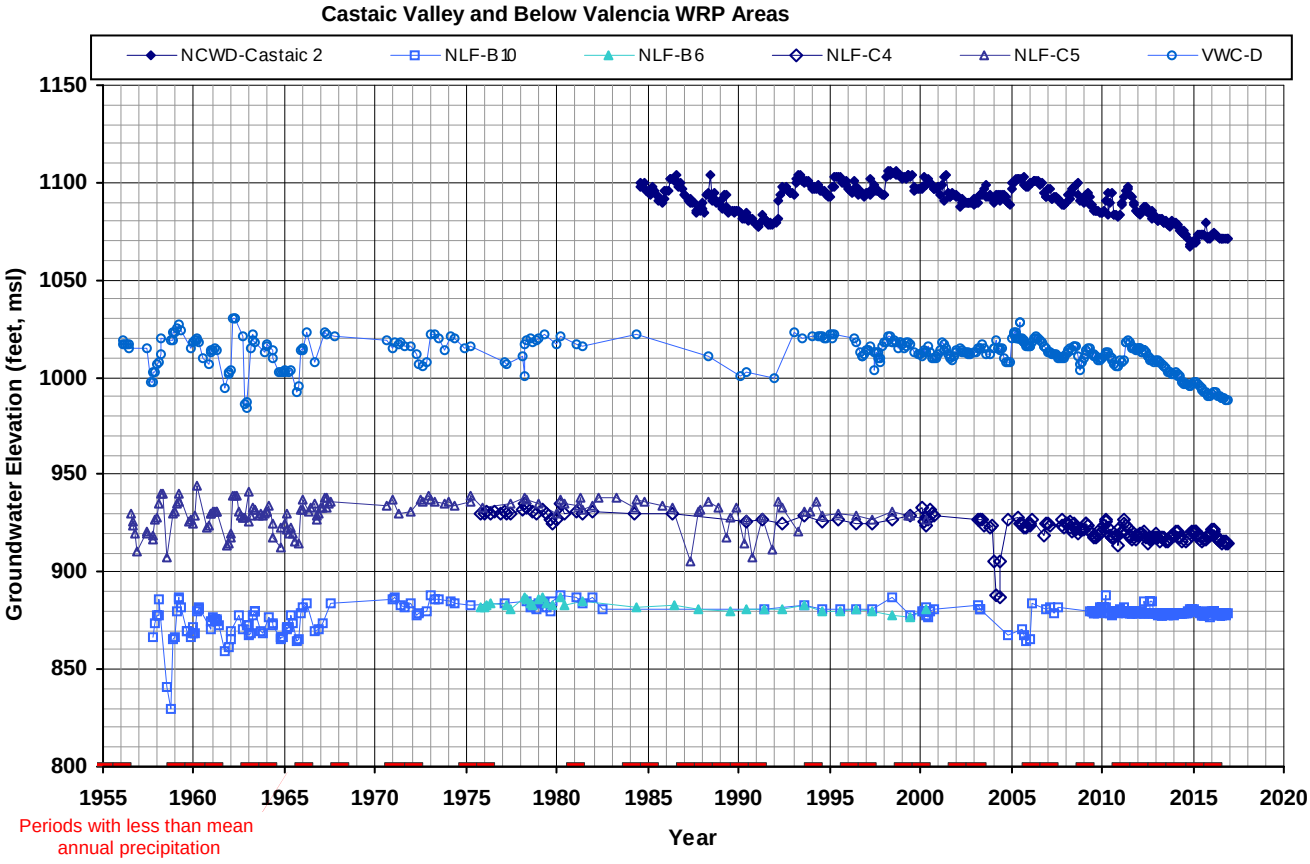


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Figure 3-5
Groundwater Elevations in Western Santa Clarita Valley Alluvial Wells
Santa Clarita Valley Water Report

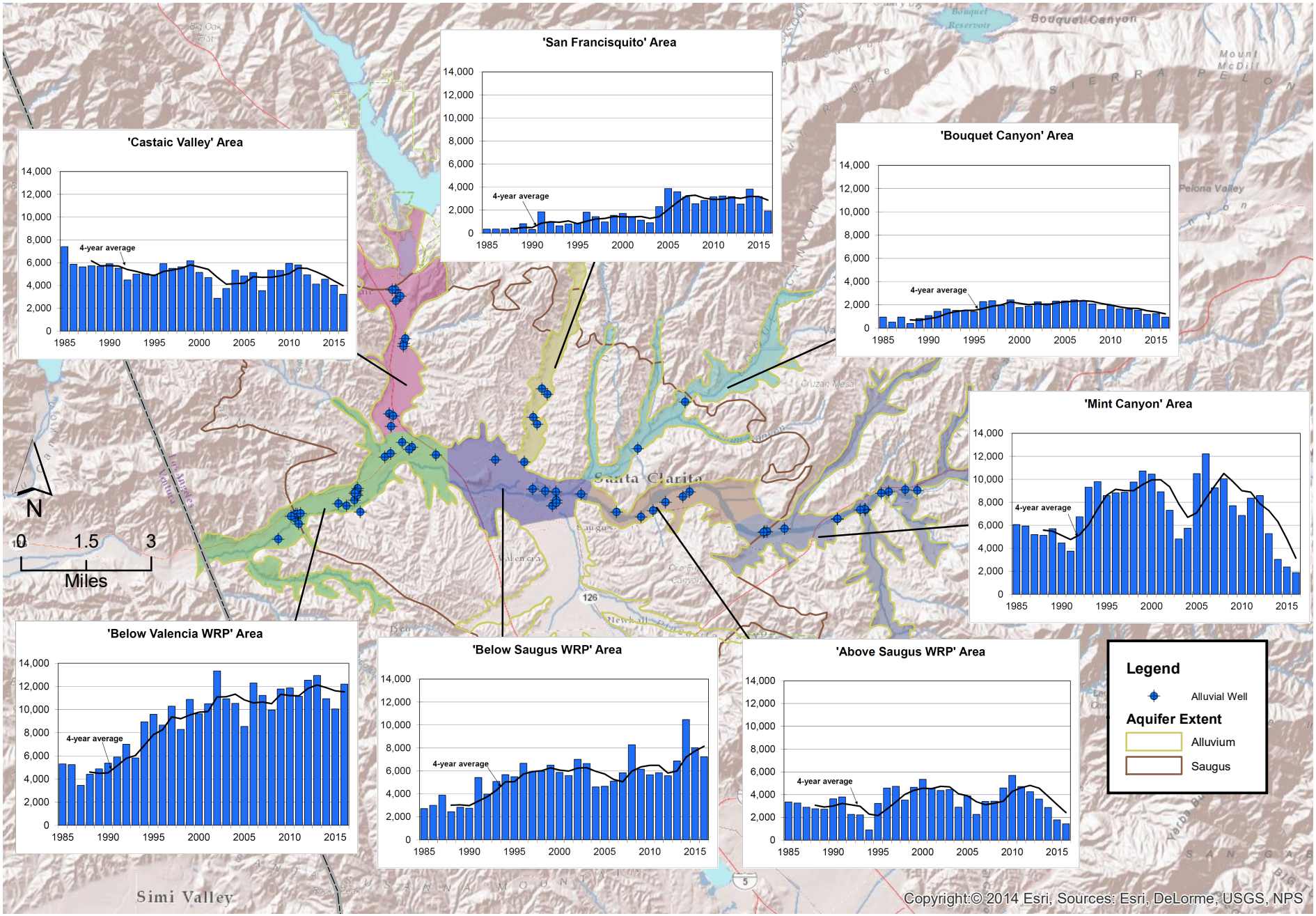

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Figure 3-6

Annual Groundwater Production from Alluvium by Area (Acre-feet)

Santa Clarita Valley Water Report

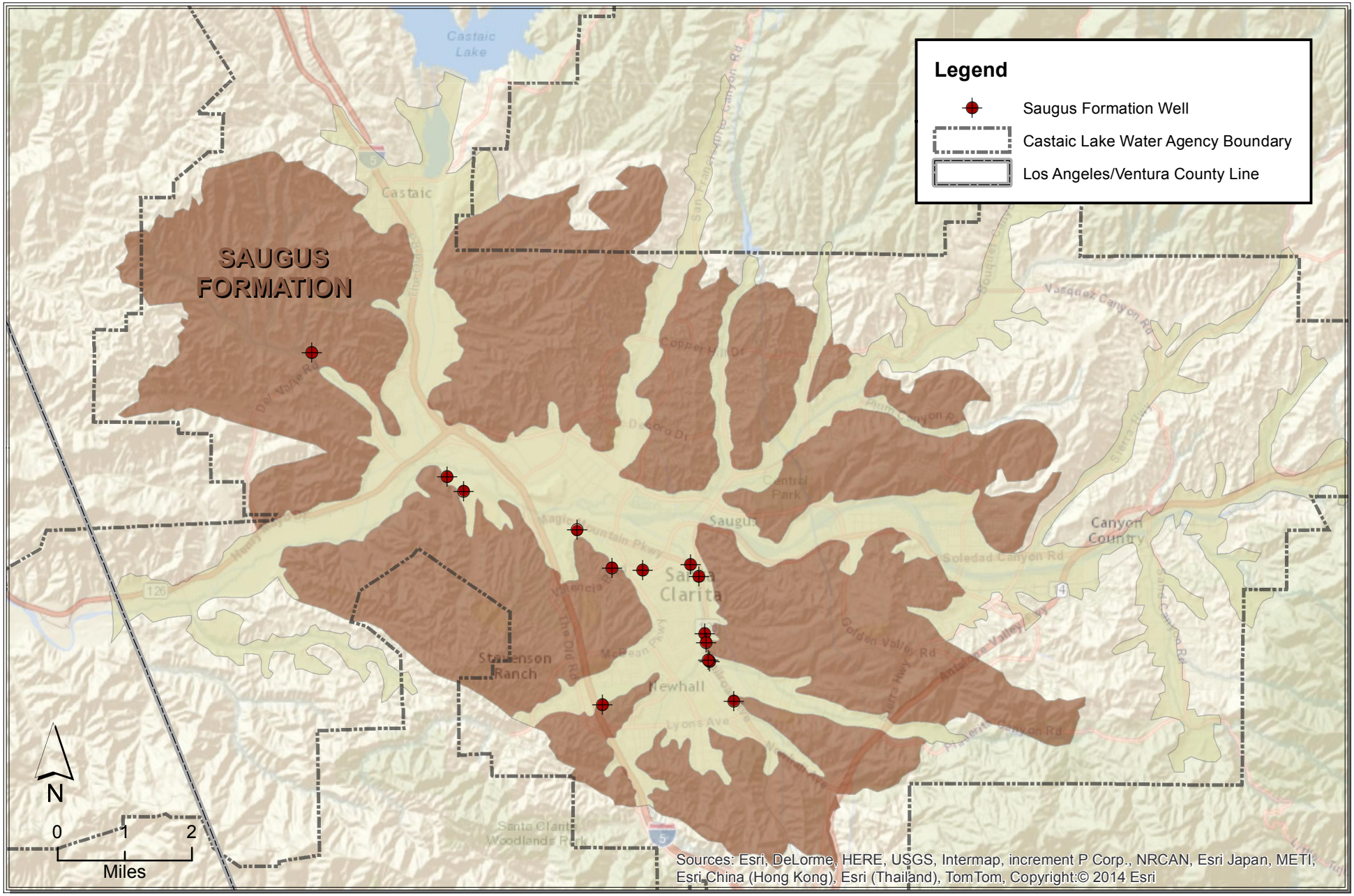

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Figure 3-7
Saugus Formation Well Locations
Santa Clarita Valley Water Report

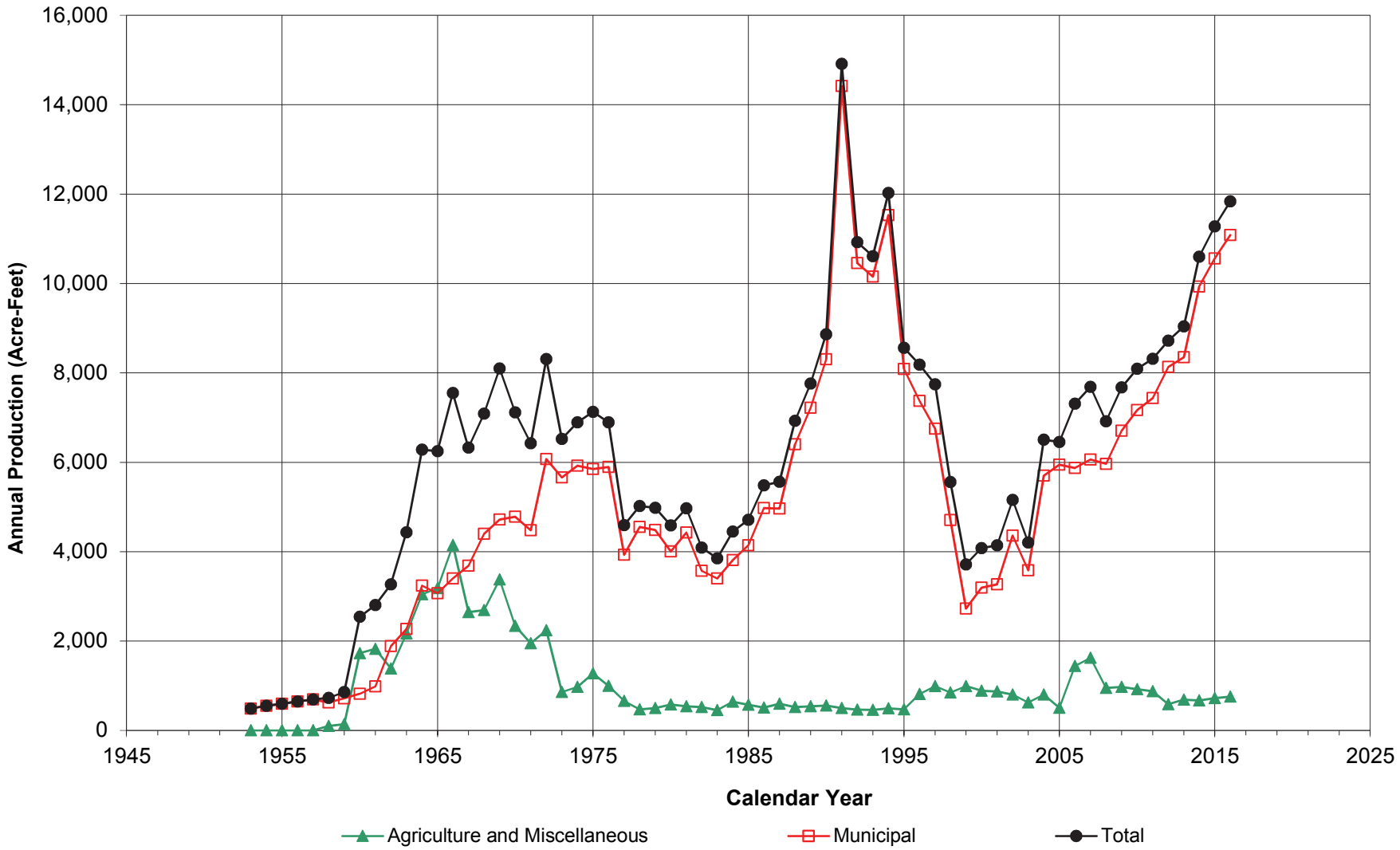

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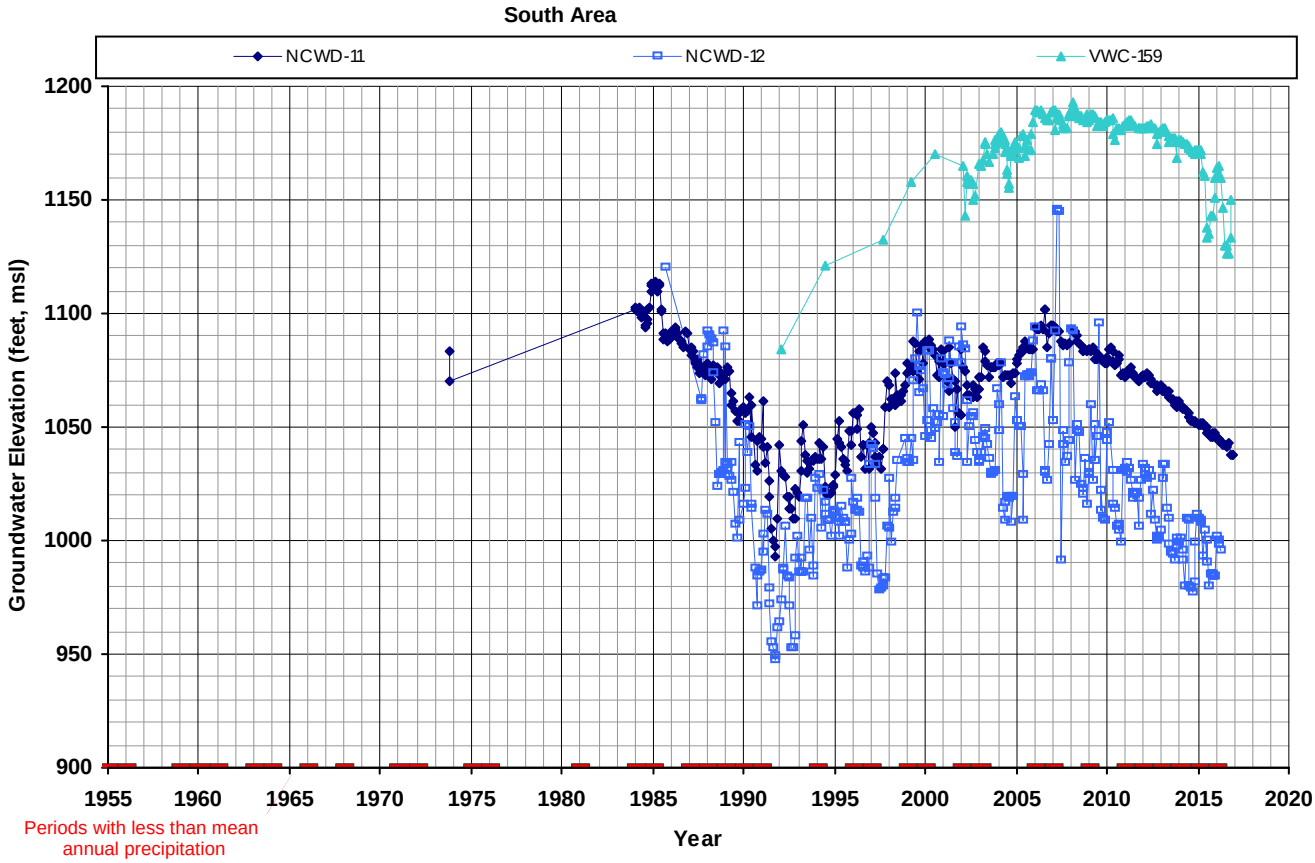
Figure 3-8
Groundwater Production - Saugus Formation
Santa Clarita Valley Water Report



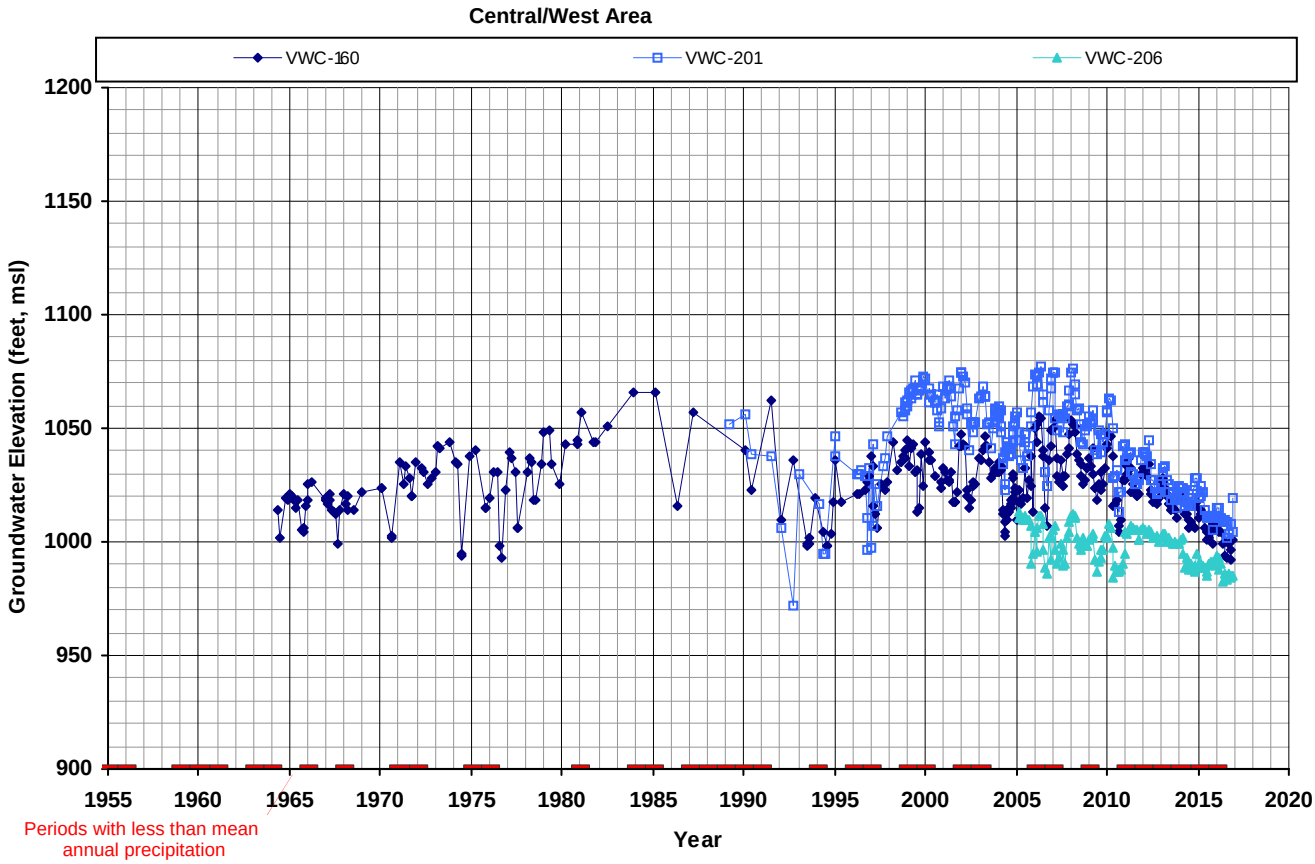


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Figure 3-9
Groundwater Elevations in Saugus Wells

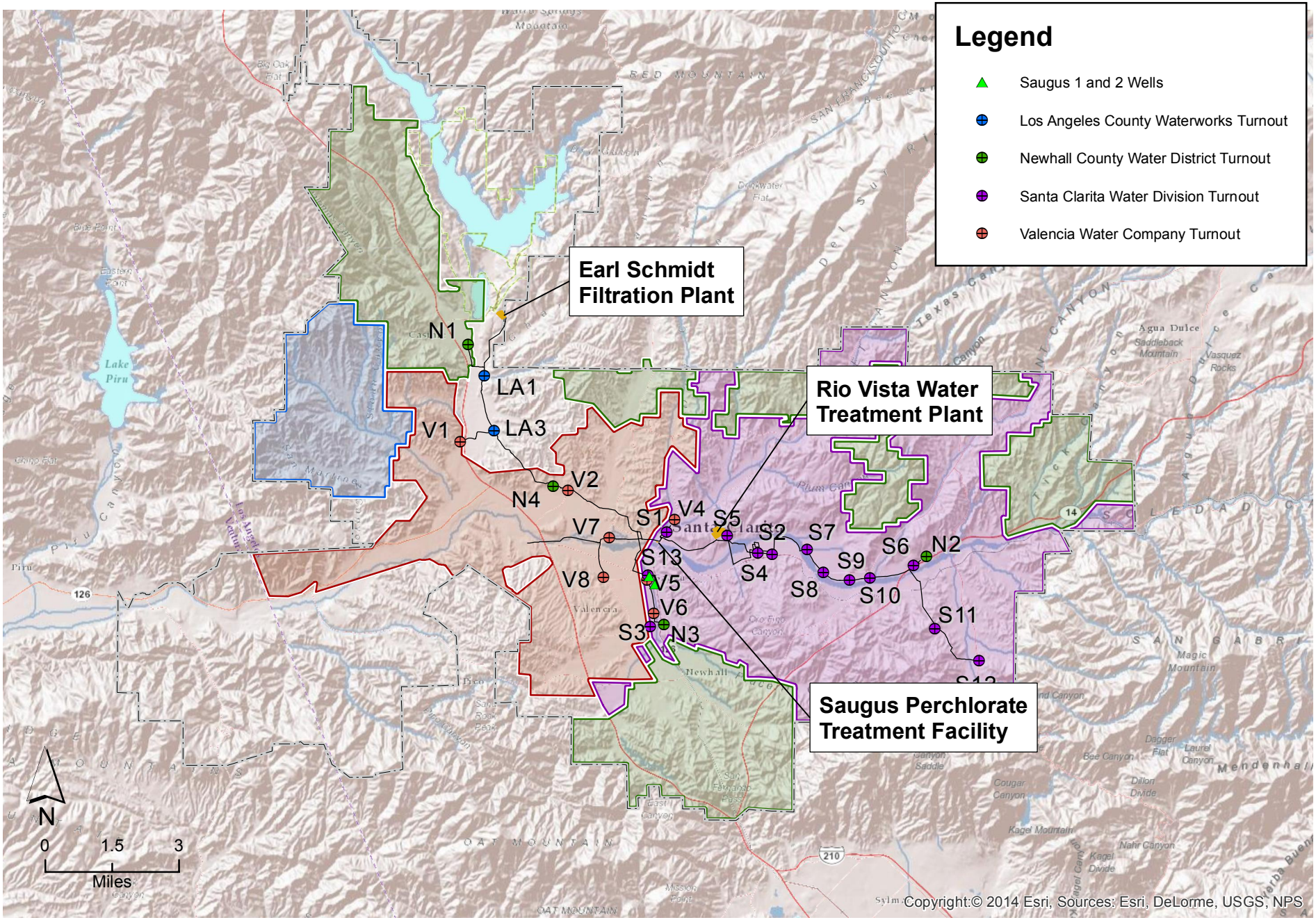

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Figure 3-10
Treated Water Distribution System
Castaic Lake Water Agency
Santa Clarita Valley Water Report

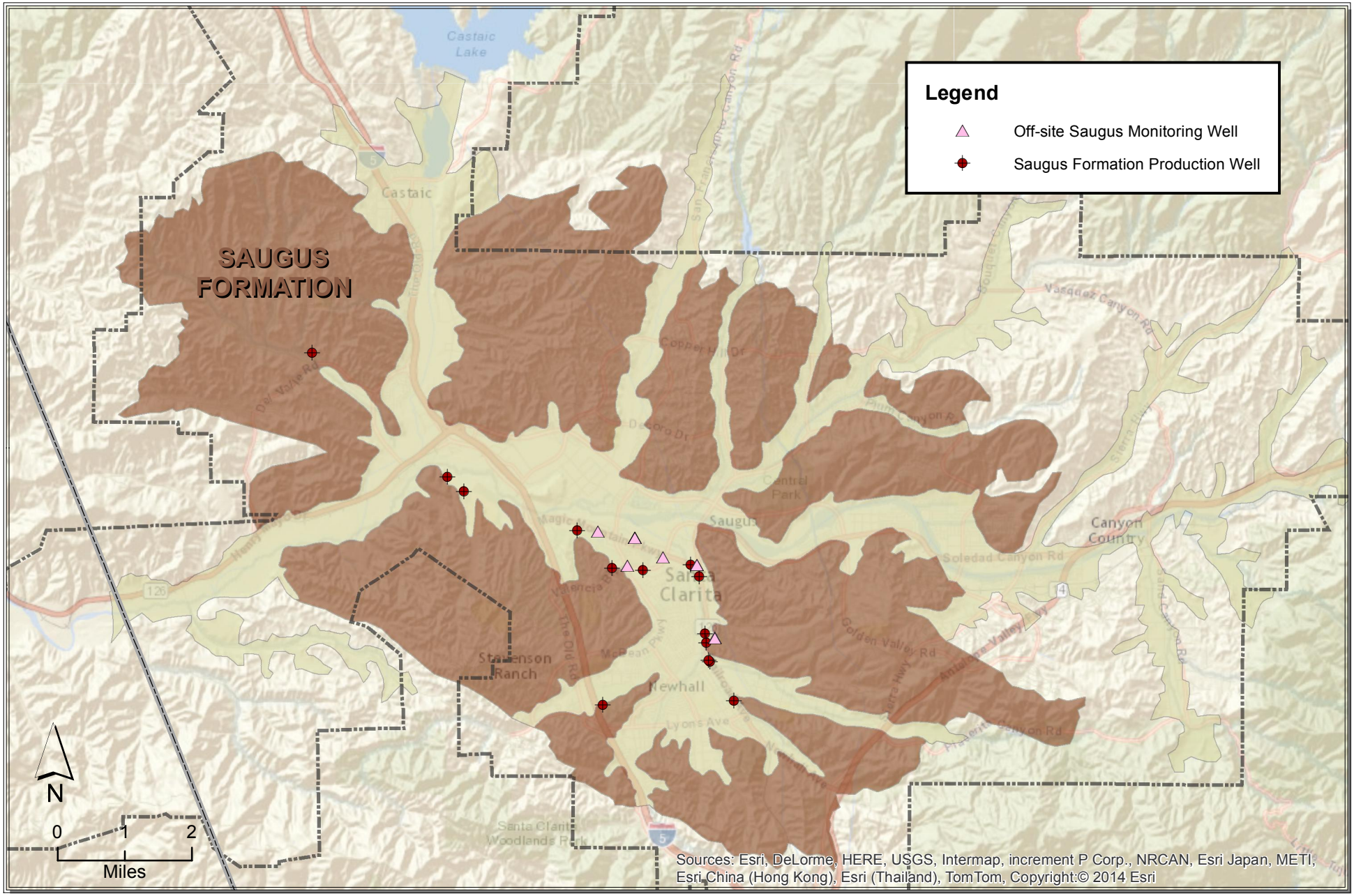

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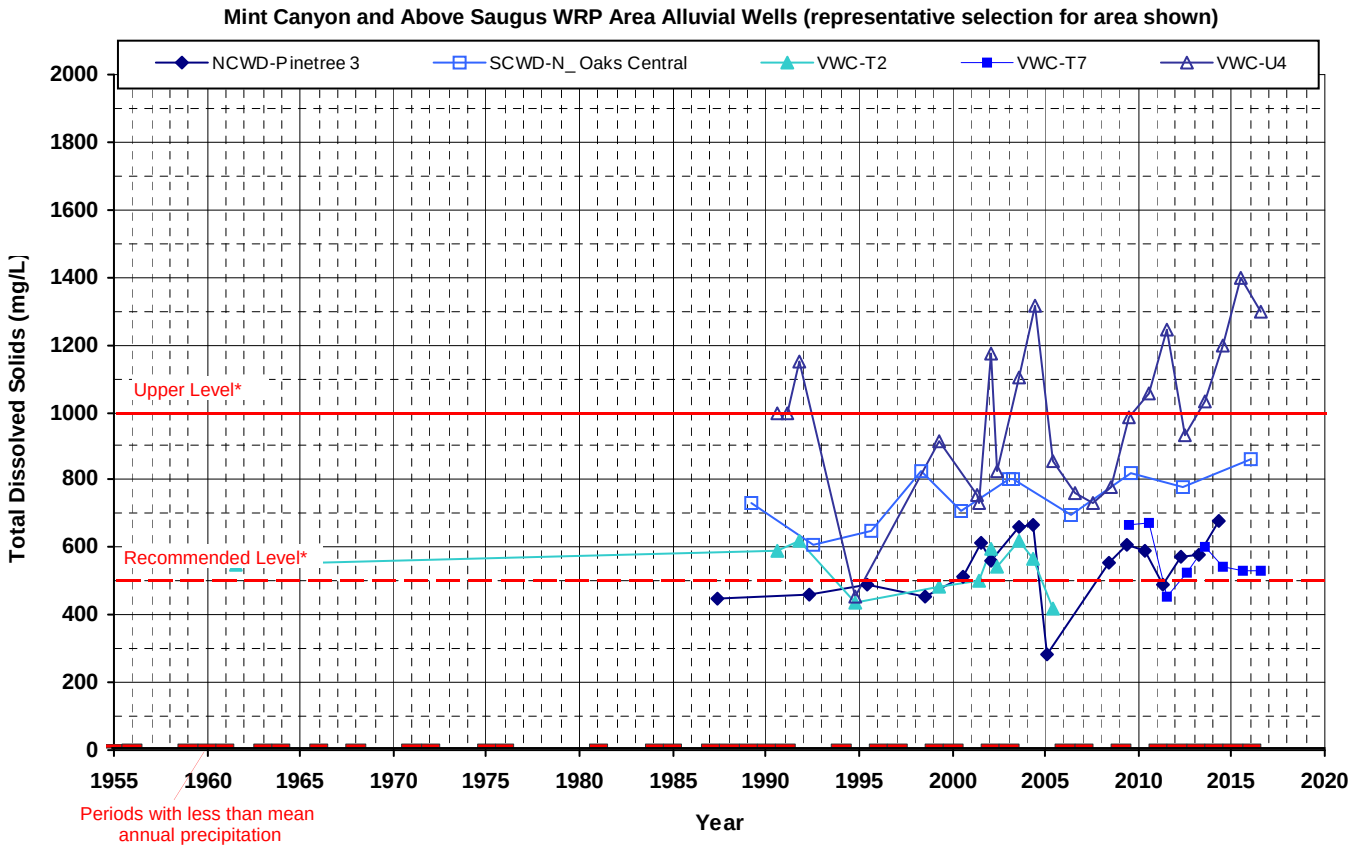
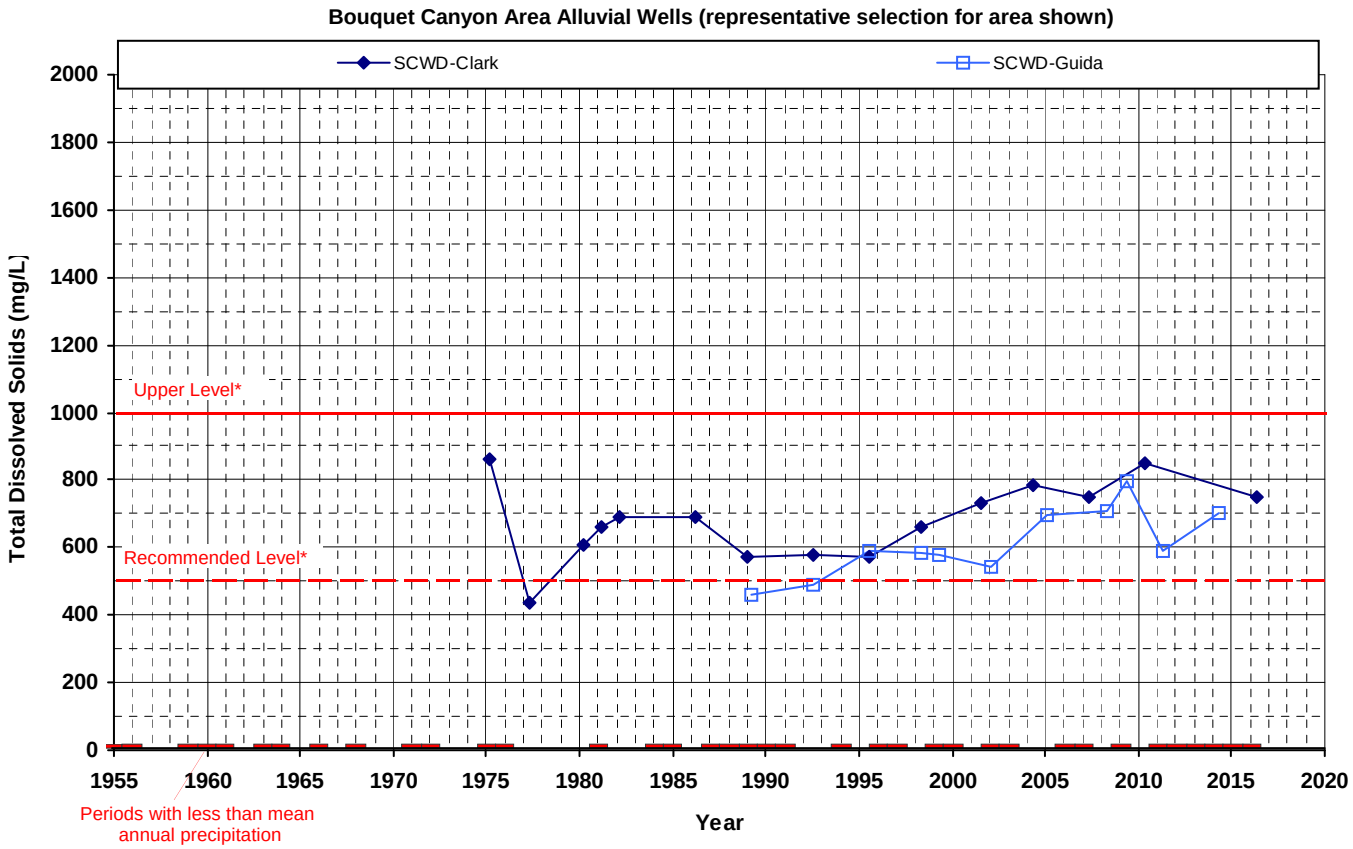
Figure 3-11
Saugus Formation Monitoring Well Locations
Santa Clarita Valley Water Report





*California Department of Public Health Secondary Maximum Contaminant Level

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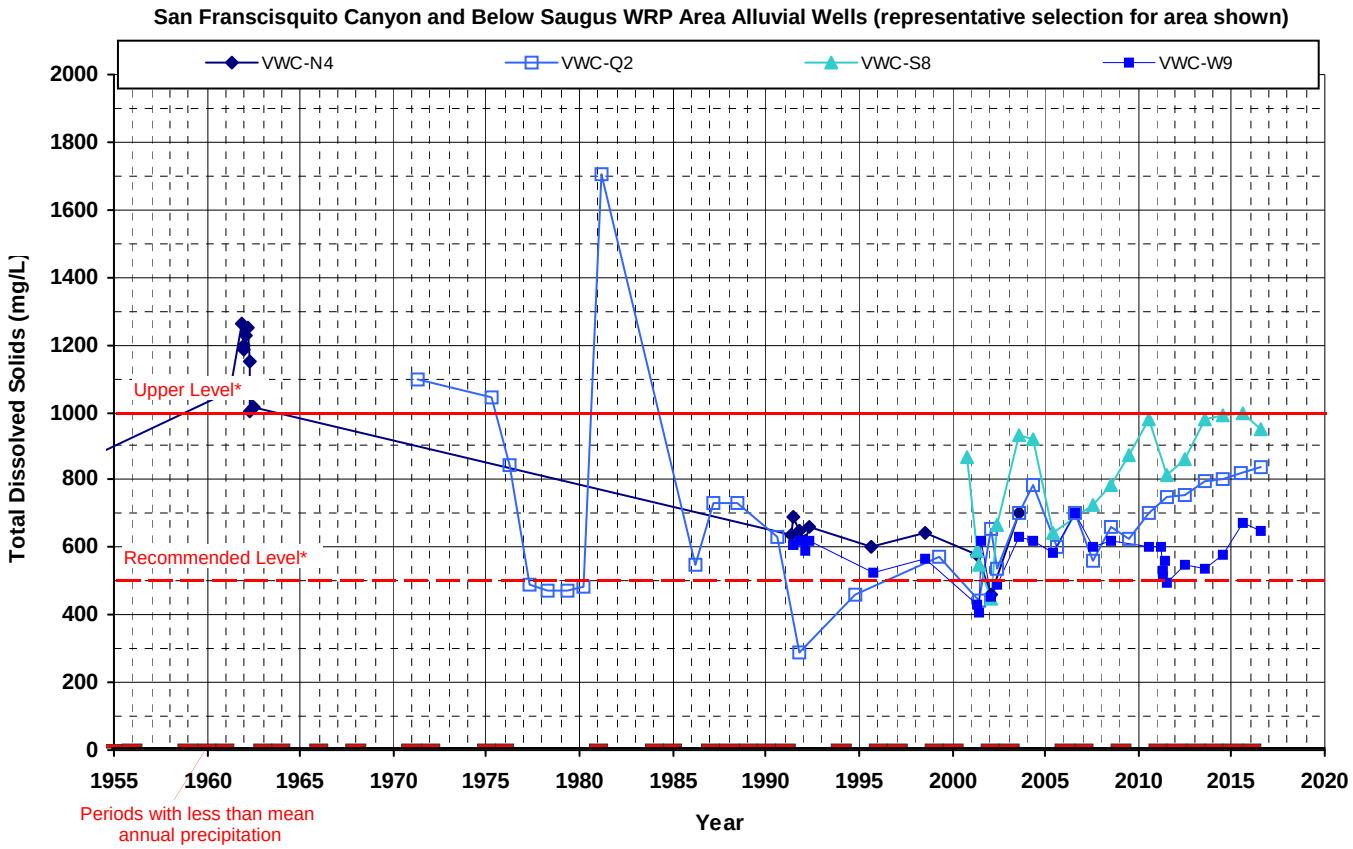
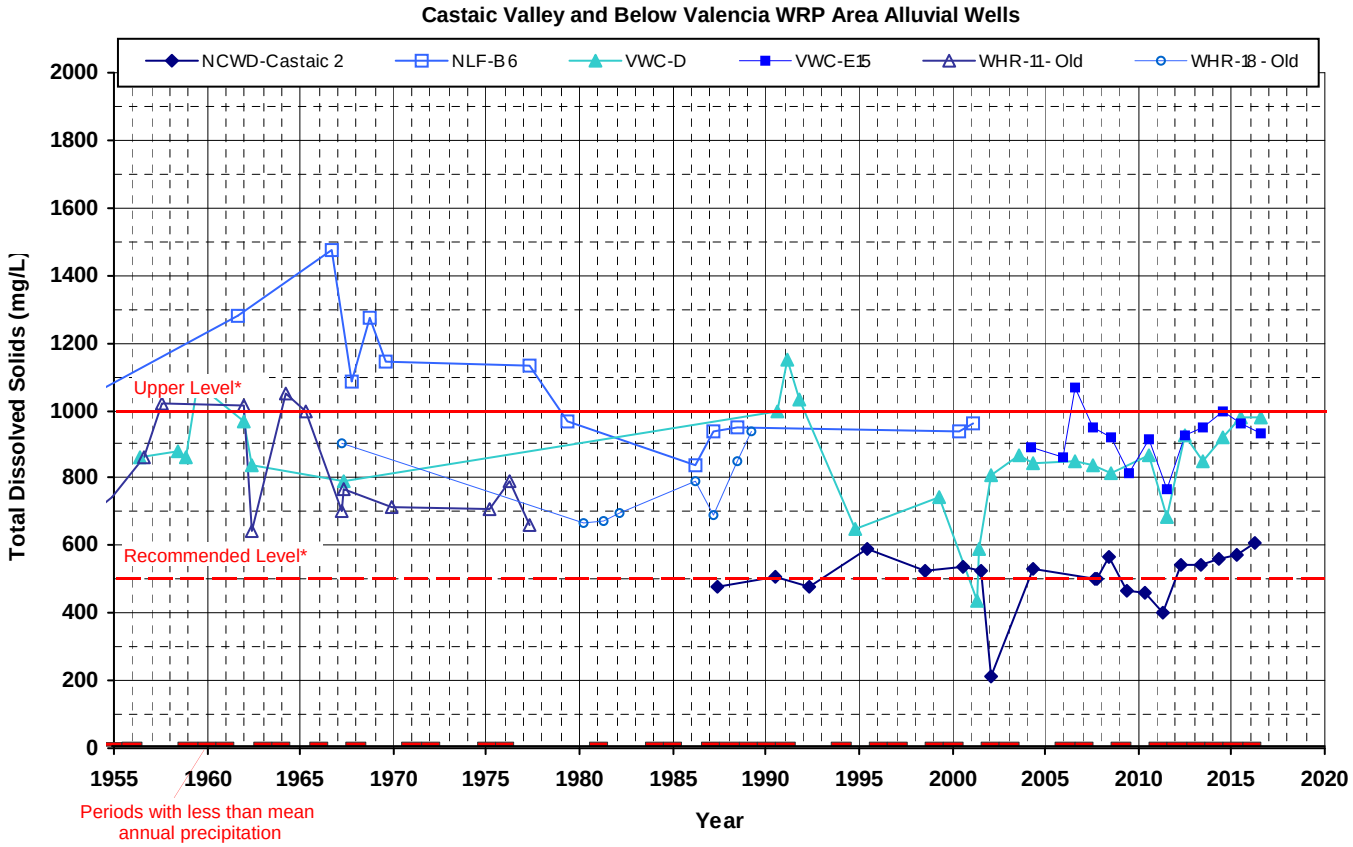
Figure 3-12
Groundwater Quality in Eastern Santa Clarita Valley Alluvial Wells





*California Department of Public Health Secondary Maximum Contaminant Level

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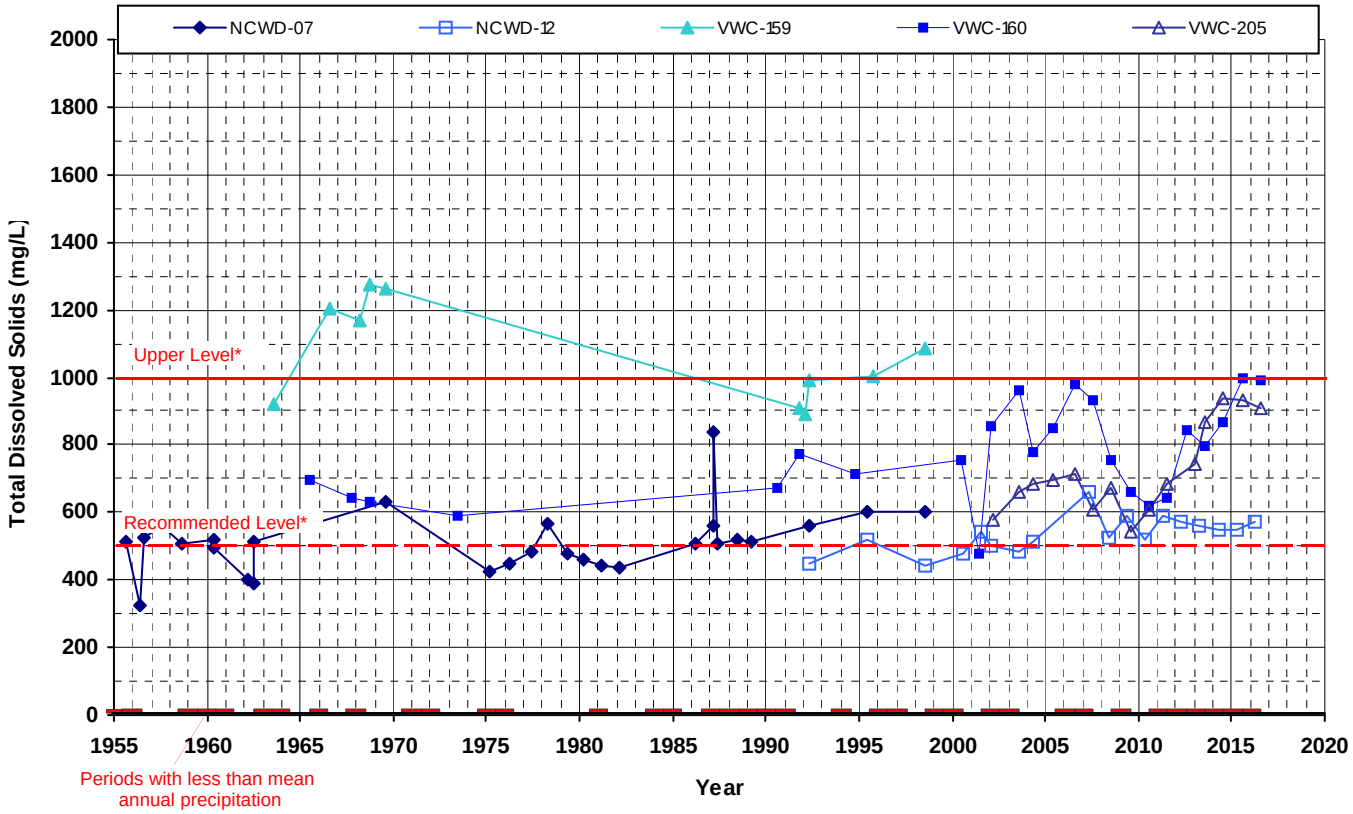
Figure 3-13
Groundwater Quality in Western Santa Clarita Valley Alluvial Wells



*California Department of Public Health Secondary Maximum Contaminant Level

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Figure 3-14
Groundwater Quality in Saugus Wells

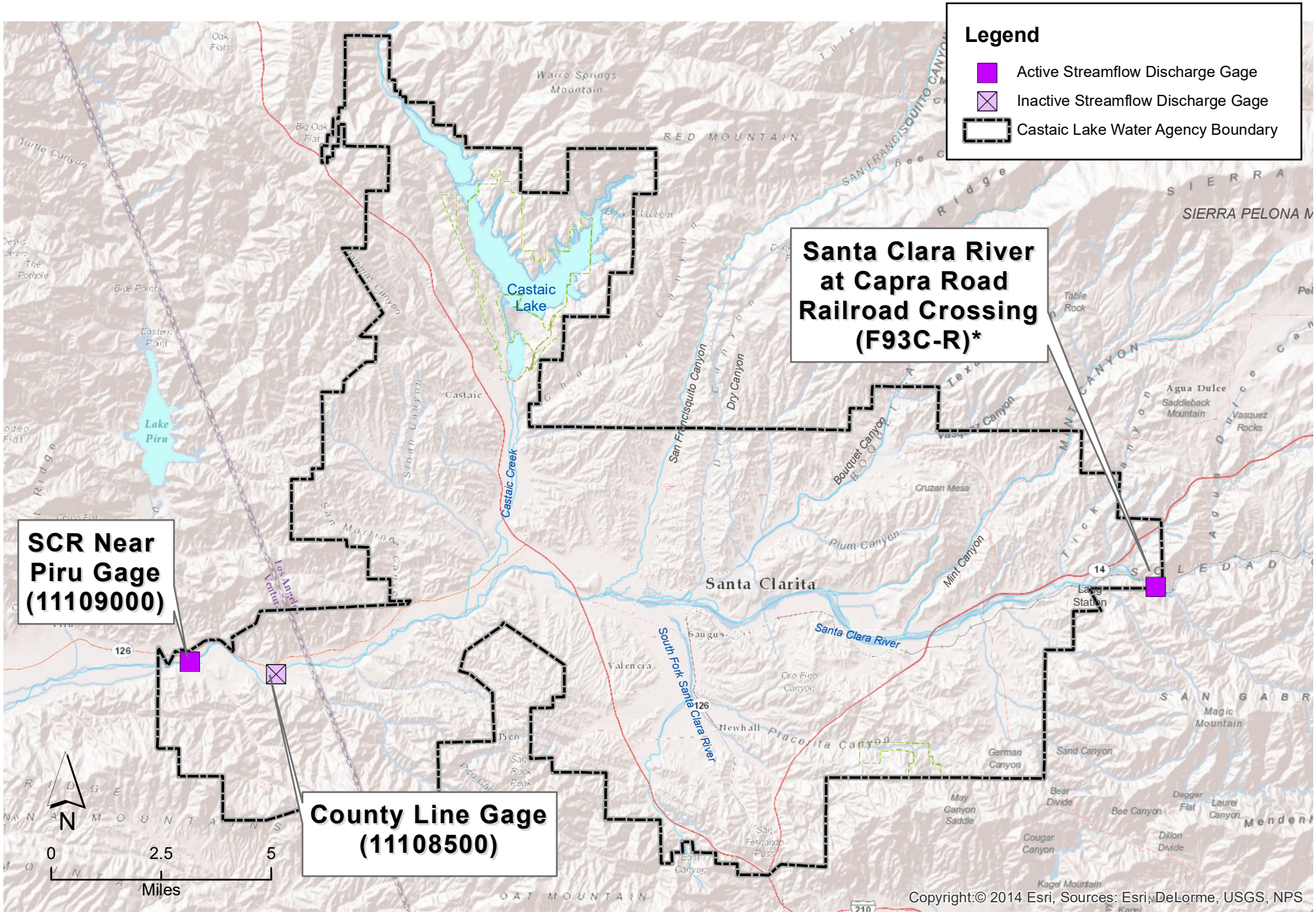

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Figure 3-15
Streamflow Discharge Gage Locations
Santa Clarita Valley Water Report

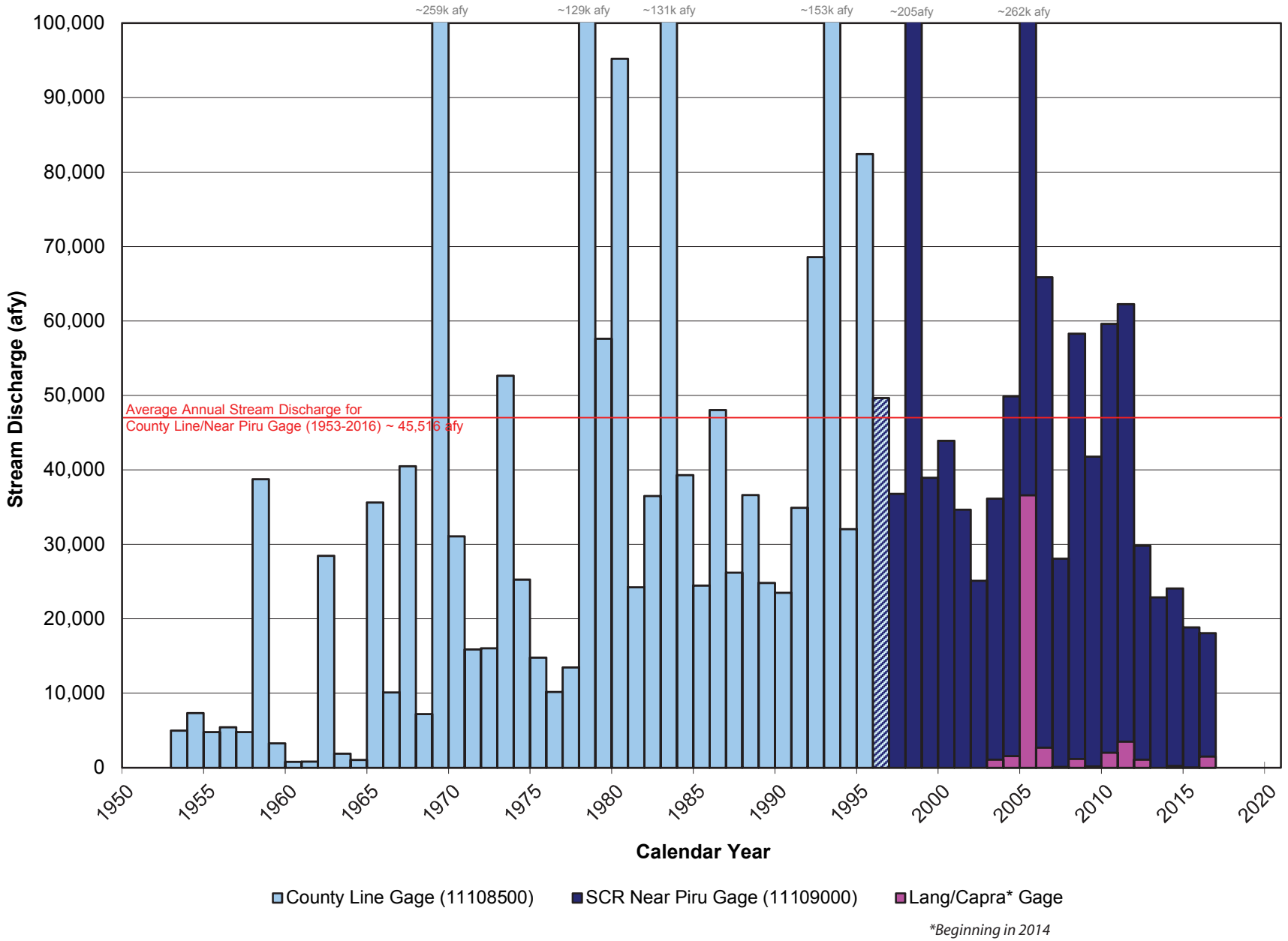

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Figure 3-16
Annual Stream Discharge
Santa Clarita Valley Water Report

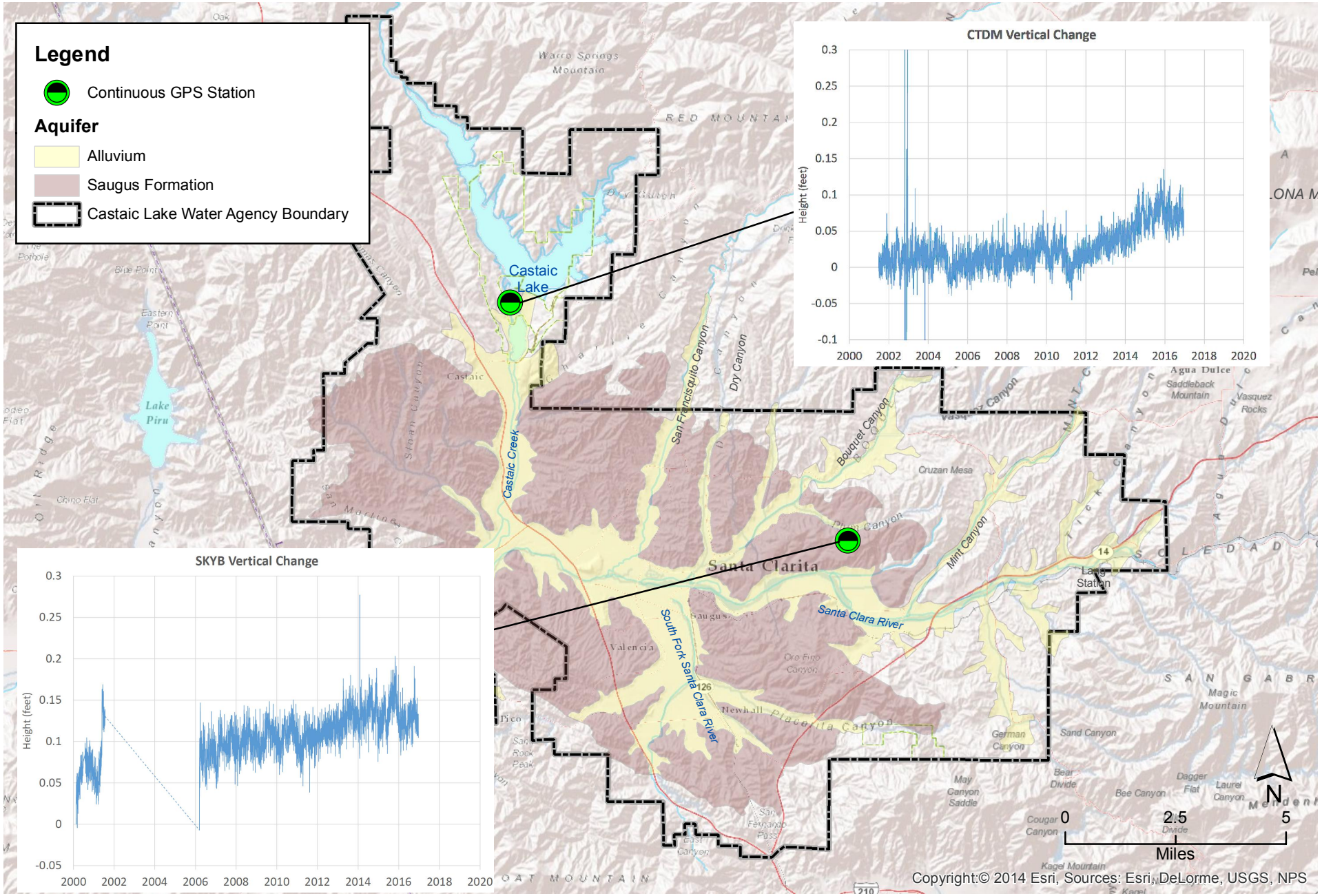

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Figure 3-17
UNAVCO Continuous GPS Station Location Map
Santa Clarita Valley Water Report

4 SUMMARY OF 2016 WATER SUPPLY AND 2017 OUTLOOK

As discussed in the preceding chapters, total water demands in the Santa Clarita Valley were 72,300 af in 2016, or nine percent higher than in 2015. Of the total demand in 2016, nearly 58,000 af were for municipal water supply (an increase of 3,500 af over 2015), and the balance (14,300 af, an increase of approximately 2,200 af over 2015) was for agricultural and other uses, including estimated individual domestic uses. As detailed in Chapter 2, the total demand in 2016 was met by a combination of local groundwater, SWP and other imported water, and a small amount of recycled water.

4.1 2016 Water Demand

The water demand in 2016 was above the projected water demand in the 2015 UWMP (69,900 af), and above the short-term projected demand that was estimated in the 2015 Water Report (65,000 af). For a long-term illustration of demand, historical water use from 1980 through 2016 is plotted in **Figure 4-1** along with the currently projected municipal and agricultural water demands in the 2015 UWMP through 2050. Historically, the primary factor causing year-to-year fluctuations in water demands has been related to weather and implementation of conservation efforts. In the short term, wetter years have typically resulted in decreased water demand, and drier years have typically resulted in higher water demand. Extended dry periods, however, have resulted in decreases in demand due to conservation and water shortage awareness related to outreach by the water suppliers. The decline in water demand toward the end of the 1989 to 1992 drought is a good example. Similarly, over the recent multi-year dry period beginning in 2006, total water demands progressively declined from a historical high in 2007 to the lowest in nearly two decades in 2015 (except for a couple of interim wet years that saw a corresponding increase). These low demand levels were influenced in part from a slowing in the rate of growth in service connections that started in 2008, but they were primarily the result of intense conservation efforts following state mandated conservation measures in 2014.

Adding to these types of demand fluctuations are signs of improving broad economic conditions after a prolonged period of slow growth in new service connections. As reflected by the numbers of service connections in each purveyor service area, growth in 2016 continued to increase, with the addition of approximately 700 new service connections. In addition, the Purveyors and the local community continue to be aware of current drought conditions. Municipal water use in 2016 increased by approximately 6 percent from 2015 after two consecutive years with a total reduction in municipal demand by 26 percent from 2013. The 2016 municipal water demand is now similar to demand last seen in the late 1990s even though the number of service connections is 40% greater; this is due in part to the SWRCB mandated and Purveyor conservation efforts.

As mentioned above, the major factor in the current declining water use in the Valley is the State's ongoing drought and related Purveyor water conservation measures. Beginning with the 2010 UWMP, conservation goals were adopted to achieve a 20% reduction in water usage by the year 2020. As California began to experience its third consecutive year of drought conditions, on January 17, 2014, Governor Brown declared a drought state of emergency. In Spring 2014, with minimal reductions in

water use observed statewide, the Governor signed an Executive Order on April 25, 2014, calling on the State to redouble its drought conservation efforts. On July 28, 2014, Resolution 2014-0038 mandating emergency water conservation measures became effective. Additionally, on April 1, 2015, with ongoing drought conditions throughout the state, and shortfalls in statewide interim conservation goals, the Governor mandated a statewide 25% reduction in usage from 2013 levels and directed the SWRCB to develop emergency regulations to implement these reductions by June 1, 2015. In 2016, with the lessening of the drought in some areas of the State, the mandated reductions in conservation became voluntary with a continued ban on wasteful water use practices. In April 2017, following successful water conservation efforts and wet year conditions for rainfall and snow, the Governor ended the drought state of emergency in most of California. The requirement for water reporting and prohibiting wasteful practices, however, are maintained.

4.2 Projected 2017 Water Demand and Supplies

With the above average rainfall conditions in early 2017, municipal water requirements in the first quarter of 2017 were lower than the first quarter of 2016 by almost 15 percent. Recognizing those early-year conditions, the potential impact of additional conservation, and continued growth in the Valley, total water demand in 2017 is estimated to be approximately 75,000 af.

It is expected that both municipal and agricultural water demands in 2017 will continue to be met with a mix of water supplies as in previous years, notably local groundwater, SWP and other supplemental imported water supplies, complemented by recycled water that will continue to supply a small fraction of total water demand.

On November 28, 2016, the initial allocation of water from the SWP for 2017 was 20 percent. On December 21, 2016, it was increased to 45 percent. On January 18, 2017, the allocation was increased to 60 percent. On April 14, 2017, the allocation was increased to 85 percent. An 85 percent allocation for CLWA equates to 80,920 af of its total Table A Amount of 95,200 af. Combined with local groundwater from the two aquifer systems (approximately 40,000 af), total carryover SWP water from 2016 (51,571 af) potentially available in 2017, annual acquisition from BVWSD and RRBWSD (combined 11,000 af), and recycled water (450 af), the total available water supplies for 2017 are potentially183,900 af without accounting for losses to carryover storage. CLWA does not anticipate withdrawing from but may contribute to a water bank in 2017. Due to continuing water conservation efforts and diversified sources of water supply, CLWA and the Purveyors anticipate having more than adequate supplies to meet all water demands in 2017. Projected 2017 water supplies and demand are summarized in **Table 4-1**.

4.3 SWP Delivery Capability

As discussed in Section 3.4.5, a federal court in August 2007 ruled that certain operational changes were required of the SWP in order to protect the endangered Delta smelt. With the objective of protecting endangered fish such as the Delta smelt and spring-run salmon, the court order resulted in the

Table 4-1
2017 Water Supply and Demand
(acre-feet)

Projected 2017 Demand [1]		**75,000**
Available 2017 Water Supplies		
Local Groundwater		40,000
Alluvium [2]	*30,000*	
Saugus Formation [3]	*10,000*	
Imported Water		143,491
Table A Amount [4]	*80,920*	
Total Carryover from 2016 [5]	*51,571*	
Buena Vista/Rosedale-Rio Bravo[6]	*11,000*	
Flexible Storage Account (CLWA/Ventura County) [7]	*0*	
Yuba Accord[8]	*0*	
Rosedale-Rio Bravo Water Banking Program Withdrawal	*0*	
Recycled Water		450
Total Available 2017 Supplies		**183,941**
Additional Dry Year Supplies [9]		
Semitropic Groundwater Banking Program[10]		35,970
Rosedale-Rio Bravo Water Banking Program[11]		100,000
2005/2006 Buena Vista/Rosedale-Rio Bravo Water Acquisition Agreement[12]	*22,000*	
2005/2006 Banking of Table A[13]	*34,292*	
2007/2010-2012/2016 Rosedale Rio-Bravo Banking[14]	*43,865*	
Two-for-One Exchange Programs		9,941
2011/2012 Rosedale-Rio Bravo Water Storage District[15]	9,441	
2011 West Kern Water District[16]	500	
Central Coast Water Authority[17]	750	750
Total Additional Dry Year Supplies		**146,661**

1. Based on: Year-to-date demand through March 2017 and average monthly demand (March-December) from 2015/2016 with adjustment for conservation.

2. The Alluvium represents 30,000 to 40,000 afy of available supply under local wet-normal conditions, and 30,000 to 35,000 afy under local dry conditions. Available supply in 2017 is shown to be reflective of dry year production under the Current Operating Plan described in the Updated Basin Yield Analysis, August 2009.

3. The Saugus Formation represents 7,500 – 15,000 afy of available water supply under non-drought conditions, and up to 35,000 afy under dry conditions, dependent on available well capacity. Estimated supply for 2017 takes into consideration current available capacity and return to service of VWC wells 201 and 205 in 2017 on a limited basis.

4. CLWA's SWP Table A amount is 95,200 af. The initial 2017 allocation on November 28, 2016 was 20 percent (19,040 af). On December 21, 2016, the allocation was increased to 45 percent (42,840 af). On January 18, 2017, the allocation was increased to 60 percent (57,120 af), and on April 14, 2017, it was increased to 85% (80,920 af) where is now stands as of May 30, 2017.

5. Of the 51,571 af of total available carryover at the beginning of 2017, significant quantities of carryover spilled or were otherwise not available to CLWA (36,000 af). Approximately 15,500 af was or will be delivered to the CLWA service area or storage programs. About 12,000 af of this amount was a result of CLWA and MWDSC entering into an unbalanced exchanged agreement.

6. 2017 annual supply from 2007 Buena Vista/Rosedale-Rio Bravo Water Acquisition Agreement.

7. CLWA can directly utilize up to 4,684 af of flexible storage capacity in Castaic Lake. The initial agreement in 2005 was for 10-year term, and the agreement was extended by 10 years in 2015. CLWA can also utilize 1,376 af of Ventura County SWP contractors' flexible storage capacity in Castaic Lake for a total of 6,060 af of flexible storage. In 2014, 4,424 af was recovered and 4,339 af was backfilled in 2015; 85 af remains to be refilled by 2019. No utilization of this flexible storage is anticipated in 2017.

8. Yuba Accord Water is subject to availability and cost. Up to 850 af of non-SWP water supply may be available to CLWA in critically dry years as a result of agreements among DWR, Yuba County Water Agency, and the U.S. Bureau of Reclamation regarding settlement of water rights issues on the Lower Yuba River (Yuba Accord). CLWA opted to take 445 af of Yuba water in 2014 and did not take any in 2015 or 2016. CLWA will not take any Yuba water in 2017.

9. Does not include other reliability measures available to CLWA and the retail water Purveyors. These measures include short-term exchanges, participation in DWR's dry-year water purchase programs, and other future groundwater storage programs.

10. CLWA initially banked 24,000 af and 32,522 af in 2002 and 2003 (the latter banked in 2004), respectively. This is the current balance (35,970 af) after accounting for program losses, recovering 4,950 af in 2009/2010, and withdrawing 4,950 af in 2014 through the first priority extraction capacity of Newhall Land and Farming Company, now Fivepoint Holdings, LLC (and giving Newhall Land/Fivepoint 5,000 af of water in consideration for this use). No water will be withdrawn in 2017. In 2015, CLWA entered into an agreement with Semitropic to participate in the Stored Water Recovery Unit (SWRU). Under this agreement, the two short-term accounts containing 35,970 AF were transferred into this new program, and CLWA can store and recover additional water within a 15,000 AF storage account. The term of the Semitropic Banking Program extends through 2035 with the option of a 10-year renewal. CLWA may withdraw up to 5,000 AFY from its account.

11. The total banked amount is 100,157 af, however the contract limit is 100,000 af.

12. Water stored in Rosedale-Rio Bravo Water Banking Program back-credited in 2007 for 2005 and 2006 pursuant to the Buena Vista/Rosedale-Rio Bravo Water Acquisition Agreement executed in 2007, not subject to losses.

13. Net recoverable water balance is 34,292 af comprising the following transactions:
    17,146 af after banking 20,000 af in 2005;
    17,146 af after banking 20,000 af in 2006.

14. Net recoverable water balance is 43,865 af comprising the following transactions:
    7,323 af after banking 8,200 af (Table A) in 2007;
    30,948 af after banking of 33,668 af (25,418 af Table A and 8,250 af of BV/RRB) in 2010;
    880 af after banking of 986 af (SWP) in 2011;
    5,729 af after banking of 6,031 af (BV/RRB) in 2012;
    recovery of 2,824 af in 2014;
    recovery of 2,998 af in 2015;
    4,807 af after banking 5,060 af (BV/RRB) in 2016.

15. Net recoverable water balance is 9,441 af comprising the following transactions:
    7,555 af after exchanging 15,602 af in 2011;
    1,886 af after exchanging 3,969 af in 2012.

16. Net recoverable water balance is 500 af comprising the following transactions:
    2,500 af after exchanging 5,000 af in 2011;
    recovery of 2,000 af in 2014.

17. In 2016, 1,500 af of SWP supply was sold to Central Coast Water Authority on behalf of the Santa Barbara County Flood Control and Water Conservation District in an unbalanced exchange agreement. They must return 750 af to CLWA.

preparation of new BOs requiring DWR to implement mitigation requirements with resultant impacts on SWP water supply reliability. The current SWP 2015 Delivery Capability Report (DWR, 2015), maintains the restrictions on SWP operations according to the BOs of the U.S. Fish and Wildlife Service and the National Marine Fishery Service issued on December 15, 2008 and June 4, 2009, respectively. In December 2010, a federal judge overruled most of the 2008 federal BO and invalidated several of the criteria that reduced SWP's water supply. These matters were appealed to the U.S. Court of Appeals for the Ninth Circuit. The Ninth Circuit ruling upheld the BOs of the federal agencies. Therefore, the operational rules defined in these BOs continue to be legally required and were used by DWR in the analyses supporting its 2015 Delivery Capability Report. The SWP 2015 Delivery Capability Report also considers the impacts on SWP delivery reliability due to climate change, sea level rise, and multiple Delta-specific concerns. Further consideration is also given to the major Delta policy planning efforts currently underway: the Delta Plan and the Bay Delta Conservation Plan (currently called CA Water Fix). With these factors, the Capability Report projects that the average annual delivery of Table A water is estimated at 61% (less than 0.1% less than the 2013 estimate). CLWA staff has assessed the impact of the current SWP Delivery Capability Report on the CLWA reliability analysis contained in the Agency's upcoming 2015 UWMP that current and anticipated supplies are available to meet projected water supply needs through the year 2050. The preceding discussion of SWP supply should be considered by noting that, while the SWP Capability Report represents a reasonable scenario with respect to long term reliability, recent reductions in supply reduce the difference between available supply and demand in the future, thereby making the CLWA service area more subject to shortages in certain dry years. Accordingly, the reduction in SWP supply reinforces the need to continue diligent efforts to conserve potable water and increase the use of recycled water to maximize utilization of potable water supplies.

As discussed in Chapter 5, CLWA and the Purveyors have worked with Los Angeles County and the City of Santa Clarita to aggressively implement water conservation in the CLWA service area. In terms of short-term water supply availability, however, CLWA and the Purveyors have determined that even with operational changes of the SWP in effect, there are sufficient supplemental water supplies, including SWP water, to augment local groundwater and other water supplies such that overall water supplies will be sufficient to meet projected water requirements. CLWA, the retail water Purveyors, Los Angeles County, and the City of Santa Clarita have formed the Santa Clarita Valley Water Committee (formerly convened as the Santa Clarita Drought Committee). The specific purpose of the committee is to work collaboratively to manage the conjunctive use of the Valley's water supplies, respond to drought conditions and ensure the progressive implementation of water use efficiency programs in the Santa Clarita Valley.

4.4 Supplemental Water Supply Sources

In addition to the water supplies described above, and as described in Chapter 3, CLWA has dry-year supplemental water supply of more than 145,000 af of recoverable water outside the groundwater basin at the end of 2016. Through four long-term groundwater banking and exchange programs, as itemized in the lower half of Table 4-1, these additional dry-year supplies include: nearly 36,000 af of

recoverable water stored in the Semitropic Groundwater Storage Bank in Kern County, more than 99,000 af in the RRBWSD, a separate two-for-one exchange with RRBWSD with more than 9,400 af of total recoverable water, and another two-for-one exchange program with the WKWD in Kern County that has 500 af of recoverable water at the end of 2016. These components of overall water supply are separately reflected in **Table 4-1** because they are intended as a future dry-year supply. There will be no extractions from the Rosedale-Rio Bravo, Semitropic or West Kern exchange programs in 2017.

4.5 Water Supply Strategy

CLWA and the Purveyors have implemented a number of projects that are part of an overall program to provide facilities needed to firm up imported water supplies during times of drought. These involve water conservation, surface and groundwater storage, water transfers and exchanges, water recycling, additional short-term pumping from the Saugus Formation, and increasing the reliability of CLWA's imported supply. This overall strategy is designed to meet increasing water demands while assuring a reasonable degree of supply reliability.

Part of the overall water supply strategy is to conjunctively use groundwater and imported water to area residents to ensure consistent quality and reliability of service. The actual blend of imported water and groundwater in any given year and location in the Valley is an operational decision and varies over time due to source availability and operational capacity of an individual Purveyor and the CLWA facilities. The goal is to conjunctively use the available water resources so that the overall reliability of water supply is maximized while utilizing local groundwater at a sustainable rate. Such is the case in 2017. Due to the larger amount of available SWP supplies, the temporary decrease in Saugus Formation well capacity due to perchlorate concentrations in the vicinity of some Saugus Formation production wells, and drought impacts on groundwater levels in the eastern portion of the subbasin, groundwater pumping from the Alluvium will be more representative of dry year levels (approximately 30,000 afy). As done in 2014 through 2016, the pumping of approximately 30,000 af from the Alluvium will be accomplished by shifting more of the pumping to the central and western portions of the subbasin.

For long-term planning purposes, water supplies and facilities are added on an incremental basis and ahead of need. It would be economically unsound to immediately, or in the short term, implement all the facilities and water supplies needed for the next twenty to thirty years. This would unfairly burden existing customers with costs that should be borne by future customers. There are numerous ongoing efforts to produce an adequate and reliable supply of good quality water for Valley residents, including increased recovery capacity at both Semitropic and RRBWSD Banking Programs and new and replacement wells in the Saugus Formation to increase groundwater recovery. Water consumers expect their needs will continue to be met with a high degree of reliability and quality of service. To that end, CLWA's and the water purveyors stated reliability goal is to deliver a reliable and high quality water supply for their customers, even during dry periods. Based on conservative water supply and demand assumptions contained in the 2015 UWMP for a planning horizon to 2050, in combination with

conservation of non-essential demand during certain dry years, CLWA and the water suppliers believe implementing their water plan will successfully achieve this goal.

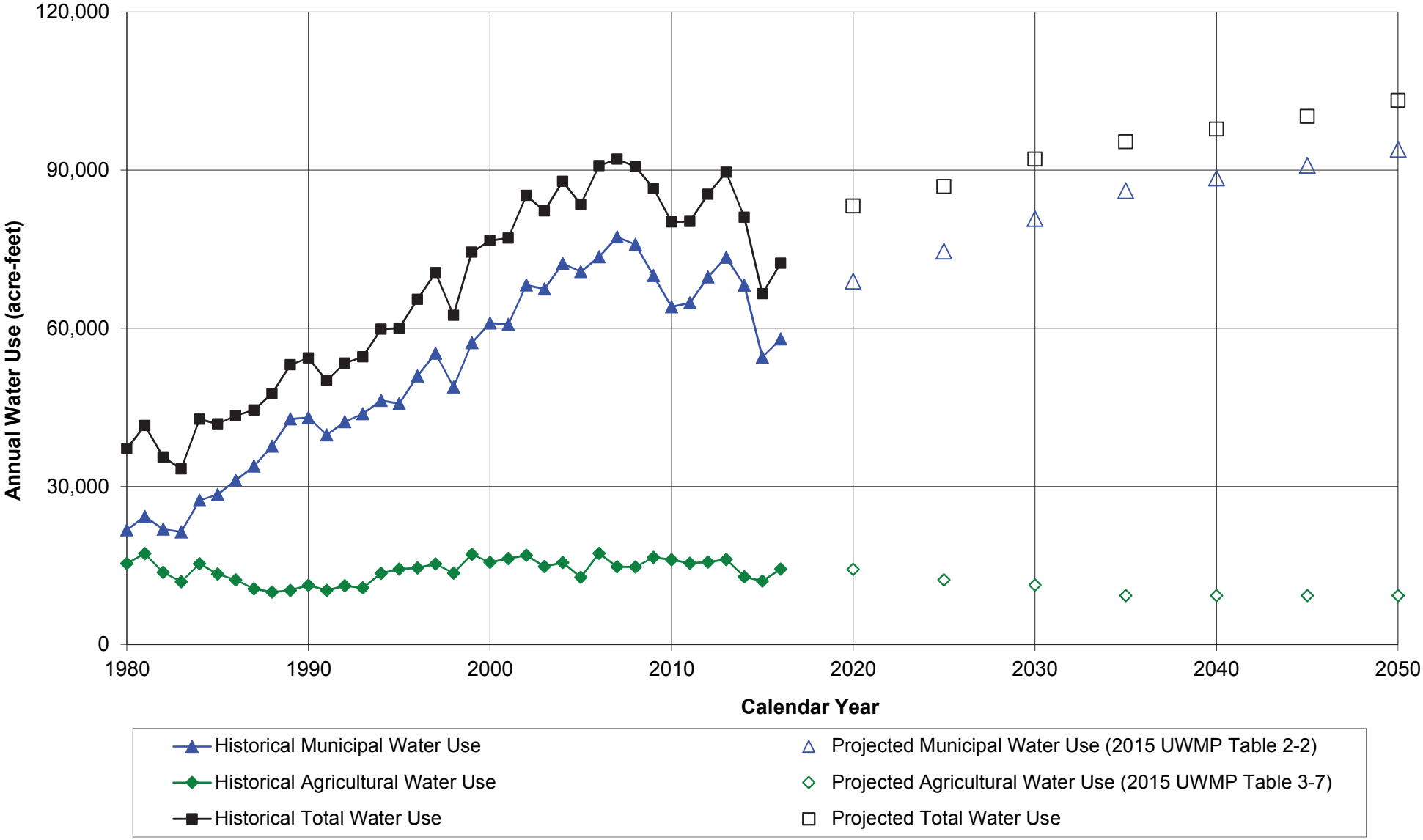

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Figure 4-1
Historical and Projected Water Use
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5 WATER CONSERVATION

5.1 Historical Conservation Efforts

The California Urban Water Conservation Council (CUWCC) was formed in 1991 through the Memorandum of Understanding Regarding Urban Water Conservation in California (MOU). The urban water conservation Best Management Practices (BMPs) included in the MOU are intended to reduce California's long-term urban water demands. In 2001, the CLWA Board approved signing the CUWCC's MOU on behalf of both the wholesale and retail service areas (CLWA and SCWD), thus meeting one of the recommendations of the 2000 UWMP. Los Angeles County signed the MOU prior to the 2000 UWMP on behalf of all its Waterworks Districts; NCWD signed the MOU on its own behalf in September 2002 and VWC signed in 2006. In 2009, the CUWCC changed its policy to specify that each signatory had to join individually and that a wholesaler could no longer be a signatory on behalf of its retailers. SCWD therefore signed the MOU independently in 2011. In the CLWA service area, demand management is addressed at both the local (retail agency) and regional (Santa Clarita Valley-wide) levels.

In 2007, VWC coordinated the development and execution of a MOU with CLWA and the other retail water purveyors that led to the preparation of the Santa Clarita Valley Water Use Efficiency Strategic Plan (2008 SCVWUESP). The purpose of the effort was to prepare a comprehensive long-term conservation plan for the Santa Clarita Valley by adopting objectives, policies and programs designed to promote proven and cost-effective conservation practices. The preparation of the 2008 SCVWUESP included input from stakeholders and the community at large and was completed in 2008. The 2008 SCVWUESP provided a detailed study of residential and commercial water use, and recommended programs designed to reduce overall Valley-wide water demand by ten percent by 2030. Following the completion of the 2008 SCVWUESP, Senate Bill SBX7-7 was passed in November 2009. SBX7-7 included requirements for reductions in per capita water use by 2020 of 20 percent which exceeded the targets outlined in the 2008 SCVWUESP.

While previous editions of this report referenced the CUWCC Best Management Practices (BMPs), the CUWCC no longer exists and implementation of the BMPs are no longer required. In late 2016, it was reorganized into the California Water Efficiency Partnership, and it is anticipated that the new organization will provide assistance to the water industry to help meet the goals established in SBX7-7.

5.2 Recent Conservation Efforts

In 2015, an updated SCVWUESP was finalized that incorporated the SBX7-7 targeted reductions. The updated SCVWUESP was supported by a thorough economic analysis that will guide local water conservation efforts planned and implemented by CLWA and the Purveyors in the coming years. The economic analysis concluded that water conservation measures are more economically feasible as compared to the economic benefit of adding recycled water infrastructure in meeting a portion of future water demands. The SCVWUESP is consistent with CLWA's and the Purveyors Strategic Plan Objectives including:

- Ensure long-term average water supply meets current and future demand.
- Meet local water demands.
- Achieve the water conservation target of 20 percent per capita by 2020.

CLWA and the Purveyors are committed to a water conservation program that is composed of several conservation measures that will lower projected demand by 2020, similar to what has already been implemented over the past two decades. The conservation measures incorporate education, incentives, and conservation mandates among all the various customers present in the Valley. Some of these measures are summarized below by retail water purveyor.

In August 2014, the Santa Clarita Valley Water Committee declared a second phase of the Water Conservation Action Plan that formally recommended that local water retail agencies adopt the SWRCB Prohibitive Measures and Mandatory Outdoor Watering Restrictions, which provided restricted watering days for outdoor landscaping. This restriction was lifted in May 2016. The statewide water reduction mandate was modified to allow local agencies to evaluate their water supply using specific criteria established by the State Board. Local agencies were required to determine their own mandatory water restrictions. This allowed for the removal of restrictions on the number of days customers are able to water their landscapes. Additionally, and as a result of the water conservation measures described in the Water Conservation Action Plan, the SCV Family of Water Suppliers put forth a valley wide communication plan that included outreach efforts by both CLWA and the Purveyors.

As described in the 2015 UWMP, each retail purveyor must demonstrate SBX7-7 compliance by an interim 2015 Daily Per Capita Water Use Target. As summarized in **Table 5-1**, all purveyors met their 2015 Interim Water Use Target in addition to their 2020 Target.

Table 5-1: 20x2020 Compliance GPCD Targets and Current Purveyor Levels

Purveyor	Baseline[a]	2015 Target[a]	2020 Target[a]	Actual 2015	Actual 2016
LA36[b]	235	212	188	145	144
NCWD	238	214	190	156	157
SCWD	251	226	201	158	172
VWC	334	300	267	213	220
Valley-wide[c]	277	249	221	176	185

Source: Water Use Efficiency Strategic Plan (2015)

a. Targets are consistent with 2015 UWMP (2016). GPCD values represent potable per capita water use only and do not include any recycled water use. Recycled water is included in VWC total production and demand graphs. However, for potable GPCD calculations and associated GPCD graphs, recycled water is not included to allow for comparison with potable GPCD water use targets mandated per the definition provided in SB X7-7.

b. Since Los Angeles County Waterworks District 36 does not have 3,000 AF served or 3,000 connections, SB X7-7 does not apply.

c. Valley-wide GPCD values are based on a weighted average using population estimates for NCWD, SCWD, VWC and LACWD as reported in the 2015 UWMP. Though SB X7-7 does not apply to LACWD, the valley-wide GPCD calculation includes both water production and population from the LACWD service area to examine the regional water use.

2016 was the fifth consecutive calendar year of drought conditions for most of California, including the Santa Clarita Valley. On January 17, 2014, as a response to drought conditions, the Governor of the State of California declared a drought emergency and asked that all Californians take voluntary action to reduce their 2013 water use by 20%. In February 2014, the Santa Clarita Valley Family of Water Suppliers approved the Water Conservation Action Plan that provided a series of water conservation guidelines customers could implement to reduce their water use by 20%. In July 2014, the SWRCB adopted temporary emergency water conservation regulations that required water agencies to implement the actions of their water shortage contingency plans that imposed mandatory restrictions on outdoor irrigation of ornamental landscapes or turf with potable water and prohibited the following actions:

- the application of potable water to outdoor landscapes in a manner that causes runoff,
- the use of a hose that dispenses potable water to wash a motor vehicle, except where the hose is fitted with a shut-off nozzle,
- the application of potable water to driveways, sidewalks, and other hardscape,
- failure to repair a leak within 24 hours of detection or notification,
- irrigating lawns, turf, or vegetated areas during and within 48 hours following measurable rainfall and between the hours of 9:00 am to 5:00 pm,
- the use of potable water in a fountain or other decorative water feature except where the water is part of a recirculating system,
- Restaurants can only serve water to customers on request,
- Hotels must provide guests with the option of choosing not to have towels and linens laundered daily.

On May 9th, 2016 Governor Brown issued an Executive Order B-37-16, which modified the previous Executive Order calling for reductions in water use. Executive Order B-37-16 called for adjustments to be made to water conservation regulations through January 2017 in recognition of the differing water supply conditions across the state, discontinuing specific mandatory water conservation programs to voluntary efforts (Executive Department State of California).

5.3 Specific Conservation Efforts

CLWA and the retail water Purveyors have implemented a number of conservation programs to meet the requirements of the SCVWUESP MOU and SBX7-7 goals along with other measures to comply with emergency water conservation regulations. The CLWA and the retail water purveyors offer the following programs Valley-wide to residential and commercial customers:

- **Lawn Replacement Program (residential)** - Rebates are provided to residents in the form of a $2.00 per sq. ft. incentive for living grass to be removed. To qualify, projects must be for yards between 250 and 2500 sq. ft. Only front yards qualify for this program, irrigation must be converted to a drip system, and yards must have at least 50% plant coverage.
- **Turf Removal Program (commercial)** – A $2.00 per sq. ft. rebate is offered to commercial customers for turf removal for projects up to 25,000 sq. ft. per irrigation meter.
- **Weather Based Irrigation Controllers (WBIC) Rebate Program (commercial)** - Rebates are offered for smart weather-based irrigation systems at the rate of $25.00 per active station, up to the cost of the device. This is offered to home owner association, and parks and landscape maintenance districts in the CLWA service area.
- **Pool Cover Rebate Program (residential)** – Starting in 2017, residential customers will be offered rebates on pool covers.

In addition to the programs listed above, CLWA and the individual retail water purveyors offer additional water conservations programs described below.

5.3.1 Castaic Lake Water Agency

CLWA has the following conservation programs in addition to the ones listed above:

- **Weather Based Irrigation Controllers Program (residential) –** Free irrigation controllers with weather monitors are available with required online training.

5.3.2 Valencia Water Company

VWC's internal Water Conservation Plan originally drafted in 2013 provides incentive and rebate programs in addition to what is offered by the CLWA. The Water Conservation Plan provides a broad framework defining VWC's conservation policies as well as detailed conservation programs. The Water Conservation Plan is reviewed annually and updated every three years. The last update was in 2015. Notable VWC programs include:

- **Water SMART Allocation and Tiered Rates Program** –provides customized monthly water allocations based on each customer's specific indoor and outdoor water needs. Additionally, the Water SMART Allocation and Tiered Rates Program couples the water allocation with tiered rates by establishing pricing signals that encourage the efficient uses of water and incentives to reduce the inefficient, excessive and wasteful uses of water.
- **Residential Water Tune-Up Program** – offers residential customers a home water survey at no additional cost. A water use efficiency specialist will visit a customer's home and check for leaks, install water saving devices, and perform an irrigation system inspection. The specialist will also provide information pertaining to the Water SMART Allocation and Tiered Rates Program and additional conservation program opportunities.

- **Residential Water Efficiency Kit** – offers residential customers a free water efficiency kit that includes water efficient shower heads, bathroom faucet aerators, a hose nozzle, a replacement toilet flapper, leak detector dye tablet packs, and a flow rate bag with instructions.
- **HELIUM Rebates (High Efficiency Landscape Irrigation Upgrade Measures)** – provides customers with rebates and incentives for High Efficiency ("HE") irrigation improvements. Currently, VWC offers free nozzles rebates for converting spray irrigation to drip irrigation systems, via the www.freesprinklernozzles.com program and 50% rebates for the eligible HE nozzles, pressure regulated bodies, or master pressure regulation devices.
- **Water SMART Irrigation and Garden Care Workshops** – provides customers with a $20 credit for attending the workshop. The Workshop provides information on easy-to-implement, no cost, solutions for improved irrigation efficiency. Topics include watering to the weather, cycle and soak irrigation scheduling, and when, where, and how to use Drip Irrigation.
- **High Consumption Notification Program** – provides courtesy letters to customers with water consumption significantly greater than their monthly Water SMART Allocation. The letter informs customers that there are solutions available to assist them with their water conservation goals. Customers receiving the High Consumption Notification letter are encouraged to participate in the Residential Tune-Up Program.
- **Water Conservation Works Program** – for commercial customers, VWC offers free facility surveys, rebates for HE plumbing and landscape irrigation retrofits.

5.3.3 Santa Clarita Water Division

SCWD developed a specific Santa Clarita Water Division Water Use Efficiency Strategic Plan in 2012. In this plan and the recent SCVWUESP, SCWD recognized the need to implement additional conservation measures that could accelerate savings in the SCWD service area. Both plans identified the elements and processes to promote conservation and further complement the SCVWUESP. Furthermore, SCWD uses multiple communication tools including social media sites, bill messages, monthly newsletters, robocalls, and bill inserts to update customers on water conservation. SCWD participates in multiple public outreach events every year to promote water conservation and has implemented the following programs to encourage customers to reduce water usage:

- **Free Sprinkler Nozzle Program** - both residential and commercial customers can apply to receive free high efficiency sprinkler nozzles.
- **Drip Program** - SCWD offers both residential and commercial customers a $0.25/sf rebate for installing drip irrigation systems.
- **Conservation Products** - SCWD distributes free efficient water use products like drip kits, faucet aerators, showerheads, and spray nozzles.
- **Water Audits and Budgets** - SCWD completed water audits and updated landscape water budgets for twenty large users.

5.3.4 Newhall County Water District

NCWD has taken a number of steps to comply with SBX7-7 and help NCWD customers efficiently use water which meets the requirements of the SCVWUESP. NCWD participates in multiple public outreach events every year promoting water use efficiency within the community and has implemented a variety of programs. These programs include the following:

- **Residential Sprinkler Nozzle Program** - provides rebates to customers who replace standard irrigation spray nozzles with high efficiency nozzles.
- **Customized Water Efficiency Program** – provides rebates to customers who demonstrate a process or product that conserves water.
- **Water Efficiency Target (W.E.T.) Program** – provides customers a customized water usage "target" each month through their water bill to measure against their actual usage. If their usage is over their W.E.T., there will be various programs and opportunities for the customer to identify ways to reduce their usage and meet their target.

5.3.5 Los Angeles County Waterworks District 36

Residential customers are offered rebates on water-saving devices such as efficient clothes washers and weather-based irrigation controllers.

5.4 2016 Water Use

In 2016, there was an increase in water consumption in the Santa Clarita Valley compared to 2015 levels. This was likely due to the lifting of state-mandated conservation targets to voluntary efforts.

Although more water was consumed in 2016 compared to 2015, the use (12,183 af or 3.9 billion gallons) was less than the amount of water used in 2013. 2016 water use was approximately a 24 percent reduction compared to 2013 levels which the State of California has used as the baseline year in the emergency water conservation regulations. The breakdown of water savings by individual purveyor included:

- VWC - 7,960 ac-ft (2,593 million gallons)
- SCWD – 1,902 ac-ft (619 million gallons)
- NCWD – 1,398 ac-ft (452 million gallons)
- LAC36 – 483 ac-ft (157 million gallons)

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