S Wells PFAS Groundwater Treatment and Disinfection Facility Project

Final Initial Study – Mitigated Negative Declaration

prepared by

Santa Clarita Valley Water Agency
26521 Summit Circle
Santa Clarita, California 91350
Contact: Orlando Moreno, P.E., Senior Engineer

prepared with the assistance of

Rincon Consultants, Inc.
250 East 1st Street, Suite 1400
Los Angeles, California 90012

June 2023

RINCON CONSULTANTS, INC.
Environmental Scientists | Planners | Engineers
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Initial Study

1. Project Title

S Wells PFAS Groundwater Treatment and Disinfection Facility Project

2. Lead Agency Name and Address

Santa Clarita Valley Water Agency
26521 Summit Circle
Santa Clarita, California 91350

3. Contact Person and Phone Number

Orlando Moreno, P.E., Senior Engineer
(661) 705-7253

4. Project Location

The project site is comprised of three existing well locations (Wells S6, S7, and S8); the proposed Well S9 and treatment/disinfection facility; three locations of proposed pipeline alignments; the location of proposed roundabout improvements, and the location of the proposed construction staging and laydown area. Each of these locations is described in detail in Table 1. See Figure 1 for a map of the regional project location and Figure 2 for a map of the project site location in a local context. Figure 3 shows site photographs of the existing site and facilities. Access to the project site is provided primarily via Bridgeport Lane.

5. Project Sponsor's Name and Address

Santa Clarita Valley Water Agency
26521 Summit Circle
Santa Clarita, California 91350

6. General Plan Designation

Specific Plan (North Valencia Specific Plan)

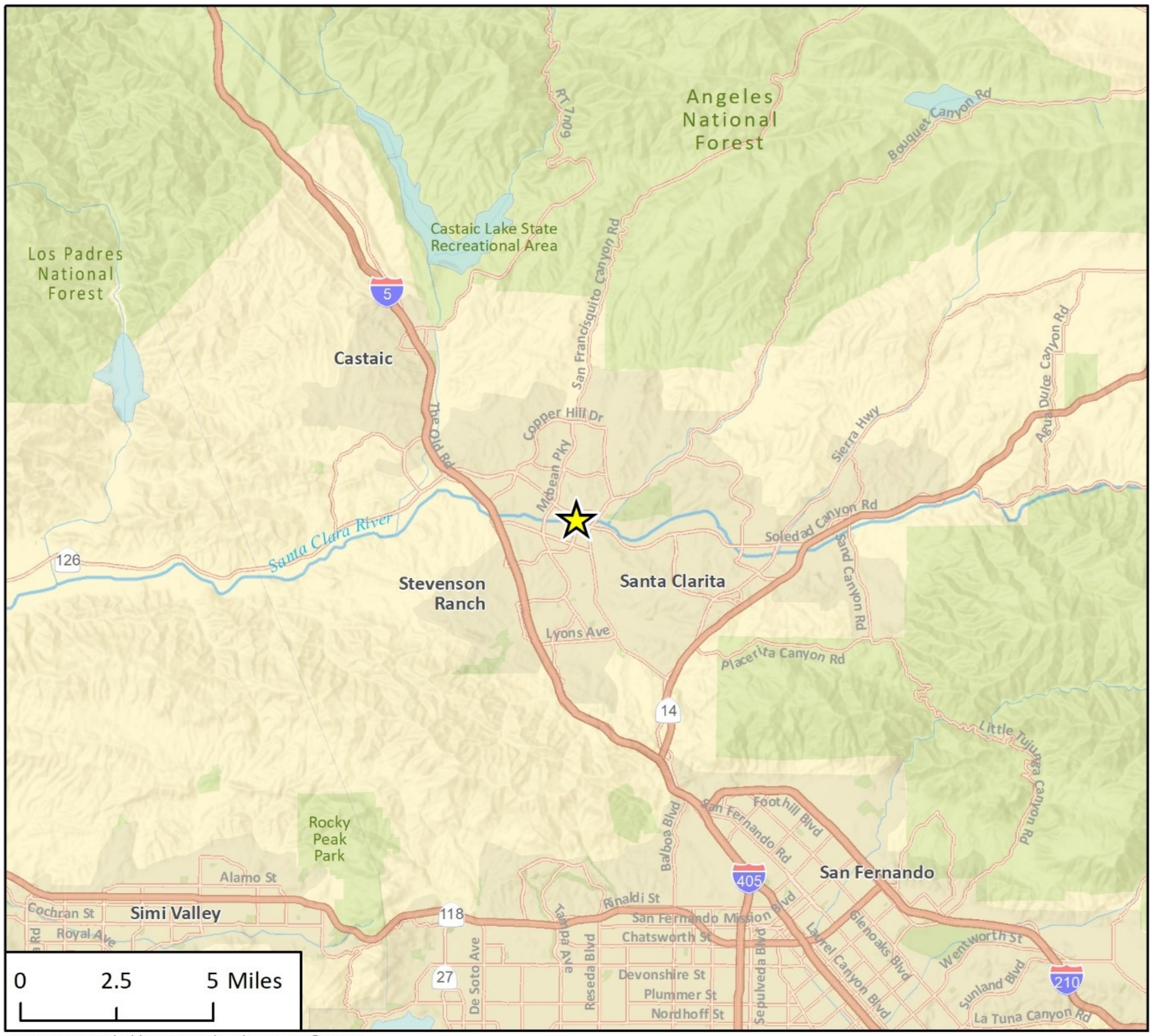
7. Zoning

Specific Plan-Open Space (North Valencia Specific Plan)

Table 1 Project Component Location Details

Project Component	Assessor's Parcel Numbers (APN)	Description
Existing Wells S6, S7, and S8	2811-073-001, 2811-065-014, and 2811-065-015	Three existing groundwater wells and appurtenant equipment sites owned by SCV Water.
New Well S9 and Treatment and Disinfection Facility	2811-065-912	A 3.26-acre parcel located along Bridgeport Lane and south of Bridgeport Park. Consists of open space land and is owned by the City of Santa Clarita.
Pipeline Interconnection Alignment	2811-071-901	An approximately 830-foot-long linear area that runs north/south through Bridgeport Lane and Bridgeport Park between the project site and the westbound lane of Newhall Ranch Road. Consists of a roadway and a grass field.
Well S8 Influent Pipeline Alignment	2811-065-015	An approximately 400-foot-long linear area that runs primarily east/west along the northern half of the existing Santa Clara River Trail from the western boundary of the project site to the existing Well S8 location. Consists of an existing multi-use bicycle and pedestrian path.
Well S7 Storm Drain Pipeline Alignment	2811-065-014	An approximately 840-foot-long linear area that runs primarily east/west along the southern half of the existing Santa Clara River Trail from a point south of the Bridgeport Lane/Bayside Lane intersection to the existing Well S7 location. Consists of an existing multi-use bicycle and pedestrian path.
Roundabout Improvements	Public right-of-way	Consists of two existing roadway roundabout features at the intersections of Parkwood Lane/Bridgeport Lane and Bayside Lane/Bridgeport Lane at the edge of a residential neighborhood.
Construction Staging and Laydown Area	2811-065-912, 2811-001-284, and 2811-066-902	Consists of undeveloped, disturbed land immediately east of the proposed site for Well S9 and treatment and disinfection facility.

Figure 1 Regional Project Location



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Project Location

N

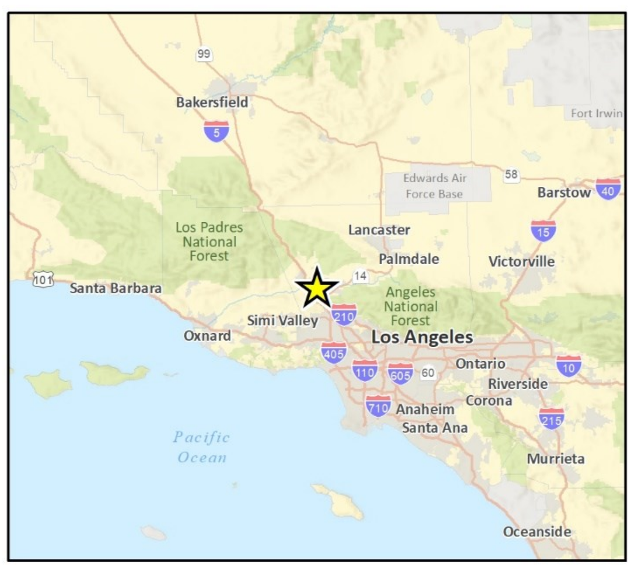

Figure 2 Project Site Location

Imagery provided by Microsoft Bing and its licensors © 2022.

Figure 3 Representative Site Photographs

Photograph 1. Bridgeport Park, view from the southeast.

Photograph 2. Proposed treatment and disinfection facility site, view from the northeast.

Photograph 3. Existing S6 well enclosure, view from the west.

Photograph 4. View of Santa Clara River Trail near location of proposed Well S7 storm drain pipeline alignment, view from the west.

8. Description of Project

Background

Santa Clara River Valley East Groundwater Subbasin Groundwater Sustainability Plan

The Santa Clarita Valley Water Agency (SCV Water) operates numerous groundwater extraction wells in the Upper Santa Clara River Groundwater Basin (Basin). The Basin is roughly 100 square miles in size and contains a shallow alluvial aquifer and the deeper Saugus Formation with groundwater extracted from both aquifers. For decades, SCV Water's 2003 Groundwater Management Plan and Urban Water Management Plans described the planned approach to pump groundwater from the Basin to provide groundwater supply as part of an overall conjunctive use strategy that includes use of imported supplies. More recently, due to statewide regulatory efforts, state-required Groundwater Sustainability Agencies were formed to develop Groundwater Sustainability Plans.

The Santa Clarita Valley Groundwater Sustainability Agency (SCV GSA) is operated via a Joint Powers Agreement between the following member agencies: the City of Santa Clarita, Los Angeles County Regional Planning, Los Angeles County Waterworks District No. 36, and SCV Water. Its Board meets quarterly. SCV Water provides administrative services to the SCV GSA, which include the Basin monitoring called for in the Santa Clara River Valley East Groundwater Subbasin Groundwater Sustainability Plan (GSP) (including groundwater-dependent ecosystem [GDE] monitoring), preparation of regular reports on Basin conditions, and preparation of an annual report.

After a robust public process, the SCV GSA adopted the GSP in 2022. The GSP adhered to the pumping plan approaches in the Urban Water Management Plan and determined the Basin can be operated sustainably over the long term in conjunction with specialized monitoring. The GSP concludes that, with the evaluated groundwater pumping plan, any changes to future non-storm surface water flows out of the Basin will not be substantially different from historic non-storm flows (SCV GSA 2022). Groundwater pumping conducted in a manner that is consistent with GSP modeling assumptions would not be expected to result in any significant direct or indirect changes to streamflow. In the event GSP sustainable management criteria (e.g., groundwater elevations) are not met due to groundwater extraction, the GPS contains management actions that must be implemented to address the issue.

Development of the GSP included use of a peer-reviewed groundwater flowmodel and considered well-by-well pumping for all municipal wells during different local hydrologic periods. This well-by well-pumping approach was consistent with the pumping approaches in the Urban Water Management Plan. Going a step further, groundwater extraction by well was finetuned in the GSP in order to maintain groundwater elevations in the entire Basin to safeguard against creating "undesirable results" related to five sustainability indicators: Chronic Lowering of Groundwater Levels, Chronic Reduction in Groundwater Storage, Degraded Groundwater Quality, Land Subsidence, and Depletion of Interconnected Surface Water. As described below, there are special criteria for the Santa Clara River related to GDEs.

More specifically, the GSP identifies "undesirable results" to GDEs as follows:

- Permanent loss or significant degradation of existing native riparian or aquatic habitat due to lowered groundwater levels caused by groundwater pumping throughout the GDE area

- In areas that currently provide essential habitat to unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*; UTS) and native fishes (sensitive aquatic species in the vicinity of the Interstate 5 Bridge), cessation of surface flow and pools during low-flow conditions in the river channel caused by groundwater extraction is an undesirable result

For the "Depletion of Interconnected Surface Water" Sustainability Indicator, the GSP sets forth a minimum threshold groundwater level to protect against surface water depletion caused by groundwater extraction. In addition, the GDE trigger level was established two feet higher than the minimum threshold groundwater level at and upstream from Interstate 5. If the GDE trigger level is reached, the SCV GSA is required to conduct an assessment of the GDE condition and determine if the GDE is experiencing undesirable results due to lowered groundwater levels beyond minimum thresholds, caused by groundwater extraction. During GSP implementation, and as data gaps are filled and studies completed, the sustainable management criteria in the GSP, including GDE trigger levels, and minimum thresholds may be revised by the SCV GSA Board of Directors.

The GSP is designed so that if it is determined that "undesirable results" to GDEs may occur due to groundwater pumping, then "management actions" will be implemented, which could include reducing groundwater pumping in areas of concern and/or importing additional water supplies to offset groundwater pumping.

Additionally, the GSP recognizes that UTS have been present in the Santa Clara River approximately two miles west of the project site near Interstate 5 (near the GDE-B monitoring well). The well-by-well pumping approaches, the specialized monitoring, and the GDE evaluation program mentioned above work together to protect against undesirable results from groundwater extraction, including cessation of surface flow and pools during low-flow conditions in the river channel, at this downstream location that currently provides essential habitat for UTS.

Furthermore, the GSP recognizes that the GDE-A area near the project site may not be a GDE and indicates more monitoring is needed to support a final determination. This observation that the GDE-A area may not be a GDE was made by others during GSP development, including the California Department of Fish and Wildlife (CDFW) because the groundwater elevations near GDE-A have been recorded to be 30 or more feet below ground surface (SCV GSA 2022). For example, in summer 2022, the groundwater elevation was approximately 35 feet below ground surface, and historical records at nearby well N indicate the historical low is deeper still (SCV GSA 2022 and 2023). The structure of the alluvial aquifer system along the Santa Clara River allows for groundwater depths to be deep at GDE-A, while at the same time relatively shallow at GDE-B. The geology and groundwater conditions at GDE-B (approximately two miles downstream of the project site), where UTS are known to be present, are different than at GDE-A because the groundwater is shallower, and alluvium thinner, at the downstream GDE-B (depth to groundwater at GDE-B measured at approximately 7 to 8 feet below ground surface during 2022) while depth to groundwater at GDE-A was measured at approximately 32 to 35 feet below ground surface on same day during 2022) (SCV GSA 2023).

The SCV GSA is in its second year of GSP implementation. Consistent with the public process and GSP, it is working toward filling known data gaps, including those regarding GDEs. As these data gaps are filled, such as with collection of new empirical groundwater elevation data in and near the Santa Clara River (including groundwater monitoring at GDE-A near the project site), the GSP's groundwater flowmodel and flowmodel calibration will be further refined and improved in a collective effort to avoid negative impacts to GDEs from groundwater extraction.

Project Background

~~The Santa Clarita Valley Water Agency (~~SCV Water~~)~~ operates 3 existing wells (S6, S7 and S8), a bank of S wells, located along the north side of the Santa Clara River between McBean Parkway and Parkwood Lane within the Bridgeport community in the city of Santa Clarita. The three wells can generate up to a total of 6,000 gallons per minute of potable water that is distributed to the Valencia Division service area. The well-by-well GSP modeling currently identifies this bank of S wells can produce up to 4,288 acre-feet per year (depending on hydrologic year type) without resulting in adverse impacts to sustainable groundwater management. The wells were taken offline in 2019 and 2020 due to the detection of per- and polyfluoroalkyl (PFAS) substances that exceeded the State's response levels. To make up for the loss of groundwater production, SCV Water has relied on the purchase of additional imported water supplies to meet local demand.

Project Description

The S Wells PFAS Groundwater Treatment and Disinfection Facility Project (herein referred to as "proposed project" or "project") involves construction of a PFAS groundwater treatment and disinfection facility and associated pipelines. The proposed facility would restore the use of Wells S6, S7 and S8 and would reduce SCV Water's dependency on imported water. In addition, a new groundwater well (S9) and a chloramine disinfection building would be constructed. The new S9 well would produce an additional 1,000 gallons per minute of potable water that would also be filtered through the proposed PFAS treatment system before distribution to SCV Water customers. The new Well S9 would serve as a replacement for the existing Mitchell 5A Well that is being abandoned by a private developer as part of the Vista Canyon Plaza Development; therefore, the new Well S9 would not result in a net increase in SCV Water's overall annual basin-wide groundwater extraction levels.

Groundwater Treatment and Disinfection Facility and Well S9

Components of the proposed groundwater treatment and disinfection facility would include up to eight ion-exchange vessels approximately 15 feet in height, a new S9 groundwater well head, control panels, a pre-filter station, a one-story chloramine disinfection building, piping, and appurtenances. The facility would be enclosed with an up to approximately 15-foot-high decorative wall and architectural paneling to screen the treatment vessels and improvements. Vehicular access to the site would be provided by two 30-foot-wide driveways with motorized gates along Bridgeport Lane. For additional security, the pedestrian doors at the facility would be equipped with a key fob system. The project also includes installation of an underground 12-inch drainage pipeline connection between the proposed treatment and disinfection facility and the existing 30-inch drainage outlet pipeline that is located along the eastern portion of the treatment and disinfection facility location. The proposed drainage pipeline would collect and convey on-site stormwater runoff as well as groundwater produced during periodic installation and water quality testing of new resin media in the treatment vessels to the existing storm drain pipeline to the east of the site, which ultimately outlets to the Santa Clara River approximately 135 feet south of the project site. In addition, the facility may include a bench or bicycle pull-out along the Santa Clara River Trail that includes signage with information on the proposed groundwater treatment and disinfection facility.

Pipelines

The project would include the installation of three pipelines. The first pipeline would consist of approximately 850 linear feet of water pipeline that would extend from the groundwater treatment and disinfection facility north through Bridgeport Park to an interconnection with SCV Water's existing distribution system in Newhall Ranch Road. The second pipeline would consist of approximately 400 linear feet of water pipeline installed primarily east/west immediately north of the existing Santa Clara River Trail from the western boundary of the project site to the existing Well S8 location. The pipeline would proceed west from the groundwater treatment and disinfection facility to Well S8 and would convey raw water flows from Wells S6, S7, and S8 to the proposed groundwater treatment and disinfection facility. The third pipeline would consist of approximately 840 linear feet of storm drain pipeline installed primarily east/west along the southern half of the existing Santa Clara River Trail from a point south of the Bridgeport Lane/Bayside Lane intersection to the existing Well S7 location. This pipeline would convey stormwater flows and pumped groundwater that currently sheet flow from the site to an existing 30-inch stormwater drain pipeline that ultimately outlets to the river. This discharge would be covered under SCV Water's existing Statewide General Permit for Drinking Water System Discharges to the Waters of the United States No 4DW0768. The Santa Clara River Trail would be restored to its existing condition or better upon completion of construction.

Existing Well Improvements

The project includes improvements, such as submersible pump replacement and electrical panel upgrades, at the existing Wells S6, S7, and S8. All work would be completed within the existing, fenced facility footprints for these wells in previously disturbed areas with the exception of Well S6 where minor piping improvements would be conducted in landscaped areas immediately north of the well site. No new noise-generating equipment would be installed. Shrubs and ground cover would be removed as needed during installation of these improvements, but no trees would be altered or removed. Landscaping would be replaced with new planting upon completion of construction activities.

Roundabout Improvements

The project would include street and curb improvements to two roundabouts located at the intersection of Parkwood Lane/Bridgeport Lane and Bayside Lane/Bridgeport Lane to accommodate periodic site access by large trucks during construction and various midsize delivery trucks and semitrucks during operation. The improvements would primarily consist of reducing the radius of the center circle and median bulbs at each roundabout.

Construction

Construction of the proposed project would occur between April 2024 and October 2025.[1] Construction activities would typically occur between 7:00 a.m. and 7:00 p.m., Monday through Friday. For the proposed Well S9, two, non-consecutive three-week periods of 24-hour construction activities would be required, one for initial pilot borehole drilling and testing and one for installation of final casing. Temporary construction lighting during well drilling activities would be shielded and directed downwards away from nearby residences.

The maximum depth of excavation would be nine feet for project components within the proposed groundwater treatment and disinfection facility with the exception of Well S9, which would be drilled to a depth of approximately 250 feet with a borehole up to approximately 36 inches in diameter. All pipelines outside the groundwater treatment and disinfection facility would have a

[1] At this time, the schedule for construction of Well S9 is uncertain due to funding considerations. However, for the purposes of this analysis, it is conservatively assumed that Well S9 would be constructed simultaneously with the groundwater treatment and disinfection facility because simultaneous construction would result in higher daily air pollutant emission levels and noise levels.

maximum depth of excavation of 5.5 feet. Improvements to existing wells and the roundabout would only require surficial ground disturbance, if any. Approximately 3,000 cubic yards (cy) of soil would be imported to the site, and approximately 3,500 cy of soil would be exported from the site. Soil would be transported using haul trucks with capacities of 10 cubic yards, and exported soil would be disposed of at the Chiquita Canyon Landfill or other local landfill. If temporary lane or road closures are needed during the proposed roundabout improvements, signage and traffic control measures would be implemented, including a flag person to direct traffic flows.

Temporary closure of one lane of the Santa Clara River Trail may be necessary during construction of pipelines near the trail, and this lane would be resurfaced upon completion of construction activities if damage from construction equipment occurs. In addition, in order to maintain cyclists' access and safety along the bike trail immediately south of the project site, construction fencing would be placed along the southern edge of the project site, and signage notifying trail users of ongoing construction activities would be posted along the path. In addition, to minimize impacts to users of Bridgeport Park, the construction work area through the park would be fenced, and the pipeline would be constructed in segments with any exposed trenches covered with plate when construction activities are not occurring. SCV Water would also implement the following best management practices (BMPs) during project construction activities to minimize conflicts with recreational usage of Bridgeport Park and the Santa Clara River Trail:

- Construction activities within Bridgeport Park would be limited to hours outside peak recreational hours to the extent feasible (i.e., limit work to the hours of 7:00 a.m. to 3:00 p.m. on weekdays with no work occurring on weekends).
- Overnight construction staging and materials laydown would not occur in Bridgeport Park or its parking lot.
- Construction workers would be prohibited from parking in the parking lot for Bridgeport Park.
- Residences within 1,000 feet of Bridgeport Park, residences within 1,000 feet of the segments of the Santa Clara River Trail that would be affected by project construction, Bridgeport Elementary School, and recreational sports organizations that utilize Bridgeport Park would be notified of upcoming construction activities affecting Bridgeport Park and the Santa Clara River Trail. The notification would include an approximate construction timeframe for these activities, a details on any planned closures or disruptions to recreational users, and a summary of project measures that will be implemented to protect recreational users (e.g., fencing, signage, detours).

Construction materials would be staged on a dirt lot directly east of the project site. Construction personnel would park along Bridgeport Lane and the staging area. An average of 10 to 20 construction workers would be on site on any given day. Delivery and haul trucks would access the site from Newhall Ranch Road either by using Parkwood Lane and Bridgeport Lane or by traveling along the maintenance road that runs along the eastern edge of Bridgeport Park.

Ten trees are proposed for removal to accommodate the proposed project, including one coast live oak (*Quercus agrifolia*), five London plane (*Platanus acerifolia*), and four western sycamore (*Platanus racemosa*), all of which are located at the site of the proposed groundwater treatment and disinfection facility. Minor utility relocations within the project site boundaries may be required for irrigation lines and electrical conduits that supply the irrigation controllers.

Operation and Maintenance

Under the proposed project, Wells S6, S7, and S8 would be reactivated, and the proposed S9 groundwater well would be brought online. The wells and treatment facility would operate up to 24 hours per day, 365 days per year. The four well pumps would be individually controlled and monitored through supervisory control and data acquisition (SCADA), allowing SCV Water to turn on any combination of one to four well pumps at a time. It is anticipated that approximately 2,700 to 4,288 acre-feet per year of groundwater would be pumped, depending on hydrologic year type. Annual groundwater pumping rates under this project for the four wells would be consistent with historical pumping rates for the existing three wells - S6, S7, and S8 - and would not exceed the pumping quantities provided in the groundwater level simulations used in the GSP. Through consistent monitoring of groundwater levels at SCV Water's new monitoring wells in the local area, pumping rates will be adjusted as needed to prevent adverse impacts to downstream GDEs consistent with the GSP monitoring program. Operation of the proposed project would require approximately 2,300 to 2,700 kilowatt-hours (kWh) of electricity daily, or approximately 840 to 986 megawatt-hours (MWh) annually.[2] Approximately one to two maintenance staff would visit the project site daily. Resin media would be replaced two to three times a year, which would require the use of a semitruck for delivery. In addition, chemical deliveries to the proposed disinfection building would occur approximately twice a month via a midsize delivery truck. Maintenance vehicles would park within the proposed groundwater treatment and disinfection facility. The vessels would have a life expectancy of approximately 30 to 50 years and may be re-coated approximately every 10 years.

Lighting would be provided within the enclosed facility and would be set on a timer controlled at the entrance of the project site. Sodium hypochlorite (chlorine) and liquid ammonium sulfate would be stored at the proposed facility in a completely enclosed structure with proper containment and venting. Sodium hypochlorite is a liquid disinfection agent added to the water and is commonly referred to as "bleach." Sodium hypochlorite is not the equivalent of chlorine gas, and chlorine gas would not be used or released during project operation. The chemicals stored on site would not be considered hazardous due to low concentrations of ammonia and chlorine. However, in accordance with standard operating practice, SCV Water would submit an emergency response/contingency plan as part of a Hazardous Materials Business Plan to the California Environmental Reporting System for the proposed facility.

9. Surrounding Land Uses and Setting

Surrounding land uses in the project site vicinity include Bridgeport Elementary School to the west; Bridgeport Park to the west, east, and north; the Santa Clara River to the south; residential development to the east; and undeveloped disturbed/landscaped areas to the west and east.

10. Other Public Agencies Whose Approval is Required

SCV Water is the lead agency for this project. Because the proposed project is located in an area designated as Open Space by the North Valencia Specific Plan, the project would require a permit from the Santa Clarita City Manager prior to any vegetation removal (Santa Clarita Municipal Code Section 14.10.060). According to Government Code Section 53091, building and zoning ordinances of a county or city shall not apply to the location or construction of facilities for the production,

2 Electricity estimate based on 12-month billing period for a similar SCV Water groundwater treatment and disinfection facility for the N Wells (Moreno 2022).

generation, storage, treatment, or transmission of water. As such, the project would not be subject to the City's building and zoning ordinances (Santa Clarita Municipal Code Titles 17 and 18), which include the City's oak tree preservation ordinance. However, SCV Water would voluntarily comply with the City's oak tree preservation ordinance during implementation of the proposed project. SCV Water would also obtain a Parkway Tree Permit pursuant to the City's Parkway Trees Ordinance for removal of western sycamore and London plane trees. In addition, the State Water Resources Control Board, Division of Drinking Water would be a responsible agency for the proposed project because the project would require a water supply permit amendment.

Environmental Factors Potentially Affected

This project would potentially affect the environmental factors checked below, involving at least one impact that is “Potentially Significant” or “Less than Significant with Mitigation Incorporated” as indicated by the checklist on the following pages.

☐ Aesthetics	☐ Agriculture and Forestry Resources	☐ Air Quality
■ Biological Resources	■ Cultural Resources	☐ Energy
■ Geology/Soils	☐ Greenhouse Gas Emissions	■ Hazards & Hazardous Materials
■ Hydrology/Water Quality	■ Land Use/Planning	☐ Mineral Resources
■ Noise	☐ Population/Housing	☐ Public Services
☐ Recreation	■ Transportation	■ Tribal Cultural Resources
☐ Utilities/Service Systems	■ Wildfire	■ Mandatory Findings of Significance

Determination

Based on this initial evaluation:

☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

■ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions to the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☐ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the proposed project MAY have a “potentially significant impact” or “less than significant with mitigation incorporated” impact on the environment, but at least one effect (1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and (2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potential significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Rick Vasilopulos	11/15/2022
Signature	Date
Rick Vasilopulos	Water Resources Planner
Printed Name	Title

Environmental Checklist

1 Aesthetics

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Except as provided in Public Resources Code Section 21099, would the project:				
a. Have a substantial adverse effect on a scenic vista?	□	□	■	□
b. Substantially damage scenic resources, including but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	□	□	□	■
c. In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from a publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	□	□	■	□
d. Create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area?	□	□	■	□

a. Would the project have a substantial adverse effect on a scenic vista?

According to the City of Santa Clarita's General Plan Conservation and Open Space Element, scenic vistas (termed "viewsheds") are defined by defined by physical features that frame the boundaries or context of one or more scenic resources and may include views of both natural and built environments. The City defines "scenic resources" as natural open spaces, topographic formations, and landscapes that contribute to a high level of visual quality, including lakes, rivers and streams, mountain meadows, oak woodlands, parks, trails, nature preserves, sculpture gardens, and similar features (City of Santa Clarita 2011). The project site is adjacent to the Santa Clara River, which may be considered a scenic vista under the City's General Plan. Distant views of the Santa Susana Mountains to the south are also visible from the project site vicinity.

Public views of the Santa Clara River and the Santa Susana Mountains are primarily visible to motorists on Bridgeport Lane and users of Bridgeport Park and the Santa Clara River Trail. Views of these features seen by motorists on Bridgeport Lane and users of Bridgeport Park are limited and intermittent due to topography and intervening vegetation.

The project would not obscure the views of the Santa Clara River and Santa Susana Mountains from the Santa Clara River Trail because these features are located to the south of the trail and the proposed facilities would be located on the north side of the trail. The proposed groundwater treatment and disinfection facility would include components approximately 15 feet in height and would be enclosed with an up to approximately 15-foot-high decorative wall and architectural paneling to screen the treatment vessels and improvements along with landscaping. This project component would reduce public views of the Santa Clara River and Santa Susana Mountains as seen from Bridgeport Lane and Bridgeport Park. However, existing views of both are already limited by existing vegetation and topography. Furthermore, views of these features would remain available and readily accessible to the public from the Santa Clara River Trail, located immediately south of the proposed facilities. Other project components such as improvements to Wells S6, S7, and S8 and the roundabouts as well as installation of belowground pipelines would have no potential to interfere with scenic vistas given the change in existing conditions would be minimal upon the completion of construction. Therefore, the project would not have a substantial adverse effect on a scenic vista, and impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

b. Would the project substantially damage scenic resources, including but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

According to California Department of Transportation (Caltrans), there are no officially designated State scenic highways within the vicinity of the project site (Caltrans 2018). The nearest eligible State scenic highway is State Route (SR) 2 (Angeles Crest Highway), approximately 24 miles southeast of the project site. Due to the distance between SR 2 and the project site, the project would not be visible from this highway. Therefore, no impact to scenic resources within view of a state scenic highway would occur.

NO IMPACT

c. Would the project, in non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from a publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?

According to Public Resources Code Section 21071(a), Santa Clarita is classified as an urbanized area because its population is more than 100,000 persons (United States Census Bureau 2021). The project site is zoned as Specific Plan-Open Space (North Valencia Specific Plan). According to Government Code Section 53091, building and zoning ordinances of a county or city shall not apply to the location or construction of facilities for the production, generation, storage, treatment, or transmission of water. As such, the project would not be subject to the City's building and zoning ordinances (Santa Clarita Municipal Code Titles 17 and 18). Although the project would be required to obtain a permit from the Santa Clarita City Manager prior to any vegetation removal (Santa Clarita Municipal Code Section 14.10.060), this permit does not specifically relate to scenic quality. Therefore, the primary regulations governing scenic quality applicable to the project site are contained in the City's General Plan Conservation and Open Space Element.

The project would not alter the scenic character of local topographic features, view corridors, major water bodies, oak woodlands, coastal sage, or views from designated routes, gateways, and vista points along roadways because none are present at or near the project site. Therefore, the project would be consistent with Objectives CO 6.1 through 6.5 in the City's General Plan Conservation and Open Space Element. Furthermore, pursuant to Objective CO 6.6 and its related policies in the City's General Plan Conservation and Open Space Element, the project would not result in significant adverse impacts to the scenic environment related to lighting (discussed under threshold [d] below), air pollution (discussed in Section 3, *Air Quality*), billboards, scenic viewpoints or viewsheds (discussed under threshold [a] above), and aboveground utility lines (City of Santa Clarita 2011). Therefore, the project would not conflict with applicable zoning and other regulations governing scenic quality. Impacts would be less than significant.

Although not required under CEQA due to the project's location in an urbanized area, the following discussion on project impacts to the existing visual character and quality of public views of the project site and its surroundings is provided for informational purposes and public disclosure. Public views of the project site and its surroundings are primarily visible to motorists on Bridgeport Lane and users of Bridgeport Park and the Santa Clara River Trail. The project would change the existing visual character of the groundwater treatment and disinfection facility parcel from landscaped open space to an enclosed treatment facility. However, the proposed facility would be designed to blend with the existing landscaping and surroundings by utilizing decorative walls, architectural paneling, and landscaping to screen the facility. As noted under item (a), this project component would reduce public views of the surrounding area, which includes views of the Santa Clara River and Santa Susana Mountains as seen from Bridgeport Lane and Bridgeport Park. However, existing views of both are already limited by existing vegetation and topography. Furthermore, views of these features would remain available and readily accessible to the public from the Santa Clara River Trail, located immediately south of the proposed facilities. Other project components such as improvements to Wells S6, S7, and S8 and the roundabouts as well as installation of belowground pipelines would not alter the existing visual character and quality given the change in existing conditions would be minimal upon the completion of construction.

LESS THAN SIGNIFICANT IMPACT

d. Would the project create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area?

Project construction would occur primarily during daytime hours and generally would not require the use of lighting. Nighttime lighting would be temporarily and intermittently used over the course two non-consecutive three-week periods during initial pilot borehole drilling and testing and installation of final casing. In addition, construction lighting may be required during the early morning hours in winter months. As described under, *Description of Project*, lighting would be aimed downward and directed away from residences. In addition, nighttime construction would be temporary and intermittent, lasting approximately six weeks in total. Furthermore, construction would occur near existing street lighting located along Bridgeport Lane, which already provides a source of nighttime lighting in the project site vicinity. Consequently, temporary and short-term construction lighting would not constitute a substantial new light source with the potential to adversely affect nighttime views in the area. Therefore, construction activities would not create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the vicinity of the project site. Impacts would be less than significant.

Upon completion of construction, none of the proposed project components would produce glare. Lighting would be provided within the enclosed facility and would be set on a timer controlled at the entrance of the project site. The facility would primarily be accessed during daytime hours and would rarely be accessed at night (typically only during emergency situations), at which time the lighting would be utilized. Therefore, project operation would not create a new source of substantial light or glare that would adversely affect daytime or nighttime views. Impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

2 Agriculture and Forestry Resources

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	□	□	□	■
b. Conflict with existing zoning for agricultural use or a Williamson Act contract?	□	□	□	■
c. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)); timberland (as defined by Public Resources Code Section 4526); or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?	□	□	□	■
d. Result in the loss of forest land or conversion of forest land to non-forest use?	□	□	□	■
e. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?	□	□	□	■

a. Would the project convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?

b. Would the project conflict with existing zoning for agricultural use or a Williamson Act contract?

c. *Would the project conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)); timberland (as defined by Public Resources Code Section 4526); or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?*

d. *Would the project result in the loss of forest land or conversion of forest land to non-forest use?*

e. *Would the project involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?*

The project site is currently vacant and is zoned as Specific Plan-Open Space (North Valencia Specific Plan). According to the California Department of Conservation's (DOC) Farmland Mapping and Monitoring Program, the project site is designated as Urban and Built-Up Land and Other Land (DOC 2016. The project site is surrounded by Bridgeport Elementary School and open space to the west, the Santa Clara River to the south, residential development and open space to the east, and Bridgeport Park to the north. As such, the project would not convert land designated as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to non-agricultural use. The project site is not zoned for agricultural use, timberland or forest land; is not under a Williamson Act Contract; and does not contain forest land. The project site is not located adjacent to farmland or forestland; therefore, the project would not lead to the conversion of these types of land to non-agricultural or non-forest uses, respectively. Therefore, no impact to agriculture and forestry resources would occur.

NO IMPACT

3 Air Quality

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Conflict with or obstruct implementation of the applicable air quality plan?	□	□	□	■
b. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?	□	□	■	□
c. Expose sensitive receptors to substantial pollutant concentrations?	□	□	■	□
d. Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	□	□	■	□

Air Quality Standards and Attainment

The project site is located within the South Coast Air Basin (SCAB), which is bounded by the Pacific Ocean to the west and the San Gabriel, San Bernardino, and San Jacinto Mountains to the north and east, and includes all of Orange County and the non-desert portions of Los Angeles, Riverside, and San Bernardino Counties, in addition to the San Gorgonio Pass area in Riverside County. The SCAB is under the regulatory jurisdiction of the South Coast Air Quality Management District (SCAQMD), which is required to monitor air pollutant levels to ensure National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) are met and, if they are not met, to develop strategies to meet the standards.

Depending on whether the standards are met or exceeded, the SCAB is classified as being in "attainment" or "nonattainment" for air quality. The SCAB is in nonattainment for the NAAQS for ozone and particulate matter 2.5 microns or less in diameter ($PM_{2.5}$) and the CAAQS for ozone, particulate matter 10 microns or less in diameter (PM_{10}), and $PM_{2.5}$. The Los Angeles County portion of the SCAB is also in nonattainment for lead (SCAQMD 2017). The SCAB is designated unclassifiable or in attainment for all other NAAQS and CAAQS. Because the SCAB currently exceeds several NAAQS and CAAQS, the SCAQMD is required to implement strategies to reduce pollutant levels to recognized acceptable standards.

Air Quality Management

Under State law, the SCAQMD is required to prepare a plan for air quality improvement for pollutants for which the SCAB is in nonattainment. The SCAQMD has adopted its 2016 Air Quality Management Plan (AQMP), which provides a strategy for the attainment of the NAAQS and CAAQS.

Each iteration of the AQMP is an update of the previous plan and has a 20-year horizon. The latest AQMP, the 2016 AQMP, was adopted on March 3, 2017. The 2016 AQMP incorporates new scientific data and notable regulatory actions that have occurred since adoption of the 2012 AQMP, including the approval of the new 8-hour ozone NAAQS of 0.070 parts per million that was finalized in 2015. The 2016 AQMP builds upon the approaches taken in the 2012 AQMP for the attainment of federal particulate matter and ozone standards and highlights the significant amount of reductions to be achieved. It emphasizes the need for interagency planning to identify additional strategies to achieve reductions within the timeframes allowed under the federal Clean Air Act, especially in the area of mobile sources. The 2016 AQMP also includes attainment demonstrations of the new 8-hour ozone NAAQS and vehicle miles travelled (VMT) emissions offsets, pursuant to recent United States Environmental Protection Agency (U.S. EPA) requirements (SCAQMD 2017).

Thresholds of Significance

The SCAQMD provides numerical thresholds to analyze the significance of a project's construction and operational impacts to regional air quality. These thresholds, which are listed in Table 2, are designed such that a project generating emissions below the thresholds would not have an individually or cumulatively significant impact to the air quality in the SCAB.

Table 2 Regional Air Quality Thresholds of Significance

	Regional Maximum Daily Thresholds (pounds/day)	
Pollutant	Construction	Operation
NO_X	100	55
VOC	75	55
PM_{10}	150	150
$PM_{2.5}$	55	55
SO_X	150	150
CO	550	550
Lead	3	3

NO_X: nitrogen oxides; VOC: volatile organic compounds; PM_{10}: particulate matter 10 microns or less in diameter; $PM_{2.5}$: particulate matter 2.5 microns or less in diameter; SO_X: sulfur oxides; CO: carbon monoxide; SCAQMD = South Coast Air Quality Management District

Source: SCAQMD 2019

In addition to the above regional significance thresholds, the SCAQMD has developed Localized Significance Thresholds (LSTs) in response to the Governing Board's Environmental Justice Enhancement Initiative (1-4), which was prepared to update the CEQA Air Quality Handbook. LSTs were devised in response to concern regarding exposure of individuals to criteria pollutants in local communities and have been developed for nitrogen oxides, carbon monoxide, PM_{10}, and $PM_{2.5}$. LSTs represent the maximum emissions from a project that will not cause or contribute to an air quality exceedance of the most stringent applicable NAAQS or CAAQS at the nearest sensitive receptor, taking into consideration ambient concentrations in each source receptor area (SRA), distance to the sensitive receptor, and project size. LSTs only apply to emissions within a fixed stationary location and are not applicable to mobile sources, such as cars on a roadway (SCAQMD 2008). According to the SCAQMD (2008a) *Final Localized Significance Thresholds Methodology*, the use of LSTs is voluntary, to be implemented at the discretion of local agencies.

The project is located within SRA 13, which covers the Santa Clarita Valley. LSTs have been developed for emissions within construction areas up to five acres in size. The SCAQMD provides lookup tables for sites that measure up to one, two, or five acres. The total footprint of the proposed project site is approximately 2.9 acres. Pursuant to SCAQMD guidance, the LSTs for a two-acre site were used to provide a conservative estimate of project impacts.

LSTs are provided for receptors at a distance of 82 to 1,640 feet (25 to 500 meters) from the project site boundary. The sensitive receptors closest to the project site are residences approximately 40 feet, or approximately six meters, to the north of the proposed roundabout improvements area. This analysis conservatively uses LSTs for sensitive receptors at a distance of 25 meters. LSTs for construction in SRA 13 on a two-acre site at a distance of 25 meters from sensitive receptors are shown in Table 3.

Table 3 SCAQMD LSTs for Construction

Pollutant	LSTs for a 2-acre Site in SRA 13 for a Receptor within 25 Meters (pounds/day)
Gradual conversion of NO_x to NO_2	163
CO	877
PM_{10}	6
$PM_{2.5}$	4

LST: Localized Significance Threshold; SRA: Source Receptor Area; NO_X: nitrogen oxides; NO_2: nitrogen dioxide; PM_{10}: particulate matter 10 microns or less in diameter; $PM_{2.5}$: particulate matter 2.5 microns or less in diameter; CO: carbon monoxide; SCAQMD = South Coast Air Quality Management District

Source: SCAQMD 2009

Applicable SCAQMD Rules and Regulations

The following SCAQMD rules and regulations would be applicable to the proposed project:

- **Rule 403 (Fugitive Dust).** Rule 403 requires the implementation of best available dust control measures during active operations capable of generating fugitive dust.
- **Rule 1113 (Architectural Coatings).** Rule 1113 limits the volatile organic compound content of architectural coatings.

Methodology

Air pollutant emissions generated by project construction and operation were estimated using the California Emissions Estimator Model (CalEEMod), version 2020.4.0. CalEEMod uses project-specific information, including the project’s land uses, square footages for different uses, and location, to model a project’s construction and operational emissions. The analysis reflects the construction and operation of the project as described under *Description of Project*.

Construction emissions modeled include emissions generated by construction equipment used on-site and emissions generated by vehicle trips associated with construction, such as worker and vendor trips. CalEEMod estimates construction emissions by multiplying the amount of time equipment is in operation by emission factors. Construction of the proposed project was analyzed based on the construction schedule and construction equipment list provided by SCV Water staff. It is assumed all construction equipment would be diesel-powered. An average of 10 to 20 construction workers would be on site daily. This analysis assumes the project would comply with all applicable regulatory standards. In particular, the project would comply with SCAQMD Rule 403 (Fugitive Dust).

Operational emissions modeled include area source emissions and mobile source emissions (i.e., vehicle emissions).[3] Area source emissions are generated by landscape maintenance equipment, consumer products, and architectural coatings. Mobile source emissions are generated by vehicle trips to and from the project site. For the air quality analysis, it was assumed maximum daily emissions would be generated on a day during which the two daily SCV Water operator visits, semi-monthly chemical deliveries, and tri-annual resin replacement visit coincide, which would equate to 8 roundtrip vehicle trips. In this scenario of maximum daily trips, approximately 50 percent of trips would be made using a light-duty truck (the SCV Water operator visits), approximately 25 percent of trips would be made using a medium-duty truck (the chemical delivery visit), and approximately 25 percent of trips would be made using a semitruck (the resin replacement visit). It is unlikely that this scenario of maximum daily trips would occur; however, it is used in this analysis to provide a conservative estimate of project impacts.

a. Would the project conflict with or obstruct implementation of the applicable air quality plan?

A project may be inconsistent with the AQMP if it would generate population, housing, or employment growth exceeding the forecasts used in the development of the AQMP. The project does not include new housing or businesses. Although project operation may require one to two new SCV Water employees, these employees would likely be sourced from the existing regional workforce given the nature of the employment opportunities. Furthermore, the proposed facility would restore the use of Wells S6, S7 and S8, and the new S9 well would serve as a replacement for the existing Mitchell 5A Well that is being abandoned by a private developer as part of the Vista Canyon Plaza Development. The purpose of the proposed project is to reduce SCV Water's dependence on imported water supplies by restoring its groundwater production capacity. The proposed project would not result in an increase in SCV Water's basin-wide groundwater pumping as compared to baseline conditions when Wells S6, S7, S8, and the Mitchell 5A well were operational; thus, the project would not provide an additional source of water supply to serve new population growth. Therefore, the project would not directly or indirectly generate population, housing, or employment growth in exceedance of the demographic forecasts underlying the emissions estimates included the SCAQMD 2016 AQMP. As a result, the project would not conflict with or obstruct implementation of the AQMP. No impact would occur.

NO IMPACT

b. Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?

The SCAB is designated nonattainment for the NAAQS for ozone and $PM_{2.5}$ and the CAAQS for ozone, PM_{10}, and $PM_{2.5}$. The following subsections discuss criteria pollutant emissions associated with construction and operation of the proposed project.

[3] CalEEMod only calculates direct emissions of criteria pollutants from energy sources that combust on site, such as natural gas used in a building (California Air Pollution Control Officers Association 2021). The project would not include natural gas usage. In addition, CalEEMod does not calculate or attribute emissions of criteria pollutants from electricity generation to individual projects because fossil fuel power plants are existing stationary sources permitted by air districts and/or the U.S. EPA, and they are subject to local, state and federal control measures. Criteria pollutant emissions from power plants are associated with the power plants themselves, and not individual projects or electricity users. Therefore, air pollutant emissions from energy usage were not quantified (California Air Pollution Control Officers Association 2021).

Construction Emissions

Project construction would generate temporary air pollutant emissions associated with fugitive dust (PM_{10} and $PM_{2.5}$) and exhaust emissions from heavy construction equipment and construction vehicles. Table 4 summarizes the estimated maximum daily emissions of pollutants during project construction. As shown therein, construction-related emissions would not exceed SCAQMD regional or localized significance thresholds. Therefore, project construction would not result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard. Impacts would be less than significant.

Table 4 Construction Emissions (pounds/day)

	Emissions (pounds per day)					
Construction Year	**VOC**	**NO_x**	**CO**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
2024	3	26	32	< 1	5	2
2025	1	12	14	< 1	1	< 1
Total Maximum Daily Emissions	**3**	**26**	**32**	**< 1**	**5**	**2**
SCAQMD Regional Thresholds	75	100	550	150	150	55
Threshold Exceeded?	No	No	No	No	No	No
Maximum Daily On-site Emissions	**3**	**25**	**29**	**< 1**	**4**	**2**
SCAQMD Localized Significance Thresholds	N/A	163	877	N/A	6	4
Threshold Exceeded?	N/A	No	No	N/A	No	No

VOC = volatile organic compounds; NO_x = nitrogen oxides; CO = carbon monoxide; SO_2 = sulfur oxides; PM_{10}: particulate matter 10 microns or less in diameter; $PM_{2.5}$: particulate matter 2.5 microns or less in diameter

Notes: Some numbers may not add up precisely due to rounding. Maximum on-site emissions are the highest emissions that would occur on the project site from on-site sources, such as heavy construction equipment and architectural coatings, and excludes off-site emissions from sources such as construction worker vehicle trips and haul truck trips. All emissions were estimated using CalEEMod. See Appendix B for CalEEMod output files.

Operational Emissions

The primary source of operational emissions associated with the proposed project would be daily vehicle trips by staff for maintenance activities (i.e., mobile sources). Other sources would include landscape maintenance and the off-gassing of coatings used for paved surfaces (i.e., area sources). Table 5 summarizes maximum daily pollutant emissions during operation of the project.

Table 5 Operational Emissions

	Estimated Maximum Daily Emissions (pounds/day)					
	VOC	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
Area	< 1	< 1	< 1	< 1	< 1	< 1
Mobile	< 1	< 1	< 1	< 1	< 1	< 1
Total	**< 1**	**< 1**	**< 1**	**< 1**	**< 1**	**< 1**
SCAQMD Thresholds	55	55	550	150	150	55
Threshold Exceeded?	n/a	No	No	n/a	No	No

VOC: volatile organic compounds; NO_X: nitrogen oxides; CO: carbon monoxide; SO_X: sulfur oxides; PM_{10}: particulate matter 10 microns or less in diameter; $PM_{2.5}$: particulate matter 2.5 microns or less in diameter; SCAQMD: South Coast Air Quality Management District

See Appendix A for modeling results.

Notes: Emissions presented are the highest of the winter and summer modeled emissions. Numbers may not add up due to rounding.

As shown in Table 5, operational emissions from the proposed project would not exceed the SCAQMD thresholds for any criteria pollutant. Therefore, project operation would not result in a cumulatively considerable net increase of any criteria pollutant for which the SCAB is non-attainment under an applicable NAAQS or CAAQS. In addition, the sodium hypochlorite and liquid ammonium sulfate stored on site would be completely enclosed with proper containment and venting, and their usage would not result in criteria air pollutant emissions. Operational impacts associated with criteria air pollutant emissions would be less than significant.

LESS THAN SIGNIFICANT IMPACT

c. Would the project expose sensitive receptors to substantial pollutant concentrations?

Certain population groups, such as children, the elderly, and people with health problems, are particularly sensitive to air pollution. Sensitive receptors are defined as land uses that are more likely to be used by these population groups and include health care facilities, retirement homes, school and playground facilities, and residential areas. The project site is located adjacent to multiple residential neighborhoods and Bridgeport Elementary School. However, as discussed under item (b) above, the project's construction and operational emissions of criteria air pollutants would not exceed the SCAQMD regional thresholds or LSTs, which are designed to be protective of public health as it relates to criteria air pollutant emissions.

The following subsections discuss the potential for the proposed project to expose sensitive receptors to substantial concentrations of carbon monoxide and toxic air contaminants (TACs).

Carbon Monoxide Hotspots

A carbon monoxide hotspot is a localized concentration of carbon monoxide that is above the state one-hour or eight-hour standards of 20.0 parts per million and 9.0 parts per million, respectively. Localized carbon monoxide hotspots generally occur at intersections with heavy peak hour traffic. Specifically, hotspots can be created at intersections where traffic volumes are high and there is heavy congestion. The entire SCAB is a federal carbon monoxide maintenance area. The closest carbon monoxide monitoring station to the project site is the U.S. EPA monitoring station located at 22224 Placerita Canyon Road in Santa Clarita. In 2021, the Santa Clarita monitoring station detected a maximum eight-hour maximum carbon monoxide concentration of 0.6 parts per million, which is substantially below the state and federal eight-hour standard of 9.0 parts per million (U.S. EPA 2022a).

As shown in Table 4, project construction would generate maximum daily carbon monoxide emissions of approximately 28 pounds per day, which is well below the SCAQMD regional threshold of 550 pounds per day. In addition, maximum daily on-site carbon monoxide emissions during construction activities would be approximately 26 pounds per day, which is well below the LST threshold of 877 pounds per day. Additionally, as shown in Table 5, project operation would generate operational maximum daily carbon monoxide emissions of less than one pound per day, which is well below the SCAQMD regional threshold of 550 pounds. Both SCAQMD regional thresholds and LSTs are designed to be protective of public health. Based on the low background level of carbon monoxide in the project area, ever-improving vehicle emissions standards for new cars in accordance with state and federal regulations, and the project's low level of operational carbon monoxide emissions, the project would not create new hotspots or contribute substantially to existing hotspots. Therefore, the project would not expose sensitive receptors to substantial carbon monoxide concentrations, and impacts would be less than significant.

Toxic Air Contaminants

TACs are a diverse group of air pollutants that may cause or contribute to an increase in deaths or serious illness or that may pose a present or potential hazard to human health. TACs include both organic and inorganic chemical substances that may be emitted from a variety of common sources, including gasoline stations, motor vehicles, dry cleaners, industrial operations, painting operations, and research and teaching facilities. TACs are different than the criteria pollutants previously discussed because ambient air quality standards have not been established for TACs. TACs occurring at extremely low levels may still cause health effects, and it is typically difficult to identify levels of exposure that do not produce adverse health effects. TAC impacts are described by carcinogenic risk and by chronic (i.e., of long duration) and acute (i.e., severe but of short duration) adverse effects on human health.

Project construction is expected to occur over an approximately 18-month period and would result in the generation of diesel particulate matter (DPM) emissions from the use of off-road diesel equipment required for site grading and excavation, paving, and other construction activities as well as from on-road diesel equipment used to bring materials to and from the project site. According to SCAQMD methodology, health effects from carcinogenic air toxics are usually described in terms of individual cancer risk. "Individual Cancer Risk" is the likelihood a person continuously exposed to concentrations of TACs over a 70-year lifetime will contract cancer based on the use of standard risk assessment methodology. SCAQMD CEQA guidance does not require preparation of a health risk assessment for short-term construction emissions. Therefore, it is not necessary to evaluate long-term cancer impacts from construction activities that occur over a relatively short duration. In addition, there would be no residual emissions or corresponding individual cancer risk after construction is complete. Furthermore, with ongoing implementation of U.S. EPA and California Air Resources Board (CARB) requirements for cleaner fuels, off-road diesel engine retrofits, and new, low-emission diesel engine types, DPM emissions from construction equipment would be substantially reduced as compared to uncontrolled emissions. Therefore, project construction would not expose sensitive receptors to substantial concentrations of TACs, and impacts would be less than significant.

CARB's (2005) *Air Quality and Land Use Handbook: A Community Health Perspective* provides recommendations regarding the siting of new sensitive land uses near potential sources of air toxic emissions (e.g., freeways, distribution centers, rail yards, ports, refineries, chrome plating facilities, dry cleaners, and gasoline dispensing facilities). SCAQMD adopted similar recommendations in its

Guidance Document for Addressing Air Quality Issues in General Plans and Local Planning (2005). The proposed project includes water treatment facilities, which are not identified as a land use emitting substantial TAC concentrations. The project does not include any stationary sources of TAC emissions, such as back-up generators. Although project operation would require occasional deliveries of chemicals twice a month and resin replacement media two to three times a year, the use of diesel-fueled trucks for these activities would not represent a source of substantial TAC emissions given the limited and infrequent nature of these vehicle trips. Furthermore, truck drivers would be required to comply with the provisions of California Code of Regulations Title 13 Section 2485, which prohibits diesel-fueled commercial motor vehicles from idling for more than five minutes and would minimize on-site TAC emissions. Therefore, project operation would not expose sensitive receptors to substantial concentrations of TACs, and operational impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

d. Would the project result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

During construction, the project would generate oil and diesel fuel odors from use of heavy equipment as well as odors related to asphalt paving. The odors would be limited to the construction period, would be temporary, and would dissipate rapidly with distance. Therefore, project construction would not result in other emissions, such as those leading to odors, adversely affecting a substantial number of people. Impacts would be less than significant.

The SCAQMD (1993) *CEQA Air Quality Handbook* identifies land uses associated with odor complaints to be agricultural uses, wastewater treatment plants, chemical and food processing plants, composting, refineries, landfills, dairies, and fiberglass molding. The proposed project does not consist of any of these land uses known to generate odors. In addition, the proposed water treatment process would be fully enclosed and would not include components generating odors. Therefore, project operation would not result in other emissions, such as those leading to odors, adversely affecting a substantial number of people. No impact would occur.

LESS THAN SIGNIFICANT IMPACT

4 Biological Resources

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	□	■	□	□
b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	□	■	□	□
c. Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	□	■	□	□
d. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	□	■	□	□
e. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	□	□	□	■
f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	□	□	□	■

Regulatory authority over biological resources is shared by federal, State, and local authorities under a variety of statutes and guidelines. Primary authority for general biological resources lies within the land use control and planning authority of local jurisdictions (in this instance, the City of Santa Clarita). The California Department of Fish and Wildlife (CDFW) is a trustee agency for biological resources throughout the State under CEQA and also has direct jurisdiction under the California Fish and Game Code (CFGC). Under the California and federal Endangered Species Acts, CDFW and the United States Fish and Wildlife Service (USFWS) also have direct regulatory authority over species formally listed as threatened or endangered and species protected by the Migratory Bird Treaty Act (MBTA).

The following analysis is based primarily on the Biological Resources Assessment (BRA) prepared for the project by Rincon Consultants, Inc. (Rincon), which is included as Appendix B. For the purposes of this analysis, the Study Area is comprised of project site as well as a 100-foot buffer around those features in order to capture potential direct and indirect impacts to biological resources. As part of the BRA, Rincon conducted a field reconnaissance survey of the Study Area in February and August 2022.

a. Would the project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

Special status species are defined as those plants and animals that are:

- Species listed as threatened or endangered under the Federal Endangered Species Act (FESA); species that are under review may be included if there is a reasonable expectation of listing within the life of the project;
- Species listed as candidate, rare, threatened, or endangered under the California Endangered Species Act (CESA) or Native Plant Protection Act;
- Species designated as Fully Protected, Species of Special Concern, or Watch List by the CFGC or CDFW;
- Species designated as locally important by the City and/or otherwise protected through ordinance or local policy; and/or
- Plants occurring on lists 1 through 4 of the California Native Plant Society (CNPS) California Rare Plant Rank system.

Special Status Plant Species

Thirty-nine special status plant species were identified within a nine-quadrangle database search of the project site. Of these, 16 special status plant species have a low potential to occur in the coastal scrub (California sagebrush scrub and scale broom scrub) habitat within the southern portion of the project site, located outside the limits of the project footprint. The remaining 23 species are not expected to occur within the project site based on the lack of suitable habitat and the non-detection of special status plant species during field reconnaissance surveys. Implementation of the project would result in impacts to the developed, disturbed, or ornamental land cover types that do not provide suitable habitat for special status plant species (Appendix B). Therefore, no impacts to special status plant species would occur.

Special Status Wildlife Species

Suitable habitat for California legless lizard, coastal whiptail, coast horned lizard, and San Diego black-tailed jackrabbit species only occurs within the bed and banks of the Santa Clara River, as well as within the coastal scrub vegetation (i.e., California sagebrush scrub, scale broom scrub) beyond the top of bank of the Santa Clara River. These areas are outside the project footprint and would not be directly affected. Therefore, direct impacts to California legless lizard, coastal whiptail, coast horned lizard, and San Diego black-tailed jackrabbit would not occur. However, if individuals are present during project construction, potential indirect impacts could result from noise, vibrations, and dust, which could cause individuals to flush out of cover and become exposed to predators or vehicle strikes. Therefore, implementation of Mitigation Measures BIO-1 and BIO-2 would be required to reduce indirect impacts to California legless lizard, coastal whiptail, coast horned lizard, and San Diego black-tailed jackrabbit to a less-than-significant level.

Aquatic Wildlife Species

~~Direct impacts to~~ Aquatic and semi-aquatic species, including arroyo toad ~~and~~, western pond turtle, and UTS, have the potential to occur within the Santa Clara River in proximity to the project site. Arroyo toad, western pond turtle, and UTS are documented in the California Natural Diversity Database (CNDDB) within five miles of the project site. UTS is known to occupy several reaches of the Santa Clara River, and multiple CNDDB occurrences are documented within five miles of the project site in the Santa Clara River (CNDDB Occurrence Numbers 3, 10, 11, 13, 15), both upstream and downstream of the project site. Although none of these occurrences overlap the project site, UTS may migrate to the portion of the Santa Clara River directly south of the project site during moderate to high flow conditions. Direct impacts to these aquatic and semi-aquatic species would not occur because ground disturbance would not occur within the riparian corridor of the Santa Clara River and instead would be confined to the developed, ornamental, and disturbed land cover types to the north of the Santa Clara River that do not provide suitable habitat for these species. However, potentially significant indirect impacts to special status aquatic and semi-aquatic species may occur ~~as a result of~~ if groundwater extraction via the existing Wells S6, S7, and S8 and the new Well S9 were to lower groundwater levels near GDEs that would result in undesirable results per the GSP. The Fremont cottonwood forest and woodland vegetation community located near the project site is identified as a potential ~~groundwater dependent ecosystem (~~GDE~~)~~ that provides suitable habitat for special status aquatic and semi-aquatic species including aquatic plant cover for UTS (~~Santa Clarita Valley Groundwater Sustainability Agency [~~SCV GSA~~]~~ 2022). ~~Although SCV Water would not increase basin-wide groundwater extraction, r~~ Reactivated operation of existing Wells S6, S7, and S8 in conjunction with operation of the new Well S9 would entail individual operation and monitoring of each well, allowing SCV Water to turn on any combination of one to four well pumps at a time to stay within the pumping values described in the GSP and avoid ~~could~~ deplete~~e~~ing local groundwater levels beyond the minimum thresholds for depletion of interconnected surface waters established in the Santa Clara River Valley East Groundwater Subbasin ~~Groundwater Sustainability Plan (~~GSP~~)~~. As noted in the GSP, the groundwater elevations beneath the Santa Clara River channel nearest to the project site is greater than 30 feet below the low-flow channel during much of the year, well below the root zones of riparian vegetation, and disconnected from the river channel (SCV GSA 2022). The monitoring well data indicates that surface water flow in this river segment is not augmented by groundwater upwelling. As a result, reactivated operation of existing Wells S6, S7, and S8 would not impact GDEs or sensitive aquatic species such as the arroyo toad, western pond turtle, or UTS at this river segment.

Further downstream near the confluence of San Francisquito Creek and for several miles downstream of the I-5 bridge, groundwater elevations are known to be closer to the surface and contribute to surface water flows. In these areas, GDEs are maintained by perennial shallow groundwater. The GSP identifies this river segment as supporting GDEs and has established minimum thresholds and triggers to ensure that groundwater levels are maintained to be protective of GDEs. The GSP requires that groundwater extraction activities, including those that would occur under the proposed project, consider potential effects to GDEs. Conformance with the monitoring and management actions of the GSP would ensure operation of the wells would not lower groundwater levels beyond the minimum thresholds determined for depletion of interconnected surface waters as established in the GSP. The minimum thresholds for depletion of interconnected surface waters were developed in the GSP expressly to avoid impacts to GDEs. These thresholds are based generally on historic low groundwater elevations, recognizing that the existing GDEs have been sustained despite historic groundwater variability. In a few locations, such as near the I-5 bridge, the minimum thresholds are established above historic low elevations to ensure management actions are implemented before acute impacts to GDEs occur. Monitoring wells have been installed at the GDEs nearest the project site (i.e., GDE-A and GDE-B) to provide continuous elevation data that will be used to determine the need for management actions. If groundwater levels reach triggers, which are shallower than the minimum thresholds, the GSP calls for an evaluation of the GDE conditions, and if groundwater extraction is leading to undesirable results, then implementation of management actions would be called upon such as reducing groundwater pumping if needed to prevent acute and chronic impacts to GDEs. ~~and could thus impact the Fremont cottonwood forest and woodland vegetation community. As a result~~ Mitigation Measure BIO-3 reinforces the requirement to monitor groundwater levels near these GDEs and to evaluate the GDE conditions, and potentially implement management actions, if needed, to avoid impacts to GDEs and also to avoid potentially significant impacts to aquatic special status species associated with these GDEs. Therefore, compliance with the GSP and implementation of Mitigation Measure BIO-3 would be required to ~~reduce~~ ensure potential indirect impacts to arroyo toad ~~and~~, western pond turtle, and UTS are avoided, resulting in less-than-significant impacts ~~to a less-than-significant level~~.

Non-Aquatic Wildlife Species

The coastal scrub and Fremont cottonwood forest and woodland vegetation communities within the project site provide suitable habitat for special status avian species, including least Bell's vireo. No direct impacts to the species would occur because suitable nesting and foraging habitat would not be directly impacted by the project. However, if least Bell's vireo is present within the vicinity of the project during construction, the proposed project has the potential to indirectly impact the species if construction noise, dust, and other human disturbances cause a nest to fail. Therefore, indirect impacts to least Bell's vireo would be potentially significant, and implementation of Mitigation Measures BIO-4 would be required to reduce these potential indirect impacts to a less-than-significant level.

Additionally, ~~depleted~~ lowered local groundwater levels could negatively impact GDEs supporting habitat for least Bell's vireo. However, as indicated above, riparian habitat near the project site is not supported perennially by groundwater and would not be affected by lowered groundwater levels that are more than 30 feet below the Santa Clara River channel for much of the year. Further downstream, GDEs are supported by groundwater, but conformance with the monitoring and management actions of the GSP would ensure operation of the wells would not lower groundwater levels beyond the minimum thresholds determined for depletion of interconnected surface waters as established in the GSP. Mitigation Measure BIO-3 reinforces the requirement to monitor groundwater levels near these GDEs and to implement management actions if groundwater levels reach action triggers, in order to avoid impacts to GDEs and also avoid potentially significant indirect impacts to LBVI. Therefore, compliance with the GSP and implementation of Mitigation Measure~~s~~ BIO-3 ~~and BIO-4~~ would be required to reduce these potential indirect impacts to least Bell's vireo to a less-than-significant level.

The project site contains habitat with the potential to support special status birds, including resident and migrant passerine species and raptors protected under the CFGC and the MBTA. Although no nests were observed during the field reconnaissance surveys, bird nesting habitat is present in the trees and shrubs occurring in and adjacent to the project site, and raptors could nest within the taller trees in the area. Therefore, the project could result in direct or indirect impacts to nesting birds. Direct impacts may include mortality from vehicle or equipment strikes as foraging birds move through the project site and physical impacts to active nests within the project site. Indirect impacts could result from noise, vibrations, and dust from construction activities throughout the project site. Noise, vibrations, and dust can cause birds to flush out of cover and become exposed to predators or vehicle strikes. Adults may not return to nests, predators may feed on eggs or chicks in unprotected nests, and/or vibrations could cause eggs to fall out of nests. Noise, dust, and vibrations may also cause avian species to leave regular foraging areas that are within and adjacent to the project site. If construction activities occur during the nesting season (generally February 1 to August 31), noise, vibrations, and dust can also cause nest failures. Therefore, implementation of Mitigation Measure BIO-5 would be required to reduce potential direct and indirect impacts to nesting birds to a less-than-significant level.

Mitigation Measure

BIO-1 Worker's Environmental Awareness Program

Prior to initiation of all construction activities (including staging and mobilization), all personnel associated with project construction shall attend a Worker's Environmental Awareness Program training, conducted by a qualified biologist, to assist workers in recognizing special status biological resources with the potential to occur within the project site. This training shall include information about all special-status species determined to be present or to have a moderate or high potential to occur on site. The training shall also address protected nesting birds and sensitive habitats.

The specifics of this program shall include identification of special status species and habitats, a description of the regulatory status and general ecological characteristics of special status resources, and a review of the limits of construction and measures required to avoid and minimize impacts to biological resources within the project site. A fact sheet conveying this information shall also be prepared for distribution to all contractors, their employees, and other personnel involved with construction of the project. All employees shall sign a form provided by the trainer documenting they attended the Worker's Environmental Awareness Program and understand the information presented. The crew foreman shall be responsible for ensuring crew members adhere to the guidelines and restrictions designed to avoid impacts to special status species. If new construction personnel are added to the project, the crew foreman shall ensure the new personnel receive the Worker's Environmental Awareness Program training before starting work.

BIO-2 General Best Management Practices

Construction personnel shall adhere to the following general BMP requirements:

- No project construction, activities, and equipment staging shall occur within bed and banks of the Santa Clara River. Any work, including operation of loaders, dozers, drilling rigs, cranes, and vehicles shall not occur on the south side of the existing fencing associated with the Santa Clara River Trail to reduce impacts to special status wildlife species that may occur within the riparian habitat. The contractor shall advise all workers of the intent of the protection measures prior to the start of project construction and activities. No vegetation shall be removed from the channel, bed, or banks of the Santa Clara River.
- Project-related vehicles shall observe a five-mile-per-hour speed limit within the unpaved limits of construction.
- All open trenches shall be fenced and sloped to prevent entrapment of wildlife species.
- Excavated material from trenching along the Santa Clara River Trail shall be side cast away from the Santa Clara River to prevent sediment deposition within the river.
- All hollow posts and pipes shall be capped, and metal fence stakes shall be plugged with bolts or other plugging materials to prevent wildlife entrapment and mortality.
- All food-related trash items such as wrappers, cans, bottles, and food scraps generated during project construction shall be disposed of in closed containers only and removed daily from the project site.
- All nighttime lighting shall be shielded and downcast to avoid potential impacts to wildlife migration.
- No deliberate feeding of wildlife shall be allowed.
- No pets shall be allowed on the project site.
- No firearms shall be allowed on the project site.
- If vehicle or equipment maintenance is necessary, it shall be performed in the designated staging areas.
- During construction, heavy equipment shall be operated in accordance with standard BMPs. All equipment used on-site shall be properly maintained to avoid leaks of oil, fuel, or residues. The contractor shall prevent oil, petroleum products, or any other pollutants from contaminating the soil or entering a watercourse (dry or otherwise). When vehicles or equipment are stationary, mats or drip pans shall be placed below vehicles to contain fluid leaks. Provisions shall be in place to remediate any accidental spills.
- Materials shall be stored on impervious surfaces or plastic ground covers to prevent any spills or leakage and shall be at least 50 feet from drainage features.
- Construction materials and spoils shall be protected from stormwater runoff using temporary perimeter sediment barriers such as berms, silt fences, fiber rolls, covers, sand/gravel bags, and straw bale barriers, as appropriate.
- While encounters with special status species are not likely or anticipated, any worker who inadvertently injures or kills a special status species or finds one dead, injured, or entrapped shall immediately report the incident to the construction foreman or biological monitor. The construction foreman or biological monitor shall immediately notify SCV Water. SCV Water shall follow up with written notification to USFWS and/or CDFW within five working days of the incident. All observations of special status species shall be recorded on California Natural Diversity Database field sheets and sent to CDFW by SCV Water or a qualified biological monitor.

- Before starting or moving construction vehicles, especially after a few days of non-operation, operators shall inspect under all vehicles to avoid impacts to any wildlife that may have sought refuge under equipment. All large building materials and pieces with crevices where wildlife can potentially hide shall be inspected before moving. If wildlife is detected, a qualified biologist shall move wildlife out of harm's way or temporarily stop activities until the animal leaves the area.

BIO-3 Groundwater ~~Pumping Regime~~ Elevation Monitoring and Management

SCV Water shall establish a groundwater pumping ~~regime~~ plan for Wells S6, S7, S8, and S9 in accordance with the sustainable management criteria for depletion of interconnected surface waters outlined in ~~the most recently adopted iteration of~~ the Santa Clara River Valley East Groundwater Subbasin GSP. SCV Water shall monitor groundwater levels ~~at this location~~ near the S Wells and downstream near the I-5 Bridge by utilizing the monitoring wells ~~previously~~ installed within GDE-A and GDE-B ~~the potential GDE area that may be affected by the proposed project (currently identified as GDE-A in the GSP)~~ to ensure that if GDE triggers specified in the GSP are reached in these wells, a GDE evaluation will be commenced to determine if groundwater extraction may lead to depletion of interconnected surface waters that may affect ecological values of GDEs, including special status species potentially occurring within surface water ecosystems created by groundwater upwelling and adjacent riparian habitat. ~~Should the trigger level outlined in the most recently adopted GSP for any GDE area the GDE areas near the project site (currently identified as "Santa Clara River Below Mouth of Bouquet Canyon" in the GSP) be exceeded at the monitoring location~~, Should trigger levels be exceeded at GDE-A or GDE-B, SCV Water shall implement ~~an~~ the GDE evaluation program outlined in the GSP that includes reviewing whether the low water levels and water level trends are caused by groundwater extraction at Wells S6, S7, S8, and/or S9 and whether ~~the~~ undesirable results to GDEs outlined in the GSP arising from groundwater extraction are anticipated to occur. If significant and unreasonable effects are anticipated from groundwater extraction, SCV Water shall implement the necessary management actions in a timely manner to resolve the exceedance of the trigger level for the GDE area. Management actions may include but are not limited to shifting pumping to another location, reducing or halting pumping at Wells S6, S7, S8, and/or S9. The evaluation process and implementation of necessary management actions shall be conducted in accordance with the procedures outlined in Section 9.5.5 of the GSP.

BIO-4 Least Bell's Vireo Pre-construction Surveys

Prior to the initiation of project construction activities within or adjacent to suitable nesting habitat during least Bell's vireo breeding season (March 15 through September 15), a qualified biologist with experience surveying for least Bell's vireo shall conduct at least ~~three~~ eight focused surveys following USFWS-established protocols to determine whether breeding least Bell's vireos are present. Focused surveys shall be completed within the project site and a 500-foot buffer. Per protocol guidelines, a final survey report (including negative findings) shall be provided to USFWS and CDFW within 45 calendar days following the completion of the survey effort. If least Bell's vireo is present, the biologist shall determine and delineate its breeding territory with high visibility flagging or similar material, and no construction shall take place within 500 feet of the breeding territory from March 15 through September 15. Construction activities shall not continue within the buffer until the young have fledged or the nest is no longer active. If take or adverse impacts to least Bell's vireo cannot be avoided during Project construction, SCV Water shall consult with CDFW and may be required to obtain a permit under the California Endangered Species Act, such an Incidental Take Permit or a Consistency Determination.

BIO-5 Protection of Nesting Birds

Project-related activities shall occur outside of the bird breeding season (generally February 1 to August 31) to the extent practicable. If construction must occur within the bird breeding season, then no more than three days prior to the initiation of ground-disturbing activities (including, but not limited to vegetation removal, site preparation, grading, excavation, and trenching) within the project site, a nesting bird pre-construction survey shall be conducted by a qualified biologist within the disturbance footprint plus a 100-foot buffer (300-foot for raptors), where feasible. If the proposed project is phased or construction activities stop for more than one week, a subsequent pre-construction nesting bird survey shall be required within three days prior to each phase of construction.

Pre-construction nesting bird surveys shall be conducted during the time of day when birds are active and shall factor in sufficient time to perform this survey adequately and completely. A report of the nesting bird survey results, if applicable, shall be submitted to SCV Water for review and approval.

If no nesting birds are observed during pre-construction surveys, no further actions are necessary. If nests are found, an appropriate avoidance buffer ranging in size from 25 to 50 feet for passerines, and up to 300 feet for active non-listed raptors nests (depending upon the species and the proposed work activity) shall be determined, and demarcated by a qualified biologist with bright orange construction fencing or other suitable material. Active nests shall be monitored at a minimum of once per week until it has been determined the young have fledged the nest and are no longer reliant upon the nest or parental care for survival. These buffers shall be increased to protect the nesting birds, if necessary, as determined by a qualified biologist. No ground disturbance or vegetation removal shall occur within this buffer until the qualified biologist confirms breeding/nesting has ended, and all the young have fledged.

Significance after Mitigation

Implementation of Mitigation Measure BIO-1 would require training all construction personnel in identifying special status wildlife species, and Mitigation Measure BIO-2 would involve implementation of general BMPs that are protective of special status wildlife species. Implementation of Mitigation Measure BIO-3 would result in sustainable pumping of groundwater from Wells S6, S7, S8, and S9 such that indirect impacts to the potential GDE and associated special status wildlife species would be avoided. The initial trigger level identified in Mitigation Measure BIO-3 is sourced from Table 8-6 of the GSP (SCV GSA 2022). The trigger level referenced in Mitigation Measure BIO-3 was developed as part of the GSP to achieve the sustainable management criterion of avoiding depletion of interconnected surface waters. The potential undesirable results which this criterion seeks to avoid consist of:

- Permanent loss or significant degradation of existing native riparian or aquatic habitat due to lowered groundwater levels caused by groundwater pumping throughout the GDE area and
- In areas that currently provide essential habitat to UTS and native fishes (sensitive aquatic species in the vicinity of Interstate 5 Bridge), cessation of surface flow and pools during low-flow conditions in the river channel caused by groundwater extraction is an undesirable result (Table 8-1 of the GSP; SCV GSA 2022).

The associated minimum threshold for avoiding these undesirable results is “surface water depletion caused by groundwater extraction as measured by groundwater levels falling below the lowest predicted future groundwater elevation measured at GDE-area monitoring wells" (SCV GSA 2022). In accordance with the procedures outlined in the GSP, whether this minimum threshold is exceeded would be analyzed based on the average of future modeled groundwater elevations using the same data set as that used to develop the minimum threshold. As indicated in Table 8-1 of the GSP, "GDE trigger levels…that are at or above historical low elevations (as estimated from the model) will be used to initiate an assessment of GDE conditions caused by groundwater extraction and management actions that might be needed to protect GDEs" (SCV GSA 2022). Although trigger levels downstream from I-5 were set equal to historical low groundwater elevation, the trigger levels at GDE-A and GDE-B were set two feet higher than historical low groundwater elevation. This more conservative approach was taken due to the concerns about UTS, in particular at GDE-B, and to ensure adequate lead time to evaluate potential undesirable results to GDEs caused by groundwater extraction and provide sufficient time to incorporate management actions if necessary. Given the connection between the trigger level, the sustainable management criterion, and the undesirable results related to depletion of interconnected surface waters, use of the GDE trigger levels and the GDE evaluation program as required by Mitigation Measure BIO-3 would result in a groundwater pumping plan that would not result in significant adverse impacts to surface water flows, riparian vegetation, and water quality in the Santa Clara River. Therefore, implementation of Mitigation Measure BIO-3 would reduce potential impacts to special status species, riparian vegetation, and the hydrology and water quality of the Santa Clara River to a less-than-significant level.

Implementation of Mitigation Measure BIO-4 would minimize the potential for project construction activities to impact least Bell's vireo by implementation of focused surveys for least Bell's vireo prior to construction and, if present, establishment of buffers around breeding territory. Implementation of Mitigation Measure BIO-5 would reduce the potential for project construction activities to directly or indirectly impact active bird nests through a pre-construction nesting bird survey and establishment of avoidance buffers around active nests, if present. In conjunction, implementation of these measures would reduce project impacts to special-status wildlife species to a less-than-significant level.

LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED

b. Would the project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

Two sensitive plant communities (Fremont cottonwood forest and woodland and scale broom scrub) occur in the southern portion of the project site within the floodplain of the Santa Clara River. No direct impacts to these plant communities would occur as a result of the project because they are not located within the project footprint and the project would only result in impacts to the developed, disturbed, or ornamental land cover types (Appendix B).

The project has the potential to indirectly impact sensitive plant communities as a result of groundwater extraction via the existing Wells S6, S7, and S8 and the new Well S9. The Fremont cottonwood forest and woodland vegetation community located near the project site is identified as a potential GDE (SCV GSA 2022). ~~Although SCV Water would not increase basin-wide groundwater extraction, r~~ Reactivated operation of existing Wells S6, S7, and S8 in conjunction with operation of the new Well S9 would entail individual operation and monitoring of each well, allowing SCV Water to turn on any combination of one to four well pumps at a time to stay within the pumping values described in the GSP and avoid ~~could~~ deplete~~e~~ing local groundwater levels beyond the minimum thresholds for depletion of interconnected surface waters established in the Santa Clara River Valley East Groundwater Subbasin GSP. In addition, as discussed under threshold (a), the GSP requires that groundwater extraction activities, including those that would occur under the proposed project, consider potential effects to GDEs. Conformance with the monitoring and management actions of the GSP would ensure operation of the wells would not lower groundwater levels beyond the minimum thresholds determined for depletion of interconnected surface waters as established in the GSP, which were developed in the GSP expressly to avoid impacts to GDEs. The proposed project ~~and could~~ thus is not expected to impact sensitive plant communities occurring within the southern portion of the project site if they are dependent upon groundwater or those located downstream near the I-5 bridge (Appendix B). ~~Therefore,~~ Nevertheless, compliance with the GSP and implementation of Mitigation Measure BIO-3 would be required to reduce this potential indirect impact to sensitive plant communities to a less-than-significant level.

LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED

c. *Would the project have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?*

No direct impacts would occur to jurisdictional waters and wetlands within the project site because none are present within the project footprint. If project construction occurs during the rainy season, jurisdictional waters and wetlands may be indirectly impacted after a rain event should stormwater runoff result in effects such as increased turbidity, altered pH, and/or decreased dissolved oxygen levels. Therefore, implementation of the stormwater control BMPs (e.g., berms, silt fences, fiber rolls) described in Mitigation Measure BIO-2 would be required to reduce potential indirect impacts to jurisdictional waters and wetlands during construction to a less-than-significant level.

During operation, the project has the potential to indirectly impact the hydrology of the Santa Clara River, including the reduction of surface water flows and changing water quality characteristics such as turbidity, oxygen, and water temperature, ~~as a result of~~ if groundwater extraction via the existing Wells S6, S7, and S8 and the new Well S9 resulted in any significant direct or indirect changes to streamflow. ~~Although SCV Water would not increase basin-wide groundwater extraction, r~~ Reactivated operation of existing Wells S6, S7, and S8 in conjunction with operation of the new Well S9 would entail individual operation and monitoring of each well, allowing SCV Water to turn on any combination of one to four well pumps at a time to stay within the pumping values described in the GSP and avoid ~~has the potential to~~ causing ~~deplete~~ local groundwater levels to decline beyond the minimum thresholds for depletion of interconnected surface waters established in the Santa Clara River Valley East Groundwater Subbasin GSP and ~~could~~ thus would not be expected to significantly impact the hydrology and water quality of the Santa Clara River. In addition, as indicated under threshold (a) and further described in the GSP, the SCV GSA monitors groundwater elevations in the vicinity of the project site as well as downstream to identify when undesirable results caused by groundwater extraction may be occurring. If undesirable results are anticipated because of groundwater extraction, the GSP calls for management actions, such as reducing groundwater pumping and or importing additional supply, to allow groundwater levels as well as interconnected surface waters to recover. ~~As a result,~~ Compliance with the GSP and implementation of Mitigation Measure BIO-3 would be required to reduce this potential indirect impact to hydrology of the Santa Clara River to a less-than-significant level.

LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED

d. Would the project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

The Santa Clara River channel in the southern portion of the project site may provide movement pathways for mobile species such as mule deer and coyote. No direct impacts to the Santa Clara River would occur as part of the proposed project, and pipeline installation conducted parallel to the Santa Clara River would not interfere with wildlife movement because the construction work areas would be fenced, the pipelines would be constructed in segments with any exposed trenches covered with plate when construction activities are not occurring, and the pipelines would be located underground following completion of the project. Therefore, direct impacts to wildlife movement would not occur as a result of the project.

Potential indirect impacts to wildlife movement could occur through lighting of the project site during construction, which could deter wildlife migration at night. As such, implementation of Mitigation Measure BIO-2, including the provision for all lighting to be shielded and downcast, would be required to reduce indirect impacts to wildlife movement to a less-than-significant level.

LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED

e. Would the project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

The City's General Plan contains objectives and policies for biological resources that are relevant to the proposed project given its location and/or proposed activities. These objectives and policies focus on conservation of existing natural areas; restoration of damaged natural vegetation; protection of wetlands, oak trees and other indigenous woodlands and endangered or threatened species and habitat; and protection of biological resources in Significant Ecological Areas (SEAs) and significant wildlife corridors (City of Santa Clarita 2011). In compliance with these objectives and policies, the project would not impact any SEA (e.g., the Santa Clara River) or wildlife movement corridors. Additionally, as described in threshold (d), the project would not significantly interfere with wildlife movement (Appendix B).

According to Government Code Section 53091, building and zoning ordinances of a county or city shall not apply to the location or construction of facilities for the production, generation, storage, treatment, or transmission of water. As such, the project would not be subject to the North Valencia Specific Plan, which establishes additional zoning regulations for the project area, or the City's building and zoning ordinances (Santa Clarita Municipal Code Titles 17 and 18), which include the City of Santa Clarita Oak Tree Preservation Ordinance. Nevertheless, SCV Water would voluntarily comply with the City's oak tree preservation ordinance during implementation of the proposed project; therefore, it is conservatively included in this analysis.

One coast live oak tree protected by the City's Oak Tree Preservation Ordinance, and nine trees (four western sycamore trees and five London plane trees) protected by the Parkway Trees Ordinance would be removed as part of the proposed project. As noted, SCV Water would voluntarily obtain an Oak Tree Removal permit from the City for removal of the coast live oak tree and would obtain a Parkway Tree Permit from the City for removal of the western sycamore and London plane trees (Appendix B). Therefore, with regulatory compliance, no impacts related to local policies and ordinances protecting biological resources would occur.

NO IMPACT

f. Would the project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

The project site is not located within any Habitat Conservation Plans, Natural Community Conservation Plans, or other approved local, regional, or state habitat conservation plan area (Appendix B). Therefore, no impact would occur.

NO IMPACT

5 Cultural Resources

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?	☐	☐	☐	■
b. Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☐	■	☐	☐
c. Disturb any human remains, including those interred outside of formal cemeteries?	☐	☐	■	☐

This section provides an analysis of the project's impacts on cultural resources, including historical and archaeological resources as well as human remains. CEQA requires a lead agency determine whether a project may have a significant effect on historical resources (Public Resources Code [PRC] Section 21084.1). A historical resource is a resource listed in, or determined to be eligible for listing in, the California Register of Historical Resources (CRHR); a resource included in a local register of historical resources; or any object, building, structure, site, area, place, record, or manuscript a lead agency determines to be historically significant (CEQA Guidelines Section 15064.5[a][1-3]).

A resource shall be considered historically significant if it:

1. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
2. Is associated with the lives of persons important in our past;
3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
4. Has yielded, or may be likely to yield, information important in prehistory or history.

In addition, if it can be demonstrated that a project would cause damage to a unique archaeological resource, the lead agency may require reasonable efforts be made to permit any or all of these resources to be preserved in place or left in an undisturbed state. To the extent that resources cannot be left undisturbed, mitigation measures are required (PRC Section 21083.2[a-b]). PRC Section 21083.2(g) defines a unique archaeological resource as an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it:

1. Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information;
2. Has a special and particular quality such as being the oldest of its type or the best available example of its type; or

3. Is directly associated with a scientifically recognized important prehistoric or historic event or person.

The impact analysis included here is organized based on the cultural resources thresholds included in CEQA Guidelines Appendix G: Environmental Checklist Form. Threshold A broadly refers to historical resources. To more clearly differentiate between archaeological and built environment resources, the analysis under threshold (a) is limited to built environment resources. Archaeological resources, including those that may be considered historical resources pursuant to CEQA Guidelines Section 15064.5 and those that may be considered unique archaeological resources pursuant to PRC Section 21083.2, are considered under threshold (b).

Methodology and Results of Cultural Resources Assessment Report

In 2022, Rincon conducted a cultural resources investigation and analysis of the project site. This analysis included a cultural resources records search of the California Historical Resources Information System at the South Central Coast Information Center (SCCIC), located at California State University, Fullerton, and a Native American Heritage Commission (NAHC) Sacred Lands File (SLF) search. Rincon also conducted a pedestrian survey of the project footprint for all locations as part of the study (Nichols, et al. 2022).

The SCCIC records search was performed to identify previously conducted cultural resources studies as well as previously recorded cultural resources within the project site and a 0.5-mile radius surrounding it. The records search included a review of available records at the SCCIC as well as the National Register of Historic Places, the CRHR, the Office of Historic Preservation Historic Properties Directory, the California Inventory of Historic Resources, the Archaeological Determinations of Eligibility list, and historical maps. The SCCIC records search identified 35 cultural resources studies conducted within a 0.5-mile radius of the project site, eight of which included portions of the project site. Approximately 100 percent of the project site has been previously studied in the last 50 years. The SCCIC search identified one previously recorded cultural resource (P-19-186861), which consists of a historic-era set of paired transmission lines, within a 0.5-mile radius of the project site. This resource is not within or adjacent to the project site (Nichols et. al 2022).

Rincon requested a search of the SLF from the NAHC to identify the potential for cultural resources within the project site and to obtain contact information for Native Americans groups or individuals who may have knowledge of resources within the project site. The SLF search was returned with positive results, which indicates the NAHC identified a potentially sensitive tribal cultural resource within the project area. The NAHC reviews the SLF by quadrangle map, which provides a large area to review to determine a positive or negative results response.

As part of its AB 52 consultation process, which is further detailed in Section 18, *Tribal Cultural Resources*, SCV Water prepared and sent letters to the Gabrieleño Band of Mission Indians-Kizh Nation, the Torres Martinez Desert Cahuilla Indians, the Fernandeño Tatavium Band of Mission Indians (FTBMI), and the San Gabriel Band of Mission Indians to request information on potential tribal cultural resources in the project vicinity that may be impacted by project development. SCV Water received one response via email from the FTBMI on August 9, 2022, requesting formal consultation and additional project information. The results of consultation are summarized in Section 18, *Tribal Cultural Resources*. As stated therein, the FTBMI indicated the presence of two tribal cultural resources within one mile of the project site. No known sacred sites or tribal cultural resources have been specifically identified within the project site.

a. Would the project cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?

The SCCIC search identified one previously recorded historic-period built environment cultural resource (a historic-era set of paired transmission lines) within a 0.5-mile radius of the project site. However, no resources were identified within or adjacent to the project site as part of the records search or the pedestrian survey (Nichols et. al 2022). Therefore, the project would not cause a substantial adverse change in the significance of a historical resource, and no impact would occur.

NO IMPACT

b. Would the project cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?

As indicated in the Cultural Resources Assessment, no archaeological resources have been identified within or adjacent to the project site. The SLF search was returned with positive results and has documented a potentially sensitive tribal cultural resource within the project site vicinity. In addition, the project site is located adjacent to the Santa Clara River, and the project site is primarily composed of alluvial sedimentation. Precontact-era archaeological sites often exist along waterways and are buried by alluvial sedimentation. The positive results of the SLF search, proximity to water, and alluvial soils indicate the potential for subsurface archaeological sensitivity within the project site (Nichols et. al 2022). Therefore, if a previously unknown archaeological resource us encountered during construction, the project would potentially cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines Section 15064.5. Implementation of Mitigation Measure CR-1 and CR-2 would be required to reduce impacts to a less-than-significant level.

Mitigation Measure

CR-1 Worker's Environmental Awareness Program

A qualified archaeologist and a representative from a locally-affiliated Native American Tribe shall be retained to conduct a worker's environmental awareness program training on archaeological and tribal cultural resource sensitivity for all construction personnel prior to the commencement of any ground-disturbing activities. The qualified archaeologist shall meet or exceed the Secretary of Interior's Professional Qualification Standards for archaeology (National Park Service 1983). The training shall include a description of the types of cultural material that may be encountered, cultural and tribal sensitivity issues, regulatory issues, and the proper protocol for treatment of the materials in the event of a find.

CR-2 Unanticipated Discovery of Cultural Resources

In the event that archaeological resources are unexpectedly encountered during ground-disturbing activities, work within 60 feet of the find shall halt and an archaeologist meeting the Secretary of the Interior's Professional Qualifications Standards for archaeology (National Park Service 1983) shall be contacted immediately to evaluate the resource. If the resource is determined by the qualified archaeologist to be prehistoric and/or of Native American origin, then a Native American representative (e.g., FTBMI) shall also be contacted to participate in the evaluation of the resource. Should the find be deemed significant, as defined by CEQA, SCV Water shall retain a professional Native American monitor procured by the FTBMI to observe all remaining ground-disturbing activities including, but not limited to, excavating, digging, trenching, plowing, drilling, grading, leveling, clearing, auguring, stripping topsoil or similar activity, and archaeological work. If the qualified archaeologist and/or Native American representative determines it to be appropriate, archaeological testing for CRHR eligibility shall be completed. If the resource proves to be eligible for the CRHR and significant impacts to the resource cannot be avoided via project redesign, a qualified archaeologist, in coordination with a Native American representative (e.g., FTBMI) if the resource is Native American in origin, shall prepare a data recovery plan tailored to the physical nature and characteristics of the resource, pursuant to the requirements of CEQA Guidelines Section 15126.4(b)(3)(C). The data recovery plan shall identify data recovery excavation methods, measurable objectives, and data thresholds to reduce any significant impacts to cultural resources related to the resource. Pursuant to the data recovery plan, the qualified archaeologist and Native American representative (e.g., FTBMI), as appropriate, shall recover and document the scientifically consequential information that justifies the resource's significance. SCV Water shall review and approve the treatment plan and archaeological testing as appropriate, and the resulting documentation shall be submitted to the regional repository of the California Historical Resources Information System, pursuant to CEQA Guidelines Section 15126.4(b)(3)(C).

Significance after Mitigation

Mitigation Measures CR-1 and CR-2 would minimize the potential for impacts related to unexpected discoveries of archaeological resources to occur through the implementation of a Worker's Environmental Awareness Program training prior to construction and appropriate procedures for evaluation and treatment should any discoveries be made during construction. Therefore, implementation of Mitigation Measures CR-1 and CR-2 would reduce impacts to archaeological resources to a less-than-significant level.

LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED

c. Would the project disturb any human remains, including those interred outside of formal cemeteries?

No known human remains have been documented within the project site or the immediate vicinity (Nichols et al. 2022). While the project site is unlikely to contain human remains, the potential for the recovery of human remains during ground-disturbing activities is always a possibility. If human remains are found, existing regulations outlined in California Health and Safety Code Section 7050.5 state no further disturbance shall occur until the County Coroner has made a determination of origin and disposition pursuant to PRC Section 5097.98. In the event of an unanticipated discovery of human remains, the County Coroner must be notified immediately. If the human remains are determined to be prehistoric or Native American in origin, the Coroner will notify the NAHC, which will determine and notify a most likely descendant. The most likely descendant shall complete the inspection of the site within 48 hours of being granted access and provide recommendations as to the treatment of the remains to the landowner. Therefore, with adherence to existing regulations, impacts to human remains would be less than significant.

LESS THAN SIGNIFICANT IMPACT

6 Energy

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	□	□	□	■
b. Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	□	□	□	■

As a state, California is one of the lowest per capita energy users in the United States, ranked 48th in the nation, due to its energy efficiency programs and mild climate (United States Energy Information Administration 2022). Electricity and natural gas are primarily consumed by the built environment for lighting, appliances, heating and cooling systems, fireplaces, and other uses such as industrial processes in addition to being consumed by alternative fuel vehicles. Most of California's electricity is generated in state with approximately 30 percent imported from the Northwest and Southwest in 20192021 however, the state relies on out-of-state natural gas imports for nearly 90 percent of its supply (California Energy Commission [CEC] 2022a and 2022b). In addition, approximately 34 percent of California's electricity supply comes from renewable energy sources, such as wind, solar photovoltaic, geothermal, and biomass (CEC 2022a). In 2018, Senate Bill 100 accelerated the state's Renewable Portfolio Standards Program, codified in the Public Utilities Act, by requiring electricity providers to increase procurement from eligible renewable energy and zero-carbon resources to 33 percent of total retail sales by 2020, 60 percent by 2030, and 100 percent by 2045. Electricity would be supplied to the project by Southern California Edison.

Petroleum fuels are primarily consumed by on-road and off-road equipment in addition to some industrial processes, with California being one of the top petroleum-producing states in the nation (CEC 2022c). Gasoline, which is used by light-duty cars, pickup trucks, and sport utility vehicles, is the most used transportation fuel in California with 12.6 billion gallons sold in 2020 (CEC 2021). Diesel, which is used primarily by heavy duty-trucks, delivery vehicles, buses, trains, ships, boats and barges, farm equipment, and heavy-duty construction and military vehicles, is the second most used fuel in California with 1.7 billion gallons sold in 2021e (CEC 2021).

Energy consumption is directly related to environmental quality in that the consumption of nonrenewable energy resources releases criteria air pollutant and greenhouse gas (GHG) emissions into the atmosphere. The environmental impacts of air pollutant and GHG emissions associated with the project's energy consumption are discussed in detail in Section 3, *Air Quality*, and Section 8, *Greenhouse Gas Emissions*, respectively.

a. *Would the project result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?*

Construction Energy Consumption

Energy use during project construction would be primarily in the form of fuel consumption to operate heavy equipment, light-duty vehicles, machinery, and generators. Temporary grid power may also be provided to construction trailers or electric construction equipment. Table 6 summarizes the anticipated energy consumption from construction equipment and vehicles, including construction worker trips to and from the project site. As shown therein, project construction would require approximately 7,466 gallons of gasoline fuel and approximately 91,266 gallons of diesel fuel.

Table 6 Energy Use during Project Construction

	Fuel Consumption (Gallons)	
Source	Gasoline	Diesel
Construction Equipment & Hauling Trips	–	91,168
Construction Worker Vehicle Trips	7,454	–

See Appendix A for CalEEMod outputs and Appendix D for energy calculation sheets.

Energy use during construction would be temporary in nature, and construction equipment used would be typical of similar-sized construction projects in the region. In addition, construction contractors would be required to comply with the provisions of California Code of Regulations Title 13, Sections 2449 and 2485, which prohibit diesel-fueled commercial motor vehicles and off-road diesel vehicles from idling for more than five minutes, which would minimize unnecessary fuel consumption. Construction equipment would be subject to the USEPA Construction Equipment Fuel Efficiency Standard (40 Code of Federal Regulations Parts 1039, 1065, and 1068), which would minimize inefficient fuel consumption. Furthermore, in the interest of cost efficiency, construction contractors would not utilize fuel in a manner that is wasteful or unnecessary. Therefore, project construction would not result in a potential impact due to wasteful, inefficient, or unnecessary consumption of energy resources, and no construction-related energy impact would occur.

Operational Energy Consumption

Operation of the project would contribute to regional energy demand by consuming electricity and gasoline and diesel fuels. Electricity would be used for groundwater pumping, water treatment, and lighting, among other purposes. Gasoline and diesel consumption would be associated with vehicle trips generated by SCV Water staff, chemical deliveries, and resin replacement. Table 7 summarizes estimated operational energy consumption for the proposed project. As shown therein, project operation would require approximately 689 gallons of gasoline fuel, 61 gallons of diesel fuel, and approximately 840 to 986 megawatt-hours of electricity per year.

Table 7 Estimated Project Annual Operational Energy Consumption

Source	Energy Consumption[1]	
Gasoline Fuel (SCV Water Staff Visits)	689 gallons	75.6 MMBtu
Diesel Fuel (Chemical Deliveries and Resin Replacements)	61 gallons	7.8 MMBtu
Electricity[2]	840 to 986 MWh	2,866 to 3,364 MMBtu

MMBtu = million metric British thermal units; MWh = megawatt-hours

[1] Energy consumption is converted to MMBtu for each source.

[2] Calculated based on electricity consumption for similar existing groundwater treatment and disinfection facility for the N Wells (Moreno 2022).

See Appendix D for transportation energy calculation sheets.

The project would be required to comply with all standards set in the latest iteration of the California Building Standards Code (California Code of Regulations Title 24), which would minimize the wasteful, inefficient, or unnecessary consumption of energy resources by the built environment during operation. CALGreen (California Code of Regulations Title 24, Part 11) requires implementation of energy-efficient light fixtures and building materials into the design of new construction projects. Furthermore, the 2022 Building Energy Efficiency Standards (California Code of Regulations Title 24, Part 6) require newly constructed buildings to meet energy performance standards set by the CEC. These standards are specifically crafted for new buildings to result in energy efficient performance so that the buildings do not result in wasteful, inefficient, or unnecessary consumption of energy. Moreover, the groundwater treatment and disinfection facility would be necessary to treat groundwater affected by PFAS contamination, thus enabling SCV Water to continue providing safe, potable water to its service area. Furthermore, in the interest of cost efficiency, SCV Water would not utilize electricity for groundwater pumping or the treatment process in a manner that is wasteful or inefficient. Therefore, project operation would not result in potentially significant environmental effects due to the wasteful, inefficient, or unnecessary consumption of energy, and no impact would occur.

NO IMPACT

b. Would the project conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

SCV Water has not adopted specific renewable energy or energy efficiency plans with which the project could comply. As mentioned above, SB 100 mandates 100 percent clean electricity for California by 2045. Because the proposed project would be powered by the existing electricity grid, the project would eventually be powered by renewable energy mandated by SB 100 and would not conflict with this statewide plan. The proposed project would not conflict with or obstruct a state or local plan for renewable energy or energy efficiency, and no impact would occur.

NO IMPACT

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7 Geology and Soils

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:				
1. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault?	☐	☐	■	☐
2. Strong seismic ground shaking?	☐	☐	■	☐
3. Seismic-related ground failure, including liquefaction?	☐	☐	■	☐
4. Landslides?	☐	☐	■	☐
b. Result in substantial soil erosion or the loss of topsoil?	☐	☐	■	☐
c. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	☐	☐	■	☐
d. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	☐	☐	■	☐
e. Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	☐	☐	☐	■

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
f. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	■	☐	☐

a.1. Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault?

a.2. Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking?

Like much of California, the project site is located in a seismically active region. The United States Geological Survey defines active faults as those that have had surface displacement within the Holocene period (approximately the last 11,000 years). Potentially active faults are those that have had surface displacement during the last 1.6 million years, and inactive faults have not had surface displacement within that period. According to the DOC, a majority of the project site is located in an Alquist-Priolo Fault Zone associated with the San Gabriel Fault Line (DOC 2015 and 2022).

The project involves construction of water infrastructure and would not involve placement of habitable structures, thereby minimizing the potential to result in loss, injury, or death involving fault rupture and strong seismic ground-shaking. Because most of California is susceptible to strong ground shaking from severe earthquakes and the project's location within an earthquake fault zone, development of the project could expose project structures to strong seismic ground shaking. However, the project would be designed and constructed in accordance with state and local building codes to reduce the potential for exposure of structures to seismic risks to the maximum extent feasible. The project would be required to comply with the seismic safety requirements in the latest iteration of the California Building Code (CBC). Compliance with such requirements would reduce seismic ground shaking impacts to the maximum extent practicable with current engineering practices. In addition, the facility would be unmanned and would not have permanent on-site personnel. The proposed groundwater treatment and disinfection facility would not be located adjacent to any residences, school buildings, or other structures and therefore would not impact those structures or their occupants should seismic ground shaking compromise the structural integrity of these components. Therefore, the project would not increase or exacerbate fault rupture or seismic ground shaking hazards at adjacent properties. In the event fault rupture or seismic ground shaking compromises the pipelines or facilities during operation, SCV Water would temporarily shut-off processes and conduct emergency repairs as soon as practicable. Therefore, the project would not cause substantial adverse effects including the risk of loss, injury, or death involving rupture of known fault or strong seismic ground shaking, and impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

a.3. Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving seismic-related ground failure, including liquefaction?

Liquefaction is the sudden loss of soil shear strength due to a rapid increase of soil pore water pressures caused by cyclic loading from a seismic event. This means a liquefied soil acts more like a fluid than a solid when shaken during an earthquake. The project site is located in a liquefaction zone (DOC 2022). Soils therefore have the potential to liquefy during a seismic event, and seismically induced liquefaction could potentially damage the proposed water treatment plant in the event of an earthquake, resulting in joint failure or leakage from the pipeline. As discussed under thresholds (a.1) and (a.2), the project would be constructed in accordance with the current seismic design provisions of the CBC. In the event seismically induced liquefaction compromises the pipelines or facilities during operation, SCV Water would temporarily shut-off water pumping, treatment, and conveyance processes and conduct emergency repairs as soon as practicable. In addition, the project involves construction of water infrastructure and would not involve placement of habitable structures within a liquefaction-prone area, thereby minimizing the potential to result in loss, injury, or death involving seismic-related ground failure due to liquefaction. Furthermore, the project would not involve groundwater injection or other activities that could exacerbate the existing liquefaction hazard. As a result, with adherence to existing regulatory requirements, the proposed project would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving seismic-related ground failure, including liquefaction. Impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

a.4. Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving landslides?

The proposed project is located in a relatively flat area that is not within or near an earthquake-induced landslide hazard zone (United States Geological Survey [USGS] 2022). Therefore, the project would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving landslides. No impact would occur.

NO IMPACT

c. Would the project be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?

Subsidence occurs when a large portion of the land is displaced vertically, usually due to the withdrawal of groundwater, oil, or natural gas. The proposed project would restore the use of the S6, S7 and S8 wells and includes construction of the new S9 groundwater well. Restoring use of Wells S6, S7, S8 would not result in an increase in SCV Water’s groundwater pumping at this location as compared to baseline conditions when these three wells were operational. The new Well S9 would serve as a replacement for the existing Mitchell 5A Well that is being abandoned and would not result in a net increase in SCV Water’s overall annual basin-wide groundwater extraction levels. As described in the drawdown study for Well S9, the proposed Well S9 would lower the water table locally by approximately one to two feet (Richard C. Slade & Associates LLC 2022). A one-to-two-foot change in the water table would not be expected to result in a subsidence event. Furthermore, SCV Water would manage its pumping regime at Wells S6, S7, S8, and S9 in accordance with the provisions of the Santa Clara River Valley East Groundwater Subbasin GSP, which includes metrics for monitoring and addressing subsidence issues (SCV GSA 2022). Therefore, the proposed project would not result in soil instability such that subsidence would occur. In addition, as described in threshold (a.3), the proposed project would result in soil instability related to liquefaction. Consequently, impacts related to the instability of soil or geologic units would be less than significant.

LESS THAN SIGNIFICANT IMPACT

b. Would the project result in substantial soil erosion or the loss of topsoil?

Ground-disturbing activities associated with project construction may result in the removal of some topsoil. Construction activities would be subject to the National Pollutant Discharge Elimination System (NPDES) Construction General Permit which requires the development of a Storm Water Pollution Prevention Plan (SWPPP) developed by a certified Qualified SWPPP Developer. The SWPPP includes project-specific BMPs to control erosion, sediment release, and otherwise reduce the potential for discharge of pollutants from construction into stormwater. Typical BMPs would include, but would not be limited to, use of silt fences, fiber rolls, stabilized construction entrances/exists, storm drain inlet protection, wind erosion control, stockpile management, and materials storage and vehicle and equipment cleaning, fueling, and maintenance procedures that minimize the discharge of spills and leaks. Erosion from construction activities would thus be controlled through implementation of BMPs outlined in the SWPPP required by the NPDES Construction General Permit. Therefore, construction impacts related to soil erosion would be less than significant.

Project operation would have minimal potential to result in erosion because no ground-disturbing activities would occur. The project includes installation of an underground storm drain pipeline from a point south of the Bridgeport Lane/Bayside Lane intersection to the existing Well S7 location. This pipeline would convey stormwater flows and pumped groundwater that currently sheet flow from the site into the river to an existing 30-inch stormwater drain pipeline that ultimately outlets to the river. In addition, the proposed groundwater treatment and disinfection facility would include a drainage pipeline connection between the proposed treatment facility and the existing 30-inch SCV Water storm drainage outlet pipeline on the eastern portion of the treatment facility location. The proposed drainage pipeline would collect and convey on-site stormwater runoff and groundwater produced during periodic installation and water quality testing of new resin media in the treatment vessels to the existing stormwater drainage outlet approximately 135 feet south of the project site. Both discharges would be covered under SCV Water's existing Statewide General Permit for Drinking Water System Discharges to the Waters of the United States No. 4DW0768. As required under this permit, SCV would be required to implement BMPs that would minimize sediment discharge via use of erosion control measures such as use of flow diffusers or the construction of check dams to slow flows. The BMPs required by this NPDES permit would thus minimize potential erosion associated with stormwater discharges during project operation. As such, operational impacts related to soil erosion would be less than significant.

LESS THAN SIGNIFICANT IMPACT

d. Would the project be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?

Expansive soils are highly compressible, clay-based soils that tend to expand as they absorb water and shrink as water is drawn away. Expansive soils can result in structural damage when foundations are not designed to account for soil expansion potential. The project site is composed of Hanford sandy loam, 0 to 2 percent slopes (12.5 percent clay), Hanford sandy loam, 2 to 9 percent slopes (12.5 percent clay), Riverwash (2.3 percent clay), Sandy alluvial land (10.9 percent clay) (United States Department of Agriculture 2022). Due to the lack of clay content of the on-site soils, the potential for expansive soils to occur is low. In addition, the project does not include construction of habitable structures. Therefore, the proposed project would not create substantial direct or indirect risks to life or property as a result of expansive soils, and impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

e. *Would the project have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?*

The proposed project would not include the use of septic tanks or alternative wastewater disposal systems. Therefore, no impact would occur.

NO IMPACT

f. *Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?*

Paleontological resources, or fossils, are the evidence of once-living organisms preserved in the rock record. They include both the fossilized remains of ancient plants and animals and the traces thereof (e.g., trackways, imprints, burrows, etc.). Paleontological resources are not found in “soil” but are contained within the geologic deposits or bedrock that underlies the soil layer. Typically, fossils are greater than 5,000 years old (i.e., older than middle Holocene in age) and are typically preserved in sedimentary rocks. Although rare, fossils can also be preserved in volcanic rocks and low-grade metamorphic rocks under certain conditions (Society of Vertebrate Paleontology [SVP] 2010). Fossils occur in a non-continuous and often unpredictable distribution within some sedimentary units, and the potential for fossils to occur within sedimentary units depends on several factors. It is possible to evaluate the potential for geologic units to contain scientifically important paleontological resources and therefore evaluate the potential for project impacts to those resources.

Rincon evaluated the paleontological sensitivity of the geologic units that underlie the project site to assess the project’s potential to result in significant impacts to scientifically important paleontological resources. The analysis was based on the results of a paleontological locality search and a review of existing information in the scientific literature regarding known fossils within geologic units mapped at the project site. According to the SVP (2010) classification system, geologic units can be assigned a high, low, undetermined, or no potential for containing scientifically significant nonrenewable paleontological resources. Following the literature review, a paleontological sensitivity classification was assigned to each geologic unit mapped within the project site. This criterion is based on rock units within which vertebrate or significant invertebrate fossils have been determined by previous studies to be present or likely to be present. The potential for impacts to significant paleontological resources is based on the potential for ground disturbance to directly impact paleontologically sensitive geologic units.

The project site is underlain by two geologic units: Quaternary stream channel deposits and Quaternary alluvium (Figure 4; Dibblee and Ehrenspeck 1996). A third geologic unit, the Saugus Formation, is exposed at the surface less than 100 feet north of the northern edge of the project site, indicating that it is likely the Saugus Formation is present at shallow depths (i.e., less than five feet below the surface) within the project site. Rincon requested a formal records search from the Natural History Museum of Los Angeles County on March 5, 2022. This search recovered no known fossil localities within the project site (Bell 2022). However, the search indicated that several fossil localities have been recovered from the same geologic units underlying the project site (Saugus Formation and unnamed Quaternary alluvium).

The distribution, characteristics, and paleontological sensitivity of each geologic unit mapped within the project site, or likely to occur at shallow depths within the project site, are discussed below:

- **Quaternary stream channel deposits (Qg)** underlie the southern part of the project site, nearest the Santa Clara River (Figure 4). Quaternary stream channel deposits underlie active stream channels and consist of gravel and sand (Dibblee and Ehrenspeck 1996). Areas mapped as Quaternary stream channel deposits experience active deposition, so the sediments are too young to preserve paleontological resources. Therefore, Quaternary stream channel deposits has **low paleontological sensitivity.**
- **Quaternary alluvium (Qa)** underlies much of the northern part of the project site (Figure 4). Quaternary alluvium is Holocene in age and consists of gravel, sand, and clay (Dibblee and Ehrenspeck 1996). Due to their Holocene age, Quaternary alluvium may be too young to preserve paleontological resources, but they may be underlain by older sediments in the subsurface. The project site located at the edge of the modern depositional basin as evidenced by the increase in elevation and surficial exposure of an older geologic unit (Saugus Formation) immediately north of the site. Therefore, Quaternary alluvium deposits may be as thin as a few feet, underlain by the highly sensitive Saugus Formation. Therefore, Quaternary alluvium has **low paleontological sensitivity.**
- The **Saugus Formation (QTs)** is exposed at the surface less than 100 feet north of the project site, making it highly likely that this geologic unit underlies the project site at shallow depths, perhaps as little as five feet (Figure 4). The Saugus Formation is Pleistocene to Pliocene in age and consists of light gray to reddish-brown, weakly lithified, conglomerate and sandstone with small areas of siltstone (Dibblee and Ehrenspeck 1996). Several fossil localities have been recovered from the Saugus Formation, bearing taxa such as horses (Equidae), rodents (Rodentia), rabbits (Leporidae), lizards (Squamata), birds, lizards, and invertebrates (Mollusca) (Bell 2022; Jefferson 2010; Paleobiology Database 2022; University of California Museum of Paleontology 2022). Given this fossil-producing history, the Saugus Formation has **high paleontological sensitivity.**

Ground disturbance associated with the proposed improvements to Wells S6, S7, and S8 and the roundabouts as well as use of the construction staging and laydown area would only require surficial ground disturbance in previously disturbed sediments with low paleontological sensitivity (Figure 4). As a result, these project components would result in less-than-significant impacts to paleontological resources.

Trenching for the proposed pipelines would reach up to approximately 5.5 feet in depth. The two pipelines that would be placed parallel to the Santa Clara River Trail would result in disturbance of Quaternary alluvium and Quaternary stream channel deposits, which have low paleontological sensitivity (Figure 4). As a result, these project components would result in less-than-significant impacts to paleontological resources. The proposed north-south pipeline through Bridgeport Park would primarily result in disturbance of Quaternary alluvium (low paleontological sensitivity); however, the northern end of this alignment is approximately 150 feet south of surficial exposures of the Saugus Formation, which has high paleontological sensitivity and could be present in this area as shallow as five feet below ground surface. Given the proximity of this sensitive geologic unit to the pipeline alignment, a 5.5-foot-deep trench would have the potential to result in disturbance to the Saugus Formation. However, the new north-south pipeline would connect the proposed groundwater treatment and disinfection facility to the existing SCV Water pipeline that runs beneath Newhall Ranch Road, meaning that sediments underlying the northern end of the alignment for the proposed north-south pipeline at and near the point of interconnection have been previously disturbed in conjunction with installation of the existing SCV Water pipeline. Therefore, this project component would also result in less-than-significant impacts to paleontological resources.

The location of the proposed groundwater treatment and disinfection facility and Well S9 is mapped as Quaternary stream channel deposits (Figure 4); however, the well is expected to reach 250 feet below the surface. Cross-sections based on well logs and inferred stratigraphic structure by Dibblee and Ehrenspeck (1996) suggest that Quaternary stream channel deposits and Quaternary alluvium are approximately 100 feet thick along this stretch of the Santa Clara River and are underlain by the Saugus Formation. Therefore, drilling for Well S9 would have the potential to result in disturbance of the Saugus Formation and may significantly impact paleontological resources, if present. Given that the borehole for Well S9 would be approximately 36 inches in diameter, recognizable, significant paleontological resources may be discovered during construction. Therefore, the project would potentially directly or indirectly destroy a unique paleontological resource or site or unique geologic feature, and implementation of Mitigation Measure GEO-1 would be required to reduce impacts associated with drilling Well S9 to a less-than-significant level.

Mitigation Measure

GEO-1 Paleontological Resources Mitigation and Monitoring Plan

SCV Water shall implement the following paleontological resources mitigation and monitoring plan prior to and during construction of Well S9:

- **Qualified Professional Paleontologist.** Prior to excavation, SCV Water shall retain a Qualified Professional Paleontologist, which is defined by the SVP (2010) as an individual, preferably with an M.S. or Ph.D. in paleontology or geology, who is experienced with paleontological procedures and techniques, who is knowledgeable in the geology of California, and who has worked as a paleontological mitigation project supervisor for at least two years. The Qualified Professional Paleontologist shall direct all mitigation measures related to paleontological resources.
- **Paleontological Worker Environmental Awareness Program.** Prior to the start of construction, the Qualified Professional Paleontologist or their designee shall conduct a paleontological Worker Environmental Awareness Program (WEAP) training for construction personnel regarding the appearance of fossils and the procedures for notifying paleontological staff should fossils be discovered by construction staff.
- **Paleontological Monitoring.** Paleontological monitoring shall be conducted during drilling for Well S9. Paleontological monitoring shall be conducted by a paleontological monitor with experience with collection and salvage of paleontological resources and who meets the minimum standards of the SVP (2010) for a Paleontological Resources Monitor. The duration and frequency of the monitoring shall be determined by the Qualified Professional Paleontologist based on the observation of the geologic setting from initial ground disturbance and nature of the drilling activity, and subject to review and approval by SCV Water. In the event

of a fossil discovery by the paleontological monitor or construction personnel, all work in the immediate vicinity of the find shall cease. A Qualified Professional Paleontologist shall evaluate the find before restarting construction activity in the area. If it is determined that the fossil(s) is (are) scientifically significant, the Qualified Professional Paleontologist shall complete the following conditions to mitigate impacts to significant fossil resources:

  - **Fossil Salvage.** If a paleontological resource is discovered, the monitor shall have the authority to temporarily divert construction equipment around the find, when doing so is safe and does not compromise the structural integrity of the construction work, until the find is assessed for scientific significance and collected in a safe and timely manner.
  - **Fossil Preparation and Curation**. Once salvaged, significant fossils shall be identified to the lowest possible taxonomic level, prepared to a curation-ready condition, and curated in a scientific institution with a permanent paleontological collection along with all pertinent field notes, photos, data, and maps. Fossils of undetermined significance at the time of collection may also warrant curation at the discretion of the Qualified Professional Paleontologist.

- **Final Paleontological Mitigation Report.** Upon completion of drilling for Well S9 (and curation of fossils if necessary) the Qualified Professional Paleontologist shall prepare a final report describing the results of the paleontological monitoring efforts associated with the project. The report shall include a summary of the field and laboratory methods, an overview of the project geology and paleontology, a list of taxa recovered (if any), an analysis of fossils recovered (if any) and their scientific significance, and recommendations. The report shall be submitted to the SCV Water. If the monitoring efforts produced fossils, then a copy of the report shall also be submitted to the designated museum repository.

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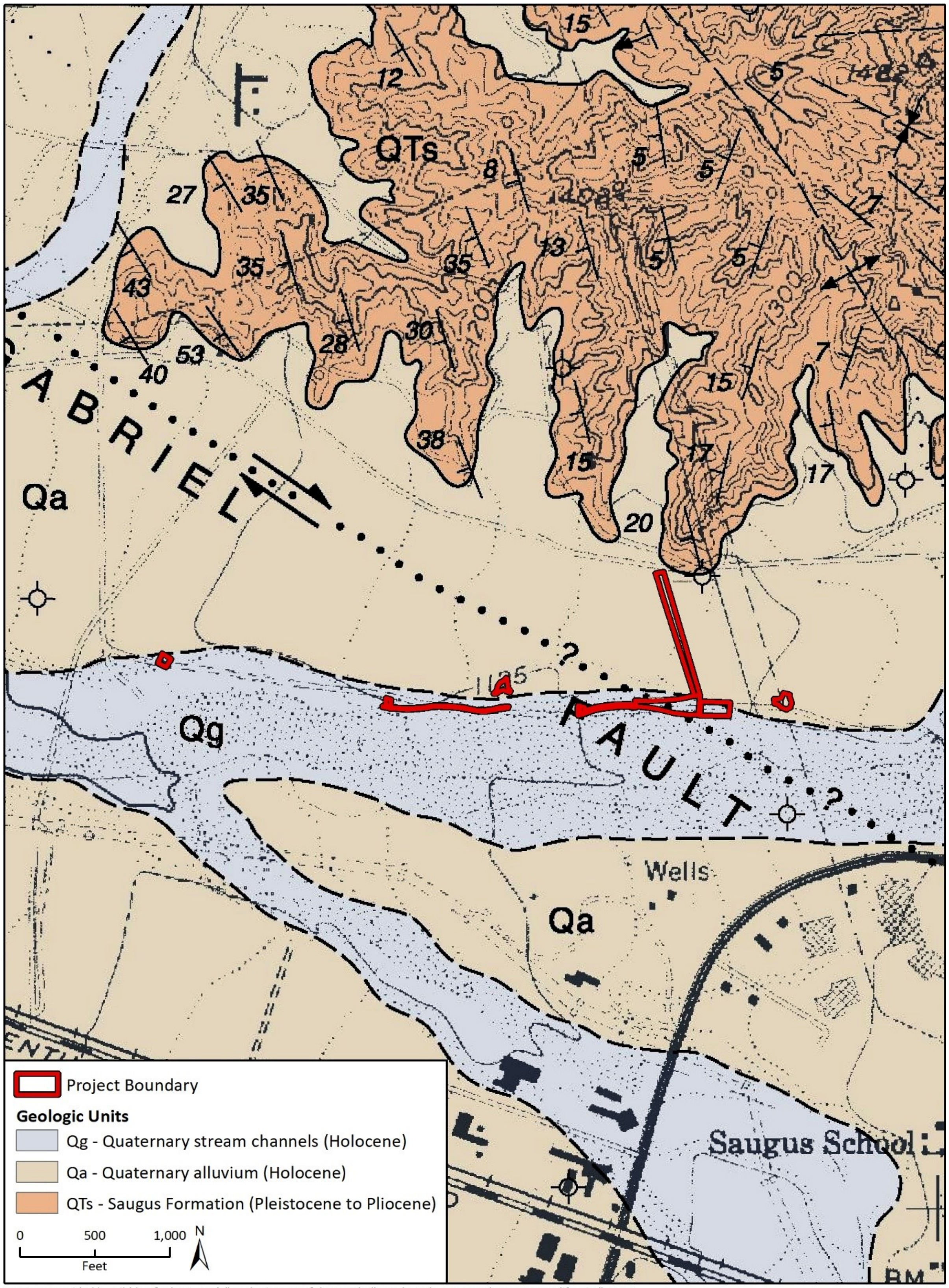
Figure 4 Geologic Map of the Project Site



Imagery provided by Dibblee & Ehrenspeck "Geologic map of the Newhall quadrangle, Los Angeles County, California," 1996.

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8 Greenhouse Gas Emissions

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	□	□	■	□
b. Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	□	□	□	■

Overview of Climate Change and Greenhouse Gases

Climate change is the observed increase in the average temperature of the Earth's atmosphere and oceans along with other substantial changes in climate (such as wind patterns, precipitation, and storms) over an extended period of time. Climate change is the result of numerous, cumulative sources of GHG emissions contributing to the "greenhouse effect," a natural occurrence which takes place in the Earth's atmosphere and helps regulate the temperature of the planet. The majority of radiation from the sun hits the Earth's surface and warms it. The surface, in turn, radiates heat back towards the atmosphere in the form of infrared radiation. Gases and clouds in the atmosphere trap and prevent some of this heat from escaping into space and re-radiate it in all directions.

GHG emissions occur both naturally and as a result of human activities, such as fossil fuel burning, decomposition of landfill wastes, raising livestock, deforestation, and some agricultural practices. GHGs produced by human activities include carbon dioxide (CO_2), methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Different types of GHGs have varying global warming potentials (GWP). The GWP of a GHG is the potential of a gas or aerosol to trap heat in the atmosphere over a specified timescale (generally, 100 years). Because GHGs absorb different amounts of heat, a common reference gas (CO_2) is used to relate the amount of heat absorbed to the amount of the gas emitted, referred to as "carbon dioxide equivalent" (CO_2e), which is the amount of GHG emitted multiplied by its GWP. Carbon dioxide has a 100-year GWP of one. By contrast, methane has a GWP of 30, meaning its global warming effect is 30 times greater than CO_2 on a molecule per molecule basis (Intergovernmental Panel on Climate Change [IPCC] 2021).[4]

The United Nations IPCC expressed that the rise and continued growth of atmospheric CO_2 concentrations is unequivocally due to human activities in its Sixth Assessment Report (2021). Human influence has warmed the atmosphere, ocean, and land, which has led the climate to warm at an unprecedented rate in the last 2,000 years. It is estimated that between the period of 1850

[4] The Intergovernmental Panel on Climate Change's (2021) *Sixth Assessment Report* determined that methane has a GWP of 30. However, the 2017 Climate Change Scoping Plan published by the California Air Resources Board uses a GWP of 25 for methane, consistent with the Intergovernmental Panel on Climate Change's (2007) *Fourth Assessment Report*. Therefore, this analysis utilizes a GWP of 25.

through 2019, that a total of 2,390 gigatonnes of anthropogenic CO_2 was emitted. It is likely that anthropogenic activities have increased the global surface temperature by approximately 1.1 degrees Celsius between the years 2010 through 2019 (IPCC 2021). Furthermore, since the late 1700s, estimated concentrations of CO_2, methane, and nitrous oxide in the atmosphere have increased by over 43 percent, 156 percent, and 17 percent, respectively, primarily due to human activity (U.S. EPA 2022b). Emissions resulting from human activities are thereby contributing to an average increase in Earth's temperature. Potential climate change impacts in California may include loss of snow pack, sea level rise, more extreme heat days per year, more high ozone days, more large forest fires, and more drought years (State of California 2018).

Regulatory Framework

In response to climate change, California implemented Assembly Bill (AB) 32, the "California Global Warming Solutions Act of 2006." AB 32 required the reduction of statewide GHG emissions to 1990 emissions levels (essentially a 15 percent reduction below 2005 emission levels) by 2020 and the adoption of rules and regulations to achieve the maximum technologically feasible and cost-effective GHG emissions reductions. On September 8, 2016, the Governor signed Senate Bill 32 into law, extending AB 32 by requiring the State to further reduce GHG emissions to 40 percent below 1990 levels by 2030 (the other provisions of AB 32 remain unchanged). On December 14, 2017, CARB adopted the 2017 Scoping Plan, which provides a framework for achieving the 2030 target. The 2017 Scoping Plan relies on the continuation and expansion of existing policies and regulations, such as the Cap-and-Trade Program and the Low Carbon Fuel Standard, and implementation of recently adopted policies and legislation, such as SB 1383 (aimed at reducing short-lived climate pollutants including methane, hydrofluorocarbon gases, and anthropogenic black carbon) and SB 100 (discussed further below). The 2017 Scoping Plan also puts an increased emphasis on innovation, adoption of existing technology, and strategic investment to support its strategies. As with the 2013 Scoping Plan Update, the 2017 Scoping Plan does not provide project-level thresholds for land use development. Instead, it recommends local governments adopt policies and locally-appropriate quantitative thresholds consistent with a statewide per capita goal of six metric tons (MT) of CO_2e by 2030 and two MT of CO_2e by 2050 (CARB 2017).

Other relevant state laws and regulations include SB 100, which supports the reduction of GHG emissions from the electricity sector by accelerating the state's Renewables Portfolio Standard Program. SB 100 requires electricity providers to increase procurement from eligible renewable energy resources to 33 percent of total retail sales by 2020, 60 percent by 2030, and 100 percent by 2045.

Significance Thresholds

The vast majority of individual projects do not generate sufficient GHG emissions to directly influence climate change. However, physical changes caused by a project can contribute incrementally to cumulative effects that are significant, even if individual changes resulting from a project are limited. The issue of climate change typically involves an analysis of whether a project's contribution towards an impact would be cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, other current projects, and probable future projects (CEQA Guidelines Section 15064[h][1]). The CEQA Guidelines provide regulatory direction for the analysis and mitigation of GHG emissions appearing in CEQA documents, while giving lead agencies the discretion to set quantitative or qualitative thresholds for the assessment and mitigation of GHGs and climate change impacts.

In guidance provided by the SCAQMD's GHG CEQA Significance Threshold Working Group in September 2010, SCAQMD considered a tiered approach to determine the significance of residential, commercial, and mixed-use projects. The draft tiered approach is outlined in meeting minutes dated September 29, 2010 and consists of the following (SCAQMD 2010):

- **Tier 1.** If the project is exempt from further environmental analysis under existing statutory or categorical exemptions, there is a presumption of less-than-significant impacts with respect to climate change. If not, then the Tier 2 threshold should be considered.
- **Tier 2.** Consists of determining whether or not the project is consistent with a GHG reduction plan that may be part of a local general plan, for example. The concept embodied in this tier is equivalent to the existing concept of consistency in CEQA Guidelines Section 15064(h)(3), 15125(d), or 15152(a). Under this tier, if the proposed project is consistent with the qualifying local GHG reduction plan, it would not result in significant impacts related to GHG emissions. If there is no adopted plan, then the Tier 3 approach would be appropriate.
- **Tier 3.** Establishes a screening significance threshold level to determine significance. The Working Group has provided a recommendation of 3,000 MT of CO_2e per year for land use projects for which SCAQMD is not the lead agency.
- **Tier 4.** Establishes a service population threshold to determine significance. The Working Group has provided a recommendation of 4.8 MT of CO_2e per year for land use projects.

Under Tier 2, project impacts related to GHG emissions would be less-than-significant if a project is consistent with an approved local or regional plan. SCV Water has not adopted a plan for the reduction of GHG emissions; therefore, Tier 2 does not apply, and the GHG emissions analysis for the project cannot be streamlined via CEQA Guidelines Section 15183.5. Therefore, for the purposes of this analysis, the bright-line threshold of 3,000 MT of CO_2e per year is considered to be the best available method for determining the significance of GHG emissions associated with the proposed project.[5]

Methodology

The project's construction emissions and operational GHG emissions from area and mobile sources were estimated using CalEEMod version 2020.4.0 generally in accordance with the methodology outlined in Section 3, *Air Quality*. The SCAQMD recommends amortizing construction-related emissions over a 30-year period in conjunction with a project's operational emissions (SCAQMD 2008b). In accordance with the SCAQMD's recommendation, GHG emissions from project construction were amortized over a 30-year period (the estimated minimum project lifetime), then compared to the threshold of significance. For the purposes of calculating annual GHG emissions under operational conditions, this analysis conservatively accounts for 1,460 one-way maintenance trips, 48 one-way chemical delivery trips, and six one-way resin replacement trips. It was assumed approximately 96.4 percent of vehicles visiting the site annually would be light-duty trucks (for SCV Water operator visits), approximately 3.2 percent would be medium-duty vehicles (for chemical delivery visits), and approximately 0.4 percent would semitrucks (for resin replacement visits).

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[5] Because the project would neither directly nor indirectly generate new population, comparison to a per capita or per service population threshold is not appropriate. In addition, because the project would not involve an industrial stationary source requiring SCAQMD permitting, this analysis conservatively uses the lower GHG threshold for development projects of 3,000 MT of CO_2e per year instead of the higher industrial GHG threshold of 10,000 MT of CO_2e per year.

Operational emissions associated with annual electricity consumption were calculated outside CalEEMod by multiplying the anticipated energy use by the carbon intensity factors of SCE-supplied electricity, which were sourced from CalEEMod.

a. Would the project generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment?

Construction and operation of the proposed project would generate GHG emissions. This analysis considers the combined impact of GHG emissions from both construction and operation. Calculations of CO_2, methane, and nitrous oxide emissions are provided to identify the magnitude of potential project effects. Construction of the proposed project would generate temporary GHG emissions primarily as a result of operation of construction equipment on site as well as from vehicles transporting construction workers to and from the project site and heavy trucks to transport building materials and soil export. As shown in Table 8, construction of the proposed project would generate an estimated total of 511 MT of CO_2e. Amortized over a 30-year period (the estimated minimum project lifetime), construction of the proposed project would generate an estimated 17 MT of CO_2e per year.

Table 8 Estimated Construction GHG Emissions

Year	Project Emissions (MT of CO_2e)
Total	7511
Total Amortized over 30 Years	17

MT = metric tons; CO2e = carbon dioxide equivalents
See Appendix A for CalEEMod worksheets.

Operation of the proposed project would generate GHG emissions associated with area sources (e.g., landscape maintenance), energy usage, and vehicle trips. As shown in Table 9, annual operational emissions generated by the proposed project combined with amortized construction emissions would total approximately 197 MT of CO_2e per year. Therefore, project emissions would not exceed the threshold of 3,000 MT of CO_2e per year.

Table 9 Combined Annual Emissions of Greenhouse Gases

Emission Source	Annual Emissions (MT of CO_2e per year)
Construction	17
Operational	
Area	<1
Energy[1]	176
Mobile	4
Total	**197**
Threshold	3,000
Threshold Exceeded?	No

MT = metric tons; CO2e = carbon dioxide equivalents; MWh = megawatt-hours
[1] Estimated based on the upper estimate for the project's electricity consumption of 986 MWh.
See Appendix B for modeling results.

Furthermore, one of the primary sources of GHG emissions associated with the pumping, conveyance, treatment, and distribution of water and wastewater is the use of energy. The 2017 Scoping Plan acknowledges that “the water-energy nexus provides opportunities for conservation of these natural resources as well as reductions of GHG emissions” (CARB 2017). The 2017 Scoping Plan also points to groundwater remediation as a means of “meeting new water demands and sustaining prosperity” (CARB 2017). Statewide emissions reduction strategies for the water sector are aimed at reducing the energy intensity of water, which is “the amount of energy required to take a unit of water from its origin (such as a river or aquifer) and extract and convey it to its end use” (CARB 2017).

The following goals from the 2017 Scoping Plan would be applicable to the proposed project:

- Develop and support more reliable water supplies for people, agriculture, and the environment, provided by a more resilient, diversified, sustainably managed water resources system with a focus on actions that provide direct GHG reductions.
- Reduce the carbon footprint of water systems and water uses for both surface and groundwater supplies through integrated strategies that reduce GHG emissions while meeting the needs of a growing population, improving public safety, fostering environmental stewardship, aiding in adaptation to climate change, and supporting a stable economy.

The purpose of the project is to restore the use of Wells S6, S7 and S8 and install a new Well S9 to serve as a replacement for the Mitchell 5A well, thereby reducing SCV Water’s dependency on imported water. Ultimately, this would have the benefit of reducing GHG emissions associated with energy used to transport imported potable water to SCV Water’s service area. Furthermore, as shown in Table 9, the majority of project-related GHG emissions would be generated by electricity used to power the treatment process. Therefore, as the requirements of the Renewables Portfolio Standard continue to phase in through 2045, annual GHG emissions generated by project operation would decrease correspondingly. As a result, the project would be consistent with the State’s long-term climate goals and strategies as outlined in the 2017 Scoping Plan. Given that project emissions would not exceed the threshold of 3,000 MT of CO_2e per year and the project would be consistent with the 2017 Scoping Plan, project-related GHG emissions would be less than significant.

LESS THAN SIGNIFICANT IMPACT

b. Would the project conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

SCV Water has not adopted a GHG emissions reduction plan; therefore, there are no local GHG reduction plans that would apply to the proposed project. As such, the primary applicable plan for reducing GHG emissions is CARB’s 2017 Scoping Plan. As discussed under threshold (a), the project would be consistent with the State’s 2017 Scoping Plan and its goal to use groundwater remediation as a way of reducing the energy intensity (and corresponding GHG emissions intensity) of water supplies. No impact would occur.

NO IMPACT

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9 Hazards and Hazardous Materials

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	□	□	■	□
b. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	□	■	□	□
c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school?	□	■	□	□
d. Be located on a site that is included on a list of hazardous material sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	□	□	□	■
e. For a project located in an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?	□	□	□	■
f. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	□	■	□	□
g. Expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires?	□	■	□	□

a. Would the project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

Construction of the proposed project would temporarily increase the transport and use of hazardous materials during the use of construction vehicles and equipment. Limited quantities of miscellaneous hazardous substances, such as diesel fuel, oil, solvents, and other similar materials, would be brought onto the project site, used, and stored during the construction period. Any use of potentially hazardous materials during construction of the proposed project would be required to comply with all local, state, and federal regulations regarding the handling of hazardous materials, which would minimize the potential for the project to create a significant hazard to the public or the environment. These materials would be disposed off-site in accordance with applicable laws pertaining to the handling and disposal of hazardous waste. The transport, use, and storage of hazardous materials during construction would be conducted in accordance with applicable federal and State laws, such as the Hazardous Materials Transportation Act, California Hazardous Material Management Act, and California Code of Regulations, Title 22.

During operation, sodium hypochlorite (chlorine) and liquid ammonium sulfate would be stored at the proposed facility in a completely enclosed structure with proper containment and venting. Sodium hypochlorite is a liquid disinfection agent added to the water and is commonly referred to as "bleach." Sodium hypochlorite is not the equivalent of chlorine gas, and chlorine gas would not be used or released during project operation. Chemical deliveries to the proposed disinfection building would occur approximately twice a month, and these materials would be contained within vessels specifically engineered for safe storage. Furthermore, the chemicals stored on site would not be considered hazardous due to low concentrations of ammonia and chlorine. However, in accordance with standard operating practice, SCV Water would submit an emergency response/contingency plan as part of a Hazardous Materials Business Plan to the California Environmental Reporting System for the proposed facility. Spent resin from the PFAS treatment vessels, which may be considered a hazardous waste depending on the concentration of PFAS, would be removed two to three times a year by the resin supplier who would be required to transport and dispose of the material in accordance with all applicable regulations, such as the Hazardous Materials Transportation Act, California Hazardous Material Management Act, and California Code of Regulations, Title 22. Compliance with existing local, state, and federal regulations regarding the handling of hazardous materials during construction and operation would not expose the public or the environment to a significant hazard through the routine transport, use, or disposal of hazardous materials. Impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

b. Would the project create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

The presence of hazardous materials during project construction activities, including but not limited to ground-disturbing activities, could result in an accidental upset or release of hazardous materials if they are not properly stored and secured. Hazardous materials used during project construction would be disposed of off-site in accordance with all applicable laws and regulations, including but not limited to the CBC and California Fire Code, as well the regulations of the federal and state Occupational Safety and Health Administrations. Nonetheless, upset or accident conditions could result in the unanticipated spill or release of hazardous materials such as vehicle and equipment fuels during project construction, potentially introducing a hazard to the public and/or the environment, which could result in a potentially significant impact especially if materials are released into the Santa Clara River. Therefore, implementation of Mitigation Measure HAZ-1 would be required to provide an additional level of safety during project construction, thereby reducing the potential impact to the public and environment due to release of hazardous materials during upset or accident conditions to a less-than-significant level.

As discussed under item (a), operation and maintenance of the project would involve the routine use and storage of sodium hypochlorite and liquid ammonium sulfate, which are not considered hazardous materials. Spent resin from the PFAS treatment vessels, which may be considered a hazardous waste depending on the concentration of PFAS, would be removed two to three times a year by the resin supplier who would be required to transport and dispose of the material in accordance with all applicable regulations, such as the Hazardous Materials Transportation Act, California Hazardous Material Management Act, and California Code of Regulations, Title 22. Because of the static nature of the spent resin, any accidents occurring during the removal, transport, and disposal of the resin would be unlikely to create a significant hazard to the public or the environment. Therefore, project operation would not create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.

Mitigation Measure

HAZ-1 Hazardous Materials Management and Spill Control Plan

SCV Water shall require its construction contractor(s) to submit a Hazardous Materials Management and Spill Control Plan (HMMSCP), including a project-specific contingency plan for hazardous materials and waste operations to SCV Water for review and approval. The HMMSCP shall establish policies and procedures consistent with applicable codes and regulations, including, but not limited to, the California Building and Fire Codes, as well as regulations promulgated by the United States Department of Labor, United States Occupational Safety and Health Administration, and California Division of Occupational Safety and Health. The HMMSCP shall articulate hazardous materials handling practices to prevent the accidental spill or release of hazardous materials during project construction.

Significance after Mitigation

Mitigation Measure HAZ-1 would require preparation and implementation of a HMMSCP with appropriate procedures to implement in the event of an accidental spill or release of hazardous materials during project construction. Therefore, implementation of Mitigation Measure HAZ-1 would reduce impacts to the public or the environment related to the release of hazardous materials into the environment during reasonably foreseeable upset and accident conditions to a less-than-significant level.

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c. Would the project emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school?

The nearest school to the project site is Bridgeport Elementary School, located approximately 75 feet east of the nearest project component (the proposed roundabout improvements area at the intersection of Bridgeport and Bayside Lanes) and approximately 170 feet north of the proposed groundwater treatment and disinfection facility. As discussed under thresholds (a) and (b), the transport, use, and storage of hazardous materials during construction and operation of the project would be conducted in accordance with applicable State and federal laws. Hazardous materials associated with project operation, including sodium hypochlorite and liquid ammonium sulfate, would not produce hazardous air emissions under normal operating conditions when handled properly by trained personnel (i.e., the SCV Water operators). In addition, sodium hypochlorite is not the equivalent of chlorine gas, and chlorine gas would not be used or released during project operation. Furthermore, implementation of Mitigation Measure HAZ-1 would be required to provide an additional level of safety during project construction, thereby reducing the potential for accidental spills of hazardous materials to affect Bridgeport Elementary School. As a result, impacts would be less than significant.

LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED

d. Would the project be located on a site that is included on a list of hazardous material sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

The following databases and listings compiled pursuant to Government Code Section 65962.5 were reviewed on February 3, 2022, for known hazardous materials contamination at the project site:

- State Water Resources Control Board - GeoTracker search for leaking underground storage tanks (LUST) and other cleanup sites (SWRCB 2022);
- California Department of Toxic Substances Control - EnviroStor database for hazardous waste facilities or known contamination sites (California Department of Toxic Substances Control 2022); and
- USEPA Superfund Enterprise Management System Search (U.S. EPA 2022c).

The project site is not listed in the above environmental databases, and no other listed sites are located within 1,000 feet of the project site. Therefore, the project would not create a significant hazard to the public or the environment related to location on a hazardous materials site. No impact would occur.

NO IMPACT

e. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?

The closest public airport to the project site is Whiteman Airport, located approximately 14 miles to the southeast of the project site. Therefore, the site is not located in an area covered by an airport land use plan or within two miles of a public or public use airport. As such, the project would not result in a safety hazard or excessive aircraft noise for people working at the project site during construction or operation. No impact would occur.

NO IMPACT

f. Would the project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

During project construction, equipment staging would primarily occur on site and on vacant land directly east of the project site and would not require lane or road closures. However, during construction of the proposed roundabout improvements, it is likely that a lane or road closure at the two affected intersections would be required. Newhall Ranch Road may also require lane or road closures during construction of the interconnection pipeline. These closures could slow traffic through the local area and thereby affect implementation of emergency response and emergency evacuation plans. Therefore, impacts during project construction would be potentially significant, and implementation of Mitigation Measure HAZ-2 would be required to reduce impacts to a less-than-significant level.

The project does not include changes to the existing street system that could result in inadequate emergency access, and project operation and maintenance would not introduce new activities or substantial operational traffic with the potential to interfere with emergency response and evacuations. Rather, the roundabout improvements at the project site would likely provide enhanced access for emergency responders and evacuation orders. Therefore, no operational impacts related to emergency response plans and emergency evacuation plans would occur.

Mitigation Measure

HAZ-2 Traffic Control Plan

SCV Water shall require the project contractor(s) to prepare and implement a traffic control plan that specifies how traffic will be safely and efficiently redirected during lane closures. All work shall comply with the Work Area Traffic Control Handbook, which conforms to the standards and guidance of the California Manual on Uniform Traffic Control Devices. Traffic control measures for lane and road closures shall be included, and priority access shall be given to emergency vehicles. The traffic control plan shall also include requirements to notify local emergency response providers and all residences within 1,000 feet at least one week prior to the start of work when lane or road closures are required.

Significance after Mitigation

Mitigation Measure HAZ-2 would require the project contractor(s) to safely redirect traffic, utilize traffic control measures, and give emergency response providers advance notification and priority access such that the potential to impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan would be minimized. Therefore, implementation of Mitigation Measure HAZ-2 would reduce impacts to a less-than-significant level.

LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED

g. Would the project expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires?

As discussed in Section 20, *Wildfire,* the project site is not located in a State Responsibility Area or designated as a Very High Fire Hazard Severity Zone (VHFHSZ) (California Department of Forestry and Fire Protection [CAL FIRE] 2022a). The nearest VHFHSZ is located approximately 0.5 mile southeast of the project site within undeveloped land southeast of the intersection of Bouquet Canyon Road and Soledad Canyon Road. Commercial development, arterial roadways, and the Santa Clara River are present between the project site and the VHFHSZ. The presence of such features creates a buffer from the project site to the VHFHSZ and minimizes chance of exposure to wildland fires. However, the project site is adjacent to brush-covered open space vegetation including highly combustible native plant communities which could pose a fire risk. Heavy duty equipment used during construction that may produce sparks that could ignite vegetation would be limited through regulatory compliance. California PRC Section 4442 mandates the use of spark arrestors, which prevent the emission of flammable debris from exhaust on earth-moving and portable construction equipment with internal combustion engines that are operating on any forest-covered, brush-covered, or grass-covered land. PRC Section 4428 requires construction contractors to maintain fire suppression equipment during the highest fire danger period (April 1 to December 1) when operating on or near any forest-covered, brush-covered, or grass-covered land. These regulations would minimize the risk of fire resulting from project construction activities. Nevertheless, construction activities would have the potential to result in wildland fires due to proximity to brush-covered land, and impacts would be potentially significant. Implementation of Mitigation Measure HAZ-3 would be required to reduce construction impacts to a less-than-significant level.

Project operation would not include component with the potential to ignite wildland fires. Therefore, project operation would not expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires, and no impact would occur.

Mitigation Measures

HAZ-3 Fire Hazards Measures

During project construction, staging areas and other areas designated for construction shall be cleared of dried vegetation and other materials that could ignite. Construction equipment with spark arrestors shall be maintained in good working order. In addition, construction crews shall have a spotter during electrical installation activities who shall stop work should accidental sparks or other fire-inducing hazards occur. The spotter and construction crews shall take immediate action to remediate the hazard to safe conditions. Electrical work shall continue when approval by a site manager is granted that the hazard has been remediated. Other construction equipment, including those with hot vehicle catalytic converters, shall be kept in good working order and used only within cleared construction areas. During project construction, contractors shall require vehicles and crews to have access to functional fire extinguishers.

Significance after Mitigation

Mitigation Measure HAZ-3 would require the project contractor(s) to implement fire prevention measures such that the potential to ignite wildland fires would be minimized. Therefore, implementation of Mitigation Measure HAZ-3 would reduce impacts to a less-than-significant level.

LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED

10 Hydrology and Water Quality

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	□	■	□	□
b. Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	□	□	□	■
c. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:				
(i) Result in substantial erosion or siltation on- or off-site;	□	□	■	□
(ii) Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;	□	□	■	□
(iii) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or	□	□	■	□
(iv) Impede or redirect flood flows?	□	□	■	□
d. In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	□	□	□	■
e. Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	□	■	□	□

a. *Would the project violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?*

Construction

As stormwater flows over a construction site, it can pick up sediment, debris, and chemicals, and transport them to receiving water bodies. Temporary site preparation and trenching activities associated with the project may result in soil erosion. Construction activities could also affect water quality in the event of an accidental fuel or hazardous materials leak or spill. Receiving water bodies in the vicinity of the project site including the Santa Clara River to the south.

As previously discussed in Section 7, *Geology and Soils*, construction activities would be required to comply with the NPDES Construction General Permit (Order No. 2009-2009-DWQ, as amended) because project construction would disturb more than one acre of land. The NPDES Construction General Permit requires preparation and implementation of a project-specific SWPPP, which requires operators to implement pollution prevention controls to minimize the discharge of pollutants from stormwater and spilled or leaked materials. Such controls include installation of silt fencing and sandbag barriers, covering of stockpiles, use of desilting basins, and post-construction revegetation and drainage requirements. In addition, pursuant to the NPDES Construction General Permit requirements, inspections would be conducted on the project site once every seven calendar days and within 24 hours of a 0.25-inch storm event. Compliance with applicable regulatory requirements would minimize potential surface water quality impacts associated with sediment erosion during project construction.

There is potential for accidental leaks and spills of hazardous materials at the surface during project construction, which could result in potentially significant impacts to water quality if hazardous materials enter the Santa Clara River. Mitigation Measure HAZ-1, as described in Section 9, *Hazards and Hazardous Materials*, would reduce the potential for accidental leaks and spills of hazardous materials by requiring preparation and implementation of an HMMSCP. With implementation of Mitigation Measure HAZ-1, project construction would not violate water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality, and impacts would be less than significant.

Operation

The proposed project consists of a groundwater treatment and disinfection facility, new groundwater well, and associated infrastructure improvements. The project includes installation of an underground storm drain pipeline from a point south of the Bridgeport Lane/Bayside Lane intersection to the existing Well S7 location. This pipeline would convey stormwater flows and pumped groundwater that currently sheet flow from the site into the river to an existing 30-inch stormwater drain pipeline that ultimately outlets to the river. In addition, the proposed groundwater treatment and disinfection facility would include a drainage pipeline connection between the proposed treatment facility and the existing 30-inch SCV Water storm drainage outlet pipeline on the eastern portion of the treatment facility location. The proposed drainage pipeline would collect and convey on-site stormwater runoff and groundwater produced during periodic installation and water quality testing of new resin media in the treatment vessels to the existing stormwater drainage outlet approximately 135 feet south of the project site. Both discharges would be covered under SCV Water's existing Statewide General Permit for Drinking Water System Discharges to the Waters of the United States No 4DW0768 and thus would be required to comply with the water quality standards established in this permit. As such, project operation would not violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality. Impacts would be less than significant.

LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED

b. *Would the project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?*

The project site overlies the Santa Clara River Valley East Groundwater Subbasin (California Department of Water Resources 2006). The Santa Clara River Valley East Groundwater Subbasin is designated as a high-priority groundwater basin under the Sustainable Groundwater Management Act (SGMA) but is not critically over-drafted (SCV GSA 2022). The SCV GSA manages the basin and has adopted the Santa Clara River Valley East Groundwater Subbasin GSP to guide its efforts (SCV GSA 2022).

The proposed groundwater treatment and disinfection facility would restore the use of Wells S6, S7 and S8, and the new Well S9 would serve as a replacement for the existing Mitchell 5A Well that is being abandoned by a private developer as part of the Vista Canyon Plaza Development. The purpose of the proposed project is to reduce SCV Water's dependence on imported water supplies by restoring its groundwater production capacity. The proposed project would not result in an increase in SCV Water's basin-wide groundwater pumping as compared to baseline conditions when Wells S6, S7, S8, and the Mitchell 5A well were operational. Thus, the project would not substantially decrease basin-wide groundwater supplies such that the project may impede sustainable groundwater management of the basin, and no impact would occur.

As discussed in Section 4, *Biological Resources*, Reactivated operation of existing Wells S6, S7, and S8 in conjunction with operation of the new Well S9 would entail individual operation and monitoring of each well, allowing SCV Water to turn on any combination of one to four well pumps at a time to stay within the pumping values described in the GSP and avoid ~~could~~ deplet~~e~~ing local groundwater levels to decline beyond the minimum thresholds for depletion of interconnected surface waters established in the Santa Clara River Valley East Groundwater Subbasin GSP and ~~could~~ would thus not be expected to impact the Fremont cottonwood forest and woodland vegetation community located near the project site, which is identified as a potential GDE in the Santa Clara River Valley East Groundwater Subbasin GSP. As discussed under threshold (a), the GSP requires that groundwater extraction activities, including those that would occur under the proposed project, consider potential effects to GDEs. Conformance with the monitoring and management actions of the GSP would ensure operation of the wells would not lower groundwater levels beyond the minimum thresholds determined for depletion of interconnected surface waters as established in the GSP, which were developed in the GSP expressly to avoid impacts to GDEs. Nevertheless, ~~I~~ compliance with the GSP and implementation of Mitigation Measure BIO-3 would be required to achieve sustainable groundwater extraction such that the project would not substantially decrease local groundwater supplies such that the project may impede sustainable groundwater management of the basin. Impacts would be less than significant with mitigation incorporated.

The project would increase impervious surfaces on the project site through construction of the proposed groundwater treatment and disinfection facility. However, stormwater runoff from the groundwater treatment and disinfection facility would be discharged the existing storm drainage outlet pipeline to the Santa Clara River where it would have the opportunity to percolate into the underlying groundwater basin. Therefore, the project would not interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin, and impacts would be less than significant.

LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED

c.(i) Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would result in substantial erosion or siltation on- or off-site?

c.(ii) Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?

c.(iii) Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner that would create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?

c.(iv) Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would impede or redirect flood flows?

The project site does not include any streams or rivers and is not located within a 100- or 500-year flood zone (Federal Emergency Management Agency 2021). The proposed project would not result in alterations to the course of the nearby Santa Clara River. The project would increase impervious surfaces at the location of the proposed groundwater treatment and disinfection facility and new Well S9. Under existing conditions, stormwater currently sheet flows from this location to the Santa Clara River and onto Bridgeport Lane. Under the proposed project, stormwater runoff from the facility would be directed to a new underground 12-inch drainage pipeline connection that would connect to the existing 30-inch SCV Water storm drainage outlet pipeline on the eastern portion of the treatment facility location. The drainage pipeline would collect and convey on-site stormwater runoff and groundwater produced during periodic installation and water quality testing of new resin media in the treatment vessels to the existing stormwater drainage outlet approximately 135 feet south of the project site. In addition, the project includes installation of an underground storm drain pipeline from a point south of the Bridgeport Lane/Bayside Lane intersection to the existing Well S7 location. This pipeline would convey stormwater flows and pumped groundwater that currently sheet flow from the site into the river to an existing 30-inch stormwater drain pipeline that ultimately outlets to the river. Stormwater runoff discharges from both pipelines would be required to comply with the SCV Water's existing Statewide General Permit for Drinking Water System Discharges to the Waters of the United States No 4DW0768. Pursuant to this permit, SCV Water would be required to implement BMPs that would minimize sediment discharge via the use of erosion control measures such as use of flow diffusers or the construction of check dams to slow flow. Furthermore, the net change in surface runoff discharged to the Santa Clara River from this location as compared to existing conditions would be minimal under the proposed project because runoff from this location currently partially discharges to the river. As such, the addition of impervious surfaces would not result in substantial erosion or siltation; increase the rate or amount of surface runoff such that on- or off-site flooding occurs; exceed stormwater drainage systems or provide substantial additional sources of polluted runoff; or impede or redirect flood flows. Impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

d. In flood hazard, tsunami, or seiche zones, would the project risk release of pollutants due to project inundation?

The nearest body of water that could be subject to seiche is Castaic Lake, approximately 7.5 miles north of the project site. Given this distance, the project site is not at risk of inundation due to seiche. The project site is approximately 40 miles east from the Pacific Ocean and is therefore not located in a tsunami hazard zone. Additionally, the project site is not located within a flood hazard zone (Federal Emergency Management Agency 2021). Therefore, the project site is not at risk of inundation and would no potential to release of pollutants due to project inundation. No impact would occur.

NO IMPACT

e. Would the project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

The project is subject to the requirements of the Los Angeles Regional Water Quality Control Board's Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties (Los Angeles Regional Water Quality Control Board 2014). As described under threshold (a), the project would be required to comply with the NPDES Construction General Permit to protect water quality during construction. The NPDES Construction General Permit requires preparation and implementation of a project specific SWPPP, which requires operators to implement pollution prevention controls to minimize the discharge of pollutants from stormwater and spilled or leaked materials. Compliance with applicable regulatory requirements would minimize potential surface water quality impacts associated with sediment erosion during project construction. In addition, pursuant to the requirements of SCV Water's existing Statewide General Permit for Drinking Water System Discharges to the Waters of the United States No 4DW0768, SCV Water would be required to implement BMPs that would minimize sediment discharge in stormwater runoff during project operation via the use of erosion control measures such as use of flow diffusers or the construction of check dams to slow flow. As a result, the project would not conflict with or obstruct implementation of the applicable water quality control plan, and impacts would be less than significant.

The project site overlies the Santa Clara River Valley East Groundwater Subbasin, which is subject to the Santa Clara River Valley East Groundwater Subbasin GSP (SCV GSA 2022). As discussed under threshold (b), the proposed project would not result in a change in the amount of groundwater extracted by SCV Water from the Santa Clara River Valley East Groundwater Subbasin and would not substantially interfere with groundwater recharge. In addition, as discussed in Section 4, *Biological Resources*, the project would not result in adverse impacts to groundwater-dependent ecosystems because reactivated operation of existing Wells S6, S7, and S8 in conjunction with operation of the new Well S9 would entail individual operation and monitoring of each well, allowing SCV Water to turn on any combination of one to four well pumps at a time to stay within the pumping values described in the GSP and because ~~with~~ compliance with the GSP and implementation of Mitigation Measure BIO-3 would be required. Accordingly, the proposed project would not conflict with or obstruct implementation of the Santa Clara River Valley East Groundwater Subbasin GSP. Impacts would be less than significant with mitigation incorporated.

LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED

11 Land Use and Planning

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Physically divide an established community?	☐	☐	☐	■
b. Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☐	■	☐	☐

a. Would the project physically divide an established community?

The project consists of improvements and construction to water infrastructure and transportation facilities in a residential area in the city of Santa Clarita. Improvements to Wells S6, S7, and S8 as well as the two roundabouts would not change their location or function. The proposed pipelines would be located underground and would not result in permanent surficial changes to the public's ability to use Bridgeport Park or the Santa Clara River Trail upon the completion of construction. The proposed groundwater treatment and disinfection facility and Well S9 would not divide the community because they would be located on a vacant site bounded by Bridgeport Lane to the north, the Santa Clara River Trail to the south, and open space to the east and west. Therefore, the project would not physically divide an established community, and no impact would occur.

NO IMPACT

b. Would the project cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?

The project consists of improvements and construction to water infrastructure and transportation facilities on a parcel zoned Specific Plan-Open Space (North Valencia Specific Plan). However, according to Government Code Section 53091, building and zoning ordinances of a county or city shall not apply to the location or construction of facilities for the production, generation, storage, treatment, or transmission of water. As such, the project would not be subject to the City's building and zoning ordinances (Santa Clarita Municipal Code Titles 17 and 18) or the North Valencia Specific Plan, which establishes additional zoning regulations for the project area. However, SCV Water would obtain the required vegetation removal permit from the Santa Clarita City Manager prior to any vegetation removal (Santa Clarita Municipal Code Section 14.10.060).

The City of Santa Clarita General Plan includes Objective LU 7.2 for water service, which states that the City shall "ensure an adequate water supply to meet the demands of growth" (City of Santa Clarita 2011). Objective CO 4.2 also aims to "work with water providers and other agencies to identify and implement programs to increase water supplies to meet the needs of future growth" (City of Santa Clarita 2011). The proposed project would enable SCV Water to continue providing its existing customers with a safe, reliable water supply by enabling SCV Water to reactivate Wells S6, S7, and S8 and maintain their groundwater production capacity through installation of Well S9 as a replacement for the Mitchell 5A well. Therefore, the project would further implementation of Objective LU 7.2 and Objective CO 4.2 by constructing water infrastructure improvements to meet necessary water supply requirements, protect the long-term security of water supplies, and safeguard groundwater quality. The project would also be consistent with the Open Space land use designation because open space can be used for managed production of resources, such as groundwater, according to the City's General Plan Conservation and Open Space Element. In addition, in furtherance of Goal LU 6 of the City's General Plan Land Use Element, the proposed groundwater treatment and disinfection facility would be enclosed with an up to approximately 15-foot-high decorative wall and architectural paneling to screen the treatment vessels and improvements, which would facilitate the creation of a scenic and beautiful urban environment. For all other issue areas, the project would result in no impact, less than significant impacts, or less than significant impacts with the incorporation of mitigation measures, as detailed throughout this Initial Study. For example, the project would be required to obtain a permit from the Santa Clarita City Manager prior to any vegetation removal pursuant to Santa Clarita Municipal Code Section 14.10.060), and as discussed in Section 13, *Noise*, noise generated during project construction and operation would be consistent with the noise regulations of Santa Clarita Municipal Code Chapter 11.40 with implementation of Mitigation Measure N-1 for drilling activities associated with the new Well S9. In addition, as discussed in Section 1, *Aesthetics*, the project would be consistent with Objectives CO 6.1 through 6.6 in the City's General Plan Conservation and Open Space Element as they relate to scenic quality. As such, the project would not cause a significant environmental impact due to a conflict with the land use plans, policies, and regulations of the City of Santa Clarita adopted for the purpose of avoiding or mitigating an environmental effect. Impacts would be less than significant with mitigation incorporated.

LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED

12 Mineral Resources

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	□	□	□	■
b. Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?	□	□	□	■

a. Would the project result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?

b. Would the project result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?

The project site is currently vacant and is zoned as Specific Plan-Open Space (North Valencia Specific Plan). The project site is surrounded by Bridgeport Elementary School and open space to the west, the Santa Clara River to the south, residential development and open space to the east, and residential development and Bridgeport Park to the north. According to the City's General Plan Final EIR, the project site is in an area with a Mineral Resource Zone 2 designation, which indicates the presence of significant aggregate resources (City of Santa Clarita 2010). However, the site is not designated or zoned for mineral resource extraction, and no mineral resource extraction activities are currently occurring on site. Additionally, the nearby residential and school uses are not compatible with mineral extraction activities. Furthermore, the project would not preclude future use of the site for mineral resource extraction. Therefore, the project would result in no impacts to mineral resources.

NO IMPACT

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13 Noise

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project result in:				
a. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	■	☐	☐
b. Generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	■	☐
c. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	■

Overview of Noise and Vibration

Noise

Sound is a vibratory disturbance created by a moving or vibrating source, which is capable of being detected by the hearing organs. Noise is defined as sound that is loud, unpleasant, unexpected, or undesired and may therefore be classified as a more specific group of sounds. The effects of noise on people can include general annoyance, interference with speech communication, sleep disturbance, and, in the extreme, hearing impairment (California Department of Transportation [Caltrans] 2013).

Noise levels are commonly measured in decibels (dB) using the A-weighted sound pressure level (dBA). The A-weighting scale is an adjustment to the actual sound pressure levels so they are consistent with the human hearing response, which is most sensitive to frequencies around 4,000 Hertz and less sensitive to frequencies around and below 100 Hertz. Decibels are measured on a logarithmic scale that quantifies sound intensity in a manner similar to the Richter scale used to measure earthquake magnitudes. A doubling of the energy of a noise source, such as doubling of traffic volume, would increase the noise level by 3 dB; dividing the energy in half would result in a 3 dB decrease (Caltrans 2013).

Human perception of noise has no simple correlation with sound energy. The perception of sound is not linear in terms of dBA or in terms of sound energy. Two sources do not “sound twice as loud” as one source. It is widely accepted that the average healthy ear can barely perceive changes of 3 dBA, increase or decrease (i.e., twice the sound energy); that a change of 5 dBA is readily perceptible (eight times the sound energy); and that an increase (or decrease) of 10 dBA sounds twice (half) as loud (10.5 times the sound energy) (Caltrans 2013).

Sound changes in both level and frequency spectrum as it travels from the source to the receiver. The most obvious change is the decrease in level as the distance from the source increases. The manner by which noise reduces with distance depends on factors such as the type of sources (e.g., point or line, the path the sound will travel, site conditions, and obstructions). Noise levels from a point source typically attenuate, or drop off, at a rate of 6 dBA per doubling of distance (e.g., construction, industrial machinery, ventilation units). Noise from a line source (e.g., roadway, pipeline, railroad) typically attenuates at about 3 dBA per doubling of distance (Caltrans 2013). Noise levels may also be reduced by intervening structures; the amount of attenuation provided by this "shielding" depends on the size of the object and the frequencies of the noise levels. Natural terrain features such as hills and dense woods, and man-made features such as buildings and walls, can significantly alter noise levels. Generally, any large structure blocking the line of sight will provide at least a 5-dBA reduction in source noise levels at the receiver (Federal Highway Administration [FHWA] 2011).

The impact of noise is not a function of loudness alone. The time of day when noise occurs and the duration of the noise are also important factors of project noise impact. Most noise that lasts for more than a few seconds is variable in its intensity. Consequently, a variety of noise descriptors have been developed. L_{eq} is one of the most frequently used noise metrics; it considers both duration and sound power level. The L_{eq} is defined as the single steady-state A-weighted sound level equal to the average sound energy over a time period. When no time period is specified, a 1-hour period is assumed. The L_{max} is the highest noise level within the sampling period, and the L_{min} is the lowest noise level within the measuring period. Normal conversational levels are in the 60 to 65-dBA L_{eq} range; ambient noise levels greater than 65 dBA L_{eq} can interrupt conversations (Federal Transit Administration [FTA] 2018).

Vibration

Groundborne vibration of concern in environmental analysis consists of the oscillatory waves that move from a source through the ground to adjacent buildings or structures, and vibration energy may propagate through the buildings or structures. Vibration may be felt, may manifest as an audible low-frequency rumbling noise (referred to as groundborne noise), and may cause windows, items on shelves, and pictures on walls to rattle. Although groundborne vibration is sometimes noticeable in outdoor environments, it is almost never annoying to people who are outdoors. The primary concern from vibration is that it can be intrusive and annoying to building occupants at vibration-sensitive land uses and may cause structural damage.

Typically, ground-borne vibration generated by manmade activities attenuates rapidly as distance from the source of the vibration increases. Vibration amplitudes are usually expressed in peak particle velocity (PPV) or root mean squared (RMS) vibration velocity. The PPV and RMS velocity are normally described in inches per second (in/sec). PPV is defined as the maximum instantaneous positive or negative peak of a vibration signal. PPV is often used as it corresponds to the stresses that are experienced by buildings (Caltrans 2020).

High levels of groundborne vibration may cause damage to nearby building or structures; at lower levels, groundborne vibration may cause minor cosmetic (i.e., non-structural damage) such as cracks. These vibration levels are nearly exclusively associated with high impact activities such as blasting, pile-driving, vibratory compaction, demolition, drilling, or excavation.

Sensitive Receivers

Noise exposure goals for various types of land uses reflect the varying noise sensitivities associated with those uses. The City's Noise Element describes noise-sensitive land uses as housing, schools, medical facilities, libraries, social care facilities, and similar facilities (City of Santa Clarita 2011). The nearest noise-sensitive receivers to the project site consist of residences, which are located approximately 20 feet to the north and west of both proposed roundabout improvements areas, and Bridgeport Elementary School, which is located approximately 70 feet to the east of the proposed roundabout improvements area located at Bridgeport and Bayside Lanes.

Vibration sensitive receivers are similar to noise sensitive receivers and includes residences and institutional uses, such as schools, churches, and hospitals. However, vibration sensitive receivers also include buildings where vibrations may interfere with vibration-sensitive equipment, which can affected by levels that may be well below those associated with human annoyance.

Project Noise Setting

The most common source of noise in the project site vicinity is vehicular traffic along Bridgeport Lane. To characterize ambient sound levels at and near the project site, three 15-minute sound level measurements were conducted along Bridgeport Lane on Wednesday, February 23, 2022 at the locations shown in Figure 5. An Extech, Model 407780A, ANSI Type 2 integrating sound level meter was used to conduct the measurements. Table 10 summarizes the results of the noise measurements, and detailed sound level measurement data are included in Appendix E.

Figure 5 Noise Measurement Locations

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Table 10 Project Site Noise Monitoring Results – Short Term

Measurement	Location	Sample Times	Approximate Distance to Primary Noise Source	L_{eq} (dBA)	L_{max} (dBA)	Notes
NM1	South of project site along Santa Clara River Trail	8:25 – 8:40 a.m.	Approximately 180 feet to centerline of Bridgeport Lane	59	76	Low traffic flows (14 to 15 passenger vehicles); secondary noise sources included students on playground at Bridgeport Elementary School.
NM2	Along Bridgeport Lane adjacent to Bridgeport Elementary School	9:15 – 9:30 a.m.	Approximately 35 feet to centerline of Bridgeport Lane	58	72	
NM 3	Southeastern corner of Bridgeport Park adjacent to residences along Waterway Lane	9:38 – 9:53 a.m.	Approximately 100 feet to centerline of Bridgeport Lane	56	65	Low traffic flows (8 passenger vehicles); maintenance workers initiated leaf blowing nearby at the end of the measurement.

Detailed sound level measurement data are included in Appendix E. See Figure 5 for noise measurement locations.

Regulatory Setting

Chapter 11.44 of the Santa Clarita Municipal Code contains the City's noise regulations. Section 11.40.040 establishes operational noise level limits at residential, commercial, and manufacturing uses, which are shown in Table 11.

Table 11 City of Santa Clarita Noise Limits

Land Use[1]	Time	Noise Limit (dB)[2]
Residential	Day (7:00 a.m. to 9:00 p.m.)	65
Residential	Night (9:00 p.m. to 7:00 a.m.)	55
Commercial/manufacturing	Day (7:00 a.m. to 9:00 p.m.)	80
Commercial/manufacturing	Night (9:00 p.m. to 7:00 a.m.)	70

[1] At the boundary line between a residential property and a commercial and manufacturing property, the noise level of the quieter zone shall be used.

[2] Corrections to Noise Limits. The numerical limits above shall be adjusted by the following corrections, where the following noise conditions exist:

- Correction of -5 dB for repetitive impulsive noise
- Correction of -5 dB for steady whine, screech or hum
- The following corrections apply to daytime hours only:
  - Correction of +5 dB for noise occurring more than five but less than 15 minutes per hour
  - Correction of +10 dB for noise occurring more than one but less than five minutes per hour
  - Correction of +20 dB for noise occurring less than 1 minute per hour

Source: Santa Clarita Municipal Code Section 11.40.040

Santa Clarita Municipal Code Section 11.44.070 states, "any noise level from the use or operation of any machinery, equipment, pump, fan, air conditioning apparatus, refrigerating equipment, motor vehicle, or other mechanical or electrical device, or in repairing or rebuilding any motor vehicle, which exceeds the noise limits as set forth in Section 11.44.040 at any property line, or, if a condominium or rental units, within any condominium or rental unit within the complex, shall be a violation of this chapter."

Section 11.44.080 states that no person shall engage in any construction work which requires a building permit from the City on sites within 300 feet of a residentially zoned property, except between the hours of 7:00 a.m. to 7:00 p.m., Monday through Friday, and 8:00 a.m. to 6:00 p.m. on Saturday. Further, no work shall be performed on the following public holidays: New Year's Day, Independence Day, Thanksgiving, Christmas, Memorial Day and Labor Day. According to previous noise reports conducted in the City, City staff have indicated that construction work performed in conformance with Santa Clarita Municipal Code Section 11.44.080 is exempt from Santa Clarita Municipal Code Section 11.44.070 (Impact Sciences, Inc. 2010).

Significance Thresholds

Construction Noise

Although daytime construction activity is exempt from compliance with Santa Clarita Municipal Code Section 11.44.070 if it occurs in conformance with Santa Clarita Municipal Code Section 11.44.080, for purposes of this analysis, the FTA Transit Noise and Vibration Impact Assessment (2018) criteria will be used. The FTA provides reasonable criteria for assessing construction noise impacts based on the potential for adverse community reaction. For residential uses, the daytime noise threshold is 80 dBA L_{eq} for an 8-hour period. This threshold is also conservatively utilized to evaluate daytime construction noise impacts at Bridgeport Elementary School.

Nighttime construction activities between 7:00 p.m. and 7:00 a.m. would be required for drilling Well S9 and would therefore be subject to the noise level limits contained in Santa Clarita Municipal Code Section 11.44.070. As a result, the nighttime noise level limit of 55 dBA L_{eq} for residential uses is utilized to evaluate the significance of nighttime construction noise impacts associated with well drilling (see Table 11).

Operational Noise

The noise level limits contained in Santa Clarita Municipal Code Section 11.40.040 were utilized to evaluate the project's operational noise impacts (see Table 11).

Vibration

Vibration limits used in this analysis to determine a potential impact to local land uses from construction activities, such as blasting, pile-driving, vibratory compaction, demolition, drilling, or excavation, are based on information contained in the Caltrans (2020) *Transportation and Construction Vibration Guidance Manual* and the FTA (2018) *Transit Noise and Vibration Impact Assessment Manual*. Maximum vibration limits recommended by the American Association of State Highway and Transportation Officials (AASHTO) are identified in Table 12.

Table 12 AASHTO Maximum Vibration Levels for Preventing Damage

Type of Situation	Limiting Velocity (in/sec)
Historic sites or other critical locations	0.1
Residential buildings, plastered walls	0.2–0.3
Residential buildings in good repair with gypsum board walls	0.4–0.5
Engineered structures, without plaster	1.0–1.5

in/sec = inches per second; AASHTO = American Association of State Highway and Transportation Officials

Source: Caltrans 2020

Based on AASHTO recommendations, limiting vibration levels to below 0.2 in/sec PPV at residential structures would prevent structural damage regardless of building construction type. These limits are applicable regardless of the frequency of the source. However, as shown in Table 13 and Table 14, potential human annoyance associated with vibration is usually different if it is generated by a steady state or a transient vibration source.

Table 13 Human Response to Steady State Vibration

PPV (in/sec)	Human Response
3.6 (at 2 Hz)–0.4 (at 20 Hz)	Very disturbing
0.7 (at 2 Hz)–0.17 (at 20 Hz)	Disturbing
0.10	Strongly perceptible
0.035	Distinctly perceptible
0.012	Slightly perceptible

PPV = peak particle velocity; Hz = hertz

Source: Caltrans 2020

Table 14 Human Response to Transient Vibration

PPV (in/sec)	Human Response
2.0	Severe
0.9	Strongly perceptible
0.24	Distinctly perceptible
0.035	Barely perceptible

PPV = peak particle velocity

Source: Caltrans 2020

As shown in Table 13, the vibration level threshold at which steady vibration sources are considered to be distinctly perceptible is 0.035 in/sec PPV. However, as shown in Table 14, the vibration level threshold at which transient vibration sources (such as construction equipment) are considered to be distinctly perceptible is 0.24 in/sec PPV. This analysis uses the distinctly perceptible threshold for purposes of assessing vibration impacts.

Noise Level Increases over Ambient Noise Levels

The operational and construction noise limits used in this analysis are set at reasonable levels at which a substantial noise level increase as compared to ambient noise levels would occur. Operational noise limits are lower than construction noise limits because continuous, permanent operational noise sources typically result in adverse community reaction associated with a smaller increase in ambient noise levels. In comparison, the magnitude of an increase in ambient noise levels associated with temporary, daytime construction activities typically results in a less adverse reaction. Furthermore, these noise limits are tailored to specific land uses; for example, the noise limits for residential land uses are lower than those for commercial land uses. The difference in noise limits for each land use indicates that the noise limits inherently account for typical ambient noise levels associated with each land use. Therefore, an increase in ambient noise levels that exceeds these absolute limits would also be considered a substantial increase above ambient noise levels. As such, a separate evaluation of the magnitude of noise level increases over ambient noise levels would not provide additional analytical information regarding noise impacts and therefore is not included in this analysis.

a. Would the project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Construction Noise

Construction noise was estimated using the FHWA Roadway Construction Noise Model (RCNM). RCNM predicts construction noise levels for a variety of construction operations based on empirical data and the application of acoustical propagation formulas. Using RCNM, construction noise levels were estimated at noise sensitive receivers near the project site. RCNM provides reference noise levels for standard construction equipment, with an attenuation rate of 6 dBA per doubling of distance for stationary equipment.

Variation in power imposes additional complexity in characterizing the noise source level from construction equipment. Power variation is accounted for by describing the noise at a reference distance from the equipment operating at full power and adjusting it based on the duty cycle of the activity to determine the L_{eq} of the operation (FTA 2018). Each phase of construction has a specific equipment mix, depending on the work to be accomplished during that phase. Each phase also has its own noise characteristics; some will have higher continuous noise levels than others, and some have high-impact noise levels.

Construction activity would result in temporary noise in the project site vicinity, exposing surrounding nearby receivers to increased noise levels. Construction noise would typically be higher during the heavier periods of initial construction (i.e., grading and equipment installation) and would be lower during the later construction phases (i.e., paving and site restoration). Typical heavy construction equipment during project grading could include dozers, loaders, and graders. It is assumed diesel engines would power all construction equipment. Construction equipment would not all operate at the same time or location. In addition, construction equipment would not be in constant use during each day of construction.

Project construction would occur over an approximately 18-month period, and the nearest sensitive receivers to construction would be residences and Bridgeport Elementary School. The distances between the center of the construction area for each project component and the nearest noise-sensitive receivers are presented in Table 15 as well as the type of construction activities that would occur at each location.

Table 15 Nearest Noise-Sensitive Receivers to Construction Activities

Project Component	Distance from Center of Construction Area to Nearest Noise-Sensitive Receiver	Type of Construction Activities
Existing Well S6	100 feet (residences to the east)	Site preparation, equipment installation
Existing Well S7	110 feet (residences to the north)	Site preparation, equipment installation
Existing Well S8	110 feet (Bridgeport Elementary School to the north)	Site preparation, equipment installation
Groundwater Treatment and Disinfection Facility	435 feet (Bridgeport Elementary School to the northwest)	Site preparation, grading, equipment installation, well drilling, paving, site restoration
New Well S9	165 feet (Bridgeport Elementary School to the northwest during daytime hours) / 360 feet (residences to the east during nighttime hours)	Site preparation, grading, equipment installation, well drilling, paving, site restoration
Pipeline Interconnection Alignment	230 feet (residences to the north)	Site preparation, grading, equipment installation, site restoration
Well S8 Influent Pipeline Alignment	110 feet (Bridgeport Elementary School to the north)	Site preparation, equipment installation, paving, site restoration
Well S7 Storm Drain Pipeline Alignment	155 feet (residences to the north)	Site preparation, equipment installation, paving, site restoration
Roundabout Improvements	60 feet (residences to the north and west)	Site preparation, paving, site restoration

Construction would occur primarily between the hours of 7:00 a.m. to 7:00 p.m., Monday through Friday, which is the timeframe during which construction is exempt from compliance with the City of Santa Clarita's noise standards, with the exception of 24-well drilling activities for the new S9 well, which would occur for two, non-consecutive periods of three weeks. Estimated construction noise levels at the nearest sensitive receivers during the loudest phase of construction activities at each project component are summarized in Table 16. As shown therein, daytime construction activities at all project components would not exceed the daytime noise threshold of 80 dBA L_{eq} at the nearest sensitive receivers. However, nighttime construction activities associated with well drilling for the new Well S9 would exceed the nighttime noise threshold of 55 dBA L_{eq} at nearby residences. Therefore, project construction would result in the generation of a substantial temporary increase in ambient noise levels in the vicinity of the project in excess of local standards, and implementation of Mitigation Measure N-1 would be required to reduce impacts to a less-than-significant level.

Table 16 Estimated Construction Noise Levels by Project Component

Project Component	Loudest Construction Phase (Construction Equipment)	Estimated Noise at Nearest Sensitive Receivers (dBA L_{eq})	Daytime Threshold[1]	Threshold Exceeded?	Nighttime Threshold[3]	Threshold Exceeded?
Existing Well S6	Equipment Installation (Backhoe, Crane, Generator)	74	80	No	N/A	N/A
Existing Well S7	Equipment Installation (Backhoe, Crane, Generator)	73	80	No	N/A	N/A
Existing Well S8	Equipment Installation (Backhoe, Crane, Generator)	73	80	No	N/A	N/A
Groundwater Treatment and Disinfection Facility	Grading (Backhoe, Compactor, Dozer)	62	80	No	N/A	N/A
New Well S9[3]	Well Drilling (Bore/Drill Rig, Generator, Crane [daytime only])	71 (daytime) / 63 (nighttime)[4]	80	No	55	Yes
Pipeline Interconnection Alignment	Grading (Backhoe, Compactor, Dozer)	68	80	No	N/A	N/A
Well S8 Influent Pipeline Alignment	Equipment Installation (Backhoe, Crane, Generator)	73	80	No	N/A	N/A
Well S7 Storm Drain Pipeline Alignment	Equipment Installation (Backhoe, Crane, Generator)	70	80	No	N/A	N/A
Roundabout Improvements	Grading (Backhoe, Compactor)[5]	77	80	No	N/A	N/A

See Appendix E for RCNM data sheets.

[1] FTA 2018

[2] Santa Clarita Municipal Code Section 11.44.070

[3] Well drilling activities would occur for 24 hours a day; therefore, these activities would be subject to both the daytime and nighttime thresholds.

[4] Bridgeport Elementary School is the nearest noise-sensitive receiver to the location of the new Well S9 but is only noise-sensitive during daytime school hours when students, faculty, and staff are present. Consequently, the nearest sensitive receiver to the proposed Well S9 location during nighttime hours are residential properties to the east of the project site, which approximately 360 feet to the east and further from the proposed Well S9 location as compared to Bridgeport Elementary School. Therefore, estimated nighttime noise levels are lower than estimated daytime noise levels due to the increased distance of the nearest sensitive receiver from well drilling activities.

[5] Given the limited space of the proposed roundabout improvements area, only two pieces of construction equipment would likely be in operation at any given time.

Operational Mechanical Equipment

On-site noise sources would include mechanical equipment, specifically two 100-horsepower (hp) pumps to be installed at the proposed groundwater treatment and disinfection facility. (No new noise-generating equipment would be installed as part of the improvements completed for the existing Wells S6, S7, and S8.) To analyze noise impacts from the pumps, a reference noise level measured for a 100-hp pump on a water treatment plant was used (Padre Dam Municipal Water District 2015). This 100-hp pump produced a sound power level of approximately 93.2 dBA. With a doubling of noise energy, noise levels increase by 3 dBA; therefore, it is assumed that simultaneous operation of two 100-hp pumps would generate a sound level of approximately 96.2 dBA, which equates to a sound pressure level of approximately 88.2 dBA L_{eq} at 3.3 feet.

The proposed groundwater treatment and disinfection facility would be enclosed with an up to approximately 15-foot-high decorative wall, which would provide at least a 5-dBA reduction in noise levels at nearby sensitive receivers. Assuming a standard distance attenuation of 6 dBA per doubling of distance and a noise level reduction of 5 dBA due to the surrounding wall, the proposed pumps would generate operational noise levels of approximately 41 dBA L_{eq} at the nearest sensitive receives, which are residences located approximately 425 feet from the proposed pump location. This noise level would not exceed the City's daytime noise level limit of 65 dBA L_{eq} or nighttime noise level limit of 55 dBA L_{eq} (see Table 11). Therefore, operational mechanical equipment would not result in the generation of a substantial permanent increase in ambient noise levels in the vicinity of the project in excess of local standards, and impacts would be less than significant.

Operational Traffic

The project would involve one to two daily maintenance trips to the project site as well as infrequent trips for semimonthly chemical deliveries and resin media replacement two to three times a year. This level of vehicle trips would represent a negligible increase over existing traffic and thus would result in a negligible noise increase. Therefore, operational traffic would not result in the generation of a substantial permanent increase in ambient noise levels in the vicinity of the project in excess of local standards, and impacts would be less than significant.

Mitigation Measures

N-1 Construction Noise Reduction Plan

SCV Water shall implement a Construction Noise Reduction Plan prior to and during 24-hour well drilling activities for the new Well S9. A disturbance coordinator shall be designated for the project to implement the provisions of the plan. At a minimum, the Construction Noise Reduction Plan shall include the following requirements:

- Whenever feasible, construction activities shall be scheduled to avoid operating several pieces of equipment simultaneously.
- Maximum physical separation, as far as practicable, shall be maintained between construction equipment and adjacent residences.
- All heavy-duty stationary construction equipment shall be placed so that emitted noise is directed away from the nearest sensitive receivers.

- All equipment, fixed or mobile, shall be operated with closed engine doors and shall be equipped with properly operating and maintained mufflers consistent with manufacturers' standards.
- SCV Water shall include construction specification requirements for installation and maintenance of temporary sound barriers and/or blankets during construction activities. The temporary sound barriers and/or blankets shall be installed around the construction site boundaries. The temporary barriers/blankets shall have a minimum sound transmission loss of 8 dB and noise reduction coefficient of 0.75. Additionally, the temporary barriers/blankets shall be of sufficient height to intercept the line of sight between the noise-generating source of the construction equipment (i.e., the exhaust) used for well drilling and nearby residential receivers. If temporary blankets are used instead of a barrier, they shall be of sufficient height to extend from the top of the temporary construction fence and drape on the ground or be sealed at the ground. The temporary barriers/blankets shall be a minimum of 15 feet in height. The temporary barriers/blankets shall have grommets along the top edge with exterior grade hooks, and loop fasteners along the vertical edges with overlapping seams, with a minimum overlap of 2 inches. Alternatively, if the groundwater treatment and disinfection facility has been constructed prior to drilling the new Well S9, SCV Water may achieve compliance with this measure by demonstrating that the walls surrounding the groundwater treatment and disinfection facility are sufficient to achieve an 8-dB noise level reduction at the nearest sensitive receivers.
- A non-automated "hotline" telephone number for registering construction noise complaints shall be posted at construction site and shall be provided to all residences within 1,000 feet of the project site along with the estimated schedule for 24-hour well drilling activities. The disturbance coordinator shall determine the cause of noise complaints and institute actions warranted to correct the issue. All complaints shall be logged noting the date, time, complainant's name, nature of the complaint, and any corrective action taken.
- At least two weeks prior to well drilling activities, but no more than one month in advance, written notification shall be provided to residents located within 1,000 feet of the project site identifying the type, duration, and frequency of 24-hour well drilling construction activities.

Significance After Mitigation

Implementation of Mitigation Measure N-1 would entail the use of several noise reduction measures, including mufflers and temporary sound barriers, during well drilling activities for the new Well S9. Temporary sound barriers would reduce nighttime construction noise levels from well drilling activities by approximately 9 dBA to approximately 54 dBA L_{eq} (see Appendix E for barrier calculations). The mitigated nighttime construction noise level would therefore fall below the City's nighttime noise level limit of 55 dBA L_{eq} for residential land uses. As a result, implementation of Mitigation Measure N-1 would reduce nighttime construction noise impacts to a less-than-significant level.

LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED

b. *Would the project result in generation of excessive groundborne vibration or groundborne noise levels?*

Construction

Construction activities have the greatest potential to generate ground-borne vibration affecting nearby receivers, especially during grading and well drilling. The main vibratory sources during construction would be bulldozers, loaded trucks, and a drill rig. Neither blasting nor pile driving would be required for construction of the project. Construction vibration estimates are based on vibration levels reported by Caltrans and the FTA (Caltrans 2013; FTA 2018). Table 17 shows typical vibration levels for various pieces of construction equipment used in the assessment of construction vibration (FTA 2018). As shown therein, construction vibration levels at the nearest structures would not exceed the thresholds for structural damage, human annoyance associated with transient vibration sources, or human annoyance associated with steady state vibration sources. Therefore, project construction would not result in the generation of excessive groundborne vibration or groundborne noise levels, and impacts would be less than significant.

Table 17 Vibration Levels at Sensitive Receivers

Equipment	Distance from Nearest Building	Estimated PPV at Nearest Building (in/sec)
Bore/Drill Rig[1]	365 feet	0.005
Large Bulldozer	25 feet	0.089
Loaded Truck	35 feet	0.05
Threshold for Structural Damage[2]	**–**	**0.2**
Threshold Exceeded?	–	No
Threshold for Human Annoyance (Transient Sources)[3]	**–**	**0.24**
Threshold Exceeded for Bulldozer and Loaded Truck?	–	No
Threshold for Human Annoyance (Steady State Sources)[4]	**–**	**0.035**
Threshold Exceeded for Bore/Drill Rig?	–	No

PPV = peak particle velocity; in/sec = inches per second

[1] Vibration levels measured for caisson drilling were used to approximate vibration levels from well drilling using a bore/drill rig.

[2] The threshold for structural damage is based on the minimum vibration level for preventing damage to residential building with plastered walls (see Table 12).

[3] The threshold for human annoyance is based on the level of vibration from transient sources (e.g., bulldozers, loaded trucks) that is distinctly perceptible (see Table 14).

[4] The threshold for human annoyance is based on the level of vibration from steady state sources (e.g., bore/drill rig) that is distinctly perceptible (see Table 13).

See Appendix E for vibration analysis worksheets.

Operation

The project does not include any substantial vibration sources associated with operation. Therefore, project operation would not result in the generation of excessive groundborne vibration or groundborne noise levels, and no impact would occur.

LESS THAN SIGNIFICANT IMPACT

c. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

The nearest airport to the project site is Whiteman Airport, located approximately 14 miles to the southeast. Therefore, the project would not expose people working at the project site to excessive airport noise levels, and no impact would occur.

NO IMPACT

14 Population and Housing

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Induce substantial unplanned population growth in an area, either directly (e.g., by proposing new homes and businesses) or indirectly (e.g., through extension of roads or other infrastructure)?	□	□	□	■
b. Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	□	□	□	■

a. Would the project induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?

The proposed project would not result in the construction of new homes and therefore would not directly induce substantial unplanned population growth. The project involves construction of a groundwater treatment and disinfection facility and the new S9 well. The proposed facility would enable SCV Water to restore the use of Wells S6, S7 and S8, and the new S9 well would serve as a replacement for the existing Mitchell 5A Well that is being abandoned by a private developer as part of the Vista Canyon Plaza Development. The purpose of the proposed project is to reduce SCV Water's dependence on imported water supplies by restoring its groundwater production capacity. The proposed project would not result in an increase in SCV Water's basin-wide groundwater pumping as compared to baseline conditions when Wells S6, S7, S8, and the Mitchell 5A well were operational; thus, the project would not provide an additional source of water supplies to serve new population growth. Rather, the project would enable SCV Water to continue providing its existing customers with a safe, reliable water supply. As such, the proposed project would not increase water supply such that it would facilitate the development of land that previously could not be developed due to water service constraints. In addition, although project operation may require one to two new SCV Water employees, these employees would likely be sourced from the existing regional workforce given the nature of the employment opportunities and would not have the potential to induce substantial unplanned population growth. Therefore, the project would not induce substantial unplanned population growth in the area, either directly or indirectly. No impact would occur.

NO IMPACT

b. Would the project displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?

The proposed project involves construction of a groundwater treatment and disinfection facility, a new groundwater well, and associated pipelines as well as improvements to existing wells and roundabouts. The project would not include demolition of existing housing. As such, the project would not displace people or housing, and no impact would occur.

NO IMPACT

15 Public Services

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
1. Fire protection?	□	□	□	■
2. Police protection?	□	□	□	■
3. Schools?	□	□	□	■
4. Parks?	□	□	■	□
5. Other public facilities?	□	□	□	■

a.1. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered fire protection facilities, or the need for new or physically altered fire protection facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives?

a.2. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered police protection facilities, or the need for new or physically altered police protection facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives?

a.3. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered schools, or the need for new or physically altered schools, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios or other performance objectives?

As discussed in Section 14, *Population and Housing*, the proposed project would not directly or indirectly induce population growth that may increase demand for fire protection services, police protection services, or schools. The proposed project would not include features or facilities requiring additional or unusual fire protection resources during operation. In the event of the unexpected need for fire protection for the project, the closest fire station is the Los Angeles County Fire Department Fire Station No. 126, located approximately 0.8 mile to the southwest of the project site. Additionally, the project would include security measures that would minimize the need for additional police protection services, such as new perimeter fencing and motorized gates. Pedestrian doors would also be outfitted with a key fob system. Therefore, no impact to fire protection, police protection, or schools would occur.

NO IMPACT

a.4. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered parks, or the need for new or physically altered parks, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios or other performance objectives?

As discussed in Section 14, *Population and Housing*, the proposed project would not directly or indirectly induce population growth that may increase demand for parks. Project construction would require temporary closure of a portion of Bridgeport Park during installation of the north-south pipeline and may require temporary closure of one lane of the Santa Clara River Trail during construction of pipelines near the trail. To minimize impacts to users of Bridgeport Park, the construction work area through the park would be fenced, and the pipeline would be constructed in segments with any exposed trenches covered with plate when construction activities are not occurring. These closures would result in temporary disruptions to park visitors and trail users, who may choose to use other nearby parks, such as Valencia Heritage Park (approximately 0.6 mile to the east), during project construction instead. However, this temporary disruption to use of Bridgeport Park and the Santa Clara River Trail would be temporary, lasting for only a portion of the approximately 18-month construction period, and would not be substantial enough to necessitate the provision of new or physically altered parks to accommodate the re-directed demand for parks. Furthermore, the portions of Bridgeport Park and the Santa Clara River Trail disturbed by construction activities would be restored to their existing condition or better upon completion of construction. Specifically, the Santa Clara River Trail would be resurfaced upon completion of construction activities if damage from construction equipment occurs. Therefore, the proposed project would not result in substantial adverse physical impacts associated with the provision of new or physically altered parks, or the need for new or physically altered parks, the construction of which could cause significant environmental impacts. Impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

a.5. Would the project result in substantial adverse physical impacts associated with the provision of other new or physically altered public facilities, or the need for other new or physically altered public facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives?

As discussed in Section 14, *Population and Housing*, the proposed project would not directly or indirectly induce population growth that may increase demand other public facilities, such as libraries. Therefore, no impact to other public facilities would occur.

NO IMPACT

16 Recreation

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	□	□	■	□
b. Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	□	□	□	■

a. Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

As discussed in Section 15, *Public Services*, project construction would require temporary closure of a portion of Bridgeport Park during installation of the north-south pipeline and may require temporary closure of one lane of the Santa Clara River Trail during construction of pipelines near the trail. To minimize impacts to users of Bridgeport Park, the construction work area through the park would be fenced, and the pipeline would be constructed in segments with any exposed trenches covered with plate when construction activities are not occurring. These closures would result in temporary disruptions to park visitors and trail users, who may choose to use other nearby parks and recreational facilities, such as Valencia Heritage Park (approximately 0.6 mile to the east), during project construction instead. This disruption to use of Bridgeport Park and the Santa Clara River Trail would be temporary, lasting for only a portion of the approximately 18-month construction period. Although temporary closure of Bridgeport Park may result in an incremental and temporary increase in the use of surrounding parks such as Valencia Heritage Park, the temporary closure would not be substantial enough to cause substantial physical deterioration of this park or other existing neighborhood and regional parks and recreational facilities. Therefore, construction impacts related to recreation would be less than significant. Furthermore, as outlined in *Project Description*, SCV Water would implement a suite of BMPs during project construction activities to minimize conflicts with recreational usage of Bridgeport Park and the Santa Clara River Trail, including use of temporary fencing, limiting hours of construction within Bridgeport Park to outside peak recreational hours to the extent feasible, restricting the location of overnight construction staging and materials laydown, prohibiting construction worker parking in the parking lot for Bridgeport Park, and notification of local residents and other park users of the project construction schedule.

Upon completion of construction, the portions of Bridgeport Park and the Santa Clara River Trail disturbed by project construction activities would be restored to their existing condition or better.

The project would not result in ongoing, long-term impacts to Bridgeport Park and the Santa Clara River Trail; therefore, operational impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

b. Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?

The project would involve construction of a groundwater treatment and disinfection facility, new S9 well, and associated pipelines as well as improvements to three existing wells and two roundabouts. The project may include a bench or bicycle pull-out along the Santa Clara River Trail that includes signage with information on the treatment facility, the environmental effects of which are analyzed and mitigated throughout this document. Therefore, no additional environmental impacts associated with the relocation and construction of water facilities would occur.

NO IMPACT

17 Transportation

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	□	■	□	□
b. Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?	□	□	■	□
c. Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible use (e.g., farm equipment)?	□	□	■	□
d. Result in inadequate emergency access?	□	■	□	□

a. Would the project conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?

The project site is located primarily along a local residential street – Bridgeport Lane. Bridgeport Lane does not have any bicycle lanes or transit facilities. Sidewalks are present along the westbound lane of Bridgeport Lane, and the Santa Clara River Trail is adjacent to the project site to the south. During construction, fencing would be placed along the southern edge of the project site, and signage notifying trail users of ongoing construction activities would be posted along the path. Temporary closure of one lane of the Santa Clara River Trail may be necessary during construction of pipelines near the trail. In addition to traversing Bridgeport Lane, installation of the interconnection pipeline would traverse Newhall Rach Road, which has four lanes of traffic in each direction, sidewalks along both sides, several Santa Clarita Transit bus stops, and no bicycle lanes in the project area. The nearest transit facility to the project site is the Newhall Ranch Road/Grandview Drive bus stop located approximately 0.1 mile west of the interconnection pipeline alignment. Temporary closure of lanes along Newhall Ranch Road and Bridgeport Lane may be required during construction of the interconnection pipeline. Construction activities within Newhall Ranch Road would be short-term (approximately one week) and at least one lane would be maintained open to traffic. Temporary road or lane closures of small portions of Bridgeport Lane, Bayside Lane, and Parkwood Lane may be needed as well during the proposed roundabout improvements. Should lane or road closures be required, signage and traffic control measures, including a flag person to direct traffic flows, would be implemented.

Project construction would require vehicle trips including construction workers traveling to and from the project site, haul trucks (including for export of excavated soil materials), and other trucks associated with equipment, material, and concrete deliveries. Heavy-duty equipment would primarily be staged be staged on a vacant lot directly east of the project site, reducing the need for daily vehicle trips. The number of vehicle trips associated with construction workers would be minimal with approximately 10 to 20 workers on site daily during construction. Approximately 10 to 11 delivery and haul truck trips would occur per day during construction. Construction-related traffic would be short-term and would cease upon completion of construction activities. Construction-related vehicle trips would be infrequent, and drivers would be required to comply with local traffic control measures (e.g., stop signs) and posted speed limits. Project construction activities would occur primarily along Bridgeport Lane, which is a low-volume roadway with no bicycle or transit facilities and which does not provide vehicular access to Bridgeport Elementary School. Nevertheless, the presence of heavy construction vehicles and temporary lane closures on Newhall Ranch Road could contribute to congestion if heavy truck traffic is traveling to and from the project site or lane closures occur during school drop-off and pick-up hours. In addition, temporary lane closures on Newhall Ranch Road would have the potential to affect the provision of transit by Santa Clarita Transit given the proximity of multiple bus stops to the project area. Therefore, project construction may conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities, and impacts would be potentially significant. Implementation of Mitigation Measure T-1 would be required to reduce impacts to a less-than-significant level.

Operational activities of the proposed project would require one to two maintenance staff daily, resin media replacement approximately two to three times per year, and chemical deliveries approximately twice a month. At most, the project would generate eight daily one-way trips if daily site visits, the resin media replacement visit, and the chemical delivery visit occur on the same day. Given the minimal number of trips generated, operational impacts related to adopted policies, plans, or programs addressing the circulation system, including public transit, bicycle, or pedestrian facilities would be less than significant.

Mitigation Measure

T-1 Address Potential Transportation Congestion Conflicts

SCV Water shall inform Bridgeport Elementary School of the anticipated construction timeframe at least two weeks in advance of the start of construction activities so that Bridgeport Elementary School may notify parents and guardians of students of the potential for construction traffic along Newhall Ranch Road. In addition, at the project's pre-construction meeting(s), SCV Water shall inform its construction contractor(s) and their personnel of the potential for construction traffic along Newhall Ranch Road and construction activities within Newhall Ranch Road to contribute to congestion associated with school pick-up and drop-off times (i.e., 7:30 a.m. to 8:10 a.m. on weekdays; 1:40 p.m. to 3:15 p.m. on all weekdays except Wednesdays, 1:15 p.m. to 2:05 p.m. on Wednesdays).

T-2 Address Potential Transit Service Conflicts

SCV Water shall notify Santa Clarita Transit at least two weeks in advance of the start of construction activities within Newhall Ranch Road. In addition, priority access shall be given to Santa Clarita Transit buses during any lane closures of Newhall Ranch Road.

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b. Would the project conflict or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b)?

CEQA Guidelines Section 15064.3(b) identifies criteria for evaluating transportation impacts. Specifically, the guidelines state VMT exceeding an applicable threshold of significance may indicate a significant impact. According to CEQA Guidelines Section 15064.3(b)(3), a lead agency may include a qualitative analysis of operational and construction traffic. A VMT calculation is typically conducted on a daily or annual basis to determine operational usage of a project. Construction of the proposed project would result in a minimal, short-term increase in local VMT as a result of construction-related worker traffic, material and equipment deliveries, and construction activities. However, VMT generated from construction-related traffic would cease once construction is completed.

The Governor's Office of Planning and Research *Technical Advisory on Evaluating Transportation Impacts in CEQA* (2018) states, "Projects that generate or attract fewer than 110 trips per day generally may be assumed to cause a less-than-significant VMT impact." As discussed under threshold (a), project operation and maintenance activities would generate approximately eight daily trips if daily site visits, the resin media replacement visit, and the chemical delivery visit occur on the same day. This level of daily traffic would not exceed the VMT screening level of 110 trips per day. As a result, impacts associated with VMT would be less than significant.

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c. Would the project substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible use (e.g., farm equipment)?

The proposed project would involve the construction of two 30-foot-wide driveways with motorized gates along Bridgeport Lane. No sharp curves or dangerous intersections are proposed. The driveways would be utilized by SCV Water staff and delivery vehicles and would not be open to the public. Temporary closure of one lane of the Santa Clara River Trail may be necessary during construction of pipelines near the trail. To maintain cyclists' access during construction along the bike trail, construction fencing would be placed along the southern edge of the project site, and signage notifying trail users of ongoing construction activities would be posted along the path. In addition, this lane would be resurfaced upon completion of construction activities if damage from construction equipment occurs. Therefore, the project would not substantially increase hazards due to a geometric design feature or incompatible use during construction or operation. Impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

d. Would the project result in inadequate emergency access?

As discussed in Section 9, *Hazards and Hazardous Materials,* it is likely that lane or road closures along Parkwood Lane, Bridgeport Lane, and Bayside Lane would be required during construction of the proposed roundabout improvements. Newhall Ranch Road may also require lane closures during construction of the interconnection pipeline. These closures could slow traffic through the local area and thereby may result in inadequate emergency access. Therefore, impacts during project construction would be potentially significant, and implementation of Mitigation Measure HAZ-2 would be required. This measure would require contractors to prepare and implement a traffic control plan that specifies how traffic will be safely and efficiently redirected during lane closures. During operation, the project would provide adequate site access for emergency response with two 30-foot-wide access driveways. In addition, the proposed roundabout improvements at the project site would likely provide enhanced access for emergency responders. Therefore, project operation would not result in inadequate emergency access, and operational impacts would be less than significant.

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18 Tribal Cultural Resources

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in a Public Resources Code Section 21074 as either a site, feature, place, or cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
a. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k)?	□	■	□	□
b. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1? In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	□	■	□	□

AB 52 of 2015 expanded CEQA by defining a new resource category, "tribal cultural resources." AB 52 states, "a project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment" (PRC Section 21084.2). It further states the lead agency shall establish measures to avoid impacts altering the significant characteristics of a tribal cultural resource, when feasible (PRC Section 21084.3). PRC Sections 21074(a)(1)(A-B) define tribal cultural resources as "sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe" and are:

1. Listed or eligible for listing in the CRHR or in a local register of historical resources as defined in PRC Section 5020.1(k), or
2. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in PRC Section 5024.1(c). In applying

these criteria, the lead agency shall consider the significance of the resource to a California Native American tribe.

AB 52 also establishes a formal consultation process for California tribes regarding those resources. The consultation process must be completed before a CEQA document can be certified or adopted. Under AB 52, lead agencies are required to "begin consultation with a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project." Native American tribes to be included in the process are those having requested notice of projects proposed in the jurisdiction of the lead agency.

On August 9, 2022, SCV Water distributed AB 52 consultation letters for the proposed project, including project information, map, and contact information, to four Native American Tribes. The Native American contacts provided with an AB 52 consultation letters include the following list of recipients:

- Fernandeño Tataviam Band of Mission Indians (FTBMI)
- Gabrieleño Band of Mission Indians – Kizh Nation
- Torres Martinez Desert Cahuilla Indians
- San Gabriel Band of Mission Indians

Under AB 52, Native American tribes have 30 days to respond and request further project information and formal consultation. All letters were received by August 9, 2022. Therefore, the consultation request period for all tribes closed on September 9, 2022.

SCV Water received one response letter from Jairo F. Avila of FTBMI, who submitted a formal request for tribal consultation and additional project information on August 9, 2022. SCV Water provided the FTBMI with the project information requested, including excavation depth, the results of the SLF search, and the cultural resources assessment via emails on August 23, 2022 and October 20, 2022. Sarah Brunzell, FTBMI Cultural Resources Management Division Manager, notified SCV Water via email on October 27, 2022, that she was assuming the consultation responsibilities previously held by Jairo F. Avila and requested a map of the project limits. On October 27, 2022, SCV Water responded with a map of the project limits and the draft mitigation measures for cultural and paleontological resources for review. On November 1, 2022, Sarah Brunzell provided recommended revisions to the draft cultural resources mitigation measures and requested a final copy of the mitigation measures. SCV Water provided a final copy of the mitigation measures revised in accordance with FTBMI's recommendations. On November 8, 2022, SCV Water held a consultation meeting with Sarah Brunzell and Kimia Fatehi, FTMBI Chief of Staff. The results of this meeting are summarized below. SCV Water concluded consultation with consensus on November 15, 2022.

a. *Would the project cause a substantial adverse change in the significance of a tribal cultural resource as defined in Public Resources Code Section 21074 that is listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k)?*

b. *Would the project cause a substantial adverse change in the significance of a tribal cultural resource as defined in Public Resources Code 21074 that is a resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1?*

The NAHC SLF search was returned with positive results. One Native American Tribe, the FTBMI, requested consultation under AB 52. During the consultation meeting held on November 8, 2022, Sarah Brunzell of the FTBMI indicated the presence of two tribal cultural resources within one mile of the project site and expressed concerns about the tribal cultural resource sensitivity of the project site. As a result, Sarah Brunzell requested full-time Native American monitoring of initial ground-disturbing activities for construction of the proposed groundwater treatment and disinfection facility and associated Well S9. The requested revisions to Mitigation Measures CR-1 and CR-2 provided by the FTBMI on November 1, 2022 were incorporated in Section 5, *Cultural Resources*. In addition, Mitigation Measure TCR-1 has been included in response to the FTBMI's request for full-time Native American monitoring of initial ground-disturbing activities for construction of the proposed groundwater treatment and disinfection facility and associated Well S9. Furthermore, as indicated in Section 5, *Cultural Resources*, SCV Water would be required to comply with existing regulations outlined in California Health and Safety Code Section 7050.5 should human remains be inadvertently discovered during construction. Implementation of Mitigation Measures CR-1, CR-2, and TCR-1 along with regulatory compliance with California Health and Safety Code Section 7050.5 would be required to reduce impacts to tribal cultural resources to a less-than-significant level.

Mitigation Measure

TCR-1 Native American Monitoring

SCV Water shall retain a professional Native American monitor from a locally-affiliated tribe to observe all clearing, grubbing, and grading operations within the proposed impact areas for the groundwater treatment and disinfection facility and associated Well S9. As a consulting tribe on the project, the FTBMI will be given the right of first refusal to provide monitoring assistance. If cultural resources are encountered, the Native American monitor shall have the authority to request ground-disturbing activities cease within 60 feet of the discovery to assess and document potential finds in real time. One monitor shall be required on-site for all ground-disturbing activities for the proposed groundwater treatment and disinfection facility and associated Well S9. However, if ground-disturbing activities occur in more than one area within the footprint of the proposed groundwater treatment and disinfection facility and associated Well S9 at the same time, then the parties may mutually agree to an additional monitor to ensure that simultaneously occurring ground-disturbing activities receive thorough levels of monitoring coverage. Native American monitoring may be reduced to spot-checking or eliminated at the discretion of the monitor, in consultation with SCV Water, as warranted by conditions such as encountering bedrock, sediments being excavated are fill, or negative findings during the first 60 percent of rough grading. If monitoring is reduced to spot-checking, spot-checking shall occur when ground disturbance moves to a new location within the footprint of the proposed groundwater treatment and disinfection facility and associated Well S9 and when ground disturbance will extend to depths not previously reached (unless those depths are within bedrock).

Significance after Mitigation

Implementation of Mitigation Measure TCR-1 as well as Mitigation Measures CR-1 and CR-2 (described in Section 5, *Cultural Resources*) would reduce potential impacts to tribal cultural resources to a less-than-significant level by requiring Native American monitoring of ground disturbance during construction of the proposed groundwater treatment and disinfection facility and associated Well S9, implementation of a Worker's Environmental Awareness Program training prior to construction for all project components, and appropriate procedures for evaluation and treatment should any discoveries be made during construction for all project components.

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19 Utilities and Service Systems

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	☐	☐	☐	■
b. Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	☐	☐	☐	■
c. Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	■	☐
d. Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☐	☐	■	☐
e. Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	☐	☐	■	☐

a. Would the project require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?

Water

The proposed project would involve the construction of water treatment and conveyance infrastructure, the environmental effects of which are analyzed and mitigated throughout this document. Therefore, no additional environmental impacts associated with the relocation and construction of water facilities would occur.

Wastewater Treatment

The project would not require permanent on-site personnel and does not include the installation of restroom facilities. Therefore, no wastewater would be generated, and the project would not result the construction or relocation of additional new or expanded wastewater facilities. No impact would occur.

Stormwater Drainage

As discussed in Section 10, *Hydrology and Water Quality*, the project would minimally alter drainage patterns on site. The project also includes installation of an underground 12-inch drainage pipeline connection between the proposed groundwater treatment and disinfection facility and the existing 30-inch SCV Water storm drainage outlet pipeline on the eastern portion of the treatment facility location. The project also includes approximately 840 linear feet of storm drain pipeline to be installed primarily east/west along the southern half of the existing Santa Clara River Trail from a point south of the Bridgeport Lane/Bayside Lane intersection to the existing Well S7 location. This pipeline would convey stormwater flows and pumped groundwater that currently sheet flow from the site into the river to an existing 30-inch stormwater drain pipeline that ultimately outlets to the river. The environmental effects of these stormwater drainage improvements are analyzed and mitigated throughout this document. Therefore, no additional environmental impacts associated with the relocation and construction of stormwater drainage facilities would occur.

Electric Power

As discussed in Section 6, *Energy*, project operation would increase electricity consumption at the project site by approximately 840 to 986 MWh; however, the facility would tie-in to existing electrical lines adjacent to the project site with a new transformer and meter installed on the project site, the environmental effects of which are analyzed and mitigated throughout this document. Therefore, no additional environmental impacts associated with the relocation and construction of electric power facilities would occur.

Natural Gas

The project would not involve any components requiring natural gas service and would not involve the relocation of existing natural gas facilities. Therefore, no impact related to natural gas facilities would occur.

Telecommunications

The proposed project would not require the installation of telecommunication facilities. Therefore, no impacts related to telecommunications facilities would occur.

LESS THAN SIGNIFICANT IMPACT

b. Would the project have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?

The project involves construction of a groundwater treatment and disinfection facility and new Well S9. The proposed facility would enable SCV Water to restore the use of Wells S6, S7 and S8, and the new Well S9 would serve as a replacement for the existing Mitchell 5A Well that is being abandoned by a private developer as part of the Vista Canyon Plaza Development. The purpose of the proposed project is to reduce SCV Water's dependence on imported water supplies by restoring its groundwater production capacity. The proposed project would not result in an increase in SCV Water's basin-wide groundwater pumping as compared to baseline conditions when Wells S6, S7, S8 and the Mitchell 5A Well were operational; thus, the project would not provide an additional source of water supplies to serve new population growth. Rather, the project would enable SCV Water to continue providing its existing customers with a safe, reliable water supply in accordance with the SCV Water Urban Water Management Plan and the Santa Clara River Valley East Groundwater Subbasin GSP. Therefore, no impacts to water supply would occur.

NO IMPACT

c. *Would the project result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?*

The project would not require permanent on-site personnel and does not include the installation of restroom facilities. Therefore, no wastewater would be generated, and the project would not result in a determination by the Santa Clarita Valley Sanitation District that it does not have adequate capacity to serve the project's projected demand in addition to its existing commitments. No impact would occur.

NO IMPACT

d. *Would the project generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?*

e. *Would the project comply with federal, state, and local management and reduction statutes and regulations related to solid waste?*

Chiquita Canyon Landfill would receive solid waste generated by the proposed project. The landfill is located approximately 5.6 miles west of the project site and has a permitted capacity of 110.3 million cubic yards and a maximum permitted throughput of 12,000 tons per day. As of August 2018, the remaining capacity at the landfill was approximately 60.4 million cubic yards. Chiquita Canyon Landfill accepts a variety of waste, including inert, industrial, construction/ demolition, green materials, and mixed municipal waste (California Department of Resources Recycling and Recovery 2022).

Project construction would temporarily generate solid waste, including approximately 3,500 cubic yards of excavated soil to be exported from the project site. Construction-generated solid waste would be disposed of in accordance with all applicable federal, State, and local statutes and regulations. Given the minimal level of demolition debris, Chiquita Canyon Landfill would have the capacity to accept non-hazardous solid waste generated by project construction activities. Once constructed, solid waste produced by project operation would primarily include spent resin media from the treatment vessels. The spent resin, which may be considered a hazardous waste depending on the concentration of PFAS, would be removed two to three times a year by the resin supplier who would be required to transport and dispose of the material at a licensed hazardous waste disposal facility in accordance with all applicable regulations, such as the Hazardous Materials

Transportation Act, California Hazardous Material Management Act, and California Code of Regulations, Title 22. The project would not generate solid waste in excess of State or local standards, and would comply with all federal, State, and local management statutes and regulations, including those for hazardous waste in the event that spent resin is determined to be hazardous waste. Disposal of hazardous waste would occur at licensed hazardous waste disposal facilities. The project would not impair the attainment of solid waste reduction goals. Therefore, impacts to solid waste would be less than significant.

LESS THAN SIGNIFICANT IMPACT

20 Wildfire

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:				
a. Substantially impair an adopted emergency response plan or emergency evacuation plan?	□	■	□	□
b. Due to slope, prevailing winds, and other factors, exacerbate wildfire risks and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	□	■	□	□
c. Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	□	□	□	■
d. Expose people or structures to significant risks, including downslopes or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	□	□	□	■

The entire coastal southern California region is prone to large wildfires due to its hot, dry climate and expansive coverage of ignitable vegetation. During the autumn and winter months, strong offshore Santa Ana wind events carry dry, desert air and can fan fast-moving fires that spread rapidly from heavily-vegetated wilderness and mountainous areas into developed communities. Santa Clarita is urbanized but is surrounded by undeveloped open space. The area is prone to regular brush fires, particularly during summer heat waves, which can pose a safety risk. Recent fires in the project site vicinity include the 1,525-acre Soledad Fire east of Santa Clarita in July 2020, the 650-acre North Fire near Castaic north of Santa Clarita in April 2021, and the 5,208-acre Route Fire near Castaic in August 2022 (CAL FIRE 2022b).

While a natural ecological process in coastal chaparral and forest systems, wildfire return intervals have decreased throughout southern California, resulting in more frequent ecological disturbance, loss of biodiversity, and colonization by non-native grass species (United States Forest Service 2018). Furthermore, post-fire conditions leave exposed mountain slopes and hillsides vulnerable to surface erosion and runoff. Debris flows during post-fire rainy seasons can pose a risk to life and property and occur with little warning. In southern California, as little as 0.3 inch of rain in 30 minutes can produce debris flows on post-fire landscapes (USGS 2018).

The project site is not located in a designated VHFHSZ or a State Responsibility Area (SRA), but the nearest VHFHSZ is located approximately 0.5 mile to the southeast of the project site (CAL FIRE 2022a). Therefore, for the purposes of this analysis, the project site is considered to be located near a VHFHSZ. In addition, as discussed in Section 9, *Hazards and Hazardous Materials,* the project site is adjacent to brush-covered open space vegetated with native plant communities, which are highly combustible.

a. *If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project substantially impair an adopted emergency response plan or emergency evacuation plan?*

The City of Santa Clarita's Local Hazard Mitigation Plan (2021) sets forth hazard mitigation strategies related to a variety of threats, including wildfire. Strategies towards mitigating wildfire include working with the Los Angeles Fire Department to enhance emergency service and increase the efficiency of response times, enhance outreach and education programs on wildfires, encourage and increase communication among wildland/urban interface property owners, and enhancing the City's Urban Forestry ability to manage wildfire events. The proposed project does not include components that would interfere with implementation of the City's Local Hazard Mitigation Plan.

As discussed in Section 9, *Hazards and Hazardous Materials*, construction of the proposed treatment facilities would require temporary lane or road closures that could impede emergency response during project construction by slowing traffic and thereby affect implementation of emergency response and emergency evacuation plans. As a result, impacts during project construction would be potentially significant, and implementation of Mitigation Measure HAZ-2 would be required to reduce impacts to a less-than-significant level.

The project does not include changes to the existing street system that could result in inadequate emergency access, and project operation and maintenance would not introduce new activities or substantial operational traffic with the potential to interfere with emergency response and evacuations. Rather, the roundabout improvements at the project site would likely provide enhanced access for emergency responders and evacuation orders. Therefore, no operational impacts related to emergency response plans and emergency evacuation plans would occur.

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b. *If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project, due to slope, prevailing winds, and other factors, exacerbate wildfire risks and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?*

As discussed in Section 9, *Hazards and Hazardous Materials,* project operation would not involve activities with potential wildfire ignition risk. However, project construction in proximity to vegetated areas would have the potential to result in wildfire ignition. Potential ignition sources may include sparks from exhaust pipes, discarded cigarette butts, contact of mufflers with dry grass, other sources of sparks or flame, and spills or releases of flammable materials such as gasoline. Therefore, the project may exacerbate wildfire risks during construction, and impacts would be potentially significant. Implementation of Mitigation Measure HAZ-3 (outlined in Section 9, *Hazards* *and Hazardous Materials*), which includes a suite of fire prevention measures for construction activities, would reduce impacts to a less-than-significant level.

LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED

c. If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?

d. If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project expose people or structures to significant risks, including downslopes or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?

The proposed project consists of the construction of a groundwater treatment and disinfection facility, pipelines, and a new groundwater well as well as improvements to existing groundwater wells and roundabouts. As discussed in Section 19, *Utilities and Service Systems,* the project would not result in the relocation or construction of new or expanded utility infrastructure beyond those facilities included in the proposed project. The project would not include roads, fuel breaks, emergency water sources, or aboveground power lines that would exacerbate fire risk or result in temporary or ongoing impacts to the environment. Furthermore, the proposed project does not include habitable structures and would therefore not expose people to significant risks as a result of runoff, post-fire slop instability, or drainage changes. Therefore, no impacts would occur.

NO IMPACT

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21 Mandatory Findings of Significance

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Does the project:				
a. Have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☐	■	☐
b. Have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☐	☐	■	☐
c. Have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	■	☐	☐

a. Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?

As discussed in Section 4, *Biological Resources*, the proposed project would not substantially reduce the habitat of fish and wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, eliminate a plant or animal community, or substantially reduce the number or restrict the range of a rare or endangered plant or animal. In addition, as discussed in Section 5, *Cultural Resources*, the project would not eliminate important examples of the major periods of

California history or prehistory because none are known to be present in the project area. Impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

b. Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?

As described in the discussion of environmental checklist Sections 1 through 20, with respect to all environmental issues, the proposed project would not result in significant and unmitigable impacts to the environment. All anticipated impacts associated with project construction and operation would be either less than significant or less than significant with mitigation incorporated. This is largely because project construction activities would be temporary, and project operational activities would result in generally minimal alterations to the environmental baseline condition.

Cumulative impacts could occur if the construction of other projects occurs at the same time as the proposed project and in the same geographic scope, such that the effects of similar impacts of multiple projects combine to create greater levels of impact than would occur at the project-level. Project impacts are primarily temporary, localized effects that would occur during project activities. The residential community in which the project site is located is entirely built out; therefore, no specific future development projects in the immediate vicinity are anticipated to occur in the same timeframe as the project. The impacts of the project on existing local environmental conditions are detailed throughout this Initial Study, and the project would not combine with other existing and future projects to create cumulative impacts related to localized issues such as aesthetics, biological resources, cultural resources, geology and soils, noise, and transportation. Other resources inherently address cumulative impacts, including air quality, greenhouse gas emissions, and hydrology. As discussed in Section 3, *Air Quality*, and Section 8, *Greenhouse Gas Emissions*, the project would not generate emissions in exceed of the applicable air pollutant and GHG emission thresholds and would comply with the SCAQMD's 2016 AQMP and CARB's 2017 Scoping Plan. Air pollutant and GHG emissions thresholds are designed such that a project that generates emissions below the thresholds would not have an individually or cumulatively considerable impact. Consequently, the project would not generate cumulatively considerable impacts to air quality or GHG emissions. Similarly, as discussed in Section 4, *Biological Resources*, and Section 10, *Hydrology and Water Quality,* the project would comply with provisions set forth within the Santa Clara River Valley East Groundwater Subbasin GSP, which is a plan designed to address cumulative impacts to groundwater supplies, with implementation of Mitigation Measure BIO-3. As a result, the project would not have a cumulatively considerable impact on sustainable groundwater basin management with mitigation incorporated.

Given the above discussion, the project would not result in a cumulatively considerable contribution to a significant cumulative impact. Impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

c. Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?

In general, impacts to human beings are associated with air quality, hazards and hazardous materials, and noise impacts. As detailed in Section 3, *Air Quality*, the project would not result, either directly or indirectly, in substantial adverse effects related to air quality. As discussed in Section 9, *Hazards and Hazardous Materials*, implementation of Mitigation Measures HAZ-1, HAZ-2, and HAZ-3 as well as compliance with applicable rules and regulations would reduce potential impacts on human beings related to hazards and hazardous materials to a less-than-significant level. As discussed in Section 13, *Noise*, implementation of Mitigation Measure N-1 would reduce potential impacts on human beings related to nighttime construction noise to a less-than-significant level. Therefore, impacts to human beings would be less than significant with mitigation incorporated.

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Appendix A

Air Quality and Greenhouse Gas Modeling

S Wells PFAS Groundwater Treatment and Disinfection Facility Project AQ

South Coast AQMD Air District, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Asphalt Surfaces	12.87	1000sqft	0.30	12,870.00	0
Other Non-Asphalt Surfaces	112.64	1000sqft	2.59	112,639.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	31
Climate Zone	9			**Operational Year**	2025
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	390.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Project is located in SCAQMD. SCE is the utility provider.

Land Use - Other Non-Asphalt Surfaces for the water treatment facility, multiple pipeline improvement areas, and existing well improvements areas and Other Asphalt Surfaces for the two roundabout improvements areas

Construction Phase - Provided by Data Request.

Off-road Equipment - Provided by SCV Water

Off-road Equipment - Provided by SCV Water

Off-road Equipment - Provided by SCV Water

Off-road Equipment - Provided by SCV Water

Off-road Equipment - Provided by SCV Water

Off-road Equipment - Provided by SCV Water

Off-road Equipment - Provided by SCV Water

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Trips and VMT - Haul trip adjusted to Chiquita Canyon Landfill 6.8 miles 1 way. (6,500 CY of soil divided by 10 CY of capacity truck = 650 Haul trips) * 2 for both ways

Grading - 3,000 CY imported soil and 3,500 CY exported.

Vehicle Trips - 8 weekday trips (i.e., max daily trips if 2 staff visit, the chemical delivery occurs, and the resin replacement occurs)

Construction Off-road Equipment Mitigation - Vehicle Speed 15 mph for SCAQMD Rule 403 compliance

Fleet Mix - Fleet mix for max daily trips if 2 staff visit, the chemical delivery occurs, and the resin replacement occurs

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstructionPhase	NumDays	3.00	44.00
tblConstructionPhase	NumDays	6.00	20.00
tblConstructionPhase	NumDays	220.00	43.00
tblConstructionPhase	NumDays	10.00	20.00
tblConstructionPhase	NumDays	3.00	44.00
tblConstructionPhase	NumDaysWeek	5.00	7.00
tblFleetMix	HHD	9.2160e-003	0.25
tblFleetMix	LDA	0.54	0.00
tblFleetMix	LDT1	0.06	0.00
tblFleetMix	LDT2	0.19	0.50
tblFleetMix	LHD1	0.02	0.00
tblFleetMix	LHD2	6.5330e-003	0.00
tblFleetMix	MCY	0.02	0.00
tblFleetMix	MDV	0.13	0.00
tblFleetMix	MH	3.6570e-003	0.00
tblFleetMix	MHD	0.01	0.25
tblFleetMix	OBUS	8.1400e-004	0.00
tblFleetMix	SBUS	7.5300e-004	0.00
tblFleetMix	UBUS	4.9700e-004	0.00
tblGrading	MaterialExported	0.00	3,500.00

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

tblGrading	MaterialImported	0.00	3,000.00
tblLandUse	LandUseSquareFeet	112,640.00	112,639.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	PhaseName		Site Preparation
tblOffRoadEquipment	PhaseName		Equipment Installation
tblOffRoadEquipment	PhaseName		Well Drilling
tblOffRoadEquipment	PhaseName		Equipment Installation
tblOffRoadEquipment	PhaseName		Site Preparation
tblOffRoadEquipment	PhaseName		Grading
tblOffRoadEquipment	PhaseName		Paving
tblOffRoadEquipment	PhaseName		Site Restoration
tblOffRoadEquipment	PhaseName		Grading
tblOffRoadEquipment	PhaseName		Site Preparation
tblOffRoadEquipment	PhaseName		Equipment Installation
tblOffRoadEquipment	PhaseName		Site Restoration
tblOffRoadEquipment	UsageHours	8.00	24.00

tblTripsAndVMT	HaulingTripLength	20.00	6.80
tblTripsAndVMT	HaulingTripNumber	813.00	1,300.00
tblTripsAndVMT	WorkerTripNumber	18.00	20.00
tblTripsAndVMT	WorkerTripNumber	15.00	20.00
tblTripsAndVMT	WorkerTripNumber	53.00	40.00
tblTripsAndVMT	WorkerTripNumber	53.00	20.00
tblTripsAndVMT	WorkerTripNumber	18.00	20.00
tblTripsAndVMT	WorkerTripNumber	13.00	20.00
tblVehicleTrips	CC_TTP	0.00	100.00
tblVehicleTrips	PR_TP	0.00	100.00
tblVehicleTrips	WD_TR	0.00	0.08

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2024	2.9170	26.4417	31.6504	0.0901	8.3666	1.0015	8.9371	3.7671	0.9595	4.2639	0.0000	8,744.9761	8,744.9761	1.6996	0.2418	8,826.6079
2025	1.2803	11.5501	13.5027	0.0362	1.8143	0.4296	1.9306	0.2311	0.4054	0.5626	0.0000	3,516.1931	3,516.1931	0.7127	0.0663	3,553.7721
Maximum	**2.9170**	**26.4417**	**31.6504**	**0.0901**	**8.3666**	**1.0015**	**8.9371**	**3.7671**	**0.9595**	**4.2639**	**0.0000**	**8,744.9761**	**8,744.9761**	**1.6996**	**0.2418**	**8,826.6079**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2024	2.9170	26.4417	31.6504	0.0901	3.9741	1.0015	4.5124	1.7863	0.9595	2.2831	0.0000	8,744.9761	8,744.9761	1.6996	0.2418	8,826.6079
2025	1.2803	11.5501	13.5027	0.0362	0.9394	0.4296	1.0557	0.1573	0.4054	0.5626	0.0000	3,516.1931	3,516.1931	0.7127	0.0663	3,553.7721
Maximum	**2.9170**	**26.4417**	**31.6504**	**0.0901**	**3.9741**	**1.0015**	**4.5124**	**1.7863**	**0.9595**	**2.2831**	**0.0000**	**8,744.9761**	**8,744.9761**	**1.6996**	**0.2418**	**8,826.6079**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	51.74	0.00	48.76	51.39	0.00	41.04	0.00	0.00	0.00	0.00	0.00	0.00

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.0552	1.2000e-004	0.0128	0.0000		5.0000e-005	5.0000e-005		5.0000e-005	5.0000e-005		0.0275	0.0275	7.0000e-005		0.0293
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0106	0.2022	0.1564	1.1900e-003	0.0637	1.3000e-003	0.0650	0.0177	1.2400e-003	0.0189		127.7803	127.7803	4.3300e-003	0.0154	132.4900
Total	**0.0658**	**0.2023**	**0.1692**	**1.1900e-003**	**0.0637**	**1.3500e-003**	**0.0651**	**0.0177**	**1.2900e-003**	**0.0190**		**127.8078**	**127.8078**	**4.4000e-003**	**0.0154**	**132.5192**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.0552	1.2000e-004	0.0128	0.0000		5.0000e-005	5.0000e-005		5.0000e-005	5.0000e-005		0.0275	0.0275	7.0000e-005		0.0293
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0106	0.2022	0.1564	1.1900e-003	0.0637	1.3000e-003	0.0650	0.0177	1.2400e-003	0.0189		127.7803	127.7803	4.3300e-003	0.0154	132.4900
Total	**0.0658**	**0.2023**	**0.1692**	**1.1900e-003**	**0.0637**	**1.3500e-003**	**0.0651**	**0.0177**	**1.2900e-003**	**0.0190**		**127.8078**	**127.8078**	**4.4000e-003**	**0.0154**	**132.5192**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	4/1/2024	5/30/2024	5	44	
2	Grading	Grading	6/1/2024	6/30/2024	5	20	
3	Equipment Installation	Building Construction	7/1/2024	5/2/2025	5	220	
4	Well Drilling	Building Construction	7/1/2024	8/12/2024	7	43	
5	Paving	Paving	5/3/2025	5/30/2025	5	20	
6	Site Restoration	Site Preparation	6/3/2025	8/1/2025	5	44	

Acres of Grading (Site Preparation Phase): 88

Acres of Grading (Grading Phase): 21

Acres of Paving: 2.89

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Bore/Drill Rigs	1	8.00	221	0.50
Site Preparation	Excavators	1	8.00	158	0.38
Site Preparation	Rubber Tired Dozers	1	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	2	7.00	97	0.37
Grading	Excavators	1	8.00	158	0.38

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Grading	Plate Compactors	1	8.00	8	0.43
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	2	7.00	97	0.37
Equipment Installation	Bore/Drill Rigs	1	8.00	221	0.50
Equipment Installation	Cement and Mortar Mixers	2	8.00	9	0.56
Equipment Installation	Cranes	1	8.00	231	0.29
Equipment Installation	Forklifts	1	7.00	89	0.20
Equipment Installation	Generator Sets	1	8.00	84	0.74
Equipment Installation	Skid Steer Loaders	1	8.00	65	0.37
Equipment Installation	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Well Drilling	Bore/Drill Rigs	1	24.00	221	0.50
Well Drilling	Generator Sets	1	24.00	84	0.74
Paving	Cement and Mortar Mixers	1	8.00	9	0.56
Paving	Forklifts	1	8.00	89	0.20
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Site Restoration	Forklifts	1	8.00	89	0.20
Site Restoration	Skid Steer Loaders	1	8.00	65	0.37
Site Restoration	Tractors/Loaders/Backhoes	1	7.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	7	20.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	20.00	0.00	1,300.00	14.70	6.90	6.80	LD_Mix	HDT_Mix	HHDT
Equipment Installation	11	40.00	21.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Well Drilling	9	20.00	21.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	7	20.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Site Restoration	5	20.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Site Preparation - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.1431	0.0000	8.1431	3.5393	0.0000	3.5393			0.0000			0.0000
Off-Road	1.3377	12.9659	12.3468	0.0286		0.5692	0.5692		0.5237	0.5237		2,772.701 5	2,772.701 5	0.8968		2,795.120 2
Total	**1.3377**	**12.9659**	**12.3468**	**0.0286**	**8.1431**	**0.5692**	**8.7123**	**3.5393**	**0.5237**	**4.0629**		**2,772.701 5**	**2,772.701 5**	**0.8968**		**2,795.120 2**

3.2 Site Preparation - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0632	0.0419	0.5942	1.7900e-003	0.2236	1.2100e-003	0.2248	0.0593	1.1100e-003	0.0604		184.7161	184.7161	4.4100e-003	4.4600e-003	186.1562
Total	**0.0632**	**0.0419**	**0.5942**	**1.7900e-003**	**0.2236**	**1.2100e-003**	**0.2248**	**0.0593**	**1.1100e-003**	**0.0604**		**184.7161**	**184.7161**	**4.4100e-003**	**4.4600e-003**	**186.1562**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.6644	0.0000	3.6644	1.5927	0.0000	1.5927			0.0000			0.0000
Off-Road	1.3377	12.9659	12.3468	0.0286		0.5692	0.5692		0.5237	0.5237	0.0000	2,772.7015	2,772.7015	0.8968		2,795.1202
Total	**1.3377**	**12.9659**	**12.3468**	**0.0286**	**3.6644**	**0.5692**	**4.2336**	**1.5927**	**0.5237**	**2.1163**	**0.0000**	**2,772.7015**	**2,772.7015**	**0.8968**		**2,795.1202**

3.2 Site Preparation - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0632	0.0419	0.5942	1.7900e-003	0.2236	1.2100e-003	0.2248	0.0593	1.1100e-003	0.0604		184.7161	184.7161	4.4100e-003	4.4600e-003	186.1562
Total	**0.0632**	**0.0419**	**0.5942**	**1.7900e-003**	**0.2236**	**1.2100e-003**	**0.2248**	**0.0593**	**1.1100e-003**	**0.0604**		**184.7161**	**184.7161**	**4.4100e-003**	**4.4600e-003**	**186.1562**

3.3 Grading - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					7.4735	0.0000	7.4735	3.6015	0.0000	3.6015			0.0000			0.0000
Off-Road	1.1673	11.3163	10.5189	0.0196		0.5163	0.5163		0.4758	0.4758		1,889.8176	1,889.8176	0.6036		1,904.9084
Total	**1.1673**	**11.3163**	**10.5189**	**0.0196**	**7.4735**	**0.5163**	**7.9898**	**3.6015**	**0.4758**	**4.0774**		**1,889.8176**	**1,889.8176**	**0.6036**		**1,904.9084**

3.3 Grading - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0852	3.6394	1.4480	0.0136	0.3875	0.0208	0.4082	0.1063	0.0199	0.1261		1,494.113 5	1,494.113 5	0.0805	0.2373	1,566.852 9
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0632	0.0419	0.5942	1.7900e-003	0.2236	1.2100e-003	0.2248	0.0593	1.1100e-003	0.0604		184.7161	184.7161	4.4100e-003	4.4600e-003	186.1562
Total	**0.1483**	**3.6813**	**2.0422**	**0.0154**	**0.6110**	**0.0220**	**0.6330**	**0.1656**	**0.0210**	**0.1865**		**1,678.829 6**	**1,678.829 6**	**0.0849**	**0.2418**	**1,753.009 1**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.3631	0.0000	3.3631	1.6207	0.0000	1.6207			0.0000			0.0000
Off-Road	1.1673	11.3163	10.5189	0.0196		0.5163	0.5163		0.4758	0.4758	0.0000	1,889.817 6	1,889.817 6	0.6036		1,904.908 4
Total	**1.1673**	**11.3163**	**10.5189**	**0.0196**	**3.3631**	**0.5163**	**3.8794**	**1.6207**	**0.4758**	**2.0965**	**0.0000**	**1,889.817 6**	**1,889.817 6**	**0.6036**		**1,904.908 4**

3.3 Grading - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0852	3.6394	1.4480	0.0136	0.3875	0.0208	0.4082	0.1063	0.0199	0.1261		1,494.1135	1,494.1135	0.0805	0.2373	1,566.8529
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0632	0.0419	0.5942	1.7900e-003	0.2236	1.2100e-003	0.2248	0.0593	1.1100e-003	0.0604		184.7161	184.7161	4.4100e-003	4.4600e-003	186.1562
Total	**0.1483**	**3.6813**	**2.0422**	**0.0154**	**0.6110**	**0.0220**	**0.6330**	**0.1656**	**0.0210**	**0.1865**		**1,678.8296**	**1,678.8296**	**0.0849**	**0.2418**	**1,753.0091**

3.4 Equipment Installation - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1975	11.3719	12.1518	0.0290		0.4689	0.4689		0.4425	0.4425		2,756.6572	2,756.6572	0.6931		2,773.9843
Total	**1.1975**	**11.3719**	**12.1518**	**0.0290**		**0.4689**	**0.4689**		**0.4425**	**0.4425**		**2,756.6572**	**2,756.6572**	**0.6931**		**2,773.9843**

3.4 Equipment Installation - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category						lb/day								lb/day		
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0217	0.8038	0.3047	3.7700e-003	0.1345	4.4700e-003	0.1389	0.0387	4.2800e-003	0.0430		406.4884	406.4884	0.0138	0.0590	424.4091
Worker	0.1263	0.0838	1.1883	3.5800e-003	0.4471	2.4100e-003	0.4495	0.1186	2.2200e-003	0.1208		369.4322	369.4322	8.8200e-003	8.9200e-003	372.3123
Total	**0.1480**	**0.8876**	**1.4930**	**7.3500e-003**	**0.5816**	**6.8800e-003**	**0.5885**	**0.1573**	**6.5000e-003**	**0.1638**		**775.9207**	**775.9207**	**0.0226**	**0.0679**	**796.7214**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category						lb/day								lb/day		
Off-Road	1.1975	11.3719	12.1518	0.0290		0.4689	0.4689		0.4425	0.4425	0.0000	2,756.6572	2,756.6572	0.6931		2,773.9843
Total	**1.1975**	**11.3719**	**12.1518**	**0.0290**		**0.4689**	**0.4689**		**0.4425**	**0.4425**	**0.0000**	**2,756.6572**	**2,756.6572**	**0.6931**		**2,773.9843**

3.4 Equipment Installation - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0217	0.8038	0.3047	3.7700e-003	0.1345	4.4700e-003	0.1389	0.0387	4.2800e-003	0.0430		406.4884	406.4884	0.0138	0.0590	424.4091
Worker	0.1263	0.0838	1.1883	3.5800e-003	0.4471	2.4100e-003	0.4495	0.1186	2.2200e-003	0.1208		369.4322	369.4322	8.8200e-003	8.9200e-003	372.3123
Total	**0.1480**	**0.8876**	**1.4930**	**7.3500e-003**	**0.5816**	**6.8800e-003**	**0.5885**	**0.1573**	**6.5000e-003**	**0.1638**		**775.9207**	**775.9207**	**0.0226**	**0.0679**	**796.7214**

3.4 Equipment Installation - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1405	10.6748	12.0924	0.0290		0.4229	0.4229		0.3989	0.3989		2,756.6874	2,756.6874	0.6909		2,773.9600
Total	**1.1405**	**10.6748**	**12.0924**	**0.0290**		**0.4229**	**0.4229**		**0.3989**	**0.3989**		**2,756.6874**	**2,756.6874**	**0.6909**		**2,773.9600**

3.4 Equipment Installation - 2025

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0211	0.8000	0.3002	3.7000e-003	0.1345	4.4900e-003	0.1390	0.0387	4.2900e-003	0.0430		399.0905	399.0905	0.0138	0.0580	416.7114
Worker	0.1187	0.0754	1.1101	3.4600e-003	0.4471	2.3000e-003	0.4494	0.1186	2.1200e-003	0.1207		360.4152	360.4152	7.9700e-003	8.3400e-003	363.1007
Total	**0.1399**	**0.8754**	**1.4102**	**7.1600e-003**	**0.5816**	**6.7900e-003**	**0.5884**	**0.1573**	**6.4100e-003**	**0.1637**		**759.5057**	**759.5057**	**0.0218**	**0.0663**	**779.8121**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1405	10.6748	12.0924	0.0290		0.4229	0.4229		0.3989	0.3989	0.0000	2,756.6874	2,756.6874	0.6909		2,773.9600
Total	**1.1405**	**10.6748**	**12.0924**	**0.0290**		**0.4229**	**0.4229**		**0.3989**	**0.3989**	**0.0000**	**2,756.6874**	**2,756.6874**	**0.6909**		**2,773.9600**

3.4 Equipment Installation - 2025

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0211	0.8000	0.3002	3.7000e-003	0.1345	4.4900e-003	0.1390	0.0387	4.2900e-003	0.0430		399.0905	399.0905	0.0138	0.0580	416.7114
Worker	0.1187	0.0754	1.1101	3.4600e-003	0.4471	2.3000e-003	0.4494	0.1186	2.1200e-003	0.1207		360.4152	360.4152	7.9700e-003	8.3400e-003	363.1007
Total	**0.1399**	**0.8754**	**1.4102**	**7.1600e-003**	**0.5816**	**6.7900e-003**	**0.5884**	**0.1573**	**6.4100e-003**	**0.1637**		**759.5057**	**759.5057**	**0.0218**	**0.0663**	**779.8121**

3.5 Well Drilling - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4867	13.3366	17.1067	0.0482		0.5201	0.5201		0.5051	0.5051		4,621.1937	4,621.1937	0.9657		4,645.3369
Total	**1.4867**	**13.3366**	**17.1067**	**0.0482**		**0.5201**	**0.5201**		**0.5051**	**0.5051**		**4,621.1937**	**4,621.1937**	**0.9657**		**4,645.3369**

3.5 Well Drilling - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0217	0.8038	0.3047	3.7700e-003	0.1345	4.4700e-003	0.1389	0.0387	4.2800e-003	0.0430		406.4884	406.4884	0.0138	0.0590	424.4091
Worker	0.0632	0.0419	0.5942	1.7900e-003	0.2236	1.2100e-003	0.2248	0.0593	1.1100e-003	0.0604		184.7161	184.7161	4.4100e-003	4.4600e-003	186.1562
Total	**0.0848**	**0.8457**	**0.8989**	**5.5600e-003**	**0.3580**	**5.6800e-003**	**0.3637**	**0.0980**	**5.3900e-003**	**0.1034**		**591.2045**	**591.2045**	**0.0182**	**0.0634**	**610.5653**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4867	13.3366	17.1067	0.0482		0.5201	0.5201		0.5051	0.5051	0.0000	4,621.1937	4,621.1937	0.9657		4,645.3369
Total	**1.4867**	**13.3366**	**17.1067**	**0.0482**		**0.5201**	**0.5201**		**0.5051**	**0.5051**	**0.0000**	**4,621.1937**	**4,621.1937**	**0.9657**		**4,645.3369**

3.5 Well Drilling - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0217	0.8038	0.3047	3.7700e-003	0.1345	4.4700e-003	0.1389	0.0387	4.2800e-003	0.0430		406.4884	406.4884	0.0138	0.0590	424.4091
Worker	0.0632	0.0419	0.5942	1.7900e-003	0.2236	1.2100e-003	0.2248	0.0593	1.1100e-003	0.0604		184.7161	184.7161	4.4100e-003	4.4600e-003	186.1562
Total	**0.0848**	**0.8457**	**0.8989**	**5.5600e-003**	**0.3580**	**5.6800e-003**	**0.3637**	**0.0980**	**5.3900e-003**	**0.1034**		**591.2045**	**591.2045**	**0.0182**	**0.0634**	**610.5653**

3.6 Paving - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.2778	2.5218	3.6718	5.3600e-003		0.1122	0.1122		0.1044	0.1044		500.6030	500.6030	0.1508		504.3733
Paving	0.0393					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.3171**	**2.5218**	**3.6718**	**5.3600e-003**		**0.1122**	**0.1122**		**0.1044**	**0.1044**		**500.6030**	**500.6030**	**0.1508**		**504.3733**

3.6 Paving - 2025

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0594	0.0377	0.5550	1.7300e-003	0.2236	1.1500e-003	0.2247	0.0593	1.0600e-003	0.0604		180.2076	180.2076	3.9900e-003	4.1700e-003	181.5504
Total	**0.0594**	**0.0377**	**0.5550**	**1.7300e-003**	**0.2236**	**1.1500e-003**	**0.2247**	**0.0593**	**1.0600e-003**	**0.0604**		**180.2076**	**180.2076**	**3.9900e-003**	**4.1700e-003**	**181.5504**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.2778	2.5218	3.6718	5.3600e-003		0.1122	0.1122		0.1044	0.1044	0.0000	500.6030	500.6030	0.1508		504.3733
Paving	0.0393					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.3171**	**2.5218**	**3.6718**	**5.3600e-003**		**0.1122**	**0.1122**		**0.1044**	**0.1044**	**0.0000**	**500.6030**	**500.6030**	**0.1508**		**504.3733**

3.6 Paving - 2025

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0594	0.0377	0.5550	1.7300e-003	0.2236	1.1500e-003	0.2247	0.0593	1.0600e-003	0.0604		180.2076	180.2076	3.9900e-003	4.1700e-003	181.5504
Total	**0.0594**	**0.0377**	**0.5550**	**1.7300e-003**	**0.2236**	**1.1500e-003**	**0.2247**	**0.0593**	**1.0600e-003**	**0.0604**		**180.2076**	**180.2076**	**3.9900e-003**	**4.1700e-003**	**181.5504**

3.7 Site Restoration - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.5908	0.0000	1.5908	0.1718	0.0000	0.1718			0.0000			0.0000
Off-Road	0.2618	2.7788	4.4639	6.3300e-003		0.1152	0.1152		0.1060	0.1060		612.8047	612.8047	0.1982		617.7595
Total	**0.2618**	**2.7788**	**4.4639**	**6.3300e-003**	**1.5908**	**0.1152**	**1.7059**	**0.1718**	**0.1060**	**0.2777**		**612.8047**	**612.8047**	**0.1982**		**617.7595**

3.7 Site Restoration - 2025

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0594	0.0377	0.5550	1.7300e-003	0.2236	1.1500e-003	0.2247	0.0593	1.0600e-003	0.0604		180.2076	180.2076	3.9900e-003	4.1700e-003	181.5504
Total	**0.0594**	**0.0377**	**0.5550**	**1.7300e-003**	**0.2236**	**1.1500e-003**	**0.2247**	**0.0593**	**1.0600e-003**	**0.0604**		**180.2076**	**180.2076**	**3.9900e-003**	**4.1700e-003**	**181.5504**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.7158	0.0000	0.7158	0.0773	0.0000	0.0773			0.0000			0.0000
Off-Road	0.2618	2.7788	4.4639	6.3300e-003		0.1152	0.1152		0.1060	0.1060	0.0000	612.8047	612.8047	0.1982		617.7595
Total	**0.2618**	**2.7788**	**4.4639**	**6.3300e-003**	**0.7158**	**0.1152**	**0.8310**	**0.0773**	**0.1060**	**0.1833**	**0.0000**	**612.8047**	**612.8047**	**0.1982**		**617.7595**

3.7 Site Restoration - 2025

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0594	0.0377	0.5550	1.7300e-003	0.2236	1.1500e-003	0.2247	0.0593	1.0600e-003	0.0604		180.2076	180.2076	3.9900e-003	4.1700e-003	181.5504
Total	**0.0594**	**0.0377**	**0.5550**	**1.7300e-003**	**0.2236**	**1.1500e-003**	**0.2247**	**0.0593**	**1.0600e-003**	**0.0604**		**180.2076**	**180.2076**	**3.9900e-003**	**4.1700e-003**	**181.5504**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0106	0.2022	0.1564	1.1900e-003	0.0637	1.3000e-003	0.0650	0.0177	1.2400e-003	0.0189		127.7803	127.7803	4.3300e-003	0.0154	132.4900
Unmitigated	0.0106	0.2022	0.1564	1.1900e-003	0.0637	1.3000e-003	0.0650	0.0177	1.2400e-003	0.0189		127.7803	127.7803	4.3300e-003	0.0154	132.4900

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Asphalt Surfaces	0.00	0.00	0.00		
Other Non-Asphalt Surfaces	9.01	0.00	0.00	19,680	19,680
Total	9.01	0.00	0.00	19,680	19,680

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Other Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Other Non-Asphalt Surfaces	16.60	8.40	6.90	0.00	100.00	0.00	100	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Asphalt Surfaces	0.541709	0.062136	0.185590	0.128486	0.023783	0.006533	0.012157	0.009216	0.000814	0.000497	0.024669	0.000753	0.003657
Other Non-Asphalt Surfaces	0.000000	0.000000	0.500000	0.000000	0.000000	0.000000	0.250000	0.250000	0.000000	0.000000	0.000000	0.000000	0.000000

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0552	1.2000e-004	0.0128	0.0000		5.0000e-005	5.0000e-005		5.0000e-005	5.0000e-005		0.0275	0.0275	7.0000e-005		0.0293
Unmitigated	0.0552	1.2000e-004	0.0128	0.0000		5.0000e-005	5.0000e-005		5.0000e-005	5.0000e-005		0.0275	0.0275	7.0000e-005		0.0293

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	9.5600e-003					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0445					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.1800e-003	1.2000e-004	0.0128	0.0000		5.0000e-005	5.0000e-005		5.0000e-005	5.0000e-005		0.0275	0.0275	7.0000e-005		0.0293
Total	**0.0552**	**1.2000e-004**	**0.0128**	**0.0000**		**5.0000e-005**	**5.0000e-005**		**5.0000e-005**	**5.0000e-005**		**0.0275**	**0.0275**	**7.0000e-005**		**0.0293**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	9.5600e-003					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0445					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.1800e-003	1.2000e-004	0.0128	0.0000		5.0000e-005	5.0000e-005		5.0000e-005	5.0000e-005		0.0275	0.0275	7.0000e-005		0.0293
Total	**0.0552**	**1.2000e-004**	**0.0128**	**0.0000**		**5.0000e-005**	**5.0000e-005**		**5.0000e-005**	**5.0000e-005**		**0.0275**	**0.0275**	**7.0000e-005**		**0.0293**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

S Wells PFAS Groundwater Treatment and Disinfection Facility Project AQ

South Coast AQMD Air District, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Asphalt Surfaces	12.87	1000sqft	0.30	12,870.00	0
Other Non-Asphalt Surfaces	112.64	1000sqft	2.59	112,639.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	31
Climate Zone	9			**Operational Year**	2025
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	390.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Project is located in SCAQMD. SCE is the utility provider.

Land Use - Other Non-Asphalt Surfaces for the water treatment facility, multiple pipeline improvement areas, and existing well improvements areas and Other Asphalt Surfaces for the two roundabout improvements areas

Construction Phase - Provided by Data Request.

Off-road Equipment - Provided by SCV Water

Off-road Equipment - Provided by SCV Water

Off-road Equipment - Provided by SCV Water

Off-road Equipment - Provided by SCV Water

Off-road Equipment - Provided by SCV Water

Off-road Equipment - Provided by SCV Water

Off-road Equipment - Provided by SCV Water

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Trips and VMT - Haul trip adjusted to Chiquita Canyon Landfill 6.8 miles 1 way. (6,500 CY of soil divided by 10 CY of capacity truck = 650 Haul trips) * 2 for both ways

Grading - 3,000 CY imported soil and 3,500 CY exported.

Vehicle Trips - 8 weekday trips (i.e., max daily trips if 2 staff visit, the chemical delivery occurs, and the resin replacement occurs)

Construction Off-road Equipment Mitigation - Vehicle Speed 15 mph for SCAQMD Rule 403 compliance

Fleet Mix - Fleet mix for max daily trips if 2 staff visit, the chemical delivery occurs, and the resin replacement occurs

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstructionPhase	NumDays	220.00	43.00
tblConstructionPhase	NumDays	6.00	20.00
tblConstructionPhase	NumDays	10.00	20.00
tblConstructionPhase	NumDays	3.00	44.00
tblConstructionPhase	NumDays	3.00	44.00
tblConstructionPhase	NumDaysWeek	5.00	7.00
tblFleetMix	HHD	9.2160e-003	0.25
tblFleetMix	LDA	0.54	0.00
tblFleetMix	LDT1	0.06	0.00
tblFleetMix	LDT2	0.19	0.50
tblFleetMix	LHD1	0.02	0.00
tblFleetMix	LHD2	6.5330e-003	0.00
tblFleetMix	MCY	0.02	0.00
tblFleetMix	MDV	0.13	0.00
tblFleetMix	MH	3.6570e-003	0.00
tblFleetMix	MHD	0.01	0.25
tblFleetMix	OBUS	8.1400e-004	0.00
tblFleetMix	SBUS	7.5300e-004	0.00
tblFleetMix	UBUS	4.9700e-004	0.00
tblGrading	AcresOfGrading	10.00	21.00

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

tblGrading	AcresOfGrading	22.00	88.00
tblGrading	MaterialExported	0.00	3,500.00
tblGrading	MaterialImported	0.00	3,000.00
tblLandUse	LandUseSquareFeet	112,640.00	112,639.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	UsageHours	8.00	24.00
tblTripsAndVMT	HaulingTripLength	20.00	6.80
tblTripsAndVMT	HaulingTripNumber	813.00	1,300.00
tblTripsAndVMT	WorkerTripNumber	13.00	20.00
tblTripsAndVMT	WorkerTripNumber	13.00	20.00
tblTripsAndVMT	WorkerTripNumber	53.00	40.00
tblTripsAndVMT	WorkerTripNumber	53.00	20.00
tblTripsAndVMT	WorkerTripNumber	8.00	20.00
tblTripsAndVMT	WorkerTripNumber	8.00	20.00
tblVehicleTrips	CC_TTP	0.00	100.00
tblVehicleTrips	PR_TP	0.00	100.00
tblVehicleTrips	WD_TR	0.00	0.08

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2024	2.9085	26.3551	31.8176	0.0904	8.3666	1.0015	8.9371	3.6016	0.9594	4.1233	0.0000	8,777.603 6	8,777.603 6	1.6995	0.2408	8,858.914 2
2025	1.2744	11.5059	13.6084	0.0364	0.5816	0.4296	1.0112	0.1573	0.4053	0.5626	0.0000	3,537.610 3	3,537.610 3	0.7126	0.0657	3,575.001 9
Maximum	**2.9085**	**26.3551**	**31.8176**	**0.0904**	**8.3666**	**1.0015**	**8.9371**	**3.6016**	**0.9594**	**4.1233**	**0.0000**	**8,777.603 6**	**8,777.603 6**	**1.6995**	**0.2408**	**8,858.914 2**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2024	2.9085	26.3551	31.8176	0.0904	3.8879	1.0015	4.4584	1.7118	0.9594	2.2085	0.0000	8,777.603 6	8,777.603 6	1.6995	0.2408	8,858.914 2
2025	1.2744	11.5059	13.6084	0.0364	0.5816	0.4296	1.0112	0.1573	0.4053	0.5626	0.0000	3,537.610 3	3,537.610 3	0.7126	0.0657	3,575.001 9
Maximum	**2.9085**	**26.3551**	**31.8176**	**0.0904**	**3.8879**	**1.0015**	**4.4584**	**1.7118**	**0.9594**	**2.2085**	**0.0000**	**8,777.603 6**	**8,777.603 6**	**1.6995**	**0.2408**	**8,858.914 2**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	50.05	0.00	45.02	50.28	0.00	40.86	0.00	0.00	0.00	0.00	0.00	0.00

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.0552	1.2000e-004	0.0128	0.0000		5.0000e-005	5.0000e-005		5.0000e-005	5.0000e-005		0.0275	0.0275	7.0000e-005		0.0293
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0114	0.1925	0.1603	1.2000e-003	0.0637	1.3000e-003	0.0650	0.0177	1.2300e-003	0.0189		128.9988	128.9988	4.3000e-003	0.0154	133.6859
Total	**0.0666**	**0.1926**	**0.1731**	**1.2000e-003**	**0.0637**	**1.3500e-003**	**0.0651**	**0.0177**	**1.2800e-003**	**0.0190**		**129.0263**	**129.0263**	**4.3700e-003**	**0.0154**	**133.7152**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.0552	1.2000e-004	0.0128	0.0000		5.0000e-005	5.0000e-005		5.0000e-005	5.0000e-005		0.0275	0.0275	7.0000e-005		0.0293
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0114	0.1925	0.1603	1.2000e-003	0.0637	1.3000e-003	0.0650	0.0177	1.2300e-003	0.0189		128.9988	128.9988	4.3000e-003	0.0154	133.6859
Total	**0.0666**	**0.1926**	**0.1731**	**1.2000e-003**	**0.0637**	**1.3500e-003**	**0.0651**	**0.0177**	**1.2800e-003**	**0.0190**		**129.0263**	**129.0263**	**4.3700e-003**	**0.0154**	**133.7152**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	4/1/2024	5/30/2024	5	44	
2	Grading	Grading	6/1/2024	6/30/2024	5	20	
3	Equipment Installation	Building Construction	7/1/2024	5/2/2025	5	220	
4	Well Drilling	Building Construction	7/1/2024	8/12/2024	7	43	
5	Paving	Paving	5/3/2025	5/30/2025	5	20	
6	Site Restoration	Site Preparation	6/3/2025	8/1/2025	5	44	

Acres of Grading (Site Preparation Phase): 88

Acres of Grading (Grading Phase): 21

Acres of Paving: 2.89

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Bore/Drill Rigs	1	8.00	221	0.50
Site Preparation	Excavators	1	8.00	158	0.38
Site Preparation	Rubber Tired Dozers	1	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	2	7.00	97	0.37
Grading	Excavators	1	8.00	158	0.38

Grading	Plate Compactors	1	8.00	8	0.43
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	2	7.00	97	0.37
Equipment Installation	Bore/Drill Rigs	1	8.00	221	0.50
Equipment Installation	Cement and Mortar Mixers	2	8.00	9	0.56
Equipment Installation	Cranes	1	8.00	231	0.29
Equipment Installation	Forklifts	1	7.00	89	0.20
Equipment Installation	Generator Sets	1	8.00	84	0.74
Equipment Installation	Skid Steer Loaders	1	8.00	65	0.37
Equipment Installation	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Well Drilling	Bore/Drill Rigs	1	24.00	221	0.50
Well Drilling	Generator Sets	1	24.00	84	0.74
Paving	Cement and Mortar Mixers	1	8.00	9	0.56
Paving	Forklifts	1	8.00	89	0.20
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Site Restoration	Forklifts	1	8.00	89	0.20
Site Restoration	Skid Steer Loaders	1	8.00	65	0.37
Site Restoration	Tractors/Loaders/Backhoes	1	7.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	5	20.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading	5	20.00	0.00	1,300.00	14.70	6.90	6.80	LD_Mix	HDT_Mix	HHDT
Equipment Installation	8	40.00	21.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Well Drilling	2	20.00	21.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	3	20.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Site Restoration	3	20.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Site Preparation - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.1431	0.0000	8.1431	3.5393	0.0000	3.5393			0.0000			0.0000
Off-Road	1.3377	12.9659	12.3468	0.0286		0.5692	0.5692		0.5237	0.5237		2,772.7015	2,772.7015	0.8968		2,795.1202
Total	**1.3377**	**12.9659**	**12.3468**	**0.0286**	**8.1431**	**0.5692**	**8.7123**	**3.5393**	**0.5237**	**4.0629**		**2,772.7015**	**2,772.7015**	**0.8968**		**2,795.1202**

3.2 Site Preparation - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0597	0.0383	0.6562	1.9000e-003	0.2236	1.2100e-003	0.2248	0.0593	1.1100e-003	0.0604		196.0891	196.0891	4.3500e-003	4.2100e-003	197.4519
Total	**0.0597**	**0.0383**	**0.6562**	**1.9000e-003**	**0.2236**	**1.2100e-003**	**0.2248**	**0.0593**	**1.1100e-003**	**0.0604**		**196.0891**	**196.0891**	**4.3500e-003**	**4.2100e-003**	**197.4519**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.6644	0.0000	3.6644	1.5927	0.0000	1.5927			0.0000			0.0000
Off-Road	1.3377	12.9659	12.3468	0.0286		0.5692	0.5692		0.5237	0.5237	0.0000	2,772.7015	2,772.7015	0.8968		2,795.1202
Total	**1.3377**	**12.9659**	**12.3468**	**0.0286**	**3.6644**	**0.5692**	**4.2336**	**1.5927**	**0.5237**	**2.1163**	**0.0000**	**2,772.7015**	**2,772.7015**	**0.8968**		**2,795.1202**

3.2 Site Preparation - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0597	0.0383	0.6562	1.9000e-003	0.2236	1.2100e-003	0.2248	0.0593	1.1100e-003	0.0604		196.0891	196.0891	4.3500e-003	4.2100e-003	197.4519
Total	**0.0597**	**0.0383**	**0.6562**	**1.9000e-003**	**0.2236**	**1.2100e-003**	**0.2248**	**0.0593**	**1.1100e-003**	**0.0604**		**196.0891**	**196.0891**	**4.3500e-003**	**4.2100e-003**	**197.4519**

3.3 Grading - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					7.1724	0.0000	7.1724	3.4360	0.0000	3.4360			0.0000			0.0000
Off-Road	1.1673	11.3163	10.5189	0.0196		0.5163	0.5163		0.4758	0.4758		1,889.8176	1,889.8176	0.6036		1,904.9084
Total	**1.1673**	**11.3163**	**10.5189**	**0.0196**	**7.1724**	**0.5163**	**7.6887**	**3.4360**	**0.4758**	**3.9119**		**1,889.8176**	**1,889.8176**	**0.6036**		**1,904.9084**

3.3 Grading - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0945	3.4511	1.4152	0.0136	0.3875	0.0206	0.4081	0.1063	0.0197	0.1260		1,489.525 7	1,489.525 7	0.0810	0.2366	1,562.061 0
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0597	0.0383	0.6562	1.9000e-003	0.2236	1.2100e-003	0.2248	0.0593	1.1100e-003	0.0604		196.0891	196.0891	4.3500e-003	4.2100e-003	197.4519
Total	**0.1542**	**3.4894**	**2.0714**	**0.0155**	**0.6110**	**0.0218**	**0.6329**	**0.1656**	**0.0208**	**0.1864**		**1,685.614 8**	**1,685.614 8**	**0.0854**	**0.2408**	**1,759.512 9**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.2276	0.0000	3.2276	1.5462	0.0000	1.5462			0.0000			0.0000
Off-Road	1.1673	11.3163	10.5189	0.0196		0.5163	0.5163		0.4758	0.4758	0.0000	1,889.817 6	1,889.817 6	0.6036		1,904.908 4
Total	**1.1673**	**11.3163**	**10.5189**	**0.0196**	**3.2276**	**0.5163**	**3.7439**	**1.5462**	**0.4758**	**2.0220**	**0.0000**	**1,889.817 6**	**1,889.817 6**	**0.6036**		**1,904.908 4**

3.3 Grading - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0945	3.4511	1.4152	0.0136	0.3875	0.0206	0.4081	0.1063	0.0197	0.1260		1,489.525 7	1,489.525 7	0.0810	0.2366	1,562.061 0
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0597	0.0383	0.6562	1.9000e-003	0.2236	1.2100e-003	0.2248	0.0593	1.1100e-003	0.0604		196.0891	196.0891	4.3500e-003	4.2100e-003	197.4519
Total	**0.1542**	**3.4894**	**2.0714**	**0.0155**	**0.6110**	**0.0218**	**0.6329**	**0.1656**	**0.0208**	**0.1864**		**1,685.614 8**	**1,685.614 8**	**0.0854**	**0.2408**	**1,759.512 9**

3.4 Equipment Installation - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1975	11.3719	12.1518	0.0290		0.4689	0.4689		0.4425	0.4425		2,756.657 2	2,756.657 2	0.6931		2,773.984 3
Total	**1.1975**	**11.3719**	**12.1518**	**0.0290**		**0.4689**	**0.4689**		**0.4425**	**0.4425**		**2,756.657 2**	**2,756.657 2**	**0.6931**		**2,773.984 3**

3.4 Equipment Installation - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0227	0.7658	0.2952	3.7600e-003	0.1345	4.4500e-003	0.1389	0.0387	4.2600e-003	0.0430		405.7428	405.7428	0.0138	0.0588	423.6187
Worker	0.1193	0.0767	1.3125	3.8000e-003	0.4471	2.4100e-003	0.4495	0.1186	2.2200e-003	0.1208		392.1781	392.1781	8.6900e-003	8.4200e-003	394.9038
Total	**0.1420**	**0.8424**	**1.6077**	**7.5600e-003**	**0.5816**	**6.8600e-003**	**0.5884**	**0.1573**	**6.4800e-003**	**0.1638**		**797.9209**	**797.9209**	**0.0225**	**0.0673**	**818.5225**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1975	11.3719	12.1518	0.0290		0.4689	0.4689		0.4425	0.4425	0.0000	2,756.6572	2,756.6572	0.6931		2,773.9843
Total	**1.1975**	**11.3719**	**12.1518**	**0.0290**		**0.4689**	**0.4689**		**0.4425**	**0.4425**	**0.0000**	**2,756.6572**	**2,756.6572**	**0.6931**		**2,773.9843**

3.4 Equipment Installation - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0227	0.7658	0.2952	3.7600e-003	0.1345	4.4500e-003	0.1389	0.0387	4.2600e-003	0.0430		405.7428	405.7428	0.0138	0.0588	423.6187
Worker	0.1193	0.0767	1.3125	3.8000e-003	0.4471	2.4100e-003	0.4495	0.1186	2.2200e-003	0.1208		392.1781	392.1781	8.6900e-003	8.4200e-003	394.9038
Total	**0.1420**	**0.8424**	**1.6077**	**7.5600e-003**	**0.5816**	**6.8600e-003**	**0.5884**	**0.1573**	**6.4800e-003**	**0.1638**		**797.9209**	**797.9209**	**0.0225**	**0.0673**	**818.5225**

3.4 Equipment Installation - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1405	10.6748	12.0924	0.0290		0.4229	0.4229		0.3989	0.3989		2,756.687 4	2,756.687 4	0.6909		2,773.960 0
Total	**1.1405**	**10.6748**	**12.0924**	**0.0290**		**0.4229**	**0.4229**		**0.3989**	**0.3989**		**2,756.687 4**	**2,756.687 4**	**0.6909**		**2,773.960 0**

3.4 Equipment Installation - 2025

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0222	0.7621	0.2907	3.6900e-003	0.1345	4.4600e-003	0.1389	0.0387	4.2700e-003	0.0430		398.3474	398.3474	0.0139	0.0578	415.9247
Worker	0.1118	0.0689	1.2252	3.6700e-003	0.4471	2.3000e-003	0.4494	0.1186	2.1200e-003	0.1207		382.5755	382.5755	7.8400e-003	7.8700e-003	385.1172
Total	**0.1339**	**0.8311**	**1.5160**	**7.3600e-003**	**0.5816**	**6.7600e-003**	**0.5883**	**0.1573**	**6.3900e-003**	**0.1637**		**780.9229**	**780.9229**	**0.0217**	**0.0657**	**801.0419**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1405	10.6748	12.0924	0.0290		0.4229	0.4229		0.3989	0.3989	0.0000	2,756.6874	2,756.6874	0.6909		2,773.9600
Total	**1.1405**	**10.6748**	**12.0924**	**0.0290**		**0.4229**	**0.4229**		**0.3989**	**0.3989**	**0.0000**	**2,756.6874**	**2,756.6874**	**0.6909**		**2,773.9600**

3.4 Equipment Installation - 2025

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0222	0.7621	0.2907	3.6900e-003	0.1345	4.4600e-003	0.1389	0.0387	4.2700e-003	0.0430		398.3474	398.3474	0.0139	0.0578	415.9247
Worker	0.1118	0.0689	1.2252	3.6700e-003	0.4471	2.3000e-003	0.4494	0.1186	2.1200e-003	0.1207		382.5755	382.5755	7.8400e-003	7.8700e-003	385.1172
Total	**0.1339**	**0.8311**	**1.5160**	**7.3600e-003**	**0.5816**	**6.7600e-003**	**0.5883**	**0.1573**	**6.3900e-003**	**0.1637**		**780.9229**	**780.9229**	**0.0217**	**0.0657**	**801.0419**

3.5 Well Drilling - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4867	13.3366	17.1067	0.0482		0.5201	0.5201		0.5051	0.5051		4,621.1937	4,621.1937	0.9657		4,645.3369
Total	**1.4867**	**13.3366**	**17.1067**	**0.0482**		**0.5201**	**0.5201**		**0.5051**	**0.5051**		**4,621.1937**	**4,621.1937**	**0.9657**		**4,645.3369**

3.5 Well Drilling - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0227	0.7658	0.2952	3.7600e-003	0.1345	4.4500e-003	0.1389	0.0387	4.2600e-003	0.0430		405.7428	405.7428	0.0138	0.0588	423.6187
Worker	0.0597	0.0383	0.6562	1.9000e-003	0.2236	1.2100e-003	0.2248	0.0593	1.1100e-003	0.0604		196.0891	196.0891	4.3500e-003	4.2100e-003	197.4519
Total	**0.0823**	**0.8041**	**0.9514**	**5.6600e-003**	**0.3580**	**5.6600e-003**	**0.3637**	**0.0980**	**5.3700e-003**	**0.1034**		**601.8318**	**601.8318**	**0.0182**	**0.0630**	**621.0706**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4867	13.3366	17.1067	0.0482		0.5201	0.5201		0.5051	0.5051	0.0000	4,621.1937	4,621.1937	0.9657		4,645.3369
Total	**1.4867**	**13.3366**	**17.1067**	**0.0482**		**0.5201**	**0.5201**		**0.5051**	**0.5051**	**0.0000**	**4,621.1937**	**4,621.1937**	**0.9657**		**4,645.3369**

3.5 Well Drilling - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0227	0.7658	0.2952	3.7600e-003	0.1345	4.4500e-003	0.1389	0.0387	4.2600e-003	0.0430		405.7428	405.7428	0.0138	0.0588	423.6187
Worker	0.0597	0.0383	0.6562	1.9000e-003	0.2236	1.2100e-003	0.2248	0.0593	1.1100e-003	0.0604		196.0891	196.0891	4.3500e-003	4.2100e-003	197.4519
Total	**0.0823**	**0.8041**	**0.9514**	**5.6600e-003**	**0.3580**	**5.6600e-003**	**0.3637**	**0.0980**	**5.3700e-003**	**0.1034**		**601.8318**	**601.8318**	**0.0182**	**0.0630**	**621.0706**

3.6 Paving - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.2778	2.5218	3.6718	5.3600e-003		0.1122	0.1122		0.1044	0.1044		500.6030	500.6030	0.1508		504.3733
Paving	0.0393					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.3171**	**2.5218**	**3.6718**	**5.3600e-003**		**0.1122**	**0.1122**		**0.1044**	**0.1044**		**500.6030**	**500.6030**	**0.1508**		**504.3733**

3.6 Paving - 2025

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0559	0.0345	0.6126	1.8400e-003	0.2236	1.1500e-003	0.2247	0.0593	1.0600e-003	0.0604		191.2877	191.2877	3.9200e-003	3.9400e-003	192.5586
Total	**0.0559**	**0.0345**	**0.6126**	**1.8400e-003**	**0.2236**	**1.1500e-003**	**0.2247**	**0.0593**	**1.0600e-003**	**0.0604**		**191.2877**	**191.2877**	**3.9200e-003**	**3.9400e-003**	**192.5586**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.2778	2.5218	3.6718	5.3600e-003		0.1122	0.1122		0.1044	0.1044	0.0000	500.6030	500.6030	0.1508		504.3733
Paving	0.0393					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.3171**	**2.5218**	**3.6718**	**5.3600e-003**		**0.1122**	**0.1122**		**0.1044**	**0.1044**	**0.0000**	**500.6030**	**500.6030**	**0.1508**		**504.3733**

3.6 Paving - 2025

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0559	0.0345	0.6126	1.8400e-003	0.2236	1.1500e-003	0.2247	0.0593	1.0600e-003	0.0604		191.2877	191.2877	3.9200e-003	3.9400e-003	192.5586
Total	**0.0559**	**0.0345**	**0.6126**	**1.8400e-003**	**0.2236**	**1.1500e-003**	**0.2247**	**0.0593**	**1.0600e-003**	**0.0604**		**191.2877**	**191.2877**	**3.9200e-003**	**3.9400e-003**	**192.5586**

3.7 Site Restoration - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.2618	2.7788	4.4639	6.3300e-003		0.1152	0.1152		0.1060	0.1060		612.8047	612.8047	0.1982		617.7595
Total	**0.2618**	**2.7788**	**4.4639**	**6.3300e-003**	**0.0000**	**0.1152**	**0.1152**	**0.0000**	**0.1060**	**0.1060**		**612.8047**	**612.8047**	**0.1982**		**617.7595**

3.7 Site Restoration - 2025

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0559	0.0345	0.6126	1.8400e-003	0.2236	1.1500e-003	0.2247	0.0593	1.0600e-003	0.0604		191.2877	191.2877	3.9200e-003	3.9400e-003	192.5586
Total	**0.0559**	**0.0345**	**0.6126**	**1.8400e-003**	**0.2236**	**1.1500e-003**	**0.2247**	**0.0593**	**1.0600e-003**	**0.0604**		**191.2877**	**191.2877**	**3.9200e-003**	**3.9400e-003**	**192.5586**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.2618	2.7788	4.4639	6.3300e-003		0.1152	0.1152		0.1060	0.1060	0.0000	612.8047	612.8047	0.1982		617.7595
Total	**0.2618**	**2.7788**	**4.4639**	**6.3300e-003**	**0.0000**	**0.1152**	**0.1152**	**0.0000**	**0.1060**	**0.1060**	**0.0000**	**612.8047**	**612.8047**	**0.1982**		**617.7595**

3.7 Site Restoration - 2025

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0559	0.0345	0.6126	1.8400e-003	0.2236	1.1500e-003	0.2247	0.0593	1.0600e-003	0.0604		191.2877	191.2877	3.9200e-003	3.9400e-003	192.5586
Total	**0.0559**	**0.0345**	**0.6126**	**1.8400e-003**	**0.2236**	**1.1500e-003**	**0.2247**	**0.0593**	**1.0600e-003**	**0.0604**		**191.2877**	**191.2877**	**3.9200e-003**	**3.9400e-003**	**192.5586**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0114	0.1925	0.1603	1.2000e-003	0.0637	1.3000e-003	0.0650	0.0177	1.2300e-003	0.0189		128.9988	128.9988	4.3000e-003	0.0154	133.6859
Unmitigated	0.0114	0.1925	0.1603	1.2000e-003	0.0637	1.3000e-003	0.0650	0.0177	1.2300e-003	0.0189		128.9988	128.9988	4.3000e-003	0.0154	133.6859

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Asphalt Surfaces	0.00	0.00	0.00		
Other Non-Asphalt Surfaces	9.01	0.00	0.00	19,680	19,680
Total	9.01	0.00	0.00	19,680	19,680

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Other Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Other Non-Asphalt Surfaces	16.60	8.40	6.90	0.00	100.00	0.00	100	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Asphalt Surfaces	0.541709	0.062136	0.185590	0.128486	0.023783	0.006533	0.012157	0.009216	0.000814	0.000497	0.024669	0.000753	0.003657
Other Non-Asphalt Surfaces	0.000000	0.000000	0.500000	0.000000	0.000000	0.000000	0.250000	0.250000	0.000000	0.000000	0.000000	0.000000	0.000000

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0552	1.2000e-004	0.0128	0.0000		5.0000e-005	5.0000e-005		5.0000e-005	5.0000e-005		0.0275	0.0275	7.0000e-005		0.0293
Unmitigated	0.0552	1.2000e-004	0.0128	0.0000		5.0000e-005	5.0000e-005		5.0000e-005	5.0000e-005		0.0275	0.0275	7.0000e-005		0.0293

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	9.5600e-003					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0445					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.1800e-003	1.2000e-004	0.0128	0.0000		5.0000e-005	5.0000e-005		5.0000e-005	5.0000e-005		0.0275	0.0275	7.0000e-005		0.0293
Total	**0.0552**	**1.2000e-004**	**0.0128**	**0.0000**		**5.0000e-005**	**5.0000e-005**		**5.0000e-005**	**5.0000e-005**		**0.0275**	**0.0275**	**7.0000e-005**		**0.0293**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	9.5600e-003					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0445					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.1800e-003	1.2000e-004	0.0128	0.0000		5.0000e-005	5.0000e-005		5.0000e-005	5.0000e-005		0.0275	0.0275	7.0000e-005		0.0293
Total	**0.0552**	**1.2000e-004**	**0.0128**	**0.0000**		**5.0000e-005**	**5.0000e-005**		**5.0000e-005**	**5.0000e-005**		**0.0275**	**0.0275**	**7.0000e-005**		**0.0293**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

S Wells PFAS Groundwater Treatment and Disinfection Facility Project GHG

South Coast AQMD Air District, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Asphalt Surfaces	12.87	1000sqft	0.30	12,870.00	0
Other Non-Asphalt Surfaces	112.64	1000sqft	2.59	112,639.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	31
Climate Zone	9			**Operational Year**	2025
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	390.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Project is located in SCAQMD. SCE is the utility provider.

Land Use - Other Non-Asphalt Surfaces for the water treatment facility, multiple pipeline improvement areas, and existing well improvements areas and Other Asphalt Surfaces for the two roundabout improvements areas

Construction Phase - Provided by SCV Water.

Off-road Equipment - Provided by SCV Water

Off-road Equipment - Provided by SCV Water

Off-road Equipment - Provided by SCV Water

Off-road Equipment - Provided by SCV Water

Off-road Equipment - Provided by SCV Water

Off-road Equipment - Provided by SCV Water

Trips and VMT - Haul trip adjusted to Chiquita Canyon Landfill 6.8 miles 1 way. (6,500 CY of soil divided by 10 CY of capacity truck = 650 Haul trips) * 2 for both ways

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Grading - 3,000 CY imported soil and 3,500 CY exported.

Vehicle Trips - 784 trips per year for workers, deliveries, and resin replacement

Construction Off-road Equipment Mitigation - Vehicle Speed 15 mph for SCAQMD Rule 403 compliance

Fleet Mix - Fleet mix for 1460 worker trips, 48 delivery trips, and 6 resin replacement trips

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstructionPhase	NumDays	220.00	43.00
tblConstructionPhase	NumDays	6.00	20.00
tblConstructionPhase	NumDays	10.00	20.00
tblConstructionPhase	NumDays	3.00	44.00
tblConstructionPhase	NumDays	3.00	44.00
tblConstructionPhase	NumDaysWeek	5.00	7.00
tblFleetMix	HHD	9.2160e-003	3.9630e-003
tblFleetMix	LDA	0.54	0.00
tblFleetMix	LDT1	0.06	0.00
tblFleetMix	LDT2	0.19	0.96
tblFleetMix	LHD1	0.02	0.00
tblFleetMix	LHD2	6.5330e-003	0.00
tblFleetMix	MCY	0.02	0.00
tblFleetMix	MDV	0.13	0.00
tblFleetMix	MH	3.6570e-003	0.00
tblFleetMix	MHD	0.01	0.03
tblFleetMix	OBUS	8.1400e-004	0.00
tblFleetMix	SBUS	7.5300e-004	0.00
tblFleetMix	UBUS	4.9700e-004	0.00
tblGrading	MaterialExported	0.00	3,000.00
tblGrading	MaterialImported	0.00	3,500.00
tblLandUse	LandUseSquareFeet	112,640.00	112,639.00

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	PhaseName		Site Preparation
tblOffRoadEquipment	PhaseName		Equipment Installtion
tblOffRoadEquipment	PhaseName		Well Drilling
tblOffRoadEquipment	PhaseName		Equipment Installtion
tblOffRoadEquipment	PhaseName		Site Preparation
tblOffRoadEquipment	PhaseName		Grading
tblOffRoadEquipment	PhaseName		Paving
tblOffRoadEquipment	PhaseName		Site Restoration
tblOffRoadEquipment	PhaseName		Grading
tblOffRoadEquipment	PhaseName		Site Preparation
tblOffRoadEquipment	PhaseName		Equipment Installtion
tblOffRoadEquipment	PhaseName		Site Restoration
tblOffRoadEquipment	UsageHours	8.00	24.00
tblTripsAndVMT	HaulingTripLength	20.00	6.80
tblTripsAndVMT	HaulingTripNumber	813.00	1,300.00

tblTripsAndVMT	WorkerTripNumber	18.00	20.00
tblTripsAndVMT	WorkerTripNumber	15.00	20.00
tblTripsAndVMT	WorkerTripNumber	53.00	40.00
tblTripsAndVMT	WorkerTripNumber	53.00	20.00
tblTripsAndVMT	WorkerTripNumber	18.00	20.00
tblTripsAndVMT	WorkerTripNumber	13.00	20.00
tblVehicleTrips	CC_TTP	0.00	100.00
tblVehicleTrips	PR_TP	0.00	100.00
tblVehicleTrips	WD_TR	0.00	0.05

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2024	0.1470	1.3822	1.4586	4.1400e-003	0.3065	0.0533	0.3598	0.1274	0.0498	0.1772	0.0000	367.6871	367.6871	0.0848	7.5900e-003	372.0677
2025	0.0549	0.4905	0.5874	1.5500e-003	0.0672	0.0184	0.0856	0.0125	0.0171	0.0295	0.0000	137.7691	137.7691	0.0330	2.7700e-003	139.4195
Maximum	**0.1470**	**1.3822**	**1.4586**	**4.1400e-003**	**0.3065**	**0.0533**	**0.3598**	**0.1274**	**0.0498**	**0.1772**	**0.0000**	**367.6871**	**367.6871**	**0.0848**	**7.5900e-003**	**372.0677**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2024	0.1470	1.3822	1.4586	4.1400e-003	0.1688	0.0533	0.2221	0.0657	0.0498	0.1155	0.0000	367.6867	367.6867	0.0848	7.5900e-003	372.0674
2025	0.0549	0.4905	0.5874	1.5500e-003	0.0479	0.0184	0.0663	0.0104	0.0171	0.0274	0.0000	137.7690	137.7690	0.0330	2.7700e-003	139.4194
Maximum	**0.1470**	**1.3822**	**1.4586**	**4.1400e-003**	**0.1688**	**0.0533**	**0.2221**	**0.0657**	**0.0498**	**0.1155**	**0.0000**	**367.6867**	**367.6867**	**0.0848**	**7.5900e-003**	**372.0674**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	42.00	0.00	35.24	45.61	0.00	30.85	0.00	0.00	0.00	0.00	0.00	0.00

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
2	4-1-2024	6-30-2024	0.4814	0.4814
3	7-1-2024	9-30-2024	0.6901	0.6901
4	10-1-2024	12-31-2024	0.3540	0.3540
5	1-1-2025	3-31-2025	0.3268	0.3268
6	4-1-2025	6-30-2025	0.1762	0.1762
7	7-1-2025	9-30-2025	0.0358	0.0358
		Highest	0.6901	0.6901

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0100	1.0000e-005	1.6000e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	3.1100e-003	3.1100e-003	1.0000e-005	0.0000	3.3200e-003
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	1.0100e-003	1.7900e-003	0.0142	4.0000e-005	4.6300e-003	3.0000e-005	4.6600e-003	1.2400e-003	3.0000e-005	1.2600e-003	0.0000	4.2268	4.2268	1.2000e-004	1.6000e-004	4.2777
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0110**	**1.8000e-003**	**0.0158**	**4.0000e-005**	**4.6300e-003**	**4.0000e-005**	**4.6700e-003**	**1.2400e-003**	**4.0000e-005**	**1.2700e-003**	**0.0000**	**4.2299**	**4.2299**	**1.3000e-004**	**1.6000e-004**	**4.2811**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0100	1.0000e-005	1.6000e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	3.1100e-003	3.1100e-003	1.0000e-005	0.0000	3.3200e-003
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	1.0100e-003	1.7900e-003	0.0142	4.0000e-005	4.6300e-003	3.0000e-005	4.6600e-003	1.2400e-003	3.0000e-005	1.2600e-003	0.0000	4.2268	4.2268	1.2000e-004	1.6000e-004	4.2777
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0110**	**1.8000e-003**	**0.0158**	**4.0000e-005**	**4.6300e-003**	**4.0000e-005**	**4.6700e-003**	**1.2400e-003**	**4.0000e-005**	**1.2700e-003**	**0.0000**	**4.2299**	**4.2299**	**1.3000e-004**	**1.6000e-004**	**4.2811**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	4/1/2024	5/30/2024	5	44	
2	Grading	Grading	6/1/2024	6/30/2024	5	20	
3	Equipment Installtion	Building Construction	7/1/2024	5/2/2025	5	220	

4	Well Drilling	Building Construction	7/1/2024	8/12/2024		7	43	
5	Paving	Paving	5/3/2025	5/30/2025		5	20	
6	Site Restoration	Site Preparation	6/3/2025	8/1/2025		5	44	

Acres of Grading (Site Preparation Phase): 88

Acres of Grading (Grading Phase): 20

Acres of Paving: 2.89

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

<u>OffRoad Equipment</u>

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Bore/Drill Rigs	1	8.00	221	0.50
Site Preparation	Excavators	1	8.00	158	0.38
Site Preparation	Rubber Tired Dozers	1	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	2	7.00	97	0.37
Grading	Excavators	1	8.00	158	0.38
Grading	Plate Compactors	1	8.00	8	0.43
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	2	7.00	97	0.37
Equipment Installtion	Bore/Drill Rigs	1	8.00	221	0.50
Equipment Installtion	Cement and Mortar Mixers	2	8.00	9	0.56
Equipment Installtion	Cranes	1	8.00	231	0.29
Equipment Installtion	Forklifts	1	7.00	89	0.20
Equipment Installtion	Skid Steer Loaders	1	8.00	65	0.37
Equipment Installtion	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Well Drilling	Bore/Drill Rigs	1	24.00	221	0.50
Well Drilling	Generator Sets	1	24.00	84	0.74
Paving	Cement and Mortar Mixers	1	8.00	9	0.56

Paving	Forklifts	1	8.00	89	0.20
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Site Restoration	Forklifts	1	8.00	89	0.20
Site Restoration	Skid Steer Loaders	1	8.00	65	0.37
Site Restoration	Tractors/Loaders/Backhoes	1	7.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	7	20.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	20.00	0.00	1,300.00	14.70	6.90	6.80	LD_Mix	HDT_Mix	HHDT
Equipment Installtion	11	40.00	21.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Well Drilling	9	20.00	21.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	7	20.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Site Restoration	5	20.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Site Preparation - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1792	0.0000	0.1792	0.0779	0.0000	0.0779	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0294	0.2853	0.2716	6.3000e-004		0.0125	0.0125		0.0115	0.0115	0.0000	55.3378	55.3378	0.0179	0.0000	55.7852
Total	**0.0294**	**0.2853**	**0.2716**	**6.3000e-004**	**0.1792**	**0.0125**	**0.1917**	**0.0779**	**0.0115**	**0.0894**	**0.0000**	**55.3378**	**55.3378**	**0.0179**	**0.0000**	**55.7852**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.2800e-003	9.4000e-004	0.0134	4.0000e-005	4.8300e-003	3.0000e-005	4.8500e-003	1.2800e-003	2.0000e-005	1.3100e-003	0.0000	3.7429	3.7429	9.0000e-005	9.0000e-005	3.7721
Total	**1.2800e-003**	**9.4000e-004**	**0.0134**	**4.0000e-005**	**4.8300e-003**	**3.0000e-005**	**4.8500e-003**	**1.2800e-003**	**2.0000e-005**	**1.3100e-003**	**0.0000**	**3.7429**	**3.7429**	**9.0000e-005**	**9.0000e-005**	**3.7721**

3.2 Site Preparation - 2024

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0806	0.0000	0.0806	0.0350	0.0000	0.0350	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0294	0.2853	0.2716	6.3000e-004		0.0125	0.0125		0.0115	0.0115	0.0000	55.3377	55.3377	0.0179	0.0000	55.7851
Total	**0.0294**	**0.2853**	**0.2716**	**6.3000e-004**	**0.0806**	**0.0125**	**0.0931**	**0.0350**	**0.0115**	**0.0466**	**0.0000**	**55.3377**	**55.3377**	**0.0179**	**0.0000**	**55.7851**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.2800e-003	9.4000e-004	0.0134	4.0000e-005	4.8300e-003	3.0000e-005	4.8500e-003	1.2800e-003	2.0000e-005	1.3100e-003	0.0000	3.7429	3.7429	9.0000e-005	9.0000e-005	3.7721
Total	**1.2800e-003**	**9.4000e-004**	**0.0134**	**4.0000e-005**	**4.8300e-003**	**3.0000e-005**	**4.8500e-003**	**1.2800e-003**	**2.0000e-005**	**1.3100e-003**	**0.0000**	**3.7429**	**3.7429**	**9.0000e-005**	**9.0000e-005**	**3.7721**

3.3 Grading - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0712	0.0000	0.0712	0.0343	0.0000	0.0343	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0117	0.1132	0.1052	2.0000e-004		5.1600e-003	5.1600e-003		4.7600e-003	4.7600e-003	0.0000	17.1441	17.1441	5.4800e-003	0.0000	17.2810
Total	**0.0117**	**0.1132**	**0.1052**	**2.0000e-004**	**0.0712**	**5.1600e-003**	**0.0764**	**0.0343**	**4.7600e-003**	**0.0391**	**0.0000**	**17.1441**	**17.1441**	**5.4800e-003**	**0.0000**	**17.2810**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	9.1000e-004	0.0362	0.0143	1.4000e-004	3.8100e-003	2.1000e-004	4.0200e-003	1.0500e-003	2.0000e-004	1.2500e-003	0.0000	13.5302	13.5302	7.3000e-004	2.1500e-003	14.1891
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.8000e-004	4.3000e-004	6.1100e-003	2.0000e-005	2.1900e-003	1.0000e-005	2.2100e-003	5.8000e-004	1.0000e-005	5.9000e-004	0.0000	1.7013	1.7013	4.0000e-005	4.0000e-005	1.7146
Total	**1.4900e-003**	**0.0367**	**0.0204**	**1.6000e-004**	**6.0000e-003**	**2.2000e-004**	**6.2300e-003**	**1.6300e-003**	**2.1000e-004**	**1.8400e-003**	**0.0000**	**15.2316**	**15.2316**	**7.7000e-004**	**2.1900e-003**	**15.9036**

3.3 Grading - 2024

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0320	0.0000	0.0320	0.0154	0.0000	0.0154	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0117	0.1132	0.1052	2.0000e-004		5.1600e-003	5.1600e-003		4.7600e-003	4.7600e-003	0.0000	17.1441	17.1441	5.4800e-003	0.0000	17.2810
Total	**0.0117**	**0.1132**	**0.1052**	**2.0000e-004**	**0.0320**	**5.1600e-003**	**0.0372**	**0.0154**	**4.7600e-003**	**0.0202**	**0.0000**	**17.1441**	**17.1441**	**5.4800e-003**	**0.0000**	**17.2810**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	9.1000e-004	0.0362	0.0143	1.4000e-004	3.8100e-003	2.1000e-004	4.0200e-003	1.0500e-003	2.0000e-004	1.2500e-003	0.0000	13.5302	13.5302	7.3000e-004	2.1500e-003	14.1891
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.8000e-004	4.3000e-004	6.1100e-003	2.0000e-005	2.1900e-003	1.0000e-005	2.2100e-003	5.8000e-004	1.0000e-005	5.9000e-004	0.0000	1.7013	1.7013	4.0000e-005	4.0000e-005	1.7146
Total	**1.4900e-003**	**0.0367**	**0.0204**	**1.6000e-004**	**6.0000e-003**	**2.2000e-004**	**6.2300e-003**	**1.6300e-003**	**2.1000e-004**	**1.8400e-003**	**0.0000**	**15.2316**	**15.2316**	**7.7000e-004**	**2.1900e-003**	**15.9036**

3.4 Equipment Installtion - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0602	0.5826	0.5602	1.4800e-003		0.0236	0.0236		0.0219	0.0219	0.0000	127.7489	127.7489	0.0400	0.0000	128.7486
Total	**0.0602**	**0.5826**	**0.5602**	**1.4800e-003**		**0.0236**	**0.0236**		**0.0219**	**0.0219**	**0.0000**	**127.7489**	**127.7489**	**0.0400**	**0.0000**	**128.7486**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.4600e-003	0.0530	0.0198	2.5000e-004	8.7400e-003	2.9000e-004	9.0300e-003	2.5200e-003	2.8000e-004	2.8000e-003	0.0000	24.3123	24.3123	8.3000e-004	3.5300e-003	25.3842
Worker	7.7000e-003	5.6500e-003	0.0806	2.4000e-004	0.0290	1.6000e-004	0.0291	7.6900e-003	1.5000e-004	7.8400e-003	0.0000	22.4577	22.4577	5.3000e-004	5.4000e-004	22.6326
Total	**9.1600e-003**	**0.0587**	**0.1004**	**4.9000e-004**	**0.0377**	**4.5000e-004**	**0.0382**	**0.0102**	**4.3000e-004**	**0.0106**	**0.0000**	**46.7700**	**46.7700**	**1.3600e-003**	**4.0700e-003**	**48.0168**

3.4 Equipment Installtion - 2024

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0602	0.5826	0.5602	1.4800e-003		0.0236	0.0236		0.0219	0.0219	0.0000	127.7488	127.7488	0.0400	0.0000	128.7485
Total	**0.0602**	**0.5826**	**0.5602**	**1.4800e-003**		**0.0236**	**0.0236**		**0.0219**	**0.0219**	**0.0000**	**127.7488**	**127.7488**	**0.0400**	**0.0000**	**128.7485**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.4600e-003	0.0530	0.0198	2.5000e-004	8.7400e-003	2.9000e-004	9.0300e-003	2.5200e-003	2.8000e-004	2.8000e-003	0.0000	24.3123	24.3123	8.3000e-004	3.5300e-003	25.3842
Worker	7.7000e-003	5.6500e-003	0.0806	2.4000e-004	0.0290	1.6000e-004	0.0291	7.6900e-003	1.5000e-004	7.8400e-003	0.0000	22.4577	22.4577	5.3000e-004	5.4000e-004	22.6326
Total	**9.1600e-003**	**0.0587**	**0.1004**	**4.9000e-004**	**0.0377**	**4.5000e-004**	**0.0382**	**0.0102**	**4.3000e-004**	**0.0106**	**0.0000**	**46.7700**	**46.7700**	**1.3600e-003**	**4.0700e-003**	**48.0168**

3.4 Equipment Installtion - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0385	0.3643	0.3711	9.9000e-004		0.0144	0.0144		0.0134	0.0134	0.0000	85.1672	85.1672	0.0267	0.0000	85.8336
Total	**0.0385**	**0.3643**	**0.3711**	**9.9000e-004**		**0.0144**	**0.0144**		**0.0134**	**0.0134**	**0.0000**	**85.1672**	**85.1672**	**0.0267**	**0.0000**	**85.8336**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	9.5000e-004	0.0352	0.0130	1.6000e-004	5.8300e-003	2.0000e-004	6.0200e-003	1.6800e-003	1.9000e-004	1.8700e-003	0.0000	15.9130	15.9130	5.5000e-004	2.3100e-003	16.6156
Worker	4.8100e-003	3.3900e-003	0.0502	1.5000e-004	0.0193	1.0000e-004	0.0194	5.1300e-003	9.0000e-005	5.2200e-003	0.0000	14.6059	14.6059	3.2000e-004	3.4000e-004	14.7146
Total	**5.7600e-003**	**0.0386**	**0.0632**	**3.1000e-004**	**0.0251**	**3.0000e-004**	**0.0254**	**6.8100e-003**	**2.8000e-004**	**7.0900e-003**	**0.0000**	**30.5189**	**30.5189**	**8.7000e-004**	**2.6500e-003**	**31.3302**

3.4 Equipment Installtion - 2025

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0385	0.3643	0.3711	9.9000e-004		0.0144	0.0144		0.0134	0.0134	0.0000	85.1671	85.1671	0.0267	0.0000	85.8335
Total	**0.0385**	**0.3643**	**0.3711**	**9.9000e-004**		**0.0144**	**0.0144**		**0.0134**	**0.0134**	**0.0000**	**85.1671**	**85.1671**	**0.0267**	**0.0000**	**85.8335**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	9.5000e-004	0.0352	0.0130	1.6000e-004	5.8300e-003	2.0000e-004	6.0200e-003	1.6800e-003	1.9000e-004	1.8700e-003	0.0000	15.9130	15.9130	5.5000e-004	2.3100e-003	16.6156
Worker	4.8100e-003	3.3900e-003	0.0502	1.5000e-004	0.0193	1.0000e-004	0.0194	5.1300e-003	9.0000e-005	5.2200e-003	0.0000	14.6059	14.6059	3.2000e-004	3.4000e-004	14.7146
Total	**5.7600e-003**	**0.0386**	**0.0632**	**3.1000e-004**	**0.0251**	**3.0000e-004**	**0.0254**	**6.8100e-003**	**2.8000e-004**	**7.0900e-003**	**0.0000**	**30.5189**	**30.5189**	**8.7000e-004**	**2.6500e-003**	**31.3302**

3.5 Well Drilling - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0320	0.2867	0.3678	1.0400e-003		0.0112	0.0112		0.0109	0.0109	0.0000	90.1339	90.1339	0.0188	0.0000	90.6048
Total	**0.0320**	**0.2867**	**0.3678**	**1.0400e-003**		**0.0112**	**0.0112**		**0.0109**	**0.0109**	**0.0000**	**90.1339**	**90.1339**	**0.0188**	**0.0000**	**90.6048**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	4.8000e-004	0.0173	6.4400e-003	8.0000e-005	2.8500e-003	1.0000e-004	2.9400e-003	8.2000e-004	9.0000e-005	9.1000e-004	0.0000	7.9199	7.9199	2.7000e-004	1.1500e-003	8.2691
Worker	1.2500e-003	9.2000e-004	0.0131	4.0000e-005	4.7200e-003	3.0000e-005	4.7400e-003	1.2500e-003	2.0000e-005	1.2800e-003	0.0000	3.6579	3.6579	9.0000e-005	9.0000e-005	3.6864
Total	**1.7300e-003**	**0.0182**	**0.0196**	**1.2000e-004**	**7.5700e-003**	**1.3000e-004**	**7.6800e-003**	**2.0700e-003**	**1.1000e-004**	**2.1900e-003**	**0.0000**	**11.5778**	**11.5778**	**3.6000e-004**	**1.2400e-003**	**11.9555**

3.5 Well Drilling - 2024

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0320	0.2867	0.3678	1.0400e-003		0.0112	0.0112		0.0109	0.0109	0.0000	90.1338	90.1338	0.0188	0.0000	90.6047
Total	**0.0320**	**0.2867**	**0.3678**	**1.0400e-003**		**0.0112**	**0.0112**		**0.0109**	**0.0109**	**0.0000**	**90.1338**	**90.1338**	**0.0188**	**0.0000**	**90.6047**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	4.8000e-004	0.0173	6.4400e-003	8.0000e-005	2.8500e-003	1.0000e-004	2.9400e-003	8.2000e-004	9.0000e-005	9.1000e-004	0.0000	7.9199	7.9199	2.7000e-004	1.1500e-003	8.2691
Worker	1.2500e-003	9.2000e-004	0.0131	4.0000e-005	4.7200e-003	3.0000e-005	4.7400e-003	1.2500e-003	2.0000e-005	1.2800e-003	0.0000	3.6579	3.6579	9.0000e-005	9.0000e-005	3.6864
Total	**1.7300e-003**	**0.0182**	**0.0196**	**1.2000e-004**	**7.5700e-003**	**1.3000e-004**	**7.6800e-003**	**2.0700e-003**	**1.1000e-004**	**2.1900e-003**	**0.0000**	**11.5778**	**11.5778**	**3.6000e-004**	**1.2400e-003**	**11.9555**

3.6 Paving - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	2.7800e-003	0.0252	0.0367	5.0000e-005		1.1200e-003	1.1200e-003		1.0400e-003	1.0400e-003	0.0000	4.5414	4.5414	1.3700e-003	0.0000	4.5756
Paving	3.9000e-004					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**3.1700e-003**	**0.0252**	**0.0367**	**5.0000e-005**		**1.1200e-003**	**1.1200e-003**		**1.0400e-003**	**1.0400e-003**	**0.0000**	**4.5414**	**4.5414**	**1.3700e-003**	**0.0000**	**4.5756**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.5000e-004	3.9000e-004	5.7000e-003	2.0000e-005	2.1900e-003	1.0000e-005	2.2100e-003	5.8000e-004	1.0000e-005	5.9000e-004	0.0000	1.6598	1.6598	4.0000e-005	4.0000e-005	1.6721
Total	**5.5000e-004**	**3.9000e-004**	**5.7000e-003**	**2.0000e-005**	**2.1900e-003**	**1.0000e-005**	**2.2100e-003**	**5.8000e-004**	**1.0000e-005**	**5.9000e-004**	**0.0000**	**1.6598**	**1.6598**	**4.0000e-005**	**4.0000e-005**	**1.6721**

3.6 Paving - 2025

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	2.7800e-003	0.0252	0.0367	5.0000e-005		1.1200e-003	1.1200e-003		1.0400e-003	1.0400e-003	0.0000	4.5414	4.5414	1.3700e-003	0.0000	4.5756
Paving	3.9000e-004					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**3.1700e-003**	**0.0252**	**0.0367**	**5.0000e-005**		**1.1200e-003**	**1.1200e-003**		**1.0400e-003**	**1.0400e-003**	**0.0000**	**4.5414**	**4.5414**	**1.3700e-003**	**0.0000**	**4.5756**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.5000e-004	3.9000e-004	5.7000e-003	2.0000e-005	2.1900e-003	1.0000e-005	2.2100e-003	5.8000e-004	1.0000e-005	5.9000e-004	0.0000	1.6598	1.6598	4.0000e-005	4.0000e-005	1.6721
Total	**5.5000e-004**	**3.9000e-004**	**5.7000e-003**	**2.0000e-005**	**2.1900e-003**	**1.0000e-005**	**2.2100e-003**	**5.8000e-004**	**1.0000e-005**	**5.9000e-004**	**0.0000**	**1.6598**	**1.6598**	**4.0000e-005**	**4.0000e-005**	**1.6721**

3.7 Site Restoration - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0350	0.0000	0.0350	3.7800e-003	0.0000	3.7800e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	5.7600e-003	0.0611	0.0982	1.4000e-004		2.5300e-003	2.5300e-003		2.3300e-003	2.3300e-003	0.0000	12.2304	12.2304	3.9600e-003	0.0000	12.3293
Total	**5.7600e-003**	**0.0611**	**0.0982**	**1.4000e-004**	**0.0350**	**2.5300e-003**	**0.0375**	**3.7800e-003**	**2.3300e-003**	**6.1100e-003**	**0.0000**	**12.2304**	**12.2304**	**3.9600e-003**	**0.0000**	**12.3293**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.2000e-003	8.5000e-004	0.0126	4.0000e-005	4.8300e-003	3.0000e-005	4.8500e-003	1.2800e-003	2.0000e-005	1.3100e-003	0.0000	3.6515	3.6515	8.0000e-005	8.0000e-005	3.6787
Total	**1.2000e-003**	**8.5000e-004**	**0.0126**	**4.0000e-005**	**4.8300e-003**	**3.0000e-005**	**4.8500e-003**	**1.2800e-003**	**2.0000e-005**	**1.3100e-003**	**0.0000**	**3.6515**	**3.6515**	**8.0000e-005**	**8.0000e-005**	**3.6787**

3.7 Site Restoration - 2025

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0158	0.0000	0.0158	1.7000e-003	0.0000	1.7000e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	5.7600e-003	0.0611	0.0982	1.4000e-004		2.5300e-003	2.5300e-003		2.3300e-003	2.3300e-003	0.0000	12.2304	12.2304	3.9600e-003	0.0000	12.3293
Total	**5.7600e-003**	**0.0611**	**0.0982**	**1.4000e-004**	**0.0158**	**2.5300e-003**	**0.0183**	**1.7000e-003**	**2.3300e-003**	**4.0300e-003**	**0.0000**	**12.2304**	**12.2304**	**3.9600e-003**	**0.0000**	**12.3293**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.2000e-003	8.5000e-004	0.0126	4.0000e-005	4.8300e-003	3.0000e-005	4.8500e-003	1.2800e-003	2.0000e-005	1.3100e-003	0.0000	3.6515	3.6515	8.0000e-005	8.0000e-005	3.6787
Total	**1.2000e-003**	**8.5000e-004**	**0.0126**	**4.0000e-005**	**4.8300e-003**	**3.0000e-005**	**4.8500e-003**	**1.2800e-003**	**2.0000e-005**	**1.3100e-003**	**0.0000**	**3.6515**	**3.6515**	**8.0000e-005**	**8.0000e-005**	**3.6787**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	1.0100e-003	1.7900e-003	0.0142	4.0000e-005	4.6300e-003	3.0000e-005	4.6600e-003	1.2400e-003	3.0000e-005	1.2600e-003	0.0000	4.2268	4.2268	1.2000e-004	1.6000e-004	4.2777
Unmitigated	1.0100e-003	1.7900e-003	0.0142	4.0000e-005	4.6300e-003	3.0000e-005	4.6600e-003	1.2400e-003	3.0000e-005	1.2600e-003	0.0000	4.2268	4.2268	1.2000e-004	1.6000e-004	4.2777

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Asphalt Surfaces	0.00	0.00	0.00		
Other Non-Asphalt Surfaces	5.63	0.00	0.00	12,300	12,300
Total	5.63	0.00	0.00	12,300	12,300

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Other Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Other Non-Asphalt Surfaces	16.60	8.40	6.90	0.00	100.00	0.00	100	0	0

4.4 Fleet Mix

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Asphalt Surfaces	0.541709	0.062136	0.185590	0.128486	0.023783	0.006533	0.012157	0.009216	0.000814	0.000497	0.024669	0.000753	0.003657
Other Non-Asphalt Surfaces	0.000000	0.000000	0.964330	0.000000	0.000000	0.000000	0.031704	0.003963	0.000000	0.000000	0.000000	0.000000	0.000000

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0100	1.0000e-005	1.6000e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	3.1100e-003	3.1100e-003	1.0000e-005	0.0000	3.3200e-003
Unmitigated	0.0100	1.0000e-005	1.6000e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	3.1100e-003	3.1100e-003	1.0000e-005	0.0000	3.3200e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	1.7500e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	8.1100e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.5000e-004	1.0000e-005	1.6000e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	3.1100e-003	3.1100e-003	1.0000e-005	0.0000	3.3200e-003
Total	**0.0100**	**1.0000e-005**	**1.6000e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**	**0.0000**	**3.1100e-003**	**3.1100e-003**	**1.0000e-005**	**0.0000**	**3.3200e-003**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	1.7500e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	8.1100e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.5000e-004	1.0000e-005	1.6000e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	3.1100e-003	3.1100e-003	1.0000e-005	0.0000	3.3200e-003
Total	**0.0100**	**1.0000e-005**	**1.6000e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**	**0.0000**	**3.1100e-003**	**3.1100e-003**	**1.0000e-005**	**0.0000**	**3.3200e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

9.0 Operational Offroad

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

S Wells PFAS Groundwater Treatment and Disinfection Facility Project

Electricity GHG Emissions Estimation Tool

Total Estimated Electricity Usage (MWh)
986

GHG Emission Calculations

	Southern California Edison		CO_2e Conversion Calculations	
	Energy Intensity Factor (lbs/MWh)	Emissions (lbs)	Total CO_2e Emissions (lbs)	Total CO_2e Emissions (MT)
CO_2	390.98	385,506	385,506	175
CH_4	0.033	33	813	0
N_2O	0.004	4	1,175	1
			TOTAL GHG EMISSIONS FROM ELECTRICITY	**176**

Notes

- MWh = megawatt-hours; lbs = pounds; CO_2 = carbon dioxide, CH_4 = methane; N_2O = nitrous oxide; CO_2e = carbon dioxide equivalent; MT = metric tons; IPCC = Intergovernmental Panel on Climate Change; CARB = California Air Resources Board
- Energy intensity factors for SCE based on CalEEMod default values.

Appendix B

Biological Resources Assessment

S Wells PFAS Groundwater Treatment and Disinfection Facility

Biological Resources Assessment

prepared for

Santa Clarita Valley Water Agency
26521 Summit Circle
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November 2022

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Executive Summary

Rincon Consultants, Inc. has prepared this Biological Resources Assessment to document existing conditions and provide a basis for evaluation of potential impacts to biological resources from the Santa Clarita Valley Water Agency's (SCV Water) S Wells PFAS Groundwater Treatment and Disinfection Facility (project). The project involves construction of a per- and polyfluoroalkyl substances (PFAS) groundwater treatment and disinfection facility and associated pipelines. The proposed facility would restore the use of Wells S6, S7 and S8 and would reduce SCV Water's dependency on imported water. In addition, a new groundwater well (S9) and a chloramine disinfection building would be constructed. The project is located in the city of Santa Clarita in Los Angeles County, within and adjacent to Bridgeport Park to the north of the Santa Clara River.

The project site includes all project components (groundwater treatment and disinfection facility, underground pipelines, staging areas, and roundabout improvements). The Study Area surrounding the project site encompasses a 100-foot survey buffer. The Santa Clara River is located in the southern portion of the Study Area, and developed, disturbed, and ornamentally vegetated areas are located in the central and northern portions of the Study Area.

No special status plant species have a high or moderate potential to occur within the Study Area. Five special status wildlife species have a high potential to occur, including California legless lizard (*Anniella* spp.), coastal whiptail (*Aspidoscelis tigris stejnegeri*), western pond turtle (*Emys marmorata*), coast horned lizard (*Phrynosoma blainvillii*), and Cooper's hawk (*Accipiter cooperii*). Four species have a moderate potential to occur and include arroyo toad (*Anaxyrus californicus*), loggerhead shrike (*Lanius ludovicianus*), least Bell's vireo (*Vireo bellii pusillus*), and San Diego black-tailed jackrabbit (*Lepus californicus bennettii*). No federally-designated critical habitat occurs within the Study Area.

Additionally, two sensitive plant communities are located within the Study Area: Fremont cottonwood forest and woodland and scale broom scrub. The southern portion of the Study Area associated with the Santa Clara River channel and ornamental trees in the northern portion of the Study Area also provide potential nesting habitat for bird species protected under California Fish and Game Code Section 3503 and the federal Migratory Bird Treaty Act.

Approximately 2.87 acres of project impacts would occur within the developed, disturbed, and ornamental land cover types in the northern portion of the Study Area. No direct impacts would occur to natural vegetation communities associated with the Santa Clara River in the southern portion of the Study Area. Therefore, the project would not directly impact special status species, nesting birds, jurisdictional resources, or sensitive plant communities. Indirect impacts to special status avian species or nesting birds could occur through noise, vibrations, and dust from construction activities during construction. In addition, indirect impacts to special status wildlife species and sensitive plant communities could occur through the reactivated operation of existing Wells S6, S7, and S8 and operation of the new Well S9, which could lower localized groundwater levels and thereby reduce groundwater availability for potential groundwater dependent ecosystems along the Santa Clara River. Indirect impacts to jurisdictional waters and wetlands may also occur through processes such as increased turbidity, altered pH, and decreased dissolved oxygen levels. With implementation of avoidance and minimization measures BIO-1 through BIO-5, potential indirect impacts to special status species, sensitive plant communities, and jurisdictional resources would be reduced to less-than-significant levels.

One coast live oak (*Quercus agrifolia*) tree protected by the City of Santa Clarita Oak Tree Preservation Ordinance and nine trees (four western sycamore trees [*Platanus racemosa*] and five London plane trees [*Platanus acerifolia*]) protected by the Parkway Trees Ordinance occur within the Study Area, and removal is anticipated to be required to complete the project. SCV Water would voluntarily obtain an Oak Tree Removal permit from the city of Santa Clarita for removal of the coast live oak tree and would be required to obtain a Parkway Tree Permit from the city of Santa Clarita for removal of the western sycamore and London plane trees.

1 Introduction

Rincon Consultants, Inc. (Rincon) has prepared this Biological Resources Assessment (BRA) Report for the Santa Clarita Valley Water Agency (SCV Water) to document existing conditions and provide a basis for evaluation of potential impacts to special status and sensitive biological resources associated with the S Wells PFAS Groundwater Treatment and Disinfection Facility Project (project) in the city of Santa Clarita (City), Los Angeles County, California (Figure 1).

1.1 Project Location

The project site is located within the Santa Clarita Valley along Newhall Ranch Road, Bridgeport Park, Bridgeport Lane, and the Santa Clara River Trail to the north of the Santa Clara River (SCR; Figure 2a and Figure 2b). The project site is comprised of three existing well locations (Wells S6, S7, and S8), the location of the proposed Well S9, groundwater treatment and disinfection facility, three locations of pipeline alignments, two locations of roundabout improvements, and a construction staging and laydown area.

The approximate center of the project site is located at latitude 34.425675 and longitude -118.547677 (WGS84). The project site is located in Township 04 North, Range 16 West, Section 15 of the United States Geological Survey (USGS) *Newhall, California* 7.5-minute topographic quadrangle (USGS 2022a).

1.2 Project Description

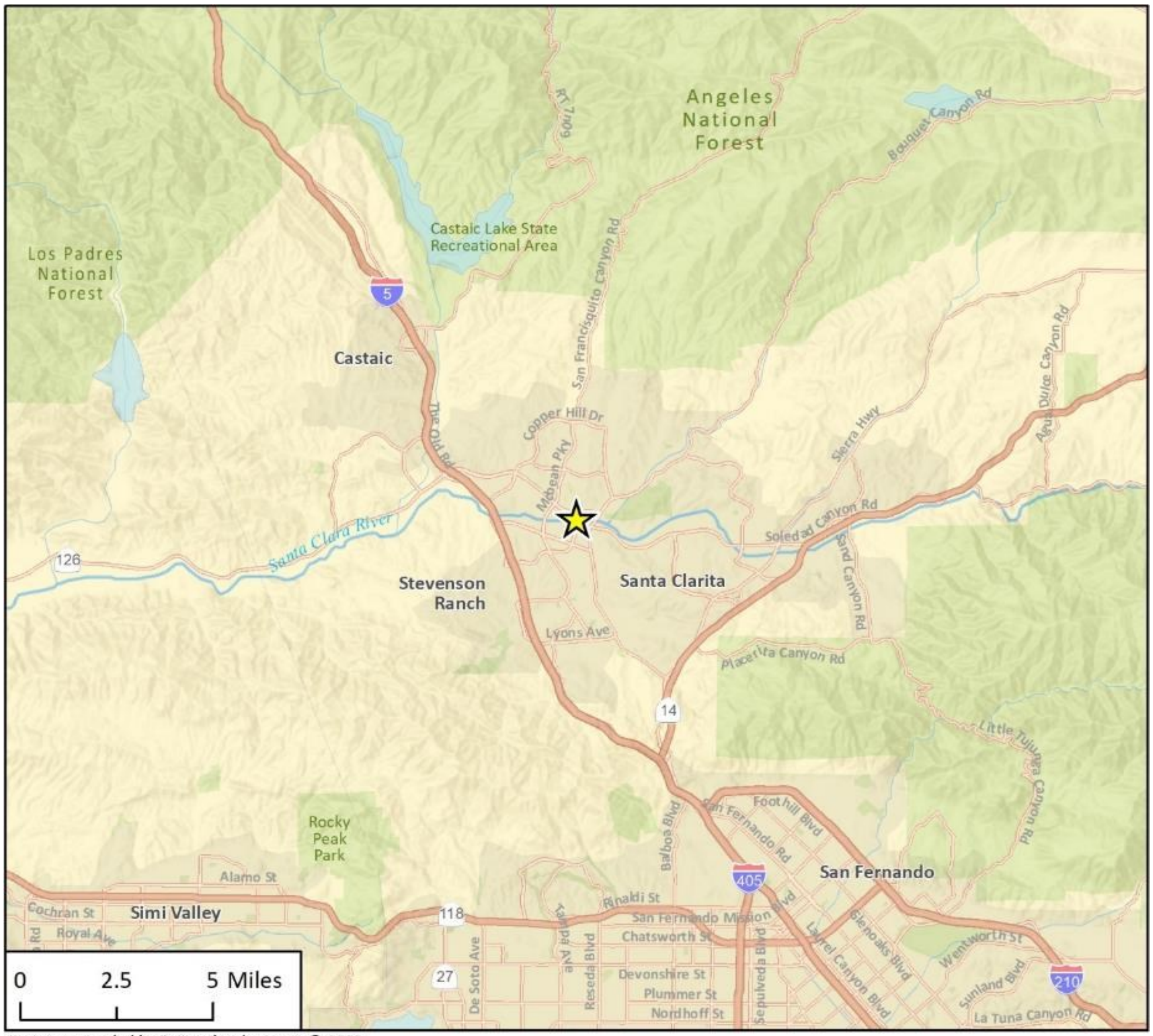
The Santa Clarita Valley Water Agency (SCV Water) operates three existing wells (S6, S7 and S8) located along the north side of the SCR between McBean Parkway and Parkwood Lane within the Bridgeport community in Santa Clarita. The three wells generate up to a total of 6,000 gallons per minute of potable water that is distributed to the Valencia Division service area. The wells were taken offline due to the detection of per- and polyfluoroalkyl substances (PFAS) that exceeded the State's response levels. To make up for the loss of groundwater production, SCV Water has relied on the purchase of additional imported water supplies to meet local demand.

The project involves construction of a PFAS groundwater treatment and disinfection facility and associated pipelines. The proposed facility would restore the use of Wells S6, S7 and S8 and would reduce SCV Water's dependency on imported water. In addition, a new groundwater well (S9) and a chloramine disinfection building would be constructed. The new S9 well would produce an additional 1,000 gallons per minute of potable water that would also be filtered through the proposed PFAS treatment system before distribution to SCV Water customers. The new Well S9 would serve as a replacement for the existing Mitchell 5A Well that is being abandoned by a private developer as part of the Vista Canyon Plaza Development; therefore, the new Well S9 would not result in a net increase in SCV Water's overall annual basin-wide groundwater extraction levels.

Groundwater Treatment and Disinfection Facility and Well S9

Components of the proposed groundwater treatment and disinfection facility would include up to eight ion-exchange vessels approximately 15 feet in height, a new S-9 groundwater well head, control panels, a pre-filter station, a one-story chloramine disinfection building, piping, and

Figure 1 Regional Location



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Project Location

N

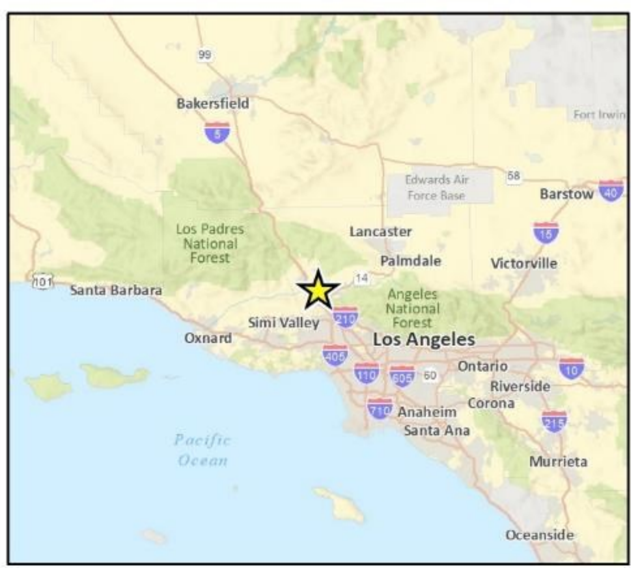

Figure 2a Study Area – Eastern Extent

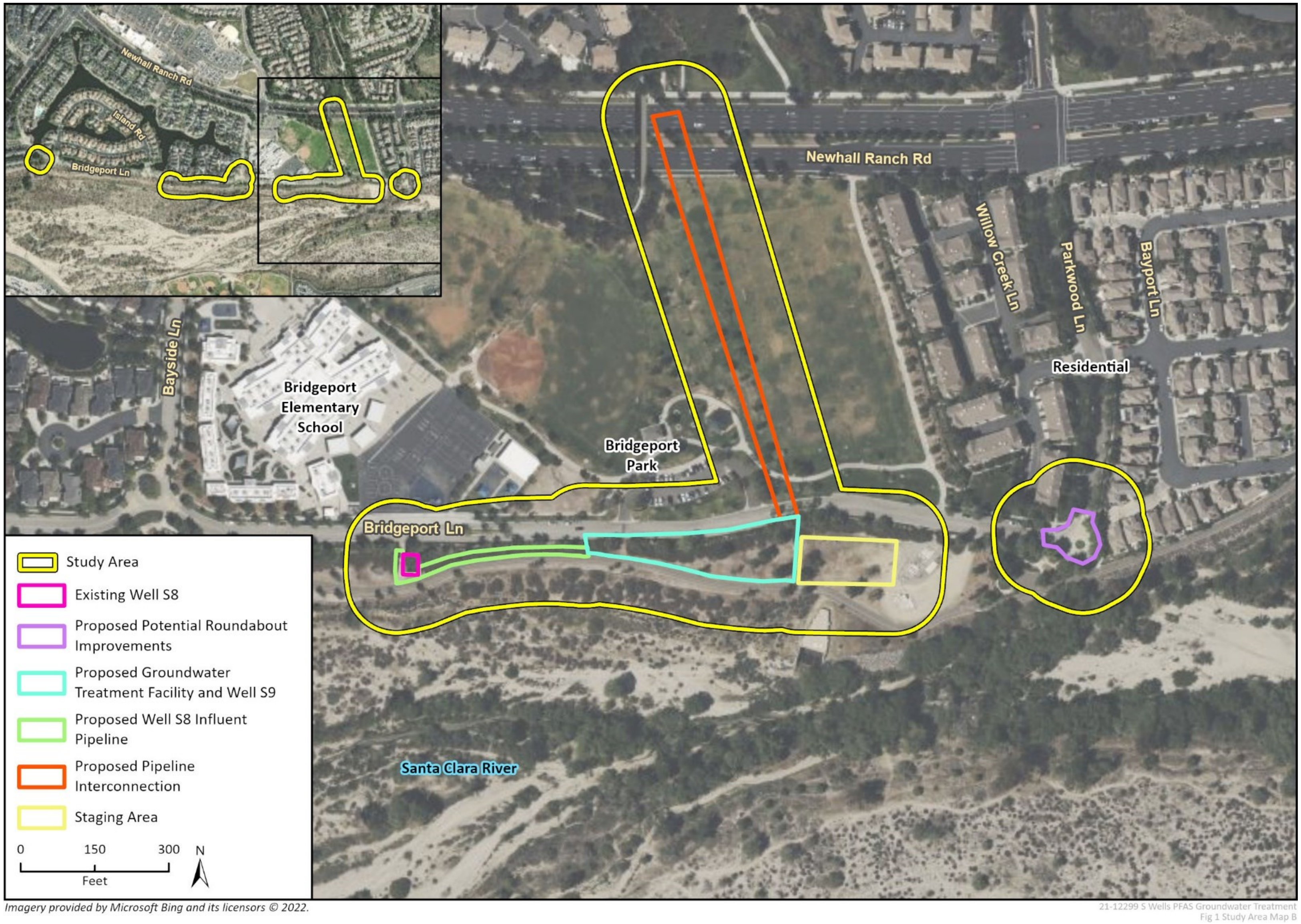

Figure 2b Study Area – Western Extent

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architectural paneling to screen the treatment vessels and improvements. Vehicular access to the site would be provided by two 30-foot-wide driveways with motorized gates along Bridgeport Lane. The project also includes installation of an underground 12-inch drainage pipeline connection between the proposed treatment and disinfection facility and the existing 30-inch drainage outlet pipeline that is located along the eastern portion of the treatment and disinfection facility location. The proposed drainage pipeline would collect and convey on-site stormwater runoff and groundwater produced during periodic installation and water quality testing of new resin media in the treatment vessels to the existing stormwater drainage pipeline to the east of the site, which ultimately currently outlets to the SCR approximately 135 feet south of the project site.

Pipelines

The project would include the installation of three pipelines. The first pipeline would consist of approximately 850 linear feet of water pipeline that would extend from the groundwater treatment and disinfection facility north through Bridgeport Park to an interconnection with SCV Water's existing distribution system in Newhall Ranch Road. The second pipeline would consist of approximately 400 linear feet of water pipeline installed primarily east/west immediately north of the existing SCR Trail from the western boundary of the project site to the existing Well S8 location. The pipeline would proceed west from the groundwater treatment and disinfection facility to Well S8 and would convey raw water flows from Wells S6, S7, and S8 to the proposed groundwater treatment and disinfection facility. The third pipeline would consist of approximately 840 linear feet of storm drain pipeline installed primarily east/west along the southern half of the existing SCR Trail from a point south of the Bridgeport Lane/Bayside Lane intersection to the existing Well S7 location. This pipeline would convey stormwater flows and pumped groundwater that currently sheet flow from the site into the SCR to an existing 30-inch stormwater drain pipeline that ultimately outlets to the SCR. This discharge would be covered under SCV Water's existing Statewide General Permit for Drinking Water System Discharges to the Waters of the United States (No. 4DW0768). The SCR Trail would be restored to its existing condition or better upon completion of construction.

Existing Well Improvements

The project includes improvements, such as submersible pump replacement and electrical panel upgrades, at the existing Wells S6, S7, and S8. All work would be completed within the existing, fenced facility footprints for these wells in previously disturbed areas with the exception of Well S6 where minor piping improvements would be conducted in landscaped areas immediately north of the well site. No new noise-generating equipment would be installed. Shrubs and ground cover would be removed as needed during installation of these improvements, but no trees would be altered or removed. Landscaping would be replaced with new planting upon completion of construction activities.

Roundabout Improvements

The project would include street and curb improvements to two roundabouts located at the intersections of Parkwood Lane/ Bridgeport Lane and Bayside Lane/Bridgeport Lane to accommodate periodic site access by large trucks during construction and various midsize delivery trucks and semitrucks during operation.

Construction

Construction of the proposed project would occur approximately between April 2024 and October 2025. The maximum depth of excavation would be nine feet for all project components with the exception of the proposed S9 well, which would be drilled to a depth of approximately 250 feet. In order to maintain cyclists' access and safety along the SCR Trail immediately south of the project site, construction fencing would be placed along the southern edge of the project site, and signage notifying trail users of ongoing construction activities would be posted along the path. In addition, to minimize impacts to users of Bridgeport Park, the construction work area through the park would be fenced, and the pipeline would be constructed in segments with any exposed trenches covered with plate when construction activities are not occurring.

Construction materials would be staged on a dirt lot directly east of the project site. Construction personnel would park along Bridgeport Lane and within the staging area. Delivery and haul trucks would access the site from Newhall Ranch Road either by using Parkwood Lane and Bridgeport Lane or by traveling along the maintenance road that runs along the eastern edge of Bridgeport Park.

Ten trees are proposed for removal to accommodate the proposed project, including one coast live oak (*Quercus agrifolia*), five London plane (*Platanus acerifolia*), and four western sycamore (*Platanus racemosa*), all of which are located within the proposed groundwater treatment and disinfection facility. No utilities would be relocated as a result of the project.

Operation and Maintenance

Under the proposed project, Wells S6, S7, and S8 would be reactivated, and the proposed S9 groundwater well would be constructed. The wells and treatment facility would operate 24 hours per day, 365 days per year. Approximately one to two maintenance staff would visit the project site daily. Resin media would be replaced two to three times a year, which would require the use of a semitruck for delivery. In addition, chemical deliveries to the proposed disinfection building would occur approximately twice a month via a midsize delivery truck. Maintenance vehicles would park within the proposed groundwater treatment and disinfection facility.

Lighting would be provided within the enclosed facility and would be set on a timer controlled at the entrance of the project site. Sodium hypochlorite (chlorine) and liquid ammonium sulfate would be stored at the proposed facility in a completely enclosed structure with proper containment and venting.

2 Methodology

2.1 Regulatory Overview

Regulated or sensitive resources studied and analyzed herein include special status plant and animal species, nesting birds and raptors, sensitive plant communities, jurisdictional waters and wetlands, wildlife movement, and locally protected resources, such as protected trees. Regulatory authority over biological resources is shared by federal, state, and local authorities. Primary authority for regulation of general biological resources lies within the land use control and planning authority of local jurisdictions (in this instance, the City).

Definition of Special Status Species

For the purposes of this report, special status species include:

- Species listed as threatened or endangered under the Federal Endangered Species Act (FESA); species that are under review may be included if there is a reasonable expectation of listing within the life of the project;
- Species listed as candidate, rare, threatened, or endangered under the California Endangered Species Act (CESA) or Native Plant Protection Act;
- Species designated as Fully Protected, Species of Special Concern, or Watch List by the California Fish and Game Code (CFGC) or California Department of Fish and Wildlife (CDFW);
- Species designated as locally important by the City and/or otherwise protected through ordinance or local policy; and
- Plants occurring on lists 1 through 4 of the California Native Plant Society (CNPS) California Rare Plant Rank system.

Environmental Statutes

For the purpose of this report, the analysis of potential impacts to biological resources was guided by the following statutes (described in detail in Appendix A):

- California Environmental Quality Act (CEQA);
- FESA;
- CESA;
- Federal Clean Water Act (CWA);
- CFGC;
- Migratory Bird Treaty Act (MBTA);
- The Bald and Golden Eagle Protection Act;
- Porter-Cologne Water Quality Control Act;
- City of Santa Clarita General Plan; and
- Santa Clarita Municipal Code.

Guidelines for Determining CEQA Significance

The following threshold criteria, as defined by the CEQA Guidelines Appendix G Initial Study Checklist, were used to evaluate potential environmental effects. Based on these criteria, the proposed project would have a significant effect on biological resources if it would:

a) Have substantial adverse effects, either directly or through habitat modifications, on any species identified as a candidate, sensitive or special status species in local or regional plans, policies, or regulations, or by the CDFW or U.S. Fish and Wildlife Service.

b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the CDFW or U.S. Fish and Wildlife Service.

c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.

d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.

e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional or state habitat conservation plan.

2.2 Literature Review

Queries of the United States Fish and Wildlife Service (USFWS) Information, Planning and Conservation System (USFWS 2022a), CDFW California Natural Diversity Database (CNDDB) (CDFW 2022a), and the CNPS Online Inventory of Rare, Threatened and Endangered Plants of California (CNPS 2022a) were conducted to obtain comprehensive information regarding state and federally listed species as well as other special status species considered to have potential to occur with the *Newhall, California* USGS 7.5-minute topographic quadrangle and the surrounding eight quadrangles (*Whitaker Peak, Warm Springs Mountain, Green Valley, Val Verde, Mint Canyon, Santa Susana, Oat Mountain, and San Fernando*). The results of these scientific database queries were compiled into a table that is presented in Appendix D.

In addition, the following resources were reviewed for information about the Study Area:

- Aerial photographs (Google Earth Pro 2022);
- *Newhall, California* USGS 7.5-minute topographic quadrangle (USGS 2022a);
- United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Web Soil Survey (USDA NRCS 2022a);
- USFWS Critical Habitat Portal (USFWS 2022b);
- USFWS National Wetland Inventory (NWI) (USFWS 2022c); and
- USGS National Hydrography Dataset (NHD) (USGS 2022b).

2.3 Field Reconnaissance Survey

A field reconnaissance survey was conducted within the project site and a 100-foot buffer, hereby referred to as the Study Area. The survey was conducted to document the existing conditions and to evaluate the potential for presence of regulated biological resources in the Study Area, including special status plant and wildlife species, sensitive plant communities, potential jurisdictional waters of the U.S./State and wetlands, and habitat for federally and state protected nesting birds.

The field reconnaissance survey was conducted by Rincon Senior Biologist Robin Murray and Rincon Biologist Kyle Gern on February 23, 2022. Weather conditions during the survey included clear skies with temperatures ranging from 39 degrees Fahrenheit (°F) to 55°F and winds ranging from approximately two to 20 miles per hour. An additional reconnaissance survey was conducted by Kyle Gern on August 30, 2022 to survey new components that were added to the project. During this survey, skies were clear, temperatures ranged from 75°F to 90°F, and winds were approximately one mile per hour. The entire Study Area was surveyed on foot, and all biological resources encountered in the Study Area were recorded.

Representative photographs of the Study Area were taken (Appendix B), and an inventory of all plant and wildlife species observed was compiled (Appendix C). Natural and semi-natural vegetation community classification was based using *A Manual of California Vegetation, Second Edition* (MCV2; Sawyer et al. 2009), which establishes systematic classifications and definitions of vegetation communities. Updates to the MCV2 provided in the online database (CNPS 2022b) were taken into consideration. Each vegetation mapping unit was analyzed for characteristics to define the applicable vegetation community, such as dominant or co-dominant plant species and community membership rules. Additionally, land covers were characterized in areas that appeared to be altered by anthropogenic activities and were dominated by non-native or ornamental vegetation (e.g., ornamental, disturbed).

2.4 Jurisdictional Delineation

Information in the report related to jurisdictional waters is based on a formal jurisdictional delineation conducted by Rincon on February 23 and August 30, 2022. The delineation mapped and recorded the extent of potential waters of the U.S., CDFW-jurisdictional streambeds, and/or waters of the State. Current federal and state policies, methods, and guidelines were used to identify and delineate potential jurisdictional areas (described in Appendix A). Data collection in the Study Area was focused on areas containing a potential waterway, and Sample Points (SPs) were chosen at locations that were best representation of the conditions within the Study Area. The Ordinary High Water Mark (OHWM) and Wetland Determination Data Forms are included in Appendix E.

3 Existing Conditions

This section summarizes the existing conditions of the Study Area and results of biological resource field database inquiries and field surveys. Brief discussions regarding the general physical characteristics within the Study Area, the watershed and drainages, soils, vegetation and land cover types, and general wildlife species, are presented below. Representative photographs of the Study Area are provided in Appendix B, and complete lists of all plants and wildlife species observed within the Study Area are presented in Appendix C.

3.1 Physical Characteristics

The Study Area is situated in a region that is characterized by a Mediterranean climate with warm, dry summers and cool, wet winters. Average high temperatures range from 77 to 89°F and average low temperatures range from 61 to 68°F. The average annual precipitation in the region is 15.56 inches with the majority falling in February (Western Regional Climate Center 2022).

The topography of the Study Area is generally level. Elevation ranges between approximately 1,120 and 1,150 feet above mean sea level. In the northern and central portions of the Study Area north of the SCR, the terrain is generally flat. The southern portion of the Study Area slopes downward from the north to the south toward the SCR channel.

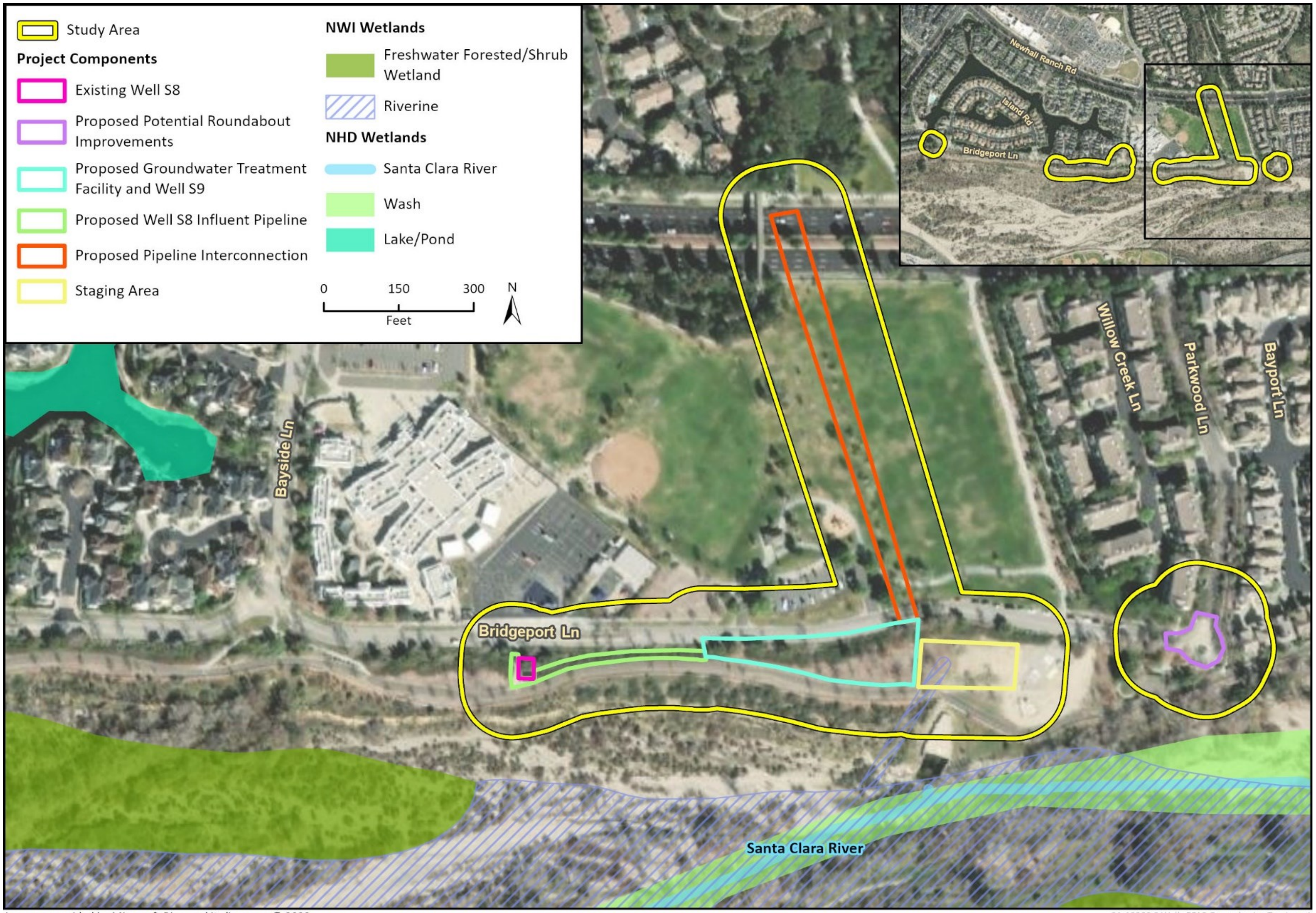
Watershed and Drainages

The Study Area is located within the SCR watershed (Hydrologic Unit Code [HUC]-8 Number [No.] 18070102; USGS 2022a). The SCR originates in the northern slopes of the San Gabriel Mountains in Los Angeles County, traverses Ventura County, and eventually flows into the Pacific Ocean between the cities of San Buenaventura (Ventura) and Oxnard. Significant tributaries within the watershed include Piru, Sespe, Santa Paula, Hopper, Pole, and Castaic Creeks; San Francisquito and Bouquet Canyon; and South Fork SCR. The hydrology of the SCR is highly variable, and flows vary seasonally.

Specifically, the Study Area is located within the Upper SCR Watershed (HUC-10 No. 1807010204), and the Salt Canyon-SCR (HUC-12 No. 180701020403) and San Francisquito Canyon (HUC-12 No. 180701020402) subwatersheds. The Upper SCR Watershed encompasses a total area of approximately 262,400 acres. Historical records and current observations indicate that the Upper SCR generally produces an intermittent flow regime, with flows increasing during the winter months (November through March), and declining throughout the summer months (USFWS 2022c). The SCR flows from east to west in the southern portion of the Study Area. The NWI identifies the SCR as an intermittent riverine system in the Study Area, which coincides with Rincon’s field observations (Figure 3a and Figure 3b). The NWI also identifies portions of the SCR that are palustrine, seasonally flooded forested wetlands within the northern portion of the main SCR channel. The SCR flows in a southwesterly direction through the cities of Fillmore, Santa Paula, and Ventura and eventually connects to the Pacific Ocean, which is a Traditional Navigable Water (TNW). Approximately 0.3 mile east and upstream of the Study Area is the confluence between Dry Canyon Creek, Bouquet Canyon Creek, and the SCR.

The NHD identifies a lake/pond in the northwestern portion of the Study Area, which was confirmed in the field to be an existing artificial lake within the Bridgeport at Valencia housing development (Bridgeport Lake; Appendix B, Photograph 28). This lake/pond area is partially unmapped by the

Figure 3a NWI and NHD Resources - Eastern Extent



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Additional data provided by NHD, 2022 and NWI 2022.

Figure 3b NWI and NHD Resources – Western Extent

Imagery provided by Microsoft Bing and its licensors © 2022.
Additional data provided by NHD, 2022 and NWI 2022.

NWI and NHD because a section of the pond occurs to the north of Bridgeport Lane between Island Road and East Island Road.

Four culvert outlets were identified along the northern bank of the SCR within and adjacent to the Study Area: one three-foot diameter concrete culvert outlet (Culvert Outlet 1; Appendix B, Photograph 10), one six-foot diameter concrete culvert outlet (Culvert Outlet 2; Appendix B, Photograph 29), one eight-foot-long by eight-foot-wide concrete box culvert outlet (Culvert Outlet 3; Appendix B, Photograph 30), and one two-foot diameter concrete culvert outlet (Culvert Outlet 4; Appendix B, Photograph 31). Culvert Outlet 2 is located within the Study Area, and Culvert Outlets 1, 3 and 4 are located just outside the Study Area boundary. Culvert Outlets 2 and 3 are mapped by the NHD. Culvert Outlets 1 and 4 are not mapped by the NWI or NHD. It is noted that mapping presented in the NHD and NWI provide useful context but are not a completely accurate depiction of current existing conditions or the extent of jurisdictional waters in the Study Area.

Soils

According to the NRCS Web Soil Survey, the Study Area includes five soil map units: (1) Hanford sandy loam, 0 to 2 percent slopes; (2) Metz loamy sand, 0 to 2 percent slopes; (3) Riverwash; (4) Sandy alluvial land; and (5) Saugus loam, 30 to 50 percent slopes, eroded (USDA NRCS 2022a; Figure 4a and Figure 4**Error! Not a valid bookmark self-reference.**b). Soils observed during the field survey are consistent with these map units. Hanford sandy loam, 0 to 2 percent slopes, Metz loamy sand, 0 to 2 percent slopes, riverwash, and sandy alluvial land are classified as hydric soils (USDA NRCS 2022b). The soil map units mapped within the Study Area are described in greater detail below.

Hanford Sandy Loam, 0 to 2 Percent Slopes

The Hanford series consists of very deep, well-drained soils that are typically located on stream bottoms and are formed in alluvium derived from granite. This series has a typical soil profile of sandy loam from zero to eight inches and fine sandy loam from eight to 70 inches. Hanford sandy loam, 0 to 2 percent slopes is found in the central portion of the Study Area and is listed as a hydric soil on the NRCS Hydric Soils List (USDA NRCS 2022b).

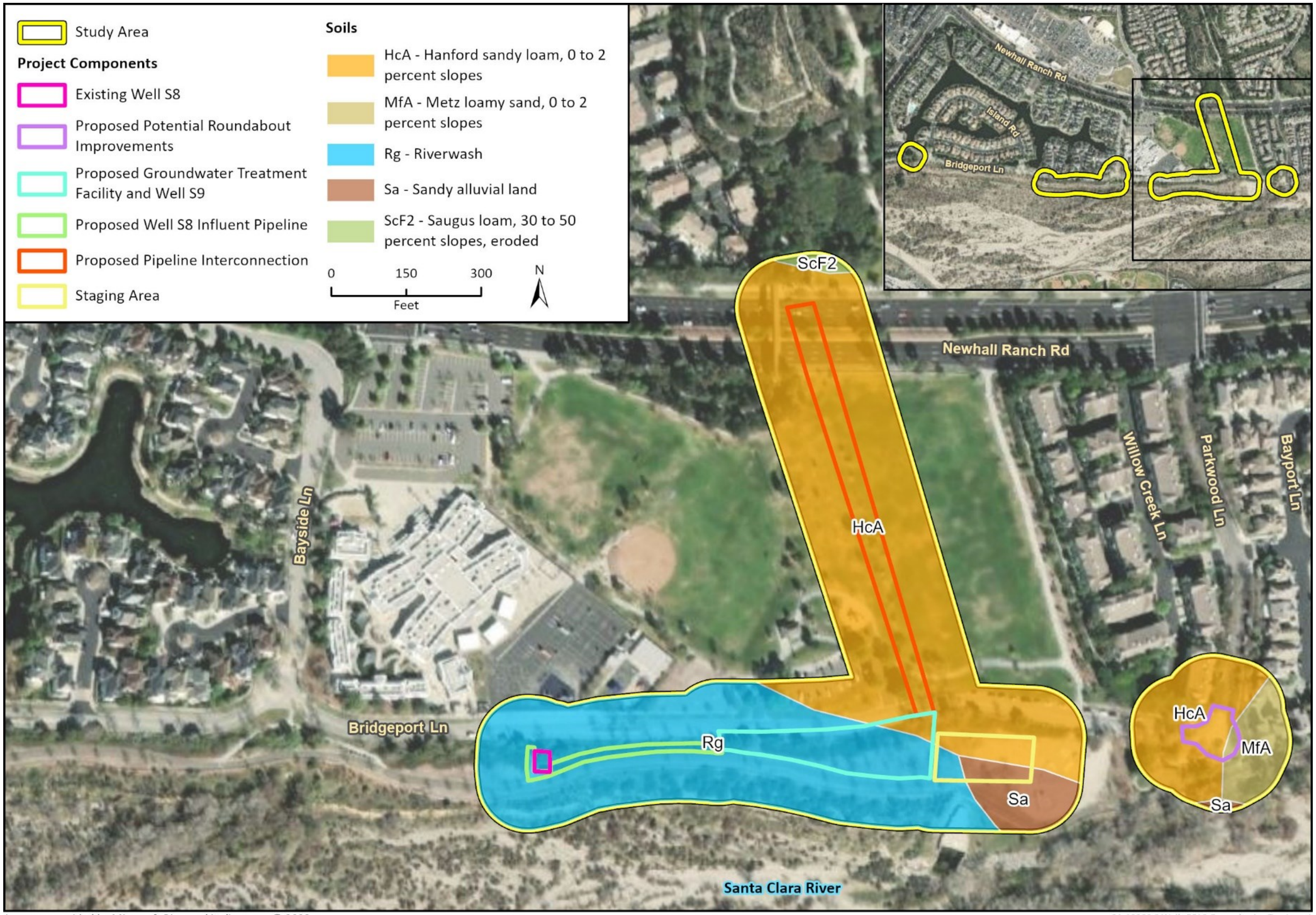
Metz Loamy Sand, 0 to 2 Percent Slopes

The Metz series consists of very deep, somewhat excessively drained soils that are typically located on alluvial fans and floodplains of river systems and formed in alluvium. This series has a typical soil profile of loamy sand from zero to seven inches and stratified sand to loamy sand from seven to 60 inches. Metz loamy sand, 0 to 2 percent slopes is found in the eastern portion of the Study Area and is listed as a hydric soil on the NRCS Hydric Soils List (USDA NRCS 2022b).

Riverwash

Riverwash occurs in the southern portion of the Study Area and is associated with the SCR channel. Riverwash soils are typically sandy, gravelly, or cobbly; are somewhat poorly drained; and experience frequent flooding. Riverwash is listed as a hydric soil on the NRCS Hydric Soils List (USDA NRCS 2022b).

Figure 4a USDA NRCS Soil Survey Mapping – Eastern Extent



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21-12299 S Wells PFAS Groundwater Treatment
Fig 3 Soil Map B

Figure 4b USDA NRCS Soil Survey Mapping – Western Extent

Imagery provided by Microsoft Bing and its licensors © 2022.
Additional data provided by SSURGO, 2022.

21-12299 S Wells PFAS Groundwater Treatment
Fig 3 Soil Map A

Sandy Alluvial Land

Sandy alluvial land occurs in the southeastern portion of the Study Area and is associated with the SCR channel. Sandy alluvial land is typically found on the foot slopes of floodplains and is derived from alluvium. The typical soil profile is sand from zero to 10 inches, stratified sand to loam from 10 to 30 inches, and stratified gravelly sand to gravelly loam from 30 to 60 inches. The depth to water table is typically 10 inches. This soil series is listed as a hydric soil on the NRCS Hydric Soils List (USDA NRCS 2022b).

Saugus Loam, 30 to 50 Percent Slopes, Eroded

The Saugus series consists of well drained loamy soils that are formed in weakly consolidated alluvium derived from paralithic bedrock. This soil series often occurs on the backslope of hills. Saugus loam soils are not listed as hydric on the NRCS Hydric Soils List (USDA NRCS 2022b).

3.2 Vegetation and Other Land Cover

Three vegetation communities and four land cover types were identified within the Study Area as described below and depicted in Figure 5a and Figure 5b. A list of plant species encountered during the field reconnaissance survey is provided in Appendix C.

California Sagebrush Scrub

California sagebrush scrub (*Artemisia californica* Shrubland Alliance) is typically found along steep upland slopes that are rarely flooded, and low-gradient deposits along streams, between sea level and 3,940 feet (1,200 meters) in elevation (Sawyer et al. 2009). Soils are typically alluvial or colluvial derived. California sagebrush (*Artemisia californica*) contributes to at least 60 percent relative cover in the shrub layer. This vegetation community is ranked G5S5 and is not considered sensitive (CDFW 2022b).

Within the Study Area, this vegetation community occurs along the northern bank of the SCR and extends to the fence line adjacent to the Santa Clara River Trail in the central and western portions of the Study Area (Appendix B, Photographs 4 and 11). California sagebrush is dominant in the shrub layer, with California buckwheat (*Eriogonum fasciculatum*), big sagebrush (*Artemisia tridentata*), white sage (*Salvia apiana*), and deerweed (*Acmispon glaber*) present as subdominant species in the shrub layer. The herbaceous layer is dominated by exotic annual grasses and forbs and includes species such as ripgut brome (*Bromus diandrus*), slender wild oat (*Avena barbata*), and black mustard (*Brassica nigra*).

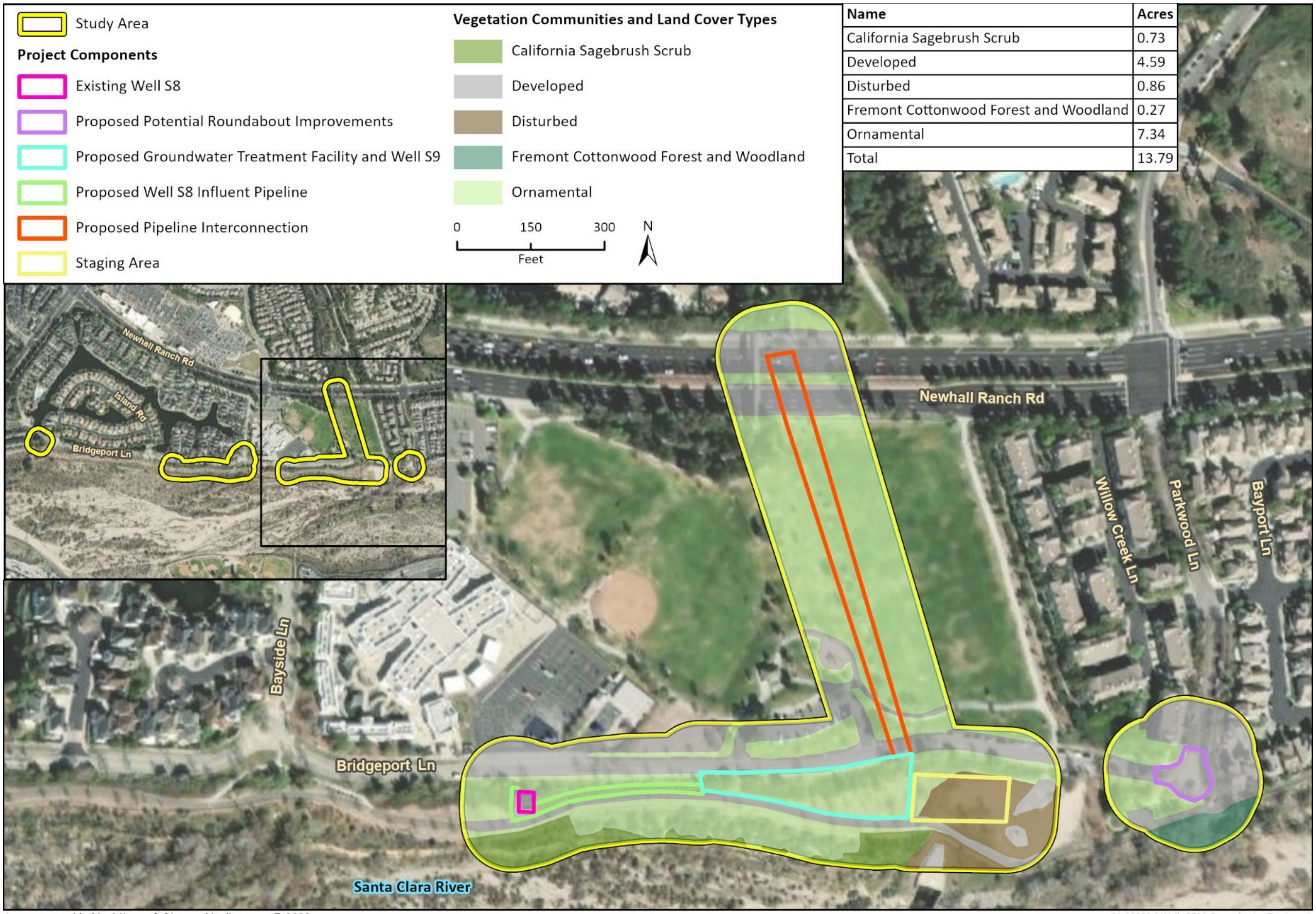
Developed

Developed areas consist of buildings, other infrastructure, and paved areas with little to no vegetation (e.g., concrete outfall structure, paved roads, SCR Trail, and buildings).

Disturbed

Ruderal plants grow in disturbed areas as a result of recent and continual surface soil disturbance. Disturbed areas typically contain a high percentage of bare ground and are dominated by non-native species. Due to the low plant species diversity and predominance of invasive weeds in most disturbed areas, the habitat value of this vegetation type is generally low, and these areas do not conform to a defined alliance in *A Manual of California Vegetation* (Sawyer et al. 2009).

Figure 5a Vegetation Communities and Land Cover Types – Eastern Extent



Name	Acres
California Sagebrush Scrub	0.73
Developed	4.59
Disturbed	0.86
Fremont Cottonwood Forest and Woodland	0.27
Ornamental	7.34
Total	13.79

Figure 5b Vegetation Communities and Land Cover Types – Western Extent

Name	Acres
California Sagebrush Scrub	1.61
Developed	2.6
Fremont Cottonwood Forest and Woodland	0.62
Open Water	0.13
Ornamental	2.33
Scale Broom Scrub	0.26
Total	7.55

Imagery provided by Microsoft Bing and its licensors © 2022.

21-12299 S Wells PFAS Groundwater Treatment
Fig 4 Veg/LC Map A

Development is present north of the SCR in the Study Area (Figure 5a and Figure 5b). Developed areas are also present along the northern bank of the SCR, and include existing concrete rip rap (Appendix B, Photograph 10) and the outfall structure (Appendix B, Photograph 9).

The disturbed land cover type occurs adjacent to existing development (e.g., outfall structure, water infrastructure) in the eastern portion of the Study Area (Figure 5a and Figure 5b). Non-native species commonly observed within this land cover type include annual non-native grasses, black mustard, and telegraph weed (*Heterotheca grandiflora*).

Fremont Cottonwood Forest and Woodland

Fremont cottonwood forest and woodland (*Populus fremontii* Forest and Woodland Alliance) is characterized by areas dominated by Fremont cottonwood (*Populus fremontii* ssp. *fremontii*) in the tree canopy with willows (*Salix* spp.) and other riparian trees such as western sycamore (*Platanus racemosa*) present as well. Fremont cottonwood accounts for approximately 10 to 80 percent absolute cover and greater than 50 percent relative cover in the tree layer. The tree canopy is typically continuous to open, the shrub layer intermittent to open, and the herbaceous layer variable (Sawyer et al. 2009). This alliance can be found on floodplains, along low-gradient rivers and perennial or seasonally intermittent streams, near springs, in canyons, on alluvial fans, and in valleys with a dependable subsurface water supply that varies considerably during the year. Fremont cottonwood forest and woodland is ranked G4S3 and is considered a sensitive natural community by CDFW (CDFW 2022b).

The Fremont cottonwood forest and woodland vegetation community is present along the northern bank of the SCR adjacent to the active channel within the Study Area and outside the project footprint (Figure 5a and Figure 5b). Within the Study Area, Fremont cottonwood is dominant in the tree layer, with arroyo willow (*Salix lasiolepis*), red willow (*Salix laevigata*), and tamarisk (*Tamarix ramosissima*) present as subdominant in the tree layer (Appendix B, Photograph 15). The shrub layer is dominated by mulefat (*Baccharis salicifolia*), with castor bean (*Ricinus communis*) and tree tobacco (*Nicotiana glauca*) present as subdominant species. Commonly observed herbaceous species include giant reed (*Arundo donax*), tall evening primrose (*Oenothera elata*), field hedge parsley (*Torilis arvensis*), and ripgut brome. This vegetation community is potentially a groundwater dependent ecosystem (GDE) that is identified as GDE-A in the Santa Clara River Valley East Groundwater Subbasin Groundwater Sustainability Plan (GSP; Santa Clarita Valley Groundwater Sustainability Agency [SCV GSA] 2022).[1]

Open Water

The open water land cover type consists of areas with standing water that lacks a natural or artificial canopy. Open water is present in the artificial lake in the western portion of the Study Area north of the existing Well S6. This lake is associated with the Bridgeport at Valencia housing development to the north of the existing Well S6.

[1] Table 5-6 of the GSP indicates that GDE-A might not be within an actual GDE area (SCV GSA 2022). However, for the purposes of this analysis, this area is conservatively treated as a GDE.

Ornamental

The ornamental land cover type does not occur naturally and includes plants that are grown and planted for ornamental landscaping purposes. It is typically located adjacent to developed areas and is not a natural community defined in *A Manual of California Vegetation* (Sawyer et al. 2009).

This land cover type is present throughout the Study Area to the north of the SCR (Figure 5a and Figure 5b). Within the Study Area, species commonly associated with this vegetation community include London plane, Peruvian pepper (*Schinus molle*), evergreen pear (*Pyrus kawakamii*), shamel ash (*Fraxinus udhei*), and bank catclaw (*Acacia redolens*). Some ornamentally planted native trees such as coast live oak and western sycamore are also present within the ornamental land cover type (Appendix B, Photographs 1 through 3 and 7).

Scale Broom Scrub

Scale broom scrub (*Lepidospartum squamatum* Shrubland Alliance) is characterized by dominant, co-dominant, or conspicuous scale broom in a shrub canopy that is open to continuous, with emergent plants in low cover and an herbaceous layer that is variable and may be grassy. Shrubs are less than 6.5 feet tall. Scale broom scrub is found in areas that are intermittently or rarely flooded, and on low-gradient alluvial deposits along streams, washes, and fans. Elevation ranges from 164 to 4,921 feet (Sawyer et al. 2009). Scale broom scrub is ranked G3S3 and is identified by the CDFW as a sensitive natural community (CDFW 2022b).

The scale broom scrub vegetation community occurs in the southern portion of the Study Area within the floodplain of the SCR and outside the project footprint (Figure 5a and Figure 5b). Within the Study Area, native species commonly associated with this vegetation community include scale broom, chaparral yucca (*Hesperoyucca whipplei*), California buckwheat, and big sagebrush. Non-native species observed within the vegetation community include various annual non-native grasses and forbs such as black mustard, redstem filaree (*Erodium cicutarium*), and red brome (*Bromus rubens*).

3.3 General Wildlife

A total of 11 wildlife species were observed during the field reconnaissance surveys (Appendix C). Common mammalian species occurring in the region include coyote (*Canis latrans*), domesticated dog (*Canus lupus familiaris*), and domesticated cat (*Felis catus*). Common avian species in the region include common raven (*Corvus corax*), American crow (*Corvus brachyrhynchos*), and great egret (*Ardea alba*), among others. These species, with the exception of domesticated dog, would be expected to use the Study Area for foraging, nesting, and/or shelter.

4 Sensitive Biological Resources

Local, state, and federal agencies regulate special status species and other sensitive biological resources and may require an assessment of their presence or potential presence to be conducted on-site prior to the approval of proposed development on a property. This section discusses sensitive biological resources observed within the Study Area and evaluates the potential for the Study Area to support additional sensitive biological resources. Assessments for the potential occurrence of special status species are based upon known ranges, habitat preferences for the species, species occurrence records from the CNDDB, species occurrence records from other sites in the vicinity of the Study Area, previous reports for the project site, and the results of surveys of the Study Area. The potential for each special status species to occur in the Study Area was evaluated according to the following criteria:

- **No Potential.** Habitat on and adjacent to the site is clearly unsuitable for the species requirements (foraging, breeding, cover, substrate, elevation, hydrology, plant community, site history, disturbance regime), and species would have been identifiable on-site if present (e.g., oak trees). Protocol surveys (if conducted) did not detect species.
- **Low Potential.** Few of the habitat components meeting the species requirements are present, and/or the majority of habitat on and adjacent to the site is unsuitable or of very poor quality. The species is not likely to be found on the site. Protocol surveys (if conducted) did not detect species.
- **Moderate Potential**. Some of the habitat components meeting the species requirements are present, and/or only some of the habitat on or adjacent to the site is unsuitable. The species has a moderate probability of being found on the site.
- **High Potential.** All of the habitat components meeting the species requirements are present and/or most of the habitat on or adjacent to the site is highly suitable. The species has a high probability of being found on the site.
- **Present.** Species is observed on the site or has been recorded (e.g., CNDDB, other reports) on the site recently (within the last five years).

4.1 Special Status Species

Special Status Plant Species

Based on the database and literature review, 39 special status plant species have been recorded within the vicinity (i.e., nine quadrangle radius) of the Study Area (Appendix D). Of these, 16 have a low potential to occur within the Study Area based upon the presence of suitable coastal scrub (California sagebrush scrub, scale broom scrub) habitat within the southern portion of the Study Area. The species that can be reasonably anticipated to occur were determined based on the published ranges of the species, and the type, extent, and condition of habitat available at the Study Area.

Mesa horkelia (*Horkelia cuneata* var. *puberula*), fragrant pitcher sage (*Lepechinia fragrans*), white rabbit-tobacco (*Pseudognaphalium leucocephalum*), and Greata's aster (*Symphyotrichum greatae*) are perennial species that would be readily identifiable during the field reconnaissance survey and were not observed. Furthermore, the field reconnaissance survey was conducted within the blooming period for the annual plants Robinson's pepper grass (*Lepidium virginicum* var. *robinsonii*) and chaparral ragwort (*Senecio aphanactis*), and neither of these species were observed during the field reconnaissance survey. As a result, these species are determined to have low potential to occur.

Suitable coastal scrub habitat exists in the southern portion of the Study Area for Catalina mariposa lily (*Calochortus catalinae*), club-haired mariposa lily (*Calochortus clavatus* var. *clavatus*), slender mariposa lily (*Calochortus clavatus* var. *gracilis*), late-flowered mariposa lily (*Calochortus fimbriatus*), and Plummer's mariposa lily (*Calochortus plummerae*). However, the area of potentially suitable habitat exists along the south-facing alluvial terrace of the SCR, which has previously been subjected to soil disturbance, likely during the installation of the SCR Trail, roadways, and the outfall structure north of the SCR. These species are perennial bulbiferous herbs that produce leaves and flowers during the spring and summer months following winter precipitation, and their aboveground vegetation senesces during the fall and winter months after reproducing. During the fall and winter months, these plant species survive as underground bulbs beneath the soil surface until the following spring. As such, these plant species are particularly sensitive to soil disturbance that would uproot or dislodge the bulb from the soil profile, and soil disturbance would likely inhibit establishment and survival of these species. Accordingly, these five species are considered to have low potential to occur within the Study Area due to previous soil disturbance.

San Fernando Valley spineflower (*Chorizanthe parryi* var. *fernandina*) and Parry's spineflower (*Chorizanthe parryi* var. *parryi*) prefer coastal scrub on upland mesas with compacted soils, and Palmer's grapplinghook (*Harpagonella palmeri*) prefers coastal scrub with clay soils. Compacted upland mesas or clay soils are not present within the Study Area; therefore, the coastal scrub habitat within the Study Area is only considered marginally suitable, and these species have low potential to occur. Lastly, there are no CNDDB records for Ojai navarretia (*Navarretia ojaiensis*) within five miles of the Study Area, and the only CNDDB record within five miles of the Study Area for slender-horned spineflower (*Dodecahema leptoceras*) is more than 120 years old (CNDDB Occurrence No. 6). As a result, these two species are considered to have low potential to occur.

The remaining 23 special status plant species are not expected to occur in the Study Area based on incompatible habitat conditions (e.g., vegetation assemblage, soils, topography, hydrology, and prior disturbances), or the absence of readily identifiable species (e.g., perennial herbs, shrubs, and/or trees) based upon the field reconnaissance survey results.

Special Status Wildlife Species

Based on the database and literature review, 32 special status wildlife species have been recorded or have the potential to occur within the vicinity (i.e., within a five-mile radius) of the Study Area (Appendix B). Of these, 25 species have potential to occur within the Study Area based upon the presence of suitable habitat and history of occurrence in the vicinity. Six species have a high potential to occur, three species have a moderate potential to occur, and 16 species have a low potential to occur within the Study Area. A list of special status wildlife species with potential to occur within the Study Area are provided in Table 1 below.

Table 1 Special Status Wildlife Species with Potential to Occur in the Study Area

Species	Low Potential	Moderate Potential	High Potential	Present
California red-legged frog (*Rana draytonii*): FT, SSC	X			
Arroyo toad (*Anaxyrus californicus*); FE, SSC		X		
Western pond turtle (*Emys marmorata*); SSC			X	
Western spadefoot (*Spea hammondii*); SSC	X			
California legless lizard (*Anniella* spp.); SSC			X	
California glossy snake (*Arizona elegans occidentalis*); SSC	X			
Coastal whiptail (*Aspidoscelis tigris stejnegeri*); SSC			X	
Coast horned lizard (*Phrynosoma blainvillii*); SSC			X	
Cooper's hawk (*Accipiter cooperii*); WL			X	
Grasshopper sparrow (*Ammodramus savannarum*); SSC	X			
Bell's sage sparrow (*Artemisiospiza belli belli*); WL	X			
Burrowing owl (*Athene cunicularia*); SSC	X			
Swainson's hawk (*Buteo swainsoni*); ST	X			
White-tailed kite (*Elanus leucurus*); FP	X			
California horned lark (*Eremophila alpestris actia*); WL	X			
Loggerhead shrike (*Lanius ludovicianus*); SSC		X		
Coastal California gnatcatcher (*Polioptila californica californica*); FT, SSC	X			
Least Bell's vireo (*Vireo bellii pusillus*); FE, SE			X	
Pallid bat (*Antrozous pallidus*); SSC	X			
Spotted bat (*Euderma maculatum*); SSC	X			
Western mastiff bat (*Eumops perotis californicus*); SSC	X			
Southwestern willow flycatcher (*Empidonax traillii extimus*); FE, SE	X			
San Diego black-tailed jackrabbit (*Lepus californicus bennettii*); SSC		X		
California condor (*Gymnogyps californianus*); FE, SE, FP	X			
American badger (*Taxidea taxus*); SSC	X			

FE = Federally Endangered; FT = Federally Threatened; SE = State Endangered; SCE = State Candidate Endangered; ST = State Threatened; SV = State Vulnerable; FP= State Fully Protected; SSC = CDFW Species of Special Concern ; WL= Watch List

A detailed description of each species with moderate or high potential to occur is provided below. Species with a low potential to occur are omitted from further discussion because there are limited habitat components meeting the species requirements and/or the majority of habitat on and adjacent to the site is unsuitable or of very poor quality, the species was not observed during field surveys, and therefore the species is not likely to be found on the site.

The remaining seven special status wildlife species that have been recorded or have the potential to occur within the vicinity (i.e., within a five-mile radius) of the Study Area are not expected to occur because the Study Area does not support their required habitat components and/or is not within the known range of the species.

Arroyo Toad

Arroyo toad (*Anaxyrus californicus*) is a federally endangered species and CDFW Species of Special Concern (SSC) endemic to California and northern Baja California. This species ranges mostly west of the desert in coastal areas from the upper Salinas River system in Monterey County to northwestern coastal Baja California. Arroyo toad occurs in washes, arroyos, sandy riverbanks, and riparian areas with willows, sycamores (*Platanus* spp.), oaks (*Quercus* spp.), and cottonwoods (*Populus* spp.). Arroyo toads require exposed sandy streambanks with stable terraces for burrowing with scattered vegetation for shelter as well as areas of quiet water or pools free of predatory fishes with sandy or gravel bottoms without silt for breeding (Zeiner 1988).

One occurrence of arroyo toad has been documented within five miles of the Study Area and is located in the SCR channel approximately two miles downstream (west) of the Study Area (CDFW 2022a). The Study Area contains coastal scrub and riparian habitat with sandy banks along the northern bank of the SCR suitable for the species, which is generally associated with the Fremont cottonwood forest and woodland and scale broom scrub vegetation communities. Therefore, this species has a moderate potential to occur within the Study Area.

California Legless Lizard

California legless lizard (*Anniella* spp.) is an SSC found in the Coast Ranges from Contra Costa County to the Mexican border. California legless lizard occurs in a variety of habitats including sparsely vegetated areas of coastal dunes, valley-foothill grasslands, chaparral, and coastal scrub that contain sandy or loose organic soils with leaf litter and moist soils for burrowing. Areas disturbed by agriculture or other human uses are typically not suitable habitat for the species (Zeiner 1988).

Numerous occurrences of the species have been documented within five miles of the Study Area, the closest being approximately 0.4 mile to the south (CDFW 2022a). The Study Area contains coastal scrub habitat with loose loamy and sandy soils suitable for the species, which is generally associated with the Fremont cottonwood forest and woodland, scale broom scrub, and California sagebrush scrub vegetation communities. Additionally, the SCR channel in the southern portion of the Study Area provides moist soils required by the species; therefore, this species has a high potential to occur within the Study Area.

Coastal Whiptail

Coastal whiptail (*Aspidoscelis tigris stejnegeri*) is an SSC that is found in deserts and semi-arid areas with sparse vegetation within Ventura, Los Angeles, Riverside and San Diego counties. The species is commonly found in a variety of habitats including valley-foothill hardwood, valley-foothill hardwood-conifer, valley-foothill riparian, mixed conifer, pine-juniper, chamise-redshank chaparral, mixed chaparral, desert scrub, desert wash, alkali scrub, and annual grasslands (Zeiner 1988).

Several occurrences have been documented within five miles of the Study Area, the closest being approximately two miles southeast of the Study Area (CDFW 2022a). California sagebrush scrub, scale broom scrub, and Fremont cottonwood forest and woodland in the southern portion of the Study Area provide potentially suitable for this species; therefore, coastal whiptail has a high potential to occur.

Western Pond Turtle

Western pond turtle (*Emys marmorata*) is an SSC that occurs in ponds, marshes, rivers, streams and irrigation ditches that typically support aquatic vegetation. It is an aquatic turtle that requires downed logs, rocks, mats of vegetation, or exposed sandy banks for basking. Western pond turtles lay their eggs in nests that are dug along the banks of streams or other uplands in sandy, friable soils. Those that reside in creeks are also known to over-winter in upland habitats or during the dry season when waterways are dry. Upland movements can be quite extensive, and individuals have been recorded nesting or overwintering hundreds of meters from aquatic habitats. The typical nesting season is usually from April through August; however, variation exists depending upon geographic location.

Three occurrences of western pond turtle are documented within five miles of the Study Area, the closest being approximately three miles west of the Study Area within the SCR channel (CDFW 2022a). The SCR active channel to the south of the Study Area maintains an intermittent flow regime and therefore provides suitable aquatic habitat during the winter months. The northern bank of the SCR in the southern portion of the Study Area contains suitable open sandy, friable soils for basking and egg laying. Suitable habitat for western pond turtle is generally associated with the Fremont cottonwood forest and woodland vegetation community in the southern portion of the Study Area, where the active channel of the SCR is located. Therefore, the western pond turtle has a high potential to occur within the Study Area.

While Bridgeport Lake contains a perennial water source, the lake does not provide downed logs, mats of vegetation, or sandy banks required by western pond turtle. Additionally, Bridgeport Lake is concrete-lined and contains rip-rap along the banks, preventing the establishment of vegetation and reducing the potential for aquatic invertebrate life to occur. Therefore, this area does not provide suitable habitat for western pond turtle.

Coast Horned Lizard

Coast horned lizard (*Phrynosoma blainvillii*) is an SSC that can be found in grasslands, coniferous forests, woodlands, and chaparral habitats containing open areas and patches of loose soil. There are numerous records of the species within the regional vicinity of the Study Area, the closest being within the SCR channel approximately 0.5 mile downstream (west) of the Study Area (CDFW 2022a). The southern portion of the Study Area contains suitable open areas for sunning, shrubs for cover, and loose soil for burial within the California sagebrush scrub, scale broom scrub, and Fremont cottonwood forest and woodland vegetation communities. Therefore, coast horned lizard has a high potential to occur within the Study Area.

Cooper's Hawk

Cooper's hawk (*Accipiter cooperii*) is a CDFW Watch List (WL) species that inhabits mature forests, open woodlands, forest edges, and riparian areas. Cooper's hawk typically nests in coniferous, deciduous, mixed hardwood forests, and riparian tree groves that contain tall trees with openings or edge habitat nearby for hunting.

One occurrence of this species is documented within five miles of the Study Area, approximately 0.2 mile south of the Study Area within the SCR channel. No nests or individuals were observed within the Study Area during the field reconnaissance survey. However, the Study Area provides suitable scrub habitat for hunting and riparian tree habitat for nesting. Therefore, Cooper's hawk has a high potential to occur within the Study Area.

Loggerhead Shrike

Loggerhead shrike (*Lanius ludovicianus*) is an SSC that inhabits broken woodlands, savannah, pinyon-juniper, Joshua tree and riparian woodlands, desert oases, scrub, and washes. This species prefers open country for hunting with perches for scanning and fairly dense shrubs and brush for nesting. This species may occupy treeless habitat if fences or wires provide hunting perches.

There are two recent occurrences of this species in the regional vicinity of the Study Area, which are located approximately 4.0 miles northwest and 4.8 miles north (CDFW 2022a). In addition, the Study Area contains suitable scrub habitat within the scale broom scrub and California sagebrush scrub vegetation communities. Therefore, loggerhead shrike has a moderate potential to occur within the Study Area.

Least Bell's Vireo

Least Bell's vireo (*Vireo bellii pusillus*; LBVI) is typically found in structurally diverse woodlands located in riparian areas. Habitat requirements critical to the continued existence of this species include dense cover within six feet of the ground for nesting and a dense, stratified canopy for foraging. Ideal habitat consists of a well-developed overstory with a dense shrub understory, often characterized as an early successional stage. Typical breeding habitat consists of an understory of dense riparian sub-shrub or shrub thickets with a mature riparian overstory. While willow-dominated habitat is often used by LBVI for nesting, plant species composition does not appear to be as important as the structure of the habitat (Griffith and Griffith 2000).

This species is not documented within five miles of the Study Area (CDFW 2022a), and the Study Area is not located within USFWS-designated critical habitat for the species (USFWS 2022b). The closest USFWS-designated critical habitat for LBVI is located approximately 2.2 miles west of the Study Area within the SCR riparian corridor. However, eBird documents multiple occurrences of LBVI within five miles of the Study Area, the closest being approximately 0.1 mile west of the Study Area on June 8, 2017 (eBird 2022). Therefore, LBVI has a high potential to occur within the Fremont cottonwood forest and woodland vegetation community within the Study Area.

San Diego Black-Tailed Jackrabbit

San Diego black tailed jackrabbit (*Lepus californicus bennettii*) is an SSC that inhabits a wide range of habitats including desert shrublands, sagebrush, chaparral, oak woodland with an herb mosaic component. This species occurs from coastal southern California to Baja California. The species requires a mix of grasses, forbs, and shrubs for foraging and prefers predominantly open areas without dense understory (Howard 1995).

The closest documented occurrence of this species was recorded in 2005 approximately five miles north of the Study Area (CDFW 2022a). In addition, portions of the Study Area contain suitable open shrub habitats and friable soils for burrow excavations. Therefore, this species has a moderate potential to occur within the scale broom scrub and California sagebrush scrub vegetation communities within the Study Area.

Other Protected Species

The Study Area contains suitable habitat to support regulated nesting birds and raptors protected under CFGC Sections 3503, 3503.5, and 3513, and the MBTA (16 United States Code Sections 703 to 712). Potential nesting habitat for birds and raptors was observed throughout the Study Area, with the most suitable locations being mature Fremont cottonwood and arroyo willow trees, California sagebrush scrub, and scale broom scrub in the southern portion of the Study Area. No inactive or potentially active nests were observed within the Study Area during the field reconnaissance survey.

4.2 Sensitive Plant Communities and Critical Habitats

Sensitive Natural Communities

The CDFW *California Sensitive Natural Communities List* identifies sensitive natural communities throughout California, based in part on global and state rarity ranks (CDFW 2022b). Natural communities having a rank of 1 to 3 are generally considered sensitive, though some communities with other ranks may also be considered sensitive. CDFW-designated sensitive vegetation communities found within the Study Area include Fremont cottonwood forest and woodland (ranked G4S3) and scale broom scrub (ranked G3S3; CDFW 2022b). These communities are located in the riparian corridor of the SCR in the southern portion of the Study Area but not within the project footprint (Figure 5a and Figure 5b).

Designated Critical Habitat

No USFWS-designated critical habitat occurs within the Study Area. The nearest designated critical habitat is for southwestern willow flycatcher, LBVI, and arroyo toad and is located approximately 2.2 miles west of the Study Area within the SCR riparian corridor (USFWS 2022b). No other USFWS-designated critical habitat exists within five miles of the Study Area.

4.3 Jurisdictional Waters and Wetlands

The results of the research and field visit determined the SCR streambed is potentially subject to United States Army Corps of Engineers (USACE), Regional Water Quality Control Board (RWQCB), and CDFW jurisdictions. Bridgeport Lake is also potentially subject to RWQCB and CDFW jurisdictions (Table 2). A map illustrating potentially jurisdictional aquatic resources within the Study Area is presented in Figure 6a and Figure 6b. All jurisdictional features identified within the Study Area are located outside the project footprint. A description of each jurisdictional feature occurring within the Study Area is provided below. Site photographs are provided in Appendix B.

Table 2 Summary of Jurisdictional Areas within the Study Area

	USACE	RWQCB	CDFW
Jurisdictional Area	Waters of the U.S. (acres [linear feet])	Waters of the State (acres [linear feet])	Jurisdictional Streambed (acres [linear feet])
Santa Clara River	0.05 (199.2)	0.05 (199.2)	1.4 (1,818)
Bridgeport Lake	0	0.09 (196.8)	0.09 (196.8)
Total	0.05 (199.2)	0.14 (396.0)	1.49 (2,014.9)

USACE = United States Army Corps of Engineers; RWQCB = Regional Water Quality Control Board; CDFW = California Department of Fish and Wildlife

Figure 6a Jurisdictional Resources – Eastern Extent

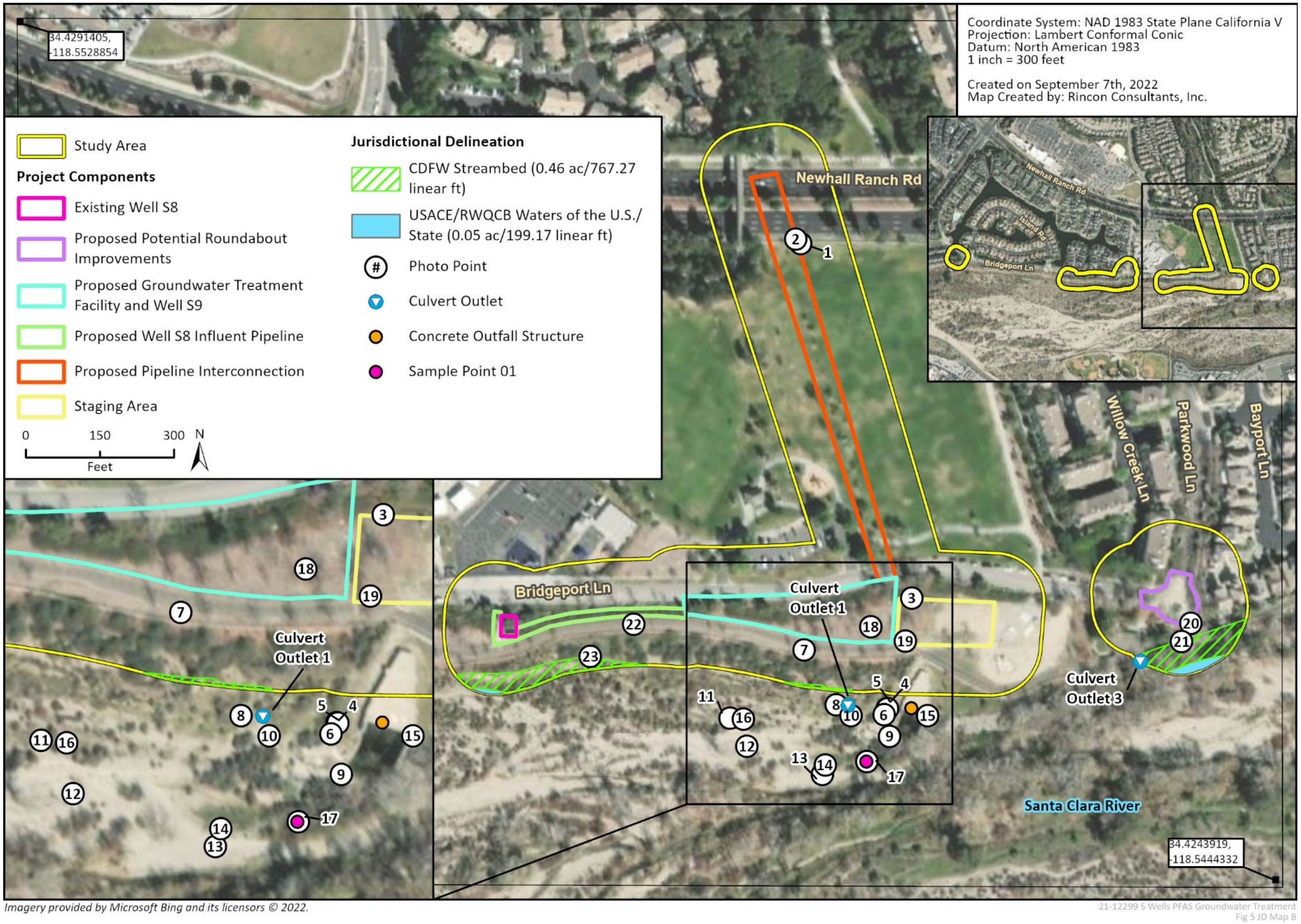


Figure 6b Jurisdictional Resources – Western Extent

Imagery provided by Microsoft Bing and its licensors © 2022.

21-12299 S Wells PFAS Groundwater Treatment
Fig 5 JD Map A

Santa Clara River

The SCR flows from east to west in the southern portion of the Study Area (Figure 6a and Figure 6b). The SCR is an intermittent system; the riverbed surface is dry for most of the year, except during and following storm events. The riverbed is wide and characterized by a braided active channel in the central portion of the riverbed, historical secondary channels along the northern and southern ends of the channel, and an active channel along the north-central portion of the riverbed just outside and to the south of the Study Area. Flowing water was present within the active channel to the south of the Study Area at the time of the field surveys (Appendix B, Photograph 13).

The top of bank of the SCR is approximately 1,035 feet wide. The OHWM of the SCR is approximately 100 to 110 feet wide and five to six feet deep and is defined by a change in sediment, a change in vegetation composition, a clearly defined bed and bank, and a break in the associated bank slope. Due to the intermittent flow regime of the Santa Clara River, surface water observed during the field survey, and direct connectivity to a TNW (Pacific Ocean), this feature is determined to be a Relatively Permanent Water (RPW) that flows at least seasonally (i.e., three months out of the year). Sampling Point (SP) 01 was taken within the OHWM of the SCR approximately 20 feet south of the Study Area (Figure 6a). Indicators of hydrophytic vegetation and wetland hydrology were observed, but hydric soils were not observed (Appendix E). Therefore, it was determined that a wetland was not present at SP01.

Four culvert outlets (Culvert Outlets 1 through 4) and one existing outfall structure are present within the northern bank of the SCR (Appendix B, Photographs 9, 10, 29, 30, and 31). Culvert Outlet 2 is the only feature located within the Study Area (Figure 6a). Culvert Outlet 2 is a six-foot diameter concrete culvert outlet that conveys runoff from sheet flow and anthropogenic sources (e.g., residential development) from uplands to the north of the Study Area into the SCR. An identifiable OHWM was observed to the south of Culvert Outlet 2, and was defined by a change in vegetation cover, a change in average sediment texture, and a clearly defined break in bank slope. Water from Culvert Outlet 2 flows for approximately 800 feet before joining with the active channel of the Santa Clara River.

Based on the field surveys, the SCR is potentially subject to USACE, RWQCB, and CDFW jurisdiction. The SCR constitutes waters subject the jurisdiction of USACE per Section 404 of the CWA and was delineated to the width of the OHWM of the SCR and waters flowing from Culvert Outlet 2. The SCR also constitutes a CDFW streambed under the jurisdiction of the CDFW per Section 1600 et seq. of the CFGC. The limits of CDFW jurisdiction extend to the top of bank or outer edge of riparian vegetation associated with the river, whichever is greater. The SCR also constitutes waters subject to the jurisdiction of the Los Angeles RWQCB per Section 401 of the CWA. The limits of RWQCB jurisdiction were determined to be coterminous with USACE jurisdiction.

Bridgeport Lake

Bridgeport Lake is an artificial lake that was excavated in uplands for the Bridgeport at Valencia housing development. Bridgeport Lake is located in the northwestern portion of the Study Area to the north of existing Well S6 (Figure 6a and Figure 6b). Bridgeport Lake is an isolated water feature lined with concrete rip rap and ornamental landscaping (Appendix B, Photograph 28). Bridgeport Lake contains an identifiable bed and banks but does not contain a hydrologic connection to the Santa Clara River or the Pacific Ocean because it is an isolated water feature.

Based upon the field surveys, Bridgeport Lake is potentially subject to RWQCB and CDFW jurisdiction. Bridgeport Lake constitutes waters of the State subject the jurisdiction of the Los

Angeles RWQCB per the Porter-Cologne Water Quality Control Act. The limits of RWQCB jurisdiction were delineated to the extent of open water associated with the lake. Bridgeport Lake is also a lake subject to the jurisdiction of the CDFW per Section 1600 et seq. of the CFGC. The limits of CDFW jurisdiction extend to the top of bank of the feature because no lacustrine vegetation was present.

4.4 Wildlife Movement

Wildlife movement corridors, or habitat linkages, are generally defined as connections between habitat patches that allow for physical and genetic exchange between otherwise isolated animal populations. Such linkages may serve a local purpose, such as providing a linkage between foraging and denning areas, or they may be regional in nature. Some habitat linkages may serve as migration corridors, wherein animals periodically move away from an area and then subsequently return. Others may be important as dispersal corridors for young animals. A group of habitat linkages in an area can form a wildlife corridor network.

The habitats in the link do not necessarily need to be the same as the habitats that are being linked. Rather, the link merely needs to contain sufficient cover and forage to allow temporary inhabitation. Typically, habitat linkages are contiguous strips of natural areas, although dense plantings of landscape vegetation can be used by certain disturbance-tolerant species. Depending upon the species using a corridor, specific physical resources (e.g., rock outcroppings, vernal pools, or oak trees) may need to be located in the habitat link at certain intervals to allow slower-moving species to traverse the link. For highly mobile or aerial species, habitat linkages may be discontinuous patches of suitable resources spaced sufficiently close together to permit travel along a route in a short period of time.

No Essential Connectivity Areas are located within the Study Area (CDFW 2022a). The nearest Essential Connectivity Area is approximately four miles northeast of the Study Area (CDFW 2022a). The SCR channel in the southern portion of the Study Area provides a source of water during the winter months and contains vegetative cover for migrating wildlife. Therefore, the SCR channel likely acts as a significant east-west movement corridor for large animals such as mule deer and coyote. Additionally, smaller, more mobile species (e.g., birds) may use the SCR channel to connect habitats to the north and south of the Study Area.

4.5 Resources Protected By Local Policies and Ordinances

City of Santa Clarita General Plan

Natural resources within city limits are regulated according to the City's General Plan, which includes policies regarding conservation of biological resources and ecosystems as well as protection of sensitive habitat (including wildlife corridors) and endangered species. The following objectives and policies related to biological resources are relevant for the proposed project based on its location and/or proposed activities (City of Santa Clarita 2011):

Objective CO 3.1: In review of development plans and projects, encourage conservation of existing natural areas and restoration of damaged natural vegetation to provide for habitat and biodiversity.

- *Policy CO 3.1.1*: On the Land Use Map and through the development review process, concentrate development into previously developed or urban areas to promote infill development and prevent sprawl and habitat loss, to the extent feasible.
- *Policy CO 3.1.2*: Avoid designating or approving new development that will adversely impact wetlands, floodplains, threatened or endangered species and habitat, and water bodies supporting fish or recreational uses, and establish an adequate buffer area as deemed appropriate through site specific review.
- *Policy CO 3.1.3*: On previously undeveloped sites ("greenfields"), identify biological resources and incorporate habitat preservation measures into the site plan, where appropriate. (This policy will generally not apply to urban infill sites, except as otherwise determined by the reviewing agency).
- *Policy CO 3.1.4*: For new development on sites with degraded habitat, include habitat restoration measures as part of the project development plan, where appropriate.
- *Policy CO 3.1.5*: Promote the use of site-appropriate native or adapted plant materials and prohibit use of invasive or noxious plant species in landscape designs.
- *Policy CO 3.1.6*: On development sites, preserve and enhance natural site elements including existing water bodies, soil conditions, ecosystems, trees, vegetation and habitat, to the extent feasible.
- *Policy CO 3.1.7*: Limit the use of turf-grass on development sites and promote the use of native or adapted plantings to promote biodiversity and natural habitat.
- *Policy CO 3.1.8*: On development sites, require tree planting to provide habitat and shade to reduce the heat island effect caused by pavement and buildings.
- *Policy CO 3.1.9*: During construction, ensure preservation of habitat and trees designated to be protected through use of fencing and other means as appropriate, so as to prevent damage by grading, soil compaction, pollution, erosion or other adverse construction impacts.
- *Policy CO 3.1.10*: To the extent feasible, encourage the use of open space to promote biodiversity.
- *Policy CO 3.1.11*: Promote use of pervious materials or porous concrete on sidewalks to allow for planted area infiltration, allow oxygen to reach tree roots (preventing sidewalk lift-up from roots seeking oxygen), and mitigate tree-sidewalk conflicts, in order to maintain a healthy mature urban forest.

Objective CO 3.2: Identify and protect areas which have exceptional biological resource value due to a specific type of vegetation, habitat, ecosystem, or location.

- *Policy CO 3.2.3*: Ensure protection of any endangered or threatened species or habitat, in conformance with state and federal laws.

Objective CO 3.3: Protect significant wildlife corridors from encroachment by development that would hinder or obstruct wildlife movement.

Objective CO 3.5: Maintain, enhance, and manage the urban forest throughout developed portions of the Santa Clarita Valley to provide habitat, reduce energy consumption, and create a more livable environment.

- *Policy CO 3.5.1*: Continue to plant and maintain trees on public lands and within the public right-of-way to provide shade and walkable streets, incorporating measures to ensure that roots have access to oxygen at tree maturity, such as use of porous concrete.
- *Policy CO 3.5.2*: Where appropriate, promote planting of trees that are native or climactically appropriate to the surrounding environment, emphasizing oaks, sycamores, maple, walnut, and other native species in order to enhance habitat, and discouraging the use of introduced species such as eucalyptus, pepper trees, and palms except as ornamental landscape features.

Objective CO 3.6: Minimize impacts of human activity and the built environment on natural plant and wildlife communities.

- *Policy CO 3.6.1*: Minimize light trespass, sky-glow, glare, and other adverse impacts on the nocturnal ecosystem by limiting exterior lighting to the level needed for safety and comfort; reduce unnecessary lighting for landscaping and architectural purposes and encourage reduction of lighting levels during nonbusiness nighttime hours.
- *Policy CO 3.6.2*: Reduce impervious surfaces and provide more natural vegetation to enhance microclimates and provide habitat.

North Valencia Specific Plan

The project site is within the planning area of the City's North Valencia Specific Plan. However, according to Government Code Section 53091, building and zoning ordinances of a county or city shall not apply to the location or construction of facilities for the production, generation, storage, treatment, or transmission of water. As such, the project would not be subject to the North Valencia Specific Plan, which establishes additional zoning regulations for the project area.

City of Santa Clarita Oak Tree Preservation Ordinance

According to Government Code Section 53091, building and zoning ordinances of a county or city shall not apply to the location or construction of facilities for the production, generation, storage, treatment, or transmission of water. As such, the project would not be subject to the City's building and zoning ordinances (Santa Clarita Municipal Code Titles 17 and 18), which include the City of Santa Clarita Oak Tree Preservation Ordinance. Nevertheless, SCV Water would voluntarily comply with the City's oak tree preservation ordinance during implementation of the proposed project; therefore, it is included in this discussion.

The City of Santa Clarita Oak Tree Preservation Ordinance (Santa Clarita Municipal Code Section 17.51.040) protects and preserves oak trees in the city and provides regulatory measures to accomplish this purpose. This policy applies to the removal, pruning, cutting, and/or encroachment into the protected zone of oak trees. The following definitions are provided in the ordinance:

- "Oak tree" means any oak tree of the genus *Quercus*, including, but not limited to, valley oak (*Quercus lobata*), California live oak, canyon oak (*Quercus chrysolepis*), interior live oak (*Quercus wislizenii*), and scrub oak (*Quercus dumosa*), regardless of size.
- "Heritage oak tree" means any oak tree measuring 108 inches or more in circumference or, in the case of a multiple trunk oak tree, two or more trunks measuring 72 inches each or greater in circumference, measured 4.5 feet above the natural grade surrounding each tree. In addition, the Commission and/or Council may classify any oak tree, regardless of size, as a heritage tree if

it is determined by a majority vote thereof that such tree has exceptional historic, aesthetic, and/or environmental qualities of major significance or prominence to the community.

- "Oak tree protected zone" means a specifically defined area totally encompassing an oak tree which work activities are strictly controlled. Using the dripline as a point of reference, the protected zone shall commence at a point five feet outside of the dripline and extend inward to the trunk of the tree. In no case shall the protected zone be less than 15 feet from the trunk of an oak tree.

An Oak Tree Permit is required to cut, prune, remove, relocate, endanger, damage, or encroach into the protected zone of any oak tree on any public or private property within the city. Oak trees that do not exceed six inches in circumference when measured at a point 4.5 feet above the tree's natural grade are exempt from the Oak Tree Permit requirements.

An inventory and evaluation of all trees within the vicinity of the project, including oak trees, was conducted on September 28, 2020, by Arbor Essence (Arbor Essence 2020; Appendix F). This study concluded there is one non-heritage coast live oak tree within the Study Area.

City of Santa Clarita Parkway Trees Ordinance

Native trees are protected under the City's Parkway Trees Ordinance (Santa Clarita Municipal Code Section 13.76). Pursuant to this ordinance, a tree permit must be obtained prior to damaging or removing any public trees within parkways or public areas.

Four native western sycamore trees and numerous non-native trees (e.g., Peruvian pepper, evergreen pear, London plane) protected by the City's Parkway Tree Ordinance are located within and adjacent to Bridgeport Park in the Study Area.

Significant Ecological Areas

The City's General Plan and Municipal Code (Santa Clarita Municipal Code Section 17.38.080) includes treatment of the Significant Ecological Areas (SEAs) Overlay Zone as among the habitat types within the city. SEAs are defined as "ecologically important land and water systems that are valuable as plant or animal communities, often important to the preservation of threatened and endangered species, and conversation of biological diversity in the County" (City of Santa Clarita 2011). Santa Clarita Municipal Code Section 17.38.080 requires a conformance review for development within the SEA Overlay Zone. The SCR river corridor is identified as a SEA, specifically the "Santa Clara River" SEA, which extends throughout the river channel. The northern portion of this SEA overlaps the southern portion of the Study Area, but does not overlap the project footprint. However, as mentioned previously, the project would not be subject to the City's building and zoning ordinances (Santa Clarita Municipal Code Titles 17 and 18) pursuant Government Code Section 53091, which include Santa Clarita Municipal Code Section 17.38.080. Therefore, SCV Water would not be required to comply with its requirements.

4.6 Habitat Conservation Plans

The Study Area is not covered by any Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan area.

5 Impact Analysis and Mitigation Measures

5.1 Special Status Species

The proposed project would have a significant effect on biological resources if it would:

a) *Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by CDFW or USFWS.*

Special Status Plant Species

As discussed in Section 4.1, *Special Status Species*, the CNDDB and CNPS query results include 39 special status plant species within a nine-quadrangle search of the parcel. Of these, 16 special status plant species have a low potential to occur in the coastal scrub (California sagebrush scrub and scale broom scrub) habitat within the southern portion of the Study Area, located outside the limits of the project footprint. The remaining 23 species are not expected to occur within the Study Area based on the lack of suitable habitat and the non-detection of special status plant species during field reconnaissance surveys.

Implementation of the project would result in impacts to the developed, disturbed, or ornamental land cover types that do not provide suitable habitat for special status plant species. Therefore, no impacts to special status plant species would occur, and no mitigation is recommended.

Special Status Wildlife Species

Suitable habitat for California legless lizard, coastal whiptail, coast horned lizard, and San Diego black-tailed jackrabbit species only occurs within the bed and banks of the SCR, as well as the coastal scrub vegetation (i.e., California sagebrush scrub, scale broom scrub) beyond the top of bank of the SCR. These areas are outside the project footprint and would not be directly affected. Therefore, direct impacts to California legless lizard, coastal whiptail, coast horned lizard, and San Diego black-tailed jackrabbit would not occur. However, if individuals are present during construction, potential indirect impacts could result from noise, vibrations, and dust, which could cause individuals to flush out of cover and become exposed to predators or vehicle strikes. Therefore, implementation of Measure BIO-1 is recommended to ensure all construction personnel are trained in identifying special status wildlife species, and Measure BIO-2 is recommended to ensure adherence to general Best Management Practices (BMPs), such as avoiding excavation within the SCR channel. Therefore, with implementation of Measures BIO-1 and BIO-2, potential indirect impacts to special status wildlife species would be reduced to a less-than-significant level.

Direct impacts to aquatic and semi-aquatic species, including arroyo toad and western pond turtle, would not occur because ground disturbance would not occur within the riparian corridor of the SCR and instead would be confined to the developed, ornamental, and disturbed land cover types to the north of the SCR that do not provide suitable habitat for these species. However, potentially significant indirect impacts to special status wildlife species may occur as a result of groundwater extraction via the existing Wells S6, S7, and S8 and the new Well S9. The Fremont cottonwood forest and woodland vegetation community located near the project site is identified as a potential GDE that provides suitable habitat for special status aquatic and semi-aquatic species (SCV GSA 2022).

Although SCV Water would not increase basin-wide groundwater extraction, reactivated operation of existing Wells S6, S7, and S8 in conjunction with operation of the new Well S9 could deplete local groundwater levels beyond the minimum thresholds for depletion of interconnected surface waters established in the Santa Clara River Valley East Groundwater Subbasin GSP and could thus impact the Fremont cottonwood forest and woodland vegetation community. As a result, implementation of Measure BIO-3 is recommended to ensure sustainable pumping of groundwater from Wells S6, S7, S8, and S9 such that potential indirect impacts to the potential GDE and associated special status wildlife species would be avoided.

The coastal scrub and Fremont cottonwood forest and woodland vegetation communities within the Study Area provide suitable habitat for special status avian species, including LBVI. No direct impacts to the species would occur because suitable nesting and foraging habitat would not be directly impacted by the project. However, if LBVI is present within the vicinity of the project during construction, the proposed project has the potential to impact the species indirectly because construction noise, dust, and other human disturbances may cause a nest to fail. Additionally, depleted local groundwater levels could negatively impact suitable habitat for LBVI within the Fremont cottonwood forest and woodland vegetation community should this habitat be a GDE. Therefore, implementation of Measures BIO-3 and BIO-4 are recommended to avoid potential indirect effects to LBVI.

The project site contains habitat with the potential to support special status birds, including resident and migrant passerine species and raptors protected under the CFGC and the MBTA. Although no nests were observed during the field reconnaissance surveys, bird nesting habitat is present in the trees and shrubs occurring in and adjacent to the project site, and raptors could nest within the taller trees in the area. Therefore, the project could result in direct or indirect impacts to nesting birds. Direct impacts may include mortality from vehicle or equipment strikes as foraging birds move through the project site and physical impacts to active nests within the project site. Indirect impacts could result from noise, vibrations, and dust from construction activities throughout the project site. Noise, vibrations, and dust can cause birds to flush out of cover and become exposed to predators or vehicle strikes. Adults may not return to nests, predators may feed on eggs or chicks in unprotected nests, or vibrations could cause eggs to fall out of nests. Noise, dust, and vibrations may also cause avian species to leave regular foraging areas that are within and adjacent to the project site. If construction activities occur during the nesting season (generally February 1 to August 31), noise, vibrations, and dust can also cause nest failures. Implementation of Measure BIO-5 is recommended to avoid potential direct and indirect effects to nesting birds.

Recommended Avoidance, Minimization, and Mitigation Measures

Implementation of Measures BIO-1 through BIO-5 would reduce impacts to special status species to less-than-significant levels.

BIO-1 WORKER ENVIRONMENTAL AWARENESS PROGRAM

Prior to initiation of all construction activities (including staging and mobilization), all personnel associated with project construction shall attend a Worker Environmental Awareness Program (WEAP) training, conducted by a qualified biologist, to assist workers in recognizing special status biological resources with the potential to occur within the project site. This training shall include information about all special-status species determined to be present or to have a moderate or high potential to occur on site. The training shall also address protected nesting birds and sensitive habitats.

The specifics of this program shall include identification of special status species and habitats, a description of the regulatory status and general ecological characteristics of special status resources, and a review of the limits of construction and measures required to avoid and minimize impacts to biological resources within the project site. A fact sheet conveying this information shall also be prepared for distribution to all contractors, their employees, and other personnel involved with construction of the project. All employees shall sign a form provided by the trainer documenting they attended the WEAP and understand the information presented. The crew foreman shall be responsible for ensuring crew members adhere to the guidelines and restrictions designed to avoid impacts to special status species. If new construction personnel are added to the project, the crew foreman shall ensure the new personnel receive the WEAP training before starting work.

BIO-2 General Best Management Practices

Construction personnel shall adhere to the following general BMP requirements:

- No project construction, activities, and equipment staging shall occur within bed and banks of the Santa Clara River. Any work, including operation of loaders, dozers, drilling rigs, cranes, and vehicles shall not occur on the south side of the existing fencing associated with the Santa Clara River Trail to reduce impacts to special status wildlife species that may occur within the riparian habitat. The contractor shall advise all workers of the intent of the protection measures prior to the start of project construction and activities. No vegetation shall be removed from the channel, bed, or banks of the Santa Clara River.
- Project-related vehicles shall observe a five-mile-per-hour speed limit within the unpaved limits of construction.
- All open trenches shall be fenced and sloped to prevent entrapment of wildlife species.
- Excavated material from trenching along the Santa Clara River Trail shall be side cast away from the Santa Clara River to prevent sediment deposition within the river.
- All hollow posts and pipes shall be capped, and metal fence stakes shall be plugged with bolts or other plugging materials to prevent wildlife entrapment and mortality.
- All food-related trash items such as wrappers, cans, bottles, and food scraps generated during project construction shall be disposed of in closed containers only and removed daily from the project site.
- All night-time lighting shall be shielded and downcast to avoid potential impacts to wildlife migration.
- No deliberate feeding of wildlife shall be allowed.
- No pets shall be allowed on the project site.
- No firearms shall be allowed on the project site.
- If vehicle or equipment maintenance is necessary, it shall be performed in the designated staging areas.
- During construction, heavy equipment shall be operated in accordance with standard BMPs. All equipment used on-site shall be properly maintained to avoid leaks of oil, fuel, or residues. The contractor shall prevent oil, petroleum products, or any other pollutants from contaminating the soil or entering a watercourse (dry or otherwise). When vehicles or equipment are stationary, mats or drip pans shall be placed below vehicles to contain fluid leaks. Provisions shall be in place to remediate any accidental spills.

- Materials shall be stored on impervious surfaces or plastic ground covers to prevent any spills or leakage and shall be at least 50 feet from drainage features.
- Construction materials and spoils shall be protected from stormwater runoff using temporary perimeter sediment barriers such as berms, silt fences, fiber rolls, covers, sand/gravel bags, and straw bale barriers, as appropriate.
- While encounters with special status species are not likely or anticipated, any worker who inadvertently injures or kills a special status species or finds one dead, injured, or entrapped shall immediately report the incident to the construction foreman or biological monitor. The construction foreman or biological monitor shall immediately notify SCV Water. SCV Water shall follow up with written notification to USFWS and/or CDFW within five working days of the incident. All observations of special status species shall be recorded on CNDDB field sheets and sent to CDFW by SCV Water or a qualified biological monitor.
- Before starting or moving construction vehicles, especially after a few days of non-operation, operators shall inspect under all vehicles to avoid impacts to any wildlife that may have sought refuge under equipment. All large building materials and pieces with crevices where wildlife can potentially hide shall be inspected before moving. If wildlife is detected, a qualified biologist shall move wildlife out of harm's way or temporarily stop activities until the animal leaves the area.

BIO-3 Groundwater Pumping Regime Management

SCV Water shall establish a groundwater pumping regime for Wells S6, S7, S8, and S9 in accordance with the sustainable management criteria for depletion of interconnected surface waters outlined in the most recently adopted iteration of the Santa Clara River Valley East Groundwater Subbasin GSP. SCV Water shall monitor groundwater levels at this location by utilizing the monitoring well previously installed within the potential GDE area that may be affected by the proposed project (currently identified as GDE-A in the GSP). Should the trigger level outlined in the GSP for the GDE areas near the project site (currently identified as "Santa Clara River Below Mouth of Bouquet Canyon" in the GSP) be exceeded at the monitoring location, SCV Water shall implement an evaluation program that includes reviewing whether the low water levels and water level trends are caused by groundwater extraction at Wells S6, S7, S8, and/or S9 and whether the undesirable results to GDEs outlined in the GSP arising from groundwater extraction are anticipated to occur.[2] If significant and unreasonable effects are anticipated from groundwater extraction, SCV Water shall implement the necessary management actions in a timely manner to resolve the exceedance of the trigger level for the GDE area. Management actions may include but are not limited to shifting pumping to another location, reducing or halting pumping at Wells S6, S7, S8, and/or S9, and/or increasing the quantity of imported water.

BIO-4 Least Bell's Vireo Pre-construction Surveys

Prior to initiation of project construction and activities within or adjacent to suitable nesting habitat during least Bell's vireo breeding season (March 15 through September 15), a qualified biologist with experience surveying for least Bell's vireo shall conduct at least three focused surveys following

[2] Trigger levels are established in the GSP for impacts related to the depletion of interconnected surface waters to "recognize potential undesirable results in time to address them" and are "intended to be protective of GDEs if the depth to groundwater falls below historical levels." Trigger levels are more protective than the "minimum thresholds" outlined in the GSP for depletion of interconnected surface waters and therefore provide a conservative level at which SCV Water shall identify and mitigate potential impacts to GDEs before they occur.

USFWS-established protocols to determine whether breeding least Bell's vireos are present. Focused surveys shall be completed within the project site and a 500-foot buffer. If least Bell's vireo is present, the biologist shall determine its breeding territory, and no construction shall take place within 500 feet of the breeding territory from March 15 through September 15.

BIO-5 PROTECTION OF NESTING BIRDS

Project-related activities shall occur outside of the bird breeding season (generally February 1 to August 31) to the extent practicable. If construction must occur within the bird breeding season, then no more than three days prior to initiation of ground-disturbing activities (including, but not limited to vegetation removal, site preparation, grading, excavation, and trenching) within the project site, a nesting bird pre-construction survey shall be conducted by a qualified biologist within the disturbance footprint plus a 100-foot buffer (300-foot for raptors), where feasible. If the proposed project is phased or construction activities stop for more than one week, a subsequent pre-construction nesting bird survey shall be required within three days prior to each phase of construction.

Pre-construction nesting bird surveys shall be conducted during the time of day when birds are active and shall factor in sufficient time to perform this survey adequately and completely. A report of the nesting bird survey results, if applicable, shall be submitted to SCV Water for review and approval.

If no nesting birds are observed during pre-construction surveys, no further actions are necessary. If nests are found, an appropriate avoidance buffer ranging in size from 25 to 50 feet for passerines, and up to 300 feet for raptors depending upon the species and the proposed work activity, shall be determined and demarcated by a qualified biologist with bright orange construction fencing or other suitable material. Active nests shall be monitored at a minimum of once per week until it has been determined the young have fledged the nest. No ground disturbance or vegetation removal shall occur within this buffer until the qualified biologist confirms breeding/nesting has ended, and all the young have fledged.

5.2 Sensitive Plant Communities

The proposed project would have a significant effect on biological resources if it would:

b) *Have a substantial adverse impact on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by CDFW or USFWS.*

Two sensitive plant communities (Fremont cottonwood forest and woodland and scale broom scrub) occur in the southern portion of the Study Area within the floodplain of the SCR. No direct impacts to these plant communities would occur as a result of the project because they are not located within the project footprint. The project would only result in impacts to the developed, disturbed, or ornamental land cover types, as summarized in Table 3.

Table 3 Project Land Cover Impacts

Land Cover	Sensitive Natural Community	Acreage within Study Area	Acreage of Project Impacts
Developed	No	7.19	0.86
Disturbed	No	0.86	0.33
Ornamental	No	9.67	1.68
Total		**17.72**	**2.87**

The project has the potential to indirectly impact sensitive plant communities as a result of groundwater extraction via the existing Wells S6, S7, and S8 and the new Well S9. The Fremont cottonwood forest and woodland vegetation community located near the project site is identified as a potential GDE (SCV GSA 2022). Although SCV Water would not increase basin-wide groundwater extraction, reactivated operation of existing Wells S6, S7, and S8 in conjunction with operation of the new Well S9 could deplete local groundwater levels beyond the minimum thresholds for depletion of interconnected surface waters established in the Santa Clara River Valley East Groundwater Subbasin GSP and could thus impact sensitive plant communities occurring within the southern portion of the Study Area if they are dependent upon groundwater. Therefore, implementation of Measure BIO-3 is recommended to reduce this potential indirect impact to sensitive plant communities to a less-than-significant level.

5.3 Jurisdictional Waters and Wetlands

The proposed project would have a significant effect on biological resources if it would:

c) *Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.*

No direct impacts would occur to jurisdictional waters and wetlands within the Study Area because none are present within the project footprint. If project construction occurs during the rainy season, jurisdictional waters and wetlands may be indirectly impacted after a rain event should stormwater runoff result in effects such as increased turbidity, altered pH, and/or decreased dissolved oxygen levels. Therefore, implementation of the stormwater control BMPs (e.g., berms, silt fences, fiber rolls) described in Measure BIO-2 is recommended to reduce potential indirect impacts to jurisdictional waters and wetlands during construction to a less-than-significant level.

During operation, the project has the potential to indirectly impact the hydrology of the SCR as a result of groundwater extraction via the existing Wells S6, S7, and S8 and the new Well S9. Although SCV Water would not increase basin-wide groundwater extraction, reactivated operation of existing Wells S6, S7, and S8 in conjunction with operation of the new Well S9 has the potential to deplete local groundwater levels beyond the minimum thresholds for depletion of interconnected surface waters established in the Santa Clara River Valley East Groundwater Subbasin GSP and could thus impact the hydrology of the SCR. As a result, implementation of Measure BIO-3 is recommended to reduce this potential indirect impact to hydrology of the SCR to a less-than-significant level.

5.4 Wildlife Movement

The proposed project would have a significant effect on biological resources if it would:

d) *Interfere substantially with the movement of any resident or migratory fish or wildlife species or with established resident or migratory wildlife corridors, or impede the use of wildlife nursery sites.*

The SCR channel in the southern portion of the Study Area may provide movement pathways for mobile species such as mule deer and coyote. No direct impacts to the SCR would occur as part of the proposed project, and pipeline improvements conducted parallel to the SCR would not interfere with wildlife movement because the construction work areas would be fenced, the pipelines would be constructed in segments with any exposed trenches covered with plate when construction activities are not occurring, and the pipelines would exist below the soil surface following completion of the project. Therefore, direct impacts to wildlife movement would not occur as a result of the project.

Potential indirect impacts to wildlife movement could occur through lighting of the project site during construction, which could deter wildlife migration at night. As such, implementation of Measure BIO-2, including the provision for all lighting to be shielded and downcast, is recommended to reduce indirect impacts to wildlife movement to a less-than-significant level.

5.5 Local Policies and Ordinances

The proposed project would have a significant effect on biological resources if it would:

e) *Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance*

City of Santa Clarita General Plan, North Valencia Specific Plan, Oak Tree Preservation Ordinance, and Parkway Tree Ordinance

The City's General Plan contains objectives and policies for biological resources that are relevant to the proposed project given its location and/or proposed activities. As identified above, these objectives and policies focus on conservation of existing natural areas; restoration of damaged natural vegetation; protection of wetlands, oak trees and other indigenous woodlands and endangered or threatened species and habitat; and protection of biological resources in SEAs and significant wildlife corridors. In compliance with the objectives and policies outlined above, the project would not impact any SEA (the SCR) or wildlife movement corridors. The SCR is identified as an SEA within the Study Area; however, no impacts to the SEA would occur as part of the project. Additionally, as described in Section 5.4, *Wildlife Movement*, the project would not significantly interfere with wildlife movement within Bridgeport Park.

According to Government Code Section 53091, building and zoning ordinances of a county or city shall not apply to the location or construction of facilities for the production, generation, storage, treatment, or transmission of water. As such, the project would not be subject to the North Valencia Specific Plan, which establishes additional zoning regulations for the project area, or the City's building and zoning ordinances (Santa Clarita Municipal Code Titles 17 and 18), which include the City of Santa Clarita Oak Tree Preservation Ordinance. Nevertheless, SCV Water would voluntarily comply with the City's oak tree preservation ordinance during implementation of the proposed project; therefore, it is conservatively included in this analysis.

One coast live oak tree protected by the City's Oak Tree Preservation Ordinance, and nine trees (four western sycamore trees and five London plane trees) protected by the Parkway Trees Ordinance are anticipated to be removed as part of the project. SCV Water would voluntarily obtain an Oak Tree Removal permit from the City for removal of the coast live oak tree and would obtain a Parkway Tree Permit from the City for removal of the western sycamore and London plane trees. Therefore, with regulatory compliance, no impacts related to local policies and ordinances protecting biological resources would occur.

5.6 Habitat Conservation Plans

The proposed project would have a significant effect on biological resources if it would:

f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Conservation Community Plan, or other approved local, regional, or state habitat conservation plan.

The Study Area is not located within any Habitat Conservation Plans, Natural Community Conservation Plans, or other approved local, regional, or state habitat conservation plan area. Therefore, no impact would occur, and no mitigation measures are recommended.

6 Limitations, Assumptions, and Use Reliance

This Biological Resources Assessment has been performed in accordance with professionally accepted biological investigation practices conducted at this time and in this geographic area. The biological investigation is limited by the scope of work performed. Reconnaissance biological surveys for certain taxa may have been conducted as part of this assessment but were not performed during a particular blooming period, nesting period, or particular portion of the season when positive identification would be expected if present, and therefore, cannot be considered definitive. The biological surveys are limited also by the environmental conditions present at the time of the surveys. In addition, general biological (or protocol) surveys do not guarantee the organisms are not present and will not be discovered in the future within the site. In particular, mobile wildlife species could occupy the site on a transient basis or re-establish populations in the future. Our field studies were based on current industry practices, which change over time and may not be applicable in the future. No other guarantees or warranties, expressed or implied, are provided. The findings and opinions conveyed in this report are based on findings derived from site reconnaissance, jurisdictional areas, review of CNDDB RareFind5, and specified historical and literature sources. Standard data sources relied upon during the completion of this report, such as the CNDDB, may vary with regard to accuracy and completeness. In particular, the CNDDB is compiled from research and observations reported to CDFW that may or may not have been the result of comprehensive or site-specific field surveys. Although Rincon believes the data sources are reasonably reliable, Rincon cannot and does not guarantee the authenticity or reliability of the data sources it has used. Additionally, pursuant to our contract, the data sources reviewed included only those that are practically reviewable without the need for extraordinary research and analysis.

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Appendix A

Regulatory Setting

Regulatory Setting

The following is a brief summary of the regulatory context under which biological resources are managed at the federal, state, and local levels. A number of federal and state statutes provide a regulatory structure that guides the protection of biological resources. Agencies with the responsibility for protection of biological resources within the project site include:

- U.S. Army Corps of Engineers (wetlands and other waters of the United States);
- U.S. Fish and Wildlife Service (federally listed species and migratory birds);
- National Marine Fisheries Service (marine animals and anadromous fishes);
- Los Angeles Regional Water Quality Control Board (waters of the State);
- California Department Fish and Wildlife (riparian areas, streambeds, and lakes; state-listed species; nesting birds, marine resources); and
- City of Santa Clarita

United States Army Corps of Engineers

The United States Army Corps of Engineers (USACE) is responsible for administering several federal programs related to ensuring the quality and navigability of the nation's waters.

Clean Water Act Section 404

Congress enacted the Clean Water Act (CWA) "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." Section 404 of the CWA authorizes the Secretary of the Army, acting through USACE, to issue permits regulating the discharge of dredged or fill materials into the "navigable waters at specified disposal sites."

Section 502 of the CWA further defines "navigable waters" as "waters of the United States, including the territorial seas." "Waters of the United States" are broadly defined at 33 Code of Federal Regulations (CFR) Part 328.3 to include navigable waters, perennial and intermittent streams, lakes, rivers, ponds, as well as wetlands, marshes, and wet meadows. In recent years, the USACE and U.S. Environmental Protection Agency (USEPA) have undertaken several efforts to modernize their regulations defining "waters of the United States" (e.g., the 2015 Clean Water Rule and 2020 Navigable Waters Protection Rule), but these efforts have been frustrated by legal challenges that have invalidated the updated regulations. Thus, the agencies' longstanding definition of "waters of the United States," which dates from 1986, remains in effect albeit with supplemental guidance interpreting applicable court decisions as described below.

Waters of the U.S.

In summary, USACE and USEPA regulations define "waters of the United States" as follows:

1. All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
2. All interstate waters including interstate wetlands;

3. All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters:
   i. Which are or could be used by interstate or foreign travelers for recreational or other purposes; or
   ii. From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
   iii. Which are used or could be used for industrial purpose by industries in interstate commerce;
4. All impoundments of waters otherwise defined as waters of the United States;
5. Tributaries of waters identified items #1 through #4 above;
6. The territorial sea;
7. Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in items # through #6 above.

Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the CWA, the final authority regarding CWA jurisdiction remains with the USEPA.

Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA are not waters of the United States.

The lateral limits of USACE jurisdiction in non-tidal waters is defined by the "ordinary high-water mark" (OHWM) unless adjacent wetlands are present. The OHWM is a line on the shore or edge of a channel established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed upon the bank, shelving, changes in the character of soil, destruction of vegetation, or the presence of debris (33 CFR 328.3[e]). As such, waters are recognized in the field by the presence of a defined watercourse with appropriate physical and topographic features. If wetlands occur within, or adjacent to, waters of the United States, the lateral limits of USACE jurisdiction extend beyond the OHWM to the outer edge of the wetlands (33 CFR 328.4 (c)). The upstream limit of jurisdiction in the absence of adjacent wetlands is the point beyond which the OHWM is no longer perceptible (33 CFR 328.4; see also 51 Federal Register 41217).

Wetlands

The USACE defines wetlands as “those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions” (33 CFR 328.3). The USACE’s delineation procedures identify wetlands in the field based on indicators of three wetland parameters: hydrophytic vegetation, hydric soils, and wetland hydrology. The following is a discussion of each of these parameters.

Hydrophytic Vegetation

Hydrophytic vegetation dominates areas where frequency and duration of inundation or soil saturation exert a controlling influence on the plant species present. Plant species are assigned wetland indicator status according to the probability of their occurrence in wetlands. More than fifty percent of the dominant plant species must have a wetland indicator status to meet the hydrophytic vegetation criterion. The USACE published the National Wetland Plant List (USACE 2020), which separates vascular plants into the following four basic categories based on plant species frequency of occurrence in wetlands:

- **Obligate Wetland (OBL).** Almost always occur in wetlands
- **Facultative Wetland (FACW).** Usually occur in wetlands, but occasionally found in non-wetlands
- **Facultative (FAC).** Occur in wetlands or non-wetlands
- **Facultative Upland (FACU).** Usually occur in non-wetlands, but may occur in wetlands
- **Obligate Upland (UPL).** Almost never occur in wetlands

The USACE considers OBL, FACW and FAC species to be indicators of wetlands. An area is considered to have hydrophytic vegetation when greater than 50 percent of the dominant species in each vegetative stratum (tree, shrub, and herb) fall within these categories. Any species not appearing on the USACE list is assumed to be an upland species, almost never occurring in wetlands. In addition, an area needs to contain at least 5 percent vegetative cover to be considered as a vegetated wetland.

Hydric Soils

Hydric soils are saturated or inundated for a sufficient duration during the growing season to develop anaerobic or reducing conditions that favor the growth and regeneration of hydrophytic vegetation. Field indicators of wetland soils include observations of ponding, inundation, saturation, dark (low chroma) soil colors, bright mottles (concentrations of oxidized minerals such as iron), 3leiing (indicates reducing conditions by a blue-grey color), or accumulation of organic material. Additional supporting information includes documentation of soil as hydric or reference to wet conditions in the local soils survey, both of which must be verified in the field.

Wetland Hydrology

Wetland hydrology is inundation or soil saturation with a frequency and duration long enough to cause the development of hydric soils and plant communities dominated by hydrophytic vegetation. If direct observation of wetland hydrology is not possible (as in seasonal wetlands), or records of wetland hydrology are not available (such as stream gauges), assessment of wetland hydrology is frequently supported by field indicators, such as water marks, drift lines, sediment deposits, or drainage patterns in wetlands.

Applicable Case Law and Agency Guidance

The USACE's regulations defining "waters of the United States" have been subject to legal interpretation, and two influential Supreme Court decisions have narrowed the definition to exclude certain classes of waters that bear an insufficient connection to navigable waters. In *Solid Waste Agency of Northern Cook County v. Army Corps of Engineers* (2001), the United States Supreme Court stated that the USACE's CWA jurisdiction does not extend to ponds that "are not adjacent to open water." In reaching its decision, the Court concluded that the "Migratory Bird Rule," which served as the basis for the USACE's asserted jurisdiction, was not supported by the CWA. The Migratory Bird Rule extended CWA jurisdiction to intrastate waters "which are or would be used as habitat by birds protected by Migratory Bird Treaties or which are or would be used as habitat by other migratory birds which cross state lines…" The Court was concerned that application of the Migratory Bird Rule resulted in "reading the term 'navigable waters' out of the statute." Highlighting the language of the CWA to determine the statute's jurisdictional reach, the Court stated, "the term 'navigable' has at least the import of showing us what Congress had in mind as its authority for enacting the CWA: its traditional jurisdiction over waters that were or had been navigable in fact or which could reasonably be so made." This decision stands for the proposition that non-navigable isolated, intrastate waters are not waters of the United States and thus are not jurisdictional under the CWA.

In 2006, the United States Supreme Court decided *Rapanos v. United States* and *Carabell v. United States* (collectively "Rapanos"), which were consolidated cases determining the extent of CWA jurisdiction over waters that carry only an infrequent surface flow. The court issued no majority opinion in Rapanos. Instead, the justices authored five separate opinions including the "plurality" opinion, authored by Justice Scalia (joined by three other justices), and a concurring opinion by Justice Kennedy. To guide implementation of the decision, the USACE and USEPA issued a joint guidance memorandum ("Rapanos Guidance Memorandum") in 2008 stating that "regulatory jurisdiction under the CWA exists over a water body if either the plurality's or Justice Kennedy's standard is satisfied."

According to the plurality opinion in Rapanos, "the waters of the United States include only relatively permanent, standing or flowing bodies of water" and do not include "ordinarily dry channels through which water occasionally or intermittently flows." In addition, while all wetlands that meet the USACE definition are considered adjacent wetlands, only those adjacent wetlands that have a continuous surface connection because they directly abut the tributary (e.g., they are not separated by uplands, a berm, dike, or similar feature) are considered jurisdictional under the plurality standard.

Under Justice Kennedy's opinion, "the USACE's jurisdiction over wetlands depends upon the existence of a significant nexus between the wetlands in question and navigable waters in the traditional sense. Wetlands possess the requisite nexus, and thus come within the statutory phrase 'navigable waters,' if the wetlands, either alone or in combination with similarly situated lands in the region, significantly affect the chemical, physical, and biological integrity of other covered waters more readily understood as 'navigable.' When, in contrast, wetlands' effects on water quality are speculative or insubstantial, they fall outside the zone fairly encompassed by the statutory term 'navigable waters.'" Justice Kennedy identified "pollutant trapping, flood control, and runoff storage" as some of the critical functions wetlands can perform relative to other waters. He concluded that, given wetlands' ecological role, "mere adjacency" to a non-navigable tributary was insufficient to establish CWA jurisdiction, and that "a more specific inquiry, based on the significant nexus standard, is therefore necessary."

Interpreting these decisions, and according to the Rapanos Guidance Memorandum, the USACE and USEPA will assert jurisdiction over the following waters:

- Traditional navigable waters;
- Wetlands adjacent to traditional navigable waters;
- Non-navigable tributaries of traditional navigable waters that are relatively permanent where the tributaries typically flow year-round or have continuous flow at least seasonally (e.g., typically three months); and,
- Wetlands that directly abut such tributaries.

The USACE and USEPA will decide jurisdiction over the following waters based on a fact-specific analysis to determine whether they have a significant nexus with a traditional navigable water:

- Non-navigable tributaries that are not relatively permanent;
- Wetlands adjacent to non-navigable tributaries that are not relatively permanent; and,
- Wetlands adjacent to but that do not directly abut a relatively permanent non-navigable tributary.

Where a significant nexus analysis is required, the USACE and USEPA will apply the significant nexus standard as follows:

- A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by all wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of downstream traditional navigable waters; and,
- Significant nexus includes consideration of hydrologic and ecologic factors.

The USACE and USEPA generally will not assert jurisdiction over the following features:

- Swales or erosional features (e.g., gullies, small washes characterized by low volume, infrequent, or short duration flow); and,
- Ditches (including roadside ditches) excavated wholly in and draining only uplands and that do not carry a relatively permanent flow of water.

Rivers and Harbors Act Section 10

Section 10 of the Rivers and Harbors Act of 1899 requires authorization from the USACE for the construction of any structure in or over any navigable water of the United States. Structures or work outside the limits defined for navigable waters of the United States require a Section 10 permit if the structure or work affects the course, location, or condition of the water body. The law applies to any dredging or disposal of dredged materials, excavation, filling, re-channelization, or any other modification of a navigable water of the United States, and applies to all structures and work. It further includes, without limitation, any wharf, dolphin, weir, boom breakwater, jetty, groin, bank protection (e.g., riprap, revetment, bulkhead), mooring structures such as pilings, aerial or subaqueous power transmission lines, intake or outfall pipes, permanently moored floating vessel, tunnel, artificial canal, boat ramp, aids to navigation, and any other permanent, or semi-permanent obstacle or obstruction. It is important to note that Section 10 applies only to navigable waters and thus does not apply to work in non-navigable wetlands or tributaries. In some cases, Section 10 authorization is issued by the USACE concurrently with CWA Section 404 authorization, such as when certain Nationwide Permits are used.

Regional Water Quality Control Board

The State Water Resources Control Board (SWRCB) and nine Regional Water Quality Control Boards (RWQCBs) have jurisdiction over "waters of the State," which are defined as any surface water or groundwater, including saline waters, within the boundaries of the state (California Water Code Section 13050[e]). These agencies also have responsibilities for administering portions of the CWA.

Clean Water Act Section 401

Section 401 of the CWA requires an applicant requesting a federal license or permit for an activity that may result in any discharge into navigable waters (such as a Section 404 Permit) to provide state certification that the proposed activity will not violate state and federal water quality standards. In California, CWA Section 401 Water Quality Certification (Section 401 Certification) is issued by the RWQCBs and by the SWRCB for multi-region projects. The process begins when an applicant submits an application to the RWQCB and informs the USACE (or the applicable agency from which a license or permit was requested) that an application has been submitted. The USACE will then determine a "reasonable period of time" for the RWQCB to act on the application; this is typically 60 days for routine projects and longer for complex projects but may not exceed one year. When the period has elapsed, if the RWQCB has not either issued or denied the application for Section 401 Certification, the USACE may determine that Certification has been waived and issue the requested permit. If a Section 401 Certification is issued it may include binding conditions, imposed either through the Certification itself or through the requested federal license or permit.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act (Porter-Cologne Act) is the principal law governing water quality regulation in California. It establishes a comprehensive program to protect water quality and the beneficial uses of water. The Porter-Cologne Act applies to surface waters, wetlands, and groundwater and to both point and nonpoint sources of pollution. Pursuant to the Porter-Cologne Act (California Water Code section 13000 et seq.), the policy of the State is as follows:

- The quality of all the waters of the State shall be protected
- All activities and factors affecting the quality of water shall be regulated to attain the highest water quality within reason
- The State must be prepared to exercise its full power and jurisdiction to protect the quality of water in the State from degradation

The Porter-Cologne Act established nine RWQCBs (based on watershed boundaries) and the SWRCB, which are charged with implementing its provisions and which have primary responsibility for protecting water quality in California. The SWRCB provides program guidance and oversight, allocates funds, and reviews RWQCB decisions. In addition, the SWRCB allocates rights to the use of surface water. The RWQCBs have primary responsibility for individual permitting, inspection, and enforcement actions within each of nine hydrologic regions. The SWRCB and RWQCBs have numerous nonpoint source related responsibilities, including monitoring and assessment, planning, financial assistance, and management.

Section 13260 of the Porter-Cologne Act requires any person discharging or proposing to discharge waste that could affect the quality of waters of the State to file a Report of Waste Discharge with the appropriate RWQCB. The RWQCB may then authorize the discharge, subject to conditions, by issuing Waste Discharge Requirements (WDRs). While this requirement was historically applied primarily to outfalls and similar point source discharges, the SWRCB's *State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State*, effective May 2020, make it clear the agency will apply the Porter-Cologne Act's requirements to discharges of dredge and fill material as well. The *Procedures* state they are to be used in issuing CWA Section 401 Certifications and WDRs and largely mirror the existing review requirements for CWA Section 404 Permits and Section 401 Certifications, incorporating most elements of the USEPA's *Section*

404(b)(1) Guidelines. Following issuance of the *Procedures*, the SWRCB produced a consolidated application form for dredge/fill discharges that can be used to obtain a CWA Section 401 Water Quality Certification, WDRs, or both.

Non-Wetland Waters of the State

The SWRCB and RWQCBs have not currently established regulations for field determinations of waters of the State except for wetlands. In many cases, the RWQCBs interpret the limits of waters of the State to be bounded by the OHWM unless isolated conditions or ephemeral waters are present. However, in the absence of statewide guidance, each RWQCB may interpret jurisdictional boundaries within their region, and the SWRCB has encouraged applicants to confirm jurisdictional limits with their RWQCB before submitting applications. As determined by the RWQCB, waters of the State may include riparian areas or other locations outside the OHWM, leading to a larger jurisdictional area over a given water body compared to the USACE.

Wetland Waters of the State

Procedures for defining wetland waters of the State pursuant to the SWRCB's *State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State* went into effect May 28, 2020. The SWRCB defines an area as wetland if, under normal circumstances:

(i) the area has continuous or recurrent saturation of the upper substrate caused by groundwater, or shallow surface water, or both;

(ii) the duration of such saturation is sufficient to cause anaerobic conditions in the upper substrate; and

(iii) the area's vegetation is dominated by hydrophytes or the area lacks vegetation.

The SWRCB's *Implementation Guidance for the Wetland Definition and Procedures for Discharges of Dredge and Fill Material to Waters of the State* (2020) states waters of the U.S. and waters of the State should be delineated using the standard USACE delineation procedures, taking into consideration that the methods shall be modified only to allow for the fact that a lack of vegetation does not preclude an area from meeting the definition of a wetland.

United States Fish and Wildlife Service

The United States Fish and Wildlife Service (USFWS) implements several laws protecting the Nation's fish and wildlife resources, including the Endangered Species Act (FESA; 16 United States Code [USC] Sections 153 et seq.), the Migratory Bird Treaty Act (MBTA; 16 USC Sections 703 through 711), and the Bald and Golden Eagle Protection Act (16 USC Section 668).

Endangered Species Act

The USFWS and National Marine Fisheries Service (NMFS) share responsibility for implementing the FESA. Generally, the USFWS implements the FESA for terrestrial and freshwater species, while the NMFS implements the FESA for marine and anadromous species. Projects that would result in "take" of any threatened or endangered animal species, or a threatened or endangered plant species if occurring on federal land, are required to obtain permits from the USFWS or NMFS through either Section 7 (interagency consultation with a federal nexus) or Section 10 (Habitat Conservation Plan) of the FESA, depending on the involvement by the federal government in funding, authorizing, or carrying out the project. The permitting process is used to determine if a project would jeopardize the continued existence of a listed species and what measures would be required to avoid jeopardizing the species. "Take" under federal definition means to harass, harm (which includes habitat modification), pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Proposed or candidate species do not have the full protection of the FESA; however, the USFWS and NMFS advise project applicants that they could be elevated to listed status at any time.

Migratory Bird Treaty Act

The MBTA of 1918 implements four international conservation treaties the U.S. entered into with Canada in 1916, Mexico in 1936, Japan in 1972, and Russia in 1976. It is intended to ensure the sustainability of populations of all protected migratory bird species. The law has been amended with the signing of each treaty, as well as when any of the treaties were amended, such as with Mexico in 1976 and Canada in 1995. The MBTA prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by the USFWS.

The list of migratory bird species protected by the law, in regulations at 50 CFR Part 10.13, is primarily based on bird families and species included in the four international treaties. A migratory bird species is included on the list if it meets one or more of the following criteria:

1. It occurs in the United States or U.S. territories as the result of natural biological or ecological processes and is currently, or was previously listed as, a species or part of a family protected by one of the four international treaties or their amendments.
2. Revised taxonomy results in it being newly split from a species that was previously on the list, and the new species occurs in the United States or U.S. territories as the result of natural biological or ecological processes.
3. New evidence exists for its natural occurrence in the United States or U.S. territories resulting from natural distributional changes and the species occurs in a protected family.

In 2004, the Migratory Bird Treaty Reform Act limited the scope of the MBTA by stating the MBTA applies only to migratory bird species that are native to the United States or U.S. territories and that a native migratory bird species is one that is present as a result of natural biological or ecological processes. The Migratory Bird Treaty Reform Acrequires the USFWS to publish a list of all nonnative, human-introduced bird species to which the MBTA does not apply, and an updated list was published in 2020. The 2020 update identifies species belonging to biological families referred to in treaties the MBTA implements but are not protected because their presence in the United States or U.S. territories is solely the result of intentional or unintentional human-assisted introductions.

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act prohibits anyone, without a permit issued by the USFWS, from "taking" bald or golden eagles, including their parts (including feathers), nests, or eggs. The Act provides criminal penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle … [or any golden eagle], alive or dead, or any part, nest, or egg thereof." The Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb."

"Disturb" means "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior."

In addition to immediate impacts, this definition also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death or nest abandonment.

California Department of Fish and Wildlife

The California Department of Fish and Wildlife (CDFW) derives its authority from the California Fish and Game Code and administers several state laws protecting fish and wildlife resources and the habitats upon which they depend.

California Endangered Species Act

The California Endangered Species Act (CESA) (California Fish and Game Code Section 2050 et. seq.) prohibits take of state listed threatened or endangered. Take under CESA is defined as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill" (California Fish and Game Code Section 86). This definition does not prohibit indirect harm by way of habitat modification, except where such harm is the proximate cause of death of a listed species. Where incidental take would occur during construction or other lawful activities, CESA allows the CDFW to issue an Incidental Take Permit upon finding, among other requirements, that impacts to the species have been minimized and fully mitigated. Unlike the federal ESA, CESA's protections extend to candidate species during the period (typically one year) while the California Fish and Game Commission decides whether the species warrants CESA listing.

Native Plant Protection Act

The CDFW also has authority to administer the Native Plant Protection Act (NPPA) (California Fish and Game Code Section 1900 et seq.). The NPPA requires the CDFW to establish criteria for determining if a species, subspecies, or variety of native plant is endangered or rare and prohibits the take of listed plant species. Effective in 2015, CDFW promulgated regulations (14 California Code of Regulations Section 786.9) under the authority of the NPPA, establishing that the CESA's permitting procedures would be applied to plants listed under the NPPA's "Rare." With this change, there is little practical difference for the regulated public between plants listed under CESA and those listed under the NPPA.

Fully Protected Species Laws

The CDFW enforces Sections 3511, 4700, 5050, and 5515 of the California Fish and Game Code, which prohibit take of species designated as Fully Protected. The CDFW is not allowed to issue an Incidental Take Permit for Fully Protected species; therefore, impacts to these species must be avoided. The exception is a situation in which a Natural Community Conservation Plan (NCCP) is in place that authorizes take of the Fully Protected species.

Avian Protection Laws

California Fish and Game Code Sections 3503, 3503.5, and 3513 describe unlawful take, possession, or destruction of native birds, nests, and eggs. Section 3503.5 protects all birds-of-prey and their eggs and nests against take, possession, or destruction of nests or eggs. Section 3513 makes it a state-level offense to take any bird in violation of the federal Migratory Bird Treaty Act.

Protection of Lakes and Streambeds

California Fish and Game Code Section 1602 states it is unlawful for any person to "substantially divert or obstruct the natural flow of, or substantially change or use any material from the bed, channel, or bank of, any river, stream, or lake" without first notifying CDFW of that activity. Thereafter, if CDFW determines and informs the entity that the activity will not substantially adversely affect any existing fish or wildlife resources, the entity may commence the activity. If, however, CDFW determines that the activity may substantially adversely affect an existing fish or wildlife resource, the entity may be required to obtain from CDFW a Lake/Streambed Alteration Agreement (LSAA), which will include reasonable measures necessary to protect the affected resource(s), before the entity may conduct the activity described in the notification. Upon receiving a complete Notification of Lake/Streambed Alteration, CDFW has 60 days to present the entity with a Draft LSAA. Upon review of the Draft LSAA by the applicant, any problematic terms are negotiated with CDFW and a final LSAA is executed.

The CDFW has not defined the term "stream" for the purposes of implementing its regulatory program under Section 1602, and the agency has not promulgated regulations directing how jurisdictional streambeds may be identified, or how their limits should be delineated. However, four relevant sources of information offer insight as to the appropriate limits of CDFW jurisdiction as discussed below.

- **The plain language of Section 1602 of CFGC** establishes the following general concepts:
  - References "river," "stream," and "lake"
  - References "natural flow"
  - References "bed," "bank," and "channel"
- **Applicable court decisions**, in particular *Rutherford v. State of California* (188 Cal App. 3d 1276 (1987), which interpreted Section 1602's use of "stream" to be as defined in common law. The Court indicated that a "stream" is commonly understood to:
  - Have a source and a terminus
  - Have banks and a channel
  - Convey flow at least periodically, but need not flow continuously and may at times appear outwardly dry
  - Represent the depression between the banks worn by the regular and usual flow of the water
  - Include the area between the opposing banks measured from the foot of the banks from the top of the water at its ordinary stage, including intervening sand bars
  - Include the land that is covered by the water in its ordinary low stage
  - Include lands below the OHWM

- **CDFW regulations** defining "stream" for other purposes, including sport fishing (14 California Code of Regulations Section 1.72) and streambed alterations associated with cannabis production (14 California Code of Regulations Section 722[c][21]), which indicate that a stream:
  - Flows at least periodically or intermittently
  - Flows through a bed or channel having banks
  - Supports fish or aquatic life
  - Can be dry for a period of time
  - Includes watercourses where surface or subsurface flow supports or has supported riparian vegetation
- **Guidance documents**, *including A Field Guide to Lake and Streambed Alteration Agreements* (CDFW 1994) and *Methods to Describe and Delineate Episodic Stream Processes on Arid Landscapes for Permitting Utility-Scale Solar Power Plants* (Brady and Vyverberg 2013), which suggest the following:
  - A stream may flow perennially or episodically
  - A stream is defined by the course in which water currently flows, or has flowed during the historic hydrologic course regime (approximately the last 200 years)
  - Width of a stream course can reasonably be identified by physical or biological indicators
  - A stream may have one or more channels (single thread vs. compound form)
  - Features such as braided channels, low-flow channels, active channels, banks associated with secondary channels, floodplains, islands, and stream-associated vegetation, are interconnected parts of the watercourse
  - Canals, aqueducts, irrigation ditches, and other means of water conveyance can be considered streams if they support aquatic life, riparian vegetation, or stream-dependent terrestrial wildlife
  - Biologic components of a stream may include aquatic and riparian vegetation, all aquatic animals including fish, amphibians, reptiles, invertebrates, and terrestrial species which derive benefits from the stream system
  - The lateral extent of a stream can be measured in different ways depending on the particular situation and the type of fish or wildlife resource at risk

The tenets listed above, among others, are applied to establish the boundaries of streambeds in various environments. The importance of each factor may be weighted based on site-specific considerations and the applicability of the indicators to the streambed at hand.

Local Jurisdiction

City of Santa Clarita General Plan

Natural resources within the City of Santa Clarita's (City) limits are regulated according to the City's General Plan (City of Santa Clarita 2011), which includes policies regarding conservation of biological resources and ecosystems as well as protection of sensitive habitat (including wildlife corridors) and endangered species. The City's General Plan includes policies relating to oak trees, protected areas, and Significant Ecological Areas, among others.

Santa Clarita Municipal Code

Natural resources within the City are also regulated by the City's Municipal Code. In particular, the City of Santa Clarita Oak Tree Preservation Ordinance (Santa Clarita Municipal Code Section 17.51.040) protects and preserves oak trees in the City; the City's Parkway Trees Ordinance (Santa Clarita Municipal Code Section 13.76) protects native trees in the City and Santa Clarita Municipal Code Section 17.38.080 protects SEAs within the City.

Appendix B

Site Photographs

Photograph 1. Photo Point 1. View of Bridgeport Park in the northern portion of the Study Area, facing south (February 23, 2022).

Photograph 2. Photo Point 2. View of Newhall Ranch Road and ornamental vegetation in the northern portion of the Study Area, facing north (February 23, 2022).

Photograph 3. Photo Point 3. View of the central portion of the Study Area near the proposed groundwater treatment and disinfection facility, with ornamental vegetation in the foreground and the Santa Clara River Trail and outfall structure in the background, facing southeast (February 23, 2022).

Photograph 4. Photo Point 4. View of the Study Area to the south of the proposed groundwater treatment and disinfection facility, with California sagebrush scrub on the right (north, and the SCR channel on the left (south), facing west (February 23, 2022).

Photograph 5. Photo Point 5. View of the Santa Clara River to the south and outside of the Study Area, with big sagebrush scrub in the foreground and Fremont cottonwood forest and woodland in the background, facing southwest (February 23, 2022).

Photograph 6. Photo Point 6. View of the existing concrete outfall structure to the southeast of the Study Area, facing southeast (February 23, 2022).

Photograph 7. Photo Point 7. View of the ornamental vegetation dominated by bank catclaw in the southern portion of the Study Area, facing southwest (February 23, 2022).

Photograph 8. Photo Point 8. View of big sagebrush scrub to the south of the Study Area, facing southeast. Note Fremont cottonwood forest and woodland in the background (February 23, 2022).

Photograph 9. Photo Point 9. View of the existing concrete outfall structure to the southeast and outside of the Study Area, facing northeast (February 23, 2022).

Photograph 10. Photo Point 10. View of Culvert Outlet 1 in the southern portion of the Study Area, facing northwest. Note concrete rip rap to the south (below) the outlet (February 23, 2022).

Photograph 11. Photo Point 11. View of the California sagebrush scrub vegetation community to the south and outside of the Study Area, facing east (February 23, 2022).

Photograph 12. Photo Point 12. View of the riverwash land cover type along the Santa Clara River approximately 50 feet southwest of the Study Area. Note offroad vehicle tracks in the center of the photograph (February 23, 2022).

Photograph 13. Photo Point 13. View of the active channel of the Santa Clara River to the south and outside of the Study Area, facing southeast (February 23, 2022).

Photograph 14. Photo Point 14. View of riparian vegetation associated with the Santa Clara River Fremont cottonwood forest and woodland to the south and outside of the Study Area, facing southeast (February 23, 2022).

Photograph 15. Photo Point 15. View of Fremont cottonwood forest and woodland associated with the Santa Clara River to the south of the existing outfall structure, facing southwest (February 23, 2022).

Photograph 16. Photo Point 16. View of coastal scrub habitat within the Santa Clara River floodplain south of the Study Area, facing northwest (February 23, 2022).

Photograph 17. Photo Point 17. View of Sampling Point 01 approximately 20 feet south of the Study Area, facing southeast (February 23, 2022).

Photograph 18. Photo Point 18. View of western sycamore, London plane, and coast live oak trees proposed for removal in the central portion of the Study Area, facing west (August 30, 2022).

Photograph 19. Photo Point 19. View of the disturbed land cover type and the staging area in the central portion of the Study Area, facing northeast (August 30, 2022).

Photograph 20. Photo Point 20. View of the proposed roundabout improvement area in the eastern portion of the Study Area (Bridgeport Lane/Parkwood Lane), facing northwest (August 30, 2022).

Photograph 21. Photo Point 21. View of the Santa Clara River Trail (center) and Fremont cottonwood forest and woodland (left) to the south of proposed roundabout improvements in the eastern portion of the Study Area (Bridgeport Lane/Parkwood Lane), facing west (August 30, 2022).

Photograph 22. Photo Point 22. View of the proposed pipeline improvements along the Santa Clara River Trail, facing west. Note the existing Well S8 facility in the background (August 30, 2022).

Photograph 23. Photo Point 23. View of the Santa Clara River Trail (center) and Fremont cottonwood forest and woodland (left) to the south of proposed roundabout improvements in the eastern portion of the Study Area (Bridgeport Lane/Parkwood Lane), facing west (August 30, 2022).

Photograph 24. Photo Point 24. View of the proposed pipeline improvements along the Santa Clara River Trail, facing west. Note the existing Well S8 facility in the background (August 30, 2022).

Photograph 25. Photo Point 25. View of the existing Well S7 (left) and ornamental vegetation (right) along the Santa Clara River Trail (center) in the western portion of the Study Area, facing east (August 30, 2022).

Photograph 26. Photo Point 26. View of the proposed roundabout improvements area in the central portion of the Study Area (Bridgeport Lane/Bayside Lane), facing east (August 30, 2022).

Photograph 27. Photo Point 27. View of the existing Well S6 where minor piping improvements are proposed within the ornamental land cover type to the north of the well, facing east (August 30, 2022).

Photograph 28. View of Bridgeport Lake within the Bridgeport at Valencia housing development in the northwestern portion of the Study Area, facing northwest (August 30, 2022).

Photograph 29. View of Culvert Outlet 2 in the southern portion of the Study Area, facing northeast (August 30, 2022).

Photograph 30. View of Culvert Outlet 3 along the southern border of the Study Area, facing north (August 30, 2022).

Photograph 31. View of Culvert Outlet 4 along the southwestern border of the Study Area, facing northwest (August 30, 2022).

Appendix C

Floral and Faunal Compendium

Plant Species Observed Within the Study Area on February 23 and August 30, 2022

Scientific Name	Common Name	Native/Introduced/ Invasive Introduced[1]	Wetland Indicator Status[2]	Life Form (Tree/Shrub/ Herbaceous)	California Sagebrush Scrub	Developed	Disturbed	Fremont Cottonwood Forest and Woodland	Ornamental	Scale Broom Scrub
Acacia redolens	bank catclaw	Introduced	UPL	Shrub					X	
Acmispon glaber	deerweed	Native	UPL	Shrub	X					
Ambrosia psilostachya	western ragweed	Native	FACU	Herbaceous						
Amsinckia spp.	fiddleneck	Native	UPL	Herbaceous						
Anemopsis californica	yerba mansa	Native	OBL	Herbaceous						
Artemisia californica	California sagebrush	Native	UPL	Shrub	X					
Artemisia tridentata	big sagebrush	Native	UPL	Shrub	X					X
Arundo donax	giant reed	Invasive Introduced	FACW	Herbaceous				X		
Baccharis salicifolia	mule fat	Native	FACW	Shrub				X		X
Brassica nigra	black mustard	Invasive Introduced	UPL	Herbaceous	X		X		X	
Bromus diandrus	ripgut brome	Invasive Introduced	UPL	Herbaceous	X					
Bromus madritensis ssp. *rubens*	red brome	Invasive Introduced	UPL	Herbaceous			X			
Camissoniopsis micrantha	Spencer primrose	Native	UPL	Herbaceous						
Carduus pycnocephalus	Italian thistle	Invasive Introduced	UPL	Herbaceous	X		X	X	X	
Centaurea solstitialis	yellow star thistle	Invasive Introduced	UPL	Herbaceous	X					
Corethrogyne filaginifolia	common sandaster	Native	UPL	Herbaceous						
Crassula connata	pigmy weed	Native	FAC	Herbaceous	X					
Cryptantha circumscissa	cushion cryptantha	Native	UPL	Herbaceous						
Cryptantha spp.	cryptantha	Native	UPL	Herbaceous			X			
Cynodon dactlyon	Bermuda grass	Invasive Introduced	FACU	Herbaceous					X	
Datura wrightii	jimsonweed	Native	UPL	Herbaceous			X			
Eriastrum densifolium	giant eriastrum	Native	UPL	Herbaceous						
Eriogonum fasciculatum	California buckwheat	Native	UPL	Shrub	X					X
Erodium cicutarium	redstem filaree	Invasive Introduced	UPL	Herbaceous			X		X	
Eucalyptus melanoxylon	black morrell	Introduced	UPL	Tree					X	
Fraxinus oxycarpa 'Raywood'	Raywood ash	Introduced	UPL	Tree					X	
Fraxinus uhdei	shamel ash	Introduced	UPL	Tree					X	
Hesperoyucca whipplei	chaparral yucca	Native	UPL	Herbaceous	X					
Heterotheca grandiflora	telegraph weed	Native	UPL	Herbaceous			X			
Hirschfeldia incana	summer mustard	Invasive Introduced	UPL	Herbaceous	X		X	X	X	
Lepidospartum squamatum	California broomsage	Native	FACU	Shrub	X			X		X
Malacothrix saxatilis	cliff aster	Native	UPL	Herbaceous			X		X	
Malva parviflora	cheeseweed	Native	UPL	Herbaceous					X	
Marah macrocarpa	chilicothe	Native	UPL	Herbaceous						
Marrubium vulgare	white horehound	Invasive Introduced	FACU	Herbaceous	X				X	
Melilotus indicus	yellow sweetclover	Introduced	FACU	Herbaceous					X	
N/A	turf grasses	Introduced	UPL	Herbaceous					X	
Nicotiana glauca	tree tobacco	Invasive Introduced	FAC	Tree				X		

Scientific Name	Common Name	Native/Introduced/ Invasive Introduced[1]	Wetland Indicator Status[2]	Life Form (Tree/Shrub/ Herbaceous)	California Sagebrush Scrub	Developed	Disturbed	Fremont Cottonwood Forest and Woodland	Ornamental	Scale Broom Scrub
Oenothera elata	tall evening primrose	Native	FACW	Herbaceous				X		
Opuntia littoralis	coast prickly pear	Native	UPL	Shrub						
Pectocarya penicillata	winged comb seed	Native	UPL	Herbaceous						
Pinus ponderosa	Ponderosa pine	Native	FACU	Tree		X			X	
Plantago lanceolata	narrowleaf plantain	Invasive Introduced	FAC	Herbaceous					X	
Platanus acerifolia	London plane	Introduced	UPL	Tree					X	
Platanus racemosa	western sycamore	Native	FAC	Tree					X	
Polygonum aviculare	prostrate knotweed	Introduced	FAC	Herbaceous					X	
Populus fremontii	Fremont cottonwood	Native	FACW	Tree				X		
Prunus cerasifera 'Atropurpurea'	purple plum	Introduced	UPL	Tree					X	
Pyrus kawakamii	evergreen pear	Introduced	UPL	Tree					X	
Quercus agrifolia	coast live oak	Native	UPL	Tree					X	
Rhapiolepis indica	Indian hawthorn	Introduced	UPL	Shrub		X			X	
Rhus integrifolia	lemonade berry	Native	UPL	Shrub						
Ricinus communis	castor bean	Introduced	FACU	Shrub				X		
Rumex crispus	curly dock	Invasive Introduced	FAC	Herbaceous				X		
Rosmarinus officinalis	rosemary	Introduced	UPL	Shrub		X			X	
Salix laevigata	red willow	Native	FACW	Tree				X		
Salix lasiolepis	arroyo willow	Native	FACW	Shrub/Tree				X		
Salsola tragus	Russian thistle	Invasive Introduced	UPL	Herbaceous			X		X	
Salvia apiana	white sage	Native	UPL	Shrub	X					
Schinus molle	Peruvian pepper	Invasive Introduced	FACU	Tree	X				X	
Schismus spp.	schismus	Introduced	UPL	Herbaceous	X				X	
Sisymbrium irio	London rocket	Invasive Introduced	UPL	Herbaceous					X	
Sonchus oleraceus	common sow thistle	Invasive Introduced	UPL	Herbaceous					X	
Stipa pulchra	purple needlegrass	Native	UPL	Herbaceous						
Tamarix ramosissima	tamarisk	Invasive Introduced	UPL	Shrub/Tree	X			X		
Taraxicum officinale	common dandelion	Introduced	UPL	Herbaceous					X	
Tulbaghia violacea	society garlic	Introduced	UPL	Herbaceous					X	
Tribulus terrestris	puncture vine	Invasive Introduced	UPL	Herbaceous						
Torilis arvensis	field hedge parsley	Invasive Introduced	UPL	Herbaceous				X		
Typha spp.	cattail	Native	OBL	Herbaceous						
Washingtonia robusta	Mexican fan palm	Invasive Introduced	FACW	Tree				X		
Urtica urens	dwarf nettle	Introduced	UPL	Herbaceous			X			

[1] California Invasive Plant Council (Cal-IPC) 2022

[2] OBL = obligate; FACW = facultative wetland; FAC = facultative; FACU = facultative upland; UPL = upland

Animal Species Observed Within the Study Area on February 23 and August 30, 2022

Scientific Name	Common Name	Status	Native or Introduced
Birds[1]			
Aphelocoma californica	California scrub jay	–	Native
Ardea alba	great egret	–	Native
Calypte anna	Anna's hummingbird	–	Native
Corvus brachyrhynchos	American crow	–	Native
Corvus corax	common raven	–	Native
Zenaida macroura	mourning dove	–	Native
Mammals			
Canus latrans	coyote	–	Native
Canus lupis familiaris	domesticated dog	–	Non-native
Felis catus	domesticated cat	–	Non-native
Reptiles[2]			
Sceloporus occidentalis	western fence lizard	–	Native
Amphibians[2]			
Pseudacris regilla	pacific tree frog	–	Native

[1] Rodewald 2015

[2] California Herps 2022

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Appendix D

Special Status Species Evaluation Tables

Special Status Species in the Regional Vicinity of the Project Site

Scientific Name Common Name	Status	Habitat Requirements	Potential to Occur in Project Area	Habitat Suitability/ Observations
Plants and Lichens				
Arenaria paludicola marsh sandwort	FE/SCE G1/S1 1B.1	Perennial stoloniferous herb. Marshes and swamps. Openings, sandy. Elevations: 10-560ft. (3-170m.) Blooms May-Aug.	No Potential	No suitable marsh or swamp habitat within the Study Area, and the Study Area is outside the known elevation range for this species. No CNDDB records exist within five miles of the Study Area.
Berberis nevinii Nevin's barberry	FE/SCE G1/S1 1B.1	Perennial evergreen shrub. Chaparral, cismontane woodland, coastal scrub, riparian scrub. Gravelly (sometimes), sandy (sometimes). Elevations: 230-2705ft. (70-825m.) Blooms (Feb)Mar-Jun.	No Potential	Suitable coastal scrub habitat is present within the Study Area. However, this species is a conspicuous perennial evergreen shrub that would have been identifiable during the field survey and was not observed.
Calochortus catalinae Catalina mariposa lily	None/None G3G4/S3S4 4.2	Perennial bulbiferous herb. Chaparral, cismontane woodland, coastal scrub, valley and foothill grassland. In heavy soils, open slopes, openings in brush. Elevations: 50-2295ft. (15-700m.) Blooms (Feb)Mar-Jun.	Low Potential	Suitable coastal scrub habitat is present within the Study Area along the alluvial terrace of the northern bank of the Santa Clara River. However, this area has previously been subjected to soil disturbance during the installation of the bike path, roadways, and outfall structure north of the Santa Clara River, and this species is extremely sensitive to soil disturbance. No CNDDB records exist within five miles of the Study Area.
Calochortus clavatus var. *avius* Pleasant Valley mariposa-lily	None/None G4T2/S2 1B.2	Perennial bulbiferous herb. Lower montane coniferous forest. Josephine silt loam and volcanically derived soil; often in rocky areas. Elevations: 1000-5905ft. (305-1800m.) Blooms May-Jul.	No Potential	No suitable habitat is present within the Study Area. No CNDDB records exist within five miles of the Study Area.
Calochortus clavatus var. *clavatus* club-haired mariposa lily	None/None G4T3/S3 4.3	Perennial bulbiferous herb. Chaparral, cismontane woodland, coastal scrub, valley and foothill grassland. Clay, Rocky, serpentinite (usually). Elevations: 100-4265ft. (30-1300m.) Blooms (Mar)May-Jun.	Low Potential	Suitable coastal scrub habitat is present within the Study Area along the alluvial terrace of the northern bank of the Santa Clara River. However, this area has previously been subjected to soil disturbance during the installation of the bike path, roadways, and outfall structure north of the Santa Clara River, and this species is extremely sensitive to soil disturbance. No CNDDB records exist within five miles of the Study Area.

Scientific Name Common Name	Status	Habitat Requirements	Potential to Occur in Project Area	Habitat Suitability/ Observations
Calochortus clavatus var. *gracilis* slender mariposa-lily	None/None G4T2T3/S2S3 1B.2	Perennial bulbiferous herb. Chaparral, coastal scrub, valley and foothill grassland. Shaded foothill canyons; often on grassy slopes within other habitat. Elevations: 1050-3280ft. (320-1000m.) Blooms Mar-Jun(Nov).	Low Potential	Suitable coastal scrub habitat is present within the Study Area along the alluvial terrace of the northern bank of the Santa Clara River. However, this area has previously been subjected to soil disturbance during the installation of the bike path, roadways, and outfall structure north of the Santa Clara River, and this species is extremely sensitive to soil disturbance.
Calochortus fimbriatus late-flowered mariposa-lily	None/None G3/S3 1B.3	Perennial bulbiferous herb. Chaparral, cismontane woodland, riparian woodland. Serpentinite (sometimes). Elevations: 900-6250ft. (275-1905m.) Blooms Jun-Aug.	Low Potential	Suitable coastal scrub habitat is present within the Study Area along the alluvial terrace of the northern bank of the Santa Clara River. However, this area has previously been subjected to soil disturbance during the installation of the bike path, roadways, and outfall structure north of the Santa Clara River, and this species is extremely sensitive to soil disturbance.
Calochortus palmeri var. *palmeri* Palmer's mariposa-lily	None/None G3T2/S2 1B.2	Perennial bulbiferous herb. Chaparral, lower montane coniferous forest, meadows and seeps. Mesic. Elevations: 2330-7840ft. (710-2390m.) Blooms Apr-Jul.	No Potential	No suitable habitat is present within the Study Area, and the Study Area is outside the known elevation range for this species.
Calochortus plummerae Plummer's mariposa-lily	None/None G4/S4 4.2	Perennial bulbiferous herb. Chaparral, cismontane woodland, coastal scrub, lower montane coniferous forest, valley and foothill grassland. Granitic, rocky. Elevations: 330-5580ft. (100-1700m.) Blooms May-Jul.	Low Potential	Suitable coastal scrub habitat is present within the Study Area along the alluvial terrace of the northern bank of the Santa Clara River. However, this area has previously been subjected to soil disturbance during the installation of the bike path, roadways, and outfall structure north of the Santa Clara River, and this species is extremely sensitive to soil disturbance.
Calystegia peirsonii Peirson's morning-glory	None/None G4/S4 4.2	Perennial rhizomatous herb. Chaparral, chenopod scrub, cismontane woodland, coastal scrub, lower montane coniferous forest, valley and foothill grassland. Often in disturbed areas or along roadsides or in grassy, open areas. Elevations: 100-4920ft. (30-1500m.) Blooms Apr-Jun.	No Potential	Suitable coastal scrub habitat is present within the Study Area. However, this species is a conspicuous perennial herb that would have been identifiable to genus during the field survey, and no unconfirmed species in the *Calystegia* genus were observed during the field survey.
Cercocarpus betuloides var. *blancheae* island mountain-mahogany	None/None G5T4/S4 4.3	Perennial evergreen shrub. Chaparral, closed-cone coniferous forest. Elevations: 100-1970ft. (30-600m.) Blooms Feb-May.	No Potential	Suitable habitat is present within the Study Area. However, this species is a conspicuous perennial evergreen shrub that would have been identifiable during the field survey and was not observed.

Scientific Name Common Name	Status	Habitat Requirements	Potential to Occur in Project Area	Habitat Suitability/ Observations
Chorizanthe parryi var. *fernandina* San Fernando Valley spineflower	None/SCE G2T1/S1 1B.1	Annual herb. Coastal scrub, valley and foothill grassland. Sandy soils. Elevations: 490-4005ft. (150-1220m.) Blooms Apr-Jul.	Low Potential	Marginally suitable coastal scrub habitat present within the Study Area. However, this species prefers upland mesas with compacted soils, which are not present within the Study Area.
Chorizanthe parryi var. *parryi* Parry's spineflower	None/None G3T2/S2 1B.1	Annual herb. Chaparral, cismontane woodland, coastal scrub, valley and foothill grassland. Openings, Rocky (sometimes), sandy (sometimes). Elevations: 900-4005ft. (275-1220m.) Blooms Apr-Jun.	Low Potential	Marginally suitable coastal scrub habitat present within the Study Area. However, this species prefers upland mesas with compacted soils, which are not present within the Study Area.
Deinandra minthornii Santa Susana tarplant	None/Santa Clara River G2/S2 1B.2	Perennial deciduous shrub. Chaparral, coastal scrub. On sandstone outcrops and crevices, in shrubland. Elevations: 920-2495ft. (280-760m.) Blooms Jul-Nov.	No Potential	Suitable coastal scrub habitat is present within the Study Area. However, this species is a conspicuous perennial shrub that would have been identifiable during the field survey and was not observed. No CNDDB records exist within five miles of the Study Area.
Deinandra paniculata paniculate tarplant	None/None G4/S4 4.2	Annual herb. Coastal scrub, valley and foothill grassland, vernal pools. Usually in vernally mesic sites. Sometimes in vernal pools or on mima mounds near them. Elevations: 80-3085ft. (25-940m.) Blooms (Mar)Apr-Nov.	No Potential	Coastal scrub habitat is present within the Study Area, but no vernally mesic depressional areas are present within the Study Area. No CNDDB records exist within five miles of the Study Area.
Dodecahema leptoceras slender-horned spineflower	FE/SCE G1/S1 1B.1	Annual herb. Chaparral, cismontane woodland, coastal scrub. Flood deposited terraces and washes; associates include Encelia, Dalea, Lepidospartum, etc. Sandy soils. Elevations: 655-2495ft. (200-760m.) Blooms Apr-Jun.	Low Potential	Suitable coastal scrub habitat present within the Study Area. However, only one historic CNDDB record (1893) exists within five miles of the Study Area, and no individuals were found during surveys conducted at the CNDDB record location in 2003.
Dudleya densiflora San Gabriel Mountains dudleya	None/None G2/S2 1B.1	Perennial herb. Chaparral, cismontane woodland, coastal scrub, lower montane coniferous forest, riparian woodland. In crevices and on decomposed granite on cliffs and canyon walls. Elevations: 800-2000ft. (244-610m.) Blooms Mar-Jul.	No Potential	No suitable crevices and decomposed granite of cliffs and canyon walls are present within the Study Area. No CNDDB records exist within five miles of the Study Area.
Nasturtium gambelii Gambel's water cress	FE/SCE G1/S1 1B.1	Perennial rhizomatous herb. Marshes and swamps. Freshwater and brackish marshes at the margins of lakes and along streams, in or just above the water level. Elevations: 15-1085ft. (5-330m.) Blooms Apr-Oct.	No Potential	No suitable freshwater marshes or swamps are present within the Study Area. No CNDDB records exist within five miles of the Study Area.

Scientific Name Common Name	Status	Habitat Requirements	Potential to Occur in Project Area	Habitat Suitability/ Observations
Navarretia fossalis spreading navarretia	FT/None G2/S2 1B.1	Annual herb. Chenopod scrub, marshes and swamps, playas, vernal pools. San Diego hardpan and San Diego claypan vernal pools; in swales and vernal pools, often surrounded by other habitat types. Elevations: 100-2150ft. (30-655m.) Blooms Apr-Jun.	No Potential	No suitable marshes, swamps, playas, or vernal pools are present within the Study Area. No CNDDB records exist within five miles of the Study Area.
Harpagonella palmeri Palmer's grapplinghook	None/None G4/S3 4.2	Annual herb. Chaparral, coastal scrub, valley and foothill grassland. Clay soils; open grassy areas within shrubland. Elevations: 65-3135ft. (20-955m.) Blooms Mar-May.	Low Potential	Coastal scrub habitat is present within the Study Area. However, no suitable clay soils are present. No CNDDB records exist within five miles of the Study Area, and this species was not observed during the field survey.
Helianthus inexpectatus Newhall sunflower	None/None G1/S1 1B.1	Perennial rhizomatous herb. Marshes and swamps, riparian woodland. Freshwater marshes and seeps. Elevations: 1000-1000ft. (305-305m.) Blooms Aug-Oct.	No Potential	Suitable riparian woodland habitat present within the Study Area. However, this species is a conspicuous perennial herb that would have been identifiable to genus during the field survey, and no unconfirmed species in the *Helianthus* genus were observed during the field survey.
Hordeum intercedens vernal barley	None/None G3G4/S3S4 3.2	Annual herb. Coastal dunes, coastal scrub, valley and foothill grassland, vernal pools. Vernal pools, dry, saline streambeds, alkaline flats. Elevations: 15-3280ft. (5-1000m.) Blooms Mar-Jun.	No Potential	No vernal pools, dry, saline streambeds, or alkaline flats are present within the Study Area. No CNDDB records exist within five miles of the Study Area.
Horkelia cuneata var. *puberula* mesa horkelia	None/None G4T1/S1 1B.1	Perennial herb. Chaparral, cismontane woodland, coastal scrub. Sandy or gravelly sites. Elevations: 230-2660ft. (70-810m.) Blooms Feb-Jul(Sep).	Low Potential	Marginally suitable coastal scrub habitat is present within the Study Area. However, no CNDDB records exist within five miles of the Study Area, and the species was not observed during the field survey, which was conducted within the blooming period.
Juglans californica Southern California black walnut	None/None G4/S4 4.2	Perennial deciduous tree. Chaparral, cismontane woodland, coastal scrub, riparian woodland. Slopes, canyons, alluvial habitats. Elevations: 165-2955ft. (50-900m.) Blooms Mar-Aug.	No Potential	Suitable coastal scrub habitat is present within the Study Area. However, this species is a conspicuous tree species that would have been identifiable during the field survey, and was not observed.
Juncus acutus ssp. *leopoldii* southwestern spiny rush	None/None G5T5/S4 4.2	Perennial rhizomatous herb. Coastal dunes, marshes and swamps, meadows and seeps. Moist saline places. Elevations: 10-2955ft. (3-900m.) Blooms (Mar)May-Jun.	No Potential	No suitable coastal dunes, marshes, swamps, meadows, or seeps are present within the Study Area. No CNDDB records exist within five miles of the Study Area.

Scientific Name Common Name	Status	Habitat Requirements	Potential to Occur in Project Area	Habitat Suitability/ Observations
Lepechinia fragrans fragrant pitcher sage	None/None G3/S3 4.2	Perennial shrub. Chaparral. Elevations: 65-4300ft. (20-1310m.) Blooms Mar-Oct.	Low Potential	Suitable habitat is present within the Study Area. However, this species is a conspicuous shrub that would have been identifiable during the field survey and was not observed.
Lepechinia rossii Ross' pitcher sage	None/None G1/S1 1B.2	Perennial shrub. Chaparral. Soil derived from fine-grained, reddish sedimentary rock. Elevations: 1000-2590ft. (305-790m.) Blooms May-Sep.	No Potential	Suitable habitat is present within the Study Area. However, this species is a conspicuous shrub that would have been identifiable during the field survey and was not observed.
Lepidium virginicum var. *robinsonii* Robinson's pepper-grass	None/None G5T3/S3 4.3	Annual herb. Chaparral, coastal scrub. Dry soils, shrubland. Elevations: 5-2905ft. (1-885m.) Blooms Jan-Jul.	Low Potential	Suitable coastal scrub habitat is present within the Study Area. However, this species was not observed during the field survey, which was conducted within the blooming period for this species. Additionally, no CNDDB records for this species exist within five miles of the Study Area.
Lilium humboldtii ssp. *ocellatum* ocellated Humboldt lily	None/None G4T4?/S4? 4.2	Perennial bulbiferous herb. Chaparral, cismontane woodland, coastal scrub, lower montane coniferous forest, riparian woodland. Yellow-pine forest or openings, oak canyons. Elevations: 100-5905ft. (30-1800m.) Blooms Mar-Jul(Aug).	No Potential	No yellow pine forest or oak canyon habitats are present within the Study Area. No CNDDB records exist within five miles of the Study Area.
Lupinus paynei Payne's bush lupine	None/None G1Q/S1 1B.1	Perennial shrub. Coastal scrub, riparian scrub, valley and foothill grassland. Sandy. Elevations: 720-1380ft. (220-420m.) Blooms Mar-Apr(May-Jul).	No Potential	Suitable habitat is present within the Study Area. However, this species is a conspicuous shrub that would have been identifiable during the field survey and was not observed.
Malacothamnus davidsonii Davidson's bush-mallow	None/None G2/S2 1B.2	Perennial deciduous shrub. Chaparral, cismontane woodland, coastal scrub, riparian woodland. Sandy washes. Elevations: 605-3740ft. (185-1140m.) Blooms Jun-Jan.	No Potential	Suitable habitat is present within the Study Area. However, this species is a conspicuous shrub that would have been identifiable during the field survey and was not observed.
Navarretia fossalis spreading navarretia	FT/None G2/S2 1B.1	Annual herb. Chenopod scrub, marshes and swamps, playas, vernal pools. San Diego hardpan and San Diego claypan vernal pools; in swales and vernal pools, often surrounded by other habitat types. Elevations: 100-2150ft. (30-655m.) Blooms Apr-Jun.	No Potential	No marshes, swamps, playas, or vernal pools are present within the Study Area. No CNDDB records exist within five miles of the Study Area.

Scientific Name Common Name	Status	Habitat Requirements	Potential to Occur in Project Area	Habitat Suitability/ Observations
Navarretia ojaiensis Ojai navarretia	None/None G2/S2 1B.1	Annual herb. Chaparral, coastal scrub, valley and foothill grassland. Openings in shrublands or grasslands. Elevations: 900-2035ft. (275-620m.) Blooms May-Jul.	Low Potential	Suitable coastal scrub habitat is present within the Study Area. However, no CNDDB records exist within five miles of the Study Area.
Navarretia setiloba Piute Mountains navarretia	None/None G2/S2 1B.1	Annual herb. Cismontane woodland, pinyon and juniper woodland, valley and foothill grassland. Red clay soils or on gravelly loam. Elevations: 935-6890ft. (285-2100m.) Blooms Apr-Jul.	No Potential	No cismontane woodland, pinyon and juniper woodland, or valley and foothill grassland is present within the Study Area. No CNDDB records exist within five miles of the Study Area.
Opuntia basilaris var. *brachyclada* short-joint beavertail	None/None G5T3/S3 1B.2	Perennial stem. Chaparral, Joshua tree woodland, Mojavean desert scrub, pinyon and juniper woodland. Sandy soil or coarse, granitic loam. Elevations: 1395-5905ft. (425-1800m.) Blooms Apr-Jun(Aug).	No Potential	Suitable habitat present within the Study Area. However, this species is a conspicuous perennial plant that would have been identifiable during the field survey and was not observed. Additionally, the Study Area is outside the known elevation range for this species.
Orcuttia californica California Orcutt grass	FE/SCE G1/S1 1B.1	Annual herb. Vernal pools. Elevations: 50-2165ft. (15-660m.) Blooms Apr-Aug.	No Potential	No vernal pools are present within the Study Area.
Pseudognaphalium leucocephalum white rabbit-tobacco	None/None G4/S2 2B.2	Perennial herb. Chaparral, cismontane woodland, coastal scrub, riparian woodland. Sandy, gravelly sites. Elevations: 0-6890ft. (0-2100m.) Blooms (Jul)Aug-Nov(Dec).	Low Potential	Suitable coastal scrub habitat is present within the Study Area. Two CNDDB records exist for this species within five miles of the Study Area. However, this perennial species was not detected during the field survey.
Senecio aphanactis chaparral ragwort	None/None G3/S2 2B.2	Annual herb. Chaparral, cismontane woodland, coastal scrub. Drying alkaline flats. Elevations: 50-2625ft. (15-800m.) Blooms Jan-Apr(May).	Low Potential	Suitable coastal scrub habitat is present within the Study Area. One historic CNDDB record (1901) exists for this species within five miles of the Study Area. However, this perennial species was not detected during the field survey, which occurred within the blooming period for this species.
Symphyotrichum greatae Greata's aster	None/None G2/S2 1B.3	Perennial rhizomatous herb. Broadleafed upland forest, chaparral, cismontane woodland, lower montane coniferous forest, riparian woodland. Mesic canyons. Elevations: 985-6595ft. (300-2010m.) Blooms Jun-Oct.	Low Potential	Marginally suitable habitat is present within the Study Area. However, this perennial species was not detected during the field survey.

Scientific Name Common Name	Status	Habitat Requirements	Potential to Occur in Project Area	Habitat Suitability/ Observations
Animals				
Invertebrates				
Branchinecta lynchi vernal pool fairy shrimp	FT/None G3/S3	Endemic to the grasslands of the Central Valley, Central Coast mountains, and South Coast mountains, in astatic rain-filled pools. Inhabit small, clear-water sandstone-depression pools and grassed swale, earth slump, or basalt-flow depression pools.	No Potential	No suitable vernal pool habitat is present within the Study Area.
Danaus plexippus pop. 1 monarch - California overwintering population	FC/None G4T2T3/S2S3	Winter roost sites extend along the coast from northern Mendocino to Baja California, Mexico. Roosts located in wind-protected tree groves (eucalyptus, Monterey pine, cypress), with nectar and water sources nearby.	No Potential	No suitable eucalyptus groves are present within the Study Area.
Euphydryas editha quino quino checkerspot butterfly	FE/None G5T1T2/S1S2	Sunny openings within chaparral and coastal sage shrublands in parts of Riverside and San Diego counties. Hills and mesas near the coast. Need high densities of food plants *Plantago erecta*, *P. insularis*, and *Orthocarpus purpurescens*.	No Potential	The Study Area is outside the known range of the species, and suitable food plants are absent from the Study Area.
Streptocephalus woottoni Riverside fairy shrimp	FE/None G1G2/S1S2	Endemic to Western Riverside, Orange, and San Diego counties in areas of tectonic swales/earth slump basins in grassland and coastal sage scrub. Inhabit seasonally astatic pools filled by winter/spring rains. Hatch in warm water later in the season.	No Potential	No suitable vernal pool habitat is present within the Study Area.
Fish				
Catostomus santaanae Santa Ana sucker	FT/None G1/S1	Endemic to Los Angeles Basin south coastal streams. Habitat generalists, but prefer sand-rubble-boulder bottoms, cool, clear water, and algae.	No Potential	Suitable aquatic habitat is present within the active channel of the Santa Clara River, which is located outside of the Study Area.

Scientific Name Common Name	Status	Habitat Requirements	Potential to Occur in Project Area	Habitat Suitability/ Observations
Gasterosteus aculeatus williamsoni unarmored threespine stickleback	FE/SE G5T1/S1 FP	Weedy pools, backwaters, and among emergent vegetation at the stream edge in small Southern California streams. Cool (<24 °C), clear water with abundant vegetation.	No Potential	Suitable aquatic habitat is present within the active channel of the Santa Clara River, which is located outside of the Study Area.
Gila orcuttii arroyo chub	None/None G2/S2 SSC	Native to streams from Malibu Creek to San Luis Rey River basin. Introduced into streams in Santa Clara, Ventura, Santa Ynez, Mojave and San Diego river basins. Slow water stream sections with mud or sand bottoms. Feeds heavily on aquatic vegetation and associated invertebrates.	No Potential	Suitable aquatic habitat is present within the active channel of the Santa Clara River, which is located outside of the Study Area.
Amphibians				
Anaxyrus californicus arroyo toad	FE/None G2G3/S2S3 SSC	Semi-arid regions near washes or intermittent streams, including valley-foothill and desert riparian, desert wash, etc. Rivers with sandy banks, willows, cottonwoods, and sycamores; loose, gravelly areas of streams in drier parts of range.	Moderate Potential	Suitable intermittent stream habitat with arroyo willow, mule fat, Fremont cottonwood, and sandy banks is present in the southeastern portion of the Study Area. However, only one CNDDB occurrence for this species exists within five miles of the Study Area and is located approximately two miles downstream.
Rana draytonii California red-legged frog	FT/None G2G3/S2S3 SSC	Lowlands and foothills in or near permanent sources of deep water with dense, shrubby or emergent riparian vegetation. Requires 11 to 20 weeks of permanent water for larval development. Must have access to estivation habitat.	Low Potential	Marginally suitable relatively permanent sources of fresh water are present in the southern portion of the Study Area and are associated with the Santa Clara River. However, primary constituent elements for California red-legged frog, such as deep-water pools for breeding and emergent riparian vegetation, are absent from the Study Area. The active river channel of the Santa Clara River to the south of the Study Area is narrow, shallow, and does not support emergent riparian vegetation. No CNDDB records exist within five miles of the Study Area.
Spea hammondii western spadefoot	None/None G2G3/S3 SSC	Occurs primarily in grassland habitats but can be found in valley-foothill hardwood woodlands. Vernal pools are essential for breeding and egg-laying.	Low Potential	No grassland or vernal pool habitat exists within the Study Area. Multiple CNDDB records exist within five miles of the Study Area, the closest of which is approximately 0.75 mile upstream.

Scientific Name Common Name	Status	Habitat Requirements	Potential to Occur in Project Area	Habitat Suitability/ Observations
Reptiles				
Anniella spp. California legless lizard	None/None G3G4/S3S4 SSC	Contra Costa County south to San Diego, within a variety of open habitats. This element represents California records of *Anniella* not yet assigned to new species within the *Anniella pulchra* complex. Variety of habitats; generally in moist, loose soil. They prefer soils with a high moisture content.	High Potential	Suitable open habitat including California sagebrush scrub and scale broom scrub are present within the Study Area as well as loose, moist soil adjacent to the active channel of the Santa Clara River. There are multiple CNDDB occurrences of this species within five miles of the Study Area, the closest being 0.43 mile south.
Arizona elegans occidentalis California glossy snake	None/None G5T2/S2 SSC	Patchily distributed from the eastern portion of San Francisco Bay, southern San Joaquin Valley, and the Coast, Transverse, and Peninsular ranges, south to Baja California. Generalist reported from a range of scrub and grassland habitats, often with loose or sandy soils.	Low Potential	Suitable open habitat, including California sagebrush scrub and scale broom scrub, are present within the Study Area. However, all three CNDDB occurrences within five miles of the Study Area are more than 60 years old.
Aspidoscelis tigris stejnegeri coastal whiptail	None/None G5T5/S3 SSC	Found in deserts and semi-arid areas with sparse vegetation and open areas. Also found in woodland and riparian areas. Ground may be firm soil, sandy, or rocky.	High Potential	Suitable open habitat with sandy soils including the scale broom scrub and California sagebrush scrub vegetation communities are present within the Study Area. There are multiple CNDDB occurrences of this species within five miles of the Study Area, the closest being two miles southeast.
Emys marmorata western pond turtle	None/None G3G4/S3 SSC	A thoroughly aquatic turtle of ponds, marshes, rivers, streams and irrigation ditches, usually with aquatic vegetation, below 6000 ft elevation. Needs basking sites and suitable (sandy banks or grassy open fields) upland habitat up to 0.5 km from water for egg-laying.	High Potential	Suitable aquatic habitat is present along the Santa Clara River to the south of the Study Area, and suitable sandy banks for basking are present in the southern portion of the Study Area. The closest CNDDB occurrence of this species is approximately three miles downstream of the Study Area.
Phrynosoma blainvillii coast horned lizard	None/None G3G4/S3S4 SSC	Frequents a wide variety of habitats, most common in lowlands along sandy washes with scattered low bushes. Open areas for sunning, bushes for cover, patches of loose soil for burial, and abundant supply of ants and other insects.	High Potential	Suitable open habitat, including California sagebrush scrub and scale broom scrub, are present within the Study Area, as well as loose soil for burial adjacent to the active channel of the Santa Clara River. There are multiple CNDDB occurrences of this species within five miles of the Study Area, the closest being 0.5 mile downstream within the Santa Clara River floodplain.

Scientific Name Common Name	Status	Habitat Requirements	Potential to Occur in Project Area	Habitat Suitability/ Observations
Birds				
Accipiter cooperii Cooper's hawk	None/None G5/S4 WL	Woodland, chiefly of open, interrupted or marginal type. Nest sites mainly in riparian growths of deciduous trees, as in canyon bottoms on river floodplains; also, live oaks.	High Potential	Suitable woodland habitat for nesting and foraging present within the Study Area. One CNDDB nesting occurrence from 2005 exists within five miles of the Study Area and is located approximately 0.15 mile south. However, no nests or individuals were observed within the Study Area during the field survey, which was conducted reasonably within the nesting season.
Ammodramus savannarum grasshopper sparrow	None/None G5/S3 SSC	Dense grasslands on rolling hills, lowland plains, in valleys and on hillsides on lower mountain slopes. Favors native grasslands with a mix of grasses, forbs and scattered shrubs. Loosely colonial when nesting.	Low Potential	No grassland habitat is present within the Study Area. One CNDDB occurrence exists within five miles of the Study Area and is located approximately 4.8 miles northwest.
Artemisiospiza belli belli Bell's sage sparrow	None/None G5T2T3/S3 WL	Nests in chaparral dominated by fairly dense stands of chamise. Found in coastal sage scrub in south of range. Nest located on the ground beneath a shrub or in a shrub 6 to 18 inches above ground. Territories about 50 yds apart.	Low Potential	No chaparral dominated by chamise occurs within the Study Area. Two CNDDB occurrences exist within five miles of the Study Area, the closest being four miles northwest.
Athene cunicularia burrowing owl	None/None G4/S3 SSC	Open, dry annual or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation. Subterranean nester, dependent upon burrowing mammals, most notably, the California ground squirrel.	Low Potential	Suitable open habitat is present in the southern portion of the Study Area adjacent to the Santa Clara River. However, no ground squirrels were observed within the Study Area during the field survey, and few mammal burrows were observed. None of the mammal burrows observed exhibited sign of burrowing owl (i.e., whitewash, pellets, feathers).
Buteo swainsoni Swainson's hawk	None/ST G5/S3	Breeds in grasslands with scattered trees, juniper-sage flats, riparian areas, savannahs, and agricultural or ranch lands with groves or lines of trees. Requires adjacent suitable foraging areas such as grasslands, or alfalfa or grain fields supporting rodent populations.	Low Potential	Suitable nesting habitat exists within the riparian corridor of the Santa Clara River. However, the Study Area does not provide ideal foraging habitat, and rodent activity (i.e., mammal burrows) was low. Additionally, only one CNDDB occurrence exists within five miles of the Study Area and is more than 100 years old.
Elanus leucurus white-tailed kite	None/None G5/S3S4 FP	Rolling foothills and valley margins with scattered oaks and river bottomlands or marshes next to deciduous woodland. Open grasslands, meadows, or marshes for foraging close to isolated, dense-topped trees for nesting and perching.	Low Potential	Suitable grassland, meadows, or marshes for foraging habitat are absent from the Study Area, and no nests were observed during the field survey.

Scientific Name Common Name	Status	Habitat Requirements	Potential to Occur in Project Area	Habitat Suitability/ Observations
Empidonax traillii extimus southwestern willow flycatcher	FE/SE G5T2/S1	Riparian woodlands in Southern California.	Low Potential	The southeastern boundary of the Study Area features moderately suitable riparian habitat for nesting and foraging for this species. However, there are no CNDDB occurrences within ten miles of the Study Area, and the Study Area is not located within United States Fish and Wildlife Service-designated critical habitat for the species. The closest United States Fish and Wildlife Service-designated critical habitat is more than two miles downstream (west) of the Study Area.
Eremophila alpestris actia California horned lark	None/None G5T4Q/S4 WL	Coastal regions, chiefly from Sonoma County to San Diego County. Also main part of San Joaquin Valley and east to foothills. Short-grass prairie, "bald" hills, mountain meadows, open coastal plains, fallow grain fields, alkali flats.	Low Potential	No suitable habitat exists within the Study Area. One CNDDB occurrence exists within five miles of the Study Area and is located approximately four miles northwest.
Gymnogyps californianus California condor	FE/SE G1/S1 FP	Require vast expanses of open savannah, grasslands, and foothill chaparral in mountain ranges of moderate altitude. Deep canyons containing clefts in the rocky walls provide nesting sites. Forages up to 100 miles from roost/nest.	Low Potential	Suitable foraging habitat is present within the Study Area. However, nesting habitat is absent from the Study Area, and there are no CNDDB occurrences within five miles of the Study Area.
Lanius ludovicianus loggerhead shrike	None/None G4/S4 SSC	Broken woodlands, savannah, pinyon-juniper, Joshua tree, and riparian woodlands, desert oases, scrub and washes. Prefers open country for hunting, with perches for scanning, and fairly dense shrubs and brush for nesting.	Moderate Potential	Suitable scrub and riparian woodland habitat for nesting is present within the Study Area, but preferred open habitat for foraging is limited due to development within and adjacent to the Study Area. Two CNDDB occurrences exist within five miles of the Study Area, the closest being four miles northwest.
Polioptila californica californica coastal California gnatcatcher	FT/None G4G5T3Q/S2 SSC	Obligate, permanent resident of coastal sage scrub below 2500 ft in Southern California. Low, coastal sage scrub in arid washes, on mesas and slopes. Not all areas classified as coastal sage scrub are occupied.	Low Potential	Marginally suitable coastal sage scrub habitat exists in the southern portion of the Study Area. The coastal sage scrub habitat within the Study Area includes sparsely scattered shrubs and is fragmented by development surrounding the Study Area. The closest CNDDB occurrence is approximately 2.75 miles southeast of the Study Area.

Scientific Name Common Name	Status	Habitat Requirements	Potential to Occur in Project Area	Habitat Suitability/ Observations
Vireo bellii pusillus least Bell's vireo	FE/SE G5T2/S2	Summer resident of Southern California in low riparian in vicinity of water or in dry river bottoms; below 2000 ft. Nests placed along margins of bushes or on twigs projecting into pathways, usually willow, Baccharis, mesquite.	High Potential	The southeastern boundary of the Study Area features moderately suitable riparian habitat for nesting and foraging for this species, and eBird documents multiple occurrences of this species within five miles of the Study Area (eBird 2022). However, there are no CNDDB occurrences within five miles of the Study Area, and the Study Area is not located within United States Fish and Wildlife Service-designated critical habitat for the species. The closest United States Fish and Wildlife Service-designated critical habitat is more than two miles downstream (west) of the Study Area.
Mammals				
Antrozous pallidus pallid bat	None/None G4/S3 SSC	Found in a variety of habitats including deserts, grasslands, shrublands, woodlands, and forests. Most common in open, dry habitats with rocky areas for roosting. Roosts in crevices of rock outcrops, caves, mine tunnels, buildings, bridges, and hollows of live and dead trees, which must protect bats from high temperatures. Very sensitive to disturbance of roosting sites.	Low Potential	Some suitable nesting habitat is present within the existing outfall structure in the southeastern portion of the Study Area. However, the Study Area is located within and adjacent to development with frequent disturbances. One CNDDB occurrence exists approximately five miles northeast of the Study Area; however, it is more than 80 years old.
Euderma maculatum spotted bat	None/None G4/S3 SSC	Occupies a wide variety of habitats from arid deserts and grasslands through mixed conifer forests. Typically forages in open terrain; over water and along washes. Feeds almost entirely on moths. Roosts in rock crevices in cliffs or caves. Occasionally roosts in buildings.	Low Potential	Suitable aquatic habitat is present within the Santa Clara River to the south of the Study Area, and low-quality roosting habitat is present within the existing outfall structure. However, preferred rock crevices or caves are absent from the Study Area, and the only CNDDB occurrence within five miles of the Study Area is more than 100 years old.
Eumops perotis californicus western mastiff bat	None/None G4G5T4/S3S4 SSC	Occurs in open, semi-arid to arid habitats, including coniferous and deciduous woodlands, coastal scrub, grasslands, and chaparral. Roosts in crevices in cliff faces and caves, and buildings. Roosts typically occur high above ground.	Low Potential	Some suitable nesting habitat is present within the existing outfall structure in the southeastern portion of the Study Area. However, the Study Area is located within and adjacent to development with frequent disturbances. One CNDDB occurrence exists approximately five miles south of the Study Area; however, it is more than 60 years old.

Scientific Name Common Name	Status	Habitat Requirements	Potential to Occur in Project Area	Habitat Suitability/ Observations
Lepus californicus bennettii San Diego black-tailed jackrabbit	None/None G5T3T4/S3S4 SSC	Occurs in Los Angeles, San Bernardino, Riverside, and San Diego counties of Southern California. Typically found in open shrub habitats. Will also occur in woodland habitats with open understory adjacent to shrublands.	Moderate Potential	Suitable habitat exists within the California sagebrush scrub and scale broom scrub in the southern portion of the Study Area. However, there is only one CNDDB occurrence within five miles of the Study Area, and it is located approximately five miles north of the Study Area.
Taxidea taxus American badger	None/None G5/S3 SSC	Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils. Needs sufficient food, friable soils and open, uncultivated ground. Preys on burrowing rodents. Digs burrows.	Low Potential	Moderately suitable open scrub habitat is present within the California sagebrush scrub and scale broom scrub. However, this habitat has been fragmented by development to the north and south of the Santa Clara River. Additionally, burrowing rodent activity was low within the Study Area, and no diagnostic sign of the species was observed within the burrows present (i.e., claw marks at burrow entrances).

Regional Vicinity refers to within a five-mile search radius of site.

Status (Federal/State)
FE = Federal Endangered
FT = Federal Threatened
FPE = Federal Proposed Endangered
FPT = Federal Proposed Threatened
FD = Federal Delisted
FC = Federal Candidate
SE = State Endangered
ST = State Threatened
SCE = State Candidate Endangered
SCT = State Candidate Threatened
SR = State Rare
SD = State Delisted
SSC = CDFW Species of Special Concern
FP = CDFW Fully Protected
WL = CDFW Watch List

California Rare Plant Rank (California Native Plant Society)
1A = Presumed extirpated in California, and rare or extinct elsewhere
1B = Rare, Threatened, or Endangered in California and elsewhere
2A = Presumed extirpated in California, but common elsewhere
2B= Rare, Threatened, or Endangered in California, but more common elsewhere
3 = Need more information (Review List)
4 = Limited Distribution (Watch List)

California Rare Plant Rank Threat Code Extension
.1 = Seriously endangered in California (>80% of occurrences threatened/high degree and immediacy of threat)
.2 = Moderately threatened in California (20 to 80% of occurrences threatened/moderate degree and immediacy of threat)
.3 = Not very endangered in California (<20% of occurrences threatened/low degree and immediacy of threat)

Additional notations may be provided as follows
T – Intraspecific Taxon (subspecies, varieties, and other designations below the level of species)
Q – Questionable taxonomy that may reduce conservation priority
? – Inexact numeric rank

Other Statuses
G1 or S1 Critically Imperiled Globally or Subnationally (state)
G2 or S2 Imperiled Globally or Subnationally (state)
G3 or S3 Vulnerable to extirpation or extinction Globally or Subnationally (state)
G4/5 or S4/5 Apparently secure, common and abundant
GH or SH Possibly Extirpated – missing; known from only historical occurrences but still some hope of rediscovery

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Appendix E

Ordinary High Water Mark and Wetland Determination Data Forms

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: South Wells PFAS Groundwater Treatment Facility and Pocket Park		**Date:** 2/23/2022	**Time:** 1245
Project Number: 21-12299		**Town:** Santa Clarita	**State:** California
Stream: Santa Clara River		**Photo begin file#:**	**Photo end file#:**
Investigator(s): Robin Murray, Kyle Gern			

Y ☒ / N ☐ Do normal circumstances exist on the site?

Y ☐ / N ☒ Is the site significantly disturbed?

Location Details: South of Bridgeport Park in Santa Clarita

Projection: Mercator **Datum:** NAD83

Coordinates: 34.425052°N, -118.547197°W

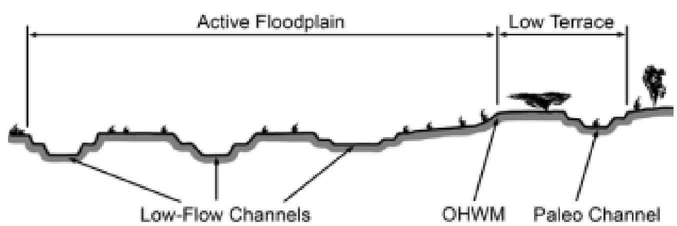
Potential anthropogenic influences on the channel system:
Vehicle use is present within the channel of the Santa Clara River. An articifical stormwater outlet is present in the eastern portion of the Study Area, and consists of a concrete structure and concrete rip rap.

Brief site description:
The Study Area is situated adjacent to and within the Ordinary High Water Mark (OHWM) of the Santa Clara River on the northern bank of the river. Vegetation/land covers associated with the Santa Clara River include fremont cottonwood forest and woodland, riverwash, big sagebrush, California sagebrush scrub, disturbed, developed, and bank catclaw (Acacia redolens).

Checklist of resources (if available):

- ☒ Aerial photography
  Dates:
- ☒ Topographic maps
- ☐ Geologic maps
- ☐ Vegetation maps
- ☐ Soils maps
- ☐ Rainfall/precipitation maps
- ☐ Existing delineation(s) for site
- ☒ Global positioning system (GPS)
- ☐ Other studies
- ☐ Stream gage data
  Gage number:
  Period of record:
  - ☐ History of recent effective discharges
  - ☐ Results of flood frequency analysis
  - ☐ Most recent shift-adjusted rating
  - ☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units

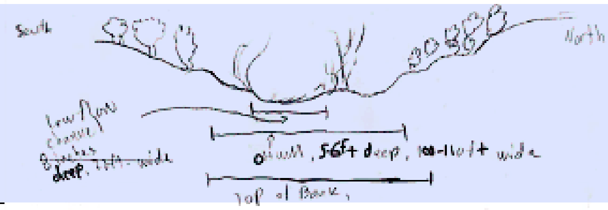


Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   - ☐ Mapping on aerial photograph
   - ☒ GPS
   - ☐ Digitized on computer
   - ☐ Other:

Project ID: 21-12299 **Cross section ID:** OH-1 **Date:** 2/23/2022 **Time:** 1245

Cross section drawing:



OHWM

GPS point: 34.425043°N, -118.547203°W

Indicators:

- [x] Change in average sediment texture
- [x] Change in vegetation species
- [x] Change in vegetation cover
- [x] Break in bank slope
- [ ] Other: ____________
- [ ] Other: ____________

Comments:

Sediment within the OHWM consists of finely-grained sand, and sediment above the OHWM is more coarsely-grained. Vegetation within the OHWM consists of riparian species such as mulefat (Baccharis salificolia), and fremont cottonwood (Populus fremontii), and vegetation above the OHWM consists of shrubs such as big sagebrush (Artemisia tridentata) and California sagebrush (Artemisia californica). Vegetation coverage is lower within the OHWM due to scour from water flows, and is higher outside the OHWM. A break in bank slope is evident upon transitioning from within the OHWM to outside the OHWM.

Floodplain unit:

- [x] Low-Flow Channel
- [ ] Active Floodplain
- [ ] Low Terrace

GPS point: 34.424929°N, -118.547191°W

Characteristics of the floodplain unit:

Average sediment texture: gravel

Total veg cover: 56 % Tree: 50 % Shrub: 5 % Herb: 1 %

Community successional stage:

- [ ] NA
- [ ] Early (herbaceous & seedlings)
- [ ] Mid (herbaceous, shrubs, saplings)
- [x] Late (herbaceous, shrubs, mature trees)

Indicators:

- [ ] Mudcracks
- [x] Ripples
- [x] Drift and/or debris
- [x] Presence of bed and bank
- [x] Benches
- [ ] Soil development
- [ ] Surface relief
- [x] Other: flowing water
- [ ] Other: ____________
- [ ] Other: ____________

Comments:

Water was observed flowing within the low-flow channel at the time of the survey. Drift and debris deposits (e.g., plant leaves and stems) are present within the low-flow channel, as well as water ripples, the presence of a bed and bank, and bench formation.

Project ID: 21-12299 **Cross section ID:** OH-1 **Date:** 2/23/2021 **Time:** 1245

Floodplain unit: ☐ Low-Flow Channel ☒ Active Floodplain ☐ Low Terrace

GPS point: 34.425176°N, -118.547226°W

Characteristics of the floodplain unit:
Average sediment texture: coarse sand
Total veg cover: 35 % Tree: 5 % Shrub: 25 % Herb: 5 %
Community successional stage:
- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☒ Late (herbaceous, shrubs, mature trees)

Indicators:
- ☐ Mudcracks
- ☐ Ripples
- ☒ Drift and/or debris
- ☒ Presence of bed and bank
- ☒ Benches
- ☐ Soil development
- ☐ Surface relief
- ☐ Other: ____
- ☐ Other: ____
- ☐ Other: ____

Comments:

The majority of the plant species observed within the active floodplain are shrubs, and include big sagebrush, California sagebrush, and California broomsage (Lepidospartum squamatum). Drift deposits are present within the active floodplain and include plant leaves and stems. An evident bed and bank are present, as well as the formation of benches along the bank.

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: ____

Characteristics of the floodplain unit:
Average sediment texture: ____
Total veg cover: ____ % Tree: ____ % Shrub: ____ % Herb: ____ %
Community successional stage:
- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:
- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☐ Other: ____
- ☐ Other: ____
- ☐ Other: ____

Comments:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: South Wells PFAS Groundwater Treatment Facility and Pocket Park City/County: Santa Clarita/LA County Sampling Date: 2/23/2022

Applicant/Owner: Santa Clarita Valley Water Agency State: CA Sampling Point: SP01

Investigator(s): Robin Murray, Kyle Gern Section, Township, Range: S15, T04N, R16W

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): 1

Subregion (LRR): C - Mediterranean Lat: 34.425052 Long: -118.547197 Datum: NAD83

Soil Map Unit Name: Riverwash NWI classification: R5UBA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No ☐

Are Vegetation ☐ Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	✔	
Hydric Soil Present?		✔
Wetland Hydrology Present?	✔	

Is the Sampled Area within a Wetland? Yes ☐ No ✔

Remarks:

Sample Point 01 (SP01) is located approximately 30 feet north of the low-flow channel of the Santa Clara River within the Ordinary High Water Mark (OHWM). SP01 is located in a depressional area surrounded by mulefat (Baccharis salicifolia).

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft. x 30 ft.)			
1. None			
2.			
3.			
4.			
= Total Cover	0		
Sapling/Shrub Stratum (Plot size: 15 ft. x 15 ft.)			
1. Baccharis salicifolia	65	Y	FACW
2. Salix lasiolepis	2	N	FACW
3.			
4.			
5.			
= Total Cover	0		
Herb Stratum (Plot size: 5 ft. x 5 ft.)			
1. Torilis arvensis	1	N	UPL
2. Bromus diandrus	1	N	UPL
3.			
4.			
5.			
6.			
7.			
8.			
= Total Cover	2		
Woody Vine Stratum (Plot size: 15 ft x 15 ft)			
1. None			
2.			
= Total Cover	0		

% Bare Ground in Herb Stratum 98 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ✔ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✔ No ☐

Remarks:

SP01 is located in an area densely covered with mulefat. Mulefat is the sole dominant species, totaling 65 percent coverage in the shrub/sapling layer. Herbaceous plant species are present at low cover (less than 5 percent).

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SOIL

Sampling Point: SP01

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 4/2	100					LS	No ribbon formation
12-24	10YR 5/2	100					S	No ribbon formation

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- [ ] Histosol (A1)
- [ ] Histic Epipedon (A2)
- [ ] Black Histic (A3)
- [ ] Hydrogen Sulfide (A4)
- [ ] Stratified Layers (A5) (**LRR C**)
- [ ] 1 cm Muck (A9) (**LRR D**)
- [ ] Depleted Below Dark Surface (A11)
- [ ] Thick Dark Surface (A12)
- [ ] Sandy Mucky Mineral (S1)
- [ ] Sandy Gleyed Matrix (S4)
- [ ] Sandy Redox (S5)
- [ ] Stripped Matrix (S6)
- [ ] Loamy Mucky Mineral (F1)
- [ ] Loamy Gleyed Matrix (F2)
- [ ] Depleted Matrix (F3)
- [ ] Redox Dark Surface (F6)
- [ ] Depleted Dark Surface (F7)
- [ ] Redox Depressions (F8)
- [ ] Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- [ ] 1 cm Muck (A9) (**LRR C**)
- [ ] 2 cm Muck (A10) (**LRR B**)
- [ ] Reduced Vertic (F18)
- [ ] Red Parent Material (TF2)
- [ ] Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: None

Depth (inches): N/A

Hydric Soil Present? Yes ___ No ✔

Remarks:

Soils within SP01 are moist starting at four inches below the soil surface. No soil saturation is present. The first soil layer (zero to 12 inches) consists of finely-grained sand, and the second soil layer (12 to 24 inches) consists of gravelly sand. Some roots observed within SP01. No indicators of problematic sandy soils are present.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- [ ] Surface Water (A1)
- [ ] High Water Table (A2)
- [ ] Saturation (A3)
- [ ] Water Marks (B1) (**Nonriverine**)
- [ ] Sediment Deposits (B2) (**Nonriverine**)
- [ ] Drift Deposits (B3) (**Nonriverine**)
- [ ] Surface Soil Cracks (B6)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [ ] Water-Stained Leaves (B9)
- [ ] Salt Crust (B11)
- [ ] Biotic Crust (B12)
- [ ] Aquatic Invertebrates (B13)
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- [ ] Water Marks (B1) (**Riverine**)
- [ ] Sediment Deposits (B2) (**Riverine**)
- [x] Drift Deposits (B3) (**Riverine**)
- [x] Drainage Patterns (B10)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)

Field Observations:

	Yes	No	Depth (inches)
Surface Water Present?		✔	
Water Table Present?		✔	
Saturation Present? (includes capillary fringe)		✔	

Wetland Hydrology Present? Yes ✔ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Drift deposits are present surrounding SP01 and include leaves and stems. Drainage patterns are also present and are indicated by bent plant stems that are pointed in the direction of water flow (west), indicating that during high-flow events water flows within SP01 in the westerly direction. The Santa Clara River flows from east to west in the southern portion of the study area where SP01 is located.

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Appendix F

Arbor Essence Tree Report

Appendix C

Cultural Resources Assessment (CONFIDENTIAL)

** This document contains sensitive and confidential information concerning archaeological sites. Archaeological site locations are exempt from the California Public Records Act, as specified in Government Code 6254.10 and from the Freedom of Information Act (Exemption 3) under the legal authority of both the National Historic Preservation Act (PL 102-574, Section 304[a]) and the Archaeological Resources Protection Act (PL 96-95, Section 9[a]).*

Appendix D

Energy Calculations

S Wells PFAS Groundwater Treatment and Disinfection Facility Project

Last Updated: September 8, 2022

Compression-Ignition Engine Brake-Specific Fuel Consumption (BSFC) Factors **[1]**:

HP: 0 to 100	0.0588	HP: Greater than 100	0.0529

Values above are expressed in gallons per horsepower-hour/BSFC.

CONSTRUCTION EQUIPMENT

Construction Equipment	#	Hours per Day	Horsepower	Load Factor	Construction Phase	Fuel Used (gallons)
Bore/Drill Rigs	1	8	221	0.5	Site Preparation	2,056
Excavators	1	8	158	0.38	Site Preparation	1,117
Rubber Tired Dozers	1	8	247	0.4	Site Preparation	1,838
Tractors/Loaders/Backhoes	2	7	97	0.37	Site Preparation	1,299
Excavators	1	8	158	0.38	Grading	508
Plate Compactors	1	8	8	0.43	Grading	32
Rubber Tired Dozers	1	8	247	0.4	Grading	836
Tractors/Loaders/Backhoes	2	7	97	0.37	Grading	591
Bore/Drill Rigs	1	8	221	0.5	Equipment Installation	10,280
Cement and Mortar Mixers	2	8	9	0.56	Equipment Installation	1,043
Cranes	1	8	231	0.29	Equipment Installation	6,232
Forklifts	1	7	89	0.2	Equipment Installation	1,611
Skid Steer Loaders	1	8	65	0.37	Equipment Installation	2,487
Tractors/Loaders/Backhoes	1	6	97	0.37	Equipment Installation	2,784
Bore/Drill Rigs	1	24	221	0.5	Well Drilling	30,840
Generator Sets	1	24	84	0.74	Well Drilling	19,287
Cement and Mortar Mixers	1	8	9	0.56	Paving	47
Forklifts	1	8	89	0.2	Paving	167
Tractors/Loaders/Backhoes	1	8	97	0.37	Paving	337
Forklifts	1	8	89	0.2	Site Restoration	368
Skid Steer Loaders	1	8	65	0.37	Site Restoration	497
Tractors/Loaders/Backhoes	1	7	97	0.37	Site Restoration	650
					Total Fuel Used	**84,908**
						(Gallons)

Construction Phase	Days of Operation
Site Preparation	44
Grading	20
Equipment Installation	220
Well Drilling	43
Paving	20
Site Restoration	44
Total Days	391

WORKER TRIPS

Constuction Phase	MPG [2]	Trips	Trip Length (miles)	Fuel Used (gallons)
Site Preparation	24.1	20	14.7	536.76
Grading	24.1	20	14.7	243.98
Equipment Installation	24.1	40	14.7	5367.63
Well Drilling	24.1	20	14.7	524.56
Paving	24.1	20	14.7	243.98
Site Restoration	24.1	20	14.7	536.76
			Fuel	**7,453.69**

HAULING AND VENDOR TRIPS

Trip Class	MPG [2]	Trips	Trip Length (miles)	Fuel Used (gallons)
HAULING TRIPS				
Site Preparation	7.5	0	20.0	0.00
Grading	7.5	1300	6.8	1178.67
Equipment Installation	7.5	0	20.0	0.00
Well Drilling	7.5	0	20.0	0.00
Paving	7.5	0	20.0	0.00
Site Restoration	7.5	0	20.0	0.00
			Fuel	**1,178.67**
VENDOR TRIPS				
Site Preparation	7.5	0	6.9	0.00
Grading	7.5	0	6.9	0.00
Equipment Installation	7.5	21	6.9	4250.40
Well Drilling	7.5	21	6.9	830.76
Paving	7.5	0	6.9	0.00
Site Restoration	7.5	0	3.9	0.00
			Fuel	**5,081.16**

Total Gasoline Consumption (gallons)	**7,454**
Total Diesel Consumption (gallons)	**91,168**

Sources:

[1] United States Environmental Protection Agency. 2021. *Exhaust and Crankcase Emission Factors for Nonroad Compression-Ignition Engines in MOVES3.0.2* . September. Available at: https://www.epa.gov/system/files/documents/2021-08/420r21021.pdf.

[2] United States Department of Transportation, Bureau of Transportation Statistics. 2021. *National Transportation Statistics* . Available at: https://www.bts.gov/topics/national-transportation-statistics.

S Wells PFAS Groundwater Treatment and Disinfection Facility Project

Last Updated: September 8, 2022

Populate one of the following tables (Leave the other blank):

Annual VMT	
Annual VMT:	12,792

OR

Daily Vehicle Trips	
Daily Vehicle Trips:	
Average Trip Distance:	

Fleet Class	Fleet Mix
Light Duty Auto (LDA)	0.000000
Light Duty Truck 1 (LDT1)	0.000000
Light Duty Truck 2 (LDT2)	0.964333
Medium Duty Vehicle (MDV)	0.000000
Light Heavy Duty 1 (LHD1)	0.000000
Light Heavy Duty 2 (LHD2)	0.000000
Medium Heavy Duty (MHD)	0.031704
Heavy Heavy Duty (HHD)	0.003963
Other Bus (OBUS)	0.000000
Urban Bus (UBUS)	0.000000
Motorcycle (MCY)	0.000000
School Bus (SBUS)	0.000000
Motorhome (MH)	0.000000

Fuel Economy (MPG) [1]	
Passenger Vehicles	24.4
Light-Med Duty Trucks	17.9
Heavy Trucks/Other	7.5
Motorcycles	44

Fleet Mix

Vehicle Type	Percent	Fuel Type	Annual VMT: VMT	Vehicle Trips: VMT	Fuel Consumption (Gallons)
Passenger Vehicles	*0.00%*	*Gasoline*	0	0.00	0.00
Light-Medium Duty Trucks	*96.43%*	*Gasoline*	12336	0.00	689.15
Heavy Trucks/Other	*3.57%*	*Diesel*	456	0.00	60.83
Motorcycle	*0.00%*	*Gasoline*	0	0.00	0.00

Total Gasoline Consumption (gallons)	**689.15**
Total Diesel Consumption (gallons)	**60.83**

Sources:

[1] United States Department of Transportation, Bureau of Transportation Statistics. 2019. National Transportation Statistics 2019. Available at: https://www.bts.gov/topics/national-transportation-statistics.

Appendix E

Noise and Vibration Modeling

Noise Measurement 1

Data Logger 2	
Duration (seconds)	3
Weighting	A
Response	SLOW
Range	40-100
L05	64.7
L10	60.5
L50	51.6
L90	46
L95	44.5
Lmax	76
Time	2/23/2022 8:28
SEL	88.2
Leq	**58.5**

No.s	Date Time	Time	dB	Sound Energy
1	2/23/2022 8:25	8:25 AM	54.6	865209.4509
2	2/23/2022 8:25	8:25 AM	66.1	12221408.33
3	2/23/2022 8:25	8:25 AM	57.5	1687023.976
4	2/23/2022 8:25	8:25 AM	59	2382984.704
5	2/23/2022 8:25	8:25 AM	66.5	13400507.76
6	2/23/2022 8:25	8:25 AM	57.5	1687023.976
7	2/23/2022 8:25	8:25 AM	51.2	395477.0216
8	2/23/2022 8:25	8:25 AM	52.9	584953.3799
9	2/23/2022 8:25	8:25 AM	49.5	267375.2814
10	2/23/2022 8:25	8:25 AM	50.2	314138.5644
11	2/23/2022 8:25	8:25 AM	49.6	273603.2518
12	2/23/2022 8:25	8:25 AM	49.4	261289.077
13	2/23/2022 8:25	8:25 AM	49.8	286497.7758
14	2/23/2022 8:25	8:25 AM	49.9	293171.1663
15	2/23/2022 8:25	8:25 AM	49.9	293171.1663
16	2/23/2022 8:25	8:25 AM	49.3	255341.4115
17	2/23/2022 8:25	8:25 AM	49.9	293171.1663
18	2/23/2022 8:26	8:26 AM	49.6	273603.2518
19	2/23/2022 8:26	8:26 AM	48.1	193696.2687
20	2/23/2022 8:26	8:26 AM	46.8	143589.0277
21	2/23/2022 8:26	8:26 AM	45.8	114056.8189
22	2/23/2022 8:26	8:26 AM	45.2	99339.33644
23	2/23/2022 8:26	8:26 AM	45.2	99339.33644
24	2/23/2022 8:26	8:26 AM	44.1	77111.87348
25	2/23/2022 8:26	8:26 AM	44.7	88536.2768
26	2/23/2022 8:26	8:26 AM	43.5	67161.63416
27	2/23/2022 8:26	8:26 AM	43.4	65632.84872
28	2/23/2022 8:26	8:26 AM	43	59857.86945

29	2/23/2022 8:26	8:26 AM	43	59857.86945
30	2/23/2022 8:26	8:26 AM	43.4	65632.84872
31	2/23/2022 8:26	8:26 AM	43.4	65632.84872
32	2/23/2022 8:26	8:26 AM	43.8	71964.98757
33	2/23/2022 8:26	8:26 AM	44.4	82626.8611
34	2/23/2022 8:26	8:26 AM	44.8	90598.55161
35	2/23/2022 8:26	8:26 AM	45.9	116713.5435
36	2/23/2022 8:26	8:26 AM	47.1	153858.4152
37	2/23/2022 8:26	8:26 AM	61.1	3864748.655
38	2/23/2022 8:27	8:27 AM	66.6	13712645.69
39	2/23/2022 8:27	8:27 AM	62.1	4865430.292
40	2/23/2022 8:27	8:27 AM	70.2	31413856.44
41	2/23/2022 8:27	8:27 AM	60.4	3289434.588
42	2/23/2022 8:27	8:27 AM	52.2	497876.0722
43	2/23/2022 8:27	8:27 AM	49.2	249529.1313
44	2/23/2022 8:27	8:27 AM	48.5	212383.7353
45	2/23/2022 8:27	8:27 AM	46.6	137126.4569
46	2/23/2022 8:27	8:27 AM	48.7	222393.0724
47	2/23/2022 8:27	8:27 AM	48	189287.2033
48	2/23/2022 8:27	8:27 AM	46.5	134005.0776
49	2/23/2022 8:27	8:27 AM	46.5	134005.0776
50	2/23/2022 8:27	8:27 AM	47.4	164862.2622
51	2/23/2022 8:27	8:27 AM	47.2	157442.2381
52	2/23/2022 8:27	8:27 AM	47.3	161109.5389
53	2/23/2022 8:27	8:27 AM	47.5	168702.3976
54	2/23/2022 8:27	8:27 AM	47.5	168702.3976
55	2/23/2022 8:27	8:27 AM	47.4	164862.2622
56	2/23/2022 8:27	8:27 AM	48.2	198208.0344
57	2/23/2022 8:27	8:27 AM	48.7	222393.0724
58	2/23/2022 8:28	8:28 AM	49.5	267375.2814
59	2/23/2022 8:28	8:28 AM	49.1	243849.1548
60	2/23/2022 8:28	8:28 AM	48.8	227573.2725
61	2/23/2022 8:28	8:28 AM	48.4	207549.2913
62	2/23/2022 8:28	8:28 AM	48.4	207549.2913
63	2/23/2022 8:28	8:28 AM	48.1	193696.2687
64	2/23/2022 8:28	8:28 AM	47.1	153858.4152
65	2/23/2022 8:28	8:28 AM	45.8	114056.8189
66	2/23/2022 8:28	8:28 AM	44.5	84551.48794
67	2/23/2022 8:28	8:28 AM	44.5	84551.48794
68	2/23/2022 8:28	8:28 AM	45.2	99339.33644
69	2/23/2022 8:28	8:28 AM	46.1	122214.0833
70	2/23/2022 8:28	8:28 AM	56.1	1222140.833
71	2/23/2022 8:28	8:28 AM	71.2	39547702.16
72	2/23/2022 8:28	8:28 AM	71.8	45406837.45
73	2/23/2022 8:28	8:28 AM	63.2	6267888.393
74	2/23/2022 8:28	8:28 AM	58.7	2223930.724
75	2/23/2022 8:28	8:28 AM	56	1194321.512

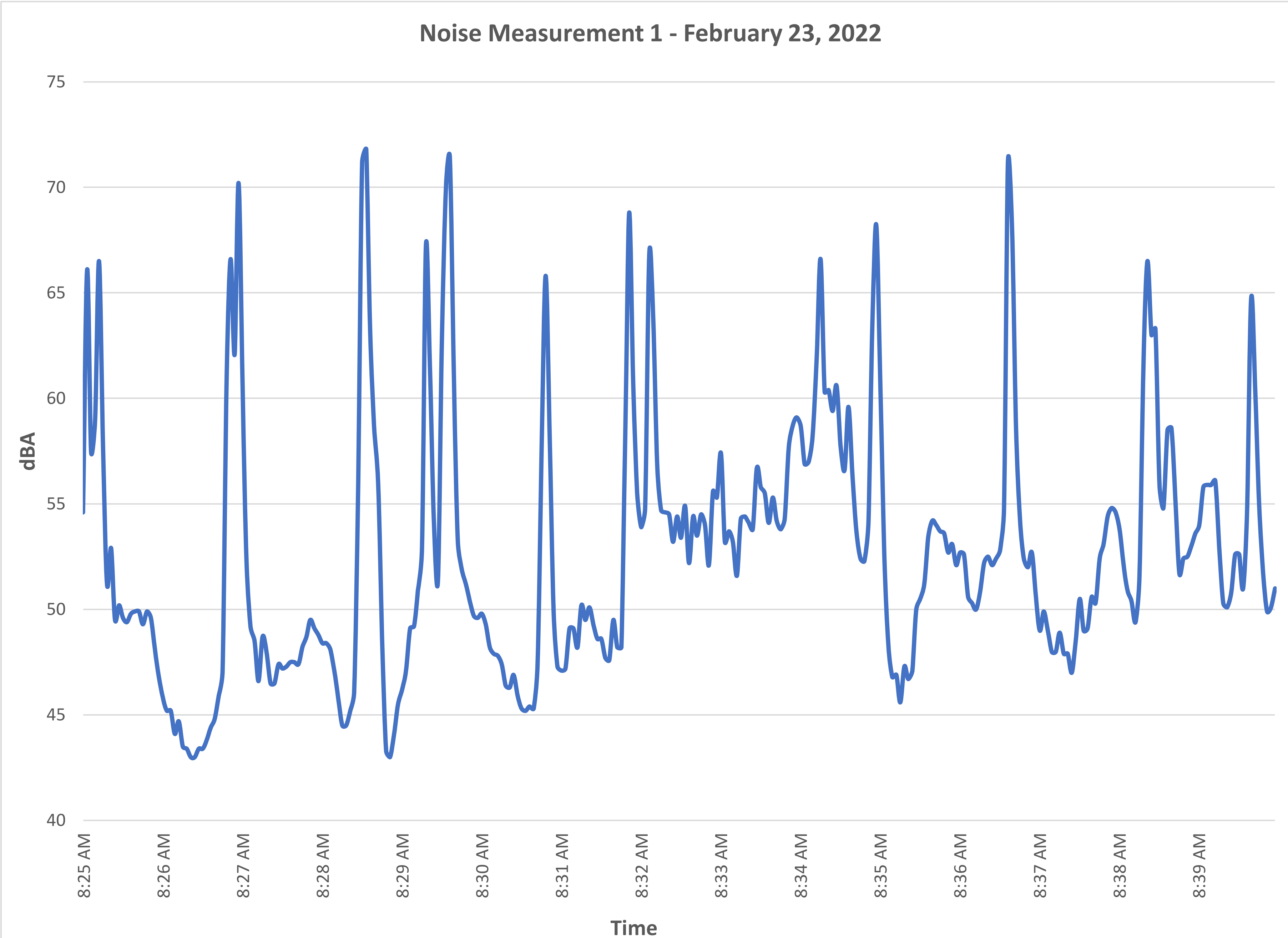
76	2/23/2022 8:28	8:28 AM	48.7	222393.0724
77	2/23/2022 8:28	8:28 AM	43.3	64138.86269
78	2/23/2022 8:29	8:29 AM	43	59857.86945
79	2/23/2022 8:29	8:29 AM	44.1	77111.87348
80	2/23/2022 8:29	8:29 AM	45.5	106444.0168
81	2/23/2022 8:29	8:29 AM	46.2	125060.815
82	2/23/2022 8:29	8:29 AM	47.1	153858.4152
83	2/23/2022 8:29	8:29 AM	49.1	243849.1548
84	2/23/2022 8:29	8:29 AM	49.2	249529.1313
85	2/23/2022 8:29	8:29 AM	50.9	369080.6312
86	2/23/2022 8:29	8:29 AM	52.9	584953.3799
87	2/23/2022 8:29	8:29 AM	67.2	15744223.81
88	2/23/2022 8:29	8:29 AM	61.4	4141152.794
89	2/23/2022 8:29	8:29 AM	54.2	789080.3976
90	2/23/2022 8:29	8:29 AM	51.4	414115.2794
91	2/23/2022 8:29	8:29 AM	62.7	5586261.41
92	2/23/2022 8:29	8:29 AM	70	30000000
93	2/23/2022 8:29	8:29 AM	71.4	41411527.94
94	2/23/2022 8:29	8:29 AM	60.9	3690806.312
95	2/23/2022 8:29	8:29 AM	53.2	626788.8393
96	2/23/2022 8:29	8:29 AM	51.9	464644.9857
97	2/23/2022 8:29	8:29 AM	51.2	395477.0216
98	2/23/2022 8:30	8:30 AM	50.4	328943.4588
99	2/23/2022 8:30	8:30 AM	49.7	279976.2902
100	2/23/2022 8:30	8:30 AM	49.6	273603.2518
101	2/23/2022 8:30	8:30 AM	49.8	286497.7758
102	2/23/2022 8:30	8:30 AM	49.3	255341.4115
103	2/23/2022 8:30	8:30 AM	48.2	198208.0344
104	2/23/2022 8:30	8:30 AM	47.9	184978.5006
105	2/23/2022 8:30	8:30 AM	47.8	180767.8758
106	2/23/2022 8:30	8:30 AM	47.4	164862.2622
107	2/23/2022 8:30	8:30 AM	46.4	130954.7497
108	2/23/2022 8:30	8:30 AM	46.3	127973.8556
109	2/23/2022 8:30	8:30 AM	46.9	146933.6458
110	2/23/2022 8:30	8:30 AM	45.9	116713.5435
111	2/23/2022 8:30	8:30 AM	45.3	101653.2468
112	2/23/2022 8:30	8:30 AM	45.2	99339.33644
113	2/23/2022 8:30	8:30 AM	45.4	104021.0551
114	2/23/2022 8:30	8:30 AM	45.3	101653.2468
115	2/23/2022 8:30	8:30 AM	47.4	164862.2622
116	2/23/2022 8:30	8:30 AM	57.2	1574422.381
117	2/23/2022 8:30	8:30 AM	65.8	11405681.89
118	2/23/2022 8:31	8:31 AM	58.7	2223930.724
119	2/23/2022 8:31	8:31 AM	50	300000
120	2/23/2022 8:31	8:31 AM	47.3	161109.5389
121	2/23/2022 8:31	8:31 AM	47.1	153858.4152
122	2/23/2022 8:31	8:31 AM	47.2	157442.2381

123	2/23/2022 8:31	8:31 AM	49.1	243849.1548
124	2/23/2022 8:31	8:31 AM	49.1	243849.1548
125	2/23/2022 8:31	8:31 AM	48.2	198208.0344
126	2/23/2022 8:31	8:31 AM	50.2	314138.5644
127	2/23/2022 8:31	8:31 AM	49.5	267375.2814
128	2/23/2022 8:31	8:31 AM	50.1	306987.8977
129	2/23/2022 8:31	8:31 AM	49.3	255341.4115
130	2/23/2022 8:31	8:31 AM	48.6	217330.788
131	2/23/2022 8:31	8:31 AM	48.6	217330.788
132	2/23/2022 8:31	8:31 AM	47.7	176653.0966
133	2/23/2022 8:31	8:31 AM	47.6	172631.9812
134	2/23/2022 8:31	8:31 AM	49.5	267375.2814
135	2/23/2022 8:31	8:31 AM	48.2	198208.0344
136	2/23/2022 8:31	8:31 AM	48.2	198208.0344
137	2/23/2022 8:31	8:31 AM	58.3	2028248.926
138	2/23/2022 8:32	8:32 AM	68.8	22757327.25
139	2/23/2022 8:32	8:32 AM	60.6	3444460.864
140	2/23/2022 8:32	8:32 AM	55.5	1064440.168
141	2/23/2022 8:32	8:32 AM	53.9	736412.6747
142	2/23/2022 8:32	8:32 AM	54.8	905985.5161
143	2/23/2022 8:32	8:32 AM	66.8	14358902.77
144	2/23/2022 8:32	8:32 AM	63.9	7364126.747
145	2/23/2022 8:32	8:32 AM	56.8	1435890.277
146	2/23/2022 8:32	8:32 AM	54.7	885362.768
147	2/23/2022 8:32	8:32 AM	54.6	865209.4509
148	2/23/2022 8:32	8:32 AM	54.5	845514.8794
149	2/23/2022 8:32	8:32 AM	53.2	626788.8393
150	2/23/2022 8:32	8:32 AM	54.4	826268.611
151	2/23/2022 8:32	8:32 AM	53.4	656328.4872
152	2/23/2022 8:32	8:32 AM	54.9	927088.6298
153	2/23/2022 8:32	8:32 AM	52.2	497876.0722
154	2/23/2022 8:32	8:32 AM	54.4	826268.611
155	2/23/2022 8:32	8:32 AM	53.5	671616.3416
156	2/23/2022 8:32	8:32 AM	54.5	845514.8794
157	2/23/2022 8:32	8:32 AM	54	753565.9295
158	2/23/2022 8:33	8:33 AM	52.1	486543.0292
159	2/23/2022 8:33	8:33 AM	55.6	1089234.164
160	2/23/2022 8:33	8:33 AM	55.3	1016532.468
161	2/23/2022 8:33	8:33 AM	57.4	1648622.622
162	2/23/2022 8:33	8:33 AM	53.2	626788.8393
163	2/23/2022 8:33	8:33 AM	53.7	703268.6446
164	2/23/2022 8:33	8:33 AM	53.2	626788.8393
165	2/23/2022 8:33	8:33 AM	51.6	433631.9312
166	2/23/2022 8:33	8:33 AM	54.3	807460.4412
167	2/23/2022 8:33	8:33 AM	54.4	826268.611
168	2/23/2022 8:33	8:33 AM	54.1	771118.7348
169	2/23/2022 8:33	8:33 AM	53.8	719649.8757

170	2/23/2022 8:33	8:33 AM	56.7	1403205.424
171	2/23/2022 8:33	8:33 AM	55.8	1140568.189
172	2/23/2022 8:33	8:33 AM	55.5	1064440.168
173	2/23/2022 8:33	8:33 AM	54.1	771118.7348
174	2/23/2022 8:33	8:33 AM	55.3	1016532.468
175	2/23/2022 8:33	8:33 AM	54.2	789080.3976
176	2/23/2022 8:33	8:33 AM	53.8	719649.8757
177	2/23/2022 8:33	8:33 AM	54.3	807460.4412
178	2/23/2022 8:34	8:34 AM	57.7	1766530.966
179	2/23/2022 8:34	8:34 AM	58.7	2223930.724
180	2/23/2022 8:34	8:34 AM	59.1	2438491.548
181	2/23/2022 8:34	8:34 AM	58.7	2223930.724
182	2/23/2022 8:34	8:34 AM	56.9	1469336.458
183	2/23/2022 8:34	8:34 AM	57	1503561.701
184	2/23/2022 8:34	8:34 AM	58.2	1982080.344
185	2/23/2022 8:34	8:34 AM	61.9	4646449.857
186	2/23/2022 8:34	8:34 AM	66.6	13712645.69
187	2/23/2022 8:34	8:34 AM	60.3	3214557.916
188	2/23/2022 8:34	8:34 AM	60.4	3289434.588
189	2/23/2022 8:34	8:34 AM	59.4	2612890.77
190	2/23/2022 8:34	8:34 AM	60.6	3444460.864
191	2/23/2022 8:34	8:34 AM	57.8	1807678.758
192	2/23/2022 8:34	8:34 AM	56.6	1371264.569
193	2/23/2022 8:34	8:34 AM	59.6	2736032.518
194	2/23/2022 8:34	8:34 AM	56.3	1279738.556
195	2/23/2022 8:34	8:34 AM	53.7	703268.6446
196	2/23/2022 8:34	8:34 AM	52.4	521340.2486
197	2/23/2022 8:34	8:34 AM	52.3	509473.0957
198	2/23/2022 8:35	8:35 AM	54.2	789080.3976
199	2/23/2022 8:35	8:35 AM	63.6	6872602.958
200	2/23/2022 8:35	8:35 AM	68.2	19820803.44
201	2/23/2022 8:35	8:35 AM	60.5	3366055.363
202	2/23/2022 8:35	8:35 AM	52.6	545910.2576
203	2/23/2022 8:35	8:35 AM	48.3	202824.8926
204	2/23/2022 8:35	8:35 AM	46.8	143589.0277
205	2/23/2022 8:35	8:35 AM	46.9	146933.6458
206	2/23/2022 8:35	8:35 AM	45.6	108923.4164
207	2/23/2022 8:35	8:35 AM	47.3	161109.5389
208	2/23/2022 8:35	8:35 AM	46.7	140320.5424
209	2/23/2022 8:35	8:35 AM	47.1	153858.4152
210	2/23/2022 8:35	8:35 AM	50	300000
211	2/23/2022 8:35	8:35 AM	50.5	336605.5363
212	2/23/2022 8:35	8:35 AM	51.2	395477.0216
213	2/23/2022 8:35	8:35 AM	53.4	656328.4872
214	2/23/2022 8:35	8:35 AM	54.2	789080.3976
215	2/23/2022 8:35	8:35 AM	54	753565.9295
216	2/23/2022 8:35	8:35 AM	53.7	703268.6446

217	2/23/2022 8:35	8:35 AM	53.6	687260.2958
218	2/23/2022 8:36	8:36 AM	52.7	558626.141
219	2/23/2022 8:36	8:36 AM	53.1	612521.3834
220	2/23/2022 8:36	8:36 AM	52.1	486543.0292
221	2/23/2022 8:36	8:36 AM	52.7	558626.141
222	2/23/2022 8:36	8:36 AM	52.6	545910.2576
223	2/23/2022 8:36	8:36 AM	50.6	344446.0864
224	2/23/2022 8:36	8:36 AM	50.3	321455.7916
225	2/23/2022 8:36	8:36 AM	50	300000
226	2/23/2022 8:36	8:36 AM	50.8	360679.3304
227	2/23/2022 8:36	8:36 AM	52.2	497876.0722
228	2/23/2022 8:36	8:36 AM	52.5	533483.823
229	2/23/2022 8:36	8:36 AM	52.1	486543.0292
230	2/23/2022 8:36	8:36 AM	52.4	521340.2486
231	2/23/2022 8:36	8:36 AM	52.8	571638.2154
232	2/23/2022 8:36	8:36 AM	54.7	885362.768
233	2/23/2022 8:36	8:36 AM	71.1	38647486.55
234	2/23/2022 8:36	8:36 AM	68.2	19820803.44
235	2/23/2022 8:36	8:36 AM	58.9	2328741.35
236	2/23/2022 8:36	8:36 AM	54.3	807460.4412
237	2/23/2022 8:36	8:36 AM	52.4	521340.2486
238	2/23/2022 8:37	8:37 AM	52	475467.9577
239	2/23/2022 8:37	8:37 AM	52.7	558626.141
240	2/23/2022 8:37	8:37 AM	50.6	344446.0864
241	2/23/2022 8:37	8:37 AM	49	238298.4704
242	2/23/2022 8:37	8:37 AM	49.9	293171.1663
243	2/23/2022 8:37	8:37 AM	49	238298.4704
244	2/23/2022 8:37	8:37 AM	48	189287.2033
245	2/23/2022 8:37	8:37 AM	48	189287.2033
246	2/23/2022 8:37	8:37 AM	48.9	232874.135
247	2/23/2022 8:37	8:37 AM	47.9	184978.5006
248	2/23/2022 8:37	8:37 AM	47.9	184978.5006
249	2/23/2022 8:37	8:37 AM	47	150356.1701
250	2/23/2022 8:37	8:37 AM	48.5	212383.7353
251	2/23/2022 8:37	8:37 AM	50.5	336605.5363
252	2/23/2022 8:37	8:37 AM	49	238298.4704
253	2/23/2022 8:37	8:37 AM	49.1	243849.1548
254	2/23/2022 8:37	8:37 AM	50.6	344446.0864
255	2/23/2022 8:37	8:37 AM	50.3	321455.7916
256	2/23/2022 8:37	8:37 AM	52.4	521340.2486
257	2/23/2022 8:37	8:37 AM	53.1	612521.3834
258	2/23/2022 8:38	8:38 AM	54.4	826268.611
259	2/23/2022 8:38	8:38 AM	54.8	905985.5161
260	2/23/2022 8:38	8:38 AM	54.6	865209.4509
261	2/23/2022 8:38	8:38 AM	53.8	719649.8757
262	2/23/2022 8:38	8:38 AM	52.1	486543.0292
263	2/23/2022 8:38	8:38 AM	50.9	369080.6312

264	2/23/2022 8:38	8:38 AM	50.4	328943.4588
265	2/23/2022 8:38	8:38 AM	49.4	261289.077
266	2/23/2022 8:38	8:38 AM	51.5	423761.2634
267	2/23/2022 8:38	8:38 AM	61.7	4437325.165
268	2/23/2022 8:38	8:38 AM	66.5	13400507.76
269	2/23/2022 8:38	8:38 AM	63	5985786.945
270	2/23/2022 8:38	8:38 AM	63.3	6413886.269
271	2/23/2022 8:38	8:38 AM	55.9	1167135.435
272	2/23/2022 8:38	8:38 AM	54.8	905985.5161
273	2/23/2022 8:38	8:38 AM	58.5	2123837.353
274	2/23/2022 8:38	8:38 AM	58.6	2173307.88
275	2/23/2022 8:38	8:38 AM	55.3	1016532.468
276	2/23/2022 8:38	8:38 AM	51.7	443732.5165
277	2/23/2022 8:38	8:38 AM	52.4	521340.2486
278	2/23/2022 8:39	8:39 AM	52.5	533483.823
279	2/23/2022 8:39	8:39 AM	53	598578.6945
280	2/23/2022 8:39	8:39 AM	53.6	687260.2958
281	2/23/2022 8:39	8:39 AM	54	753565.9295
282	2/23/2022 8:39	8:39 AM	55.8	1140568.189
283	2/23/2022 8:39	8:39 AM	55.9	1167135.435
284	2/23/2022 8:39	8:39 AM	55.9	1167135.435
285	2/23/2022 8:39	8:39 AM	56.1	1222140.833
286	2/23/2022 8:39	8:39 AM	53	598578.6945
287	2/23/2022 8:39	8:39 AM	50.3	321455.7916
288	2/23/2022 8:39	8:39 AM	50.1	306987.8977
289	2/23/2022 8:39	8:39 AM	50.8	360679.3304
290	2/23/2022 8:39	8:39 AM	52.6	545910.2576
291	2/23/2022 8:39	8:39 AM	52.6	545910.2576
292	2/23/2022 8:39	8:39 AM	51	377677.6235
293	2/23/2022 8:39	8:39 AM	54.9	927088.6298
294	2/23/2022 8:39	8:39 AM	64.7	8853627.68
295	2/23/2022 8:39	8:39 AM	60.7	3524692.665
296	2/23/2022 8:39	8:39 AM	55	948683.2981
297	2/23/2022 8:39	8:39 AM	51.8	454068.3745
298	2/23/2022 8:40	8:40 AM	49.9	293171.1663
299	2/23/2022 8:40	8:40 AM	50.1	306987.8977
300	2/23/2022 8:40	8:40 AM	51	377677.6235



Noise Measurement 1 - February 23, 2022
75
70
65
60
55
50
45
40
dBA
8:25 AM
8:26 AM
8:27 AM
8:28 AM
8:29 AM
8:30 AM
8:31 AM
8:32 AM
8:33 AM
8:34 AM
8:35 AM
8:36 AM
8:37 AM
8:38 AM
8:39 AM
Time

Noise Measurement 2

Data Logger 2	
Duration (seconds)	3
Weighting	A
Response	SLOW
Range	40-100
L05	62.5
L10	58.7
L50	54.7
L90	50.9
L95	49.7
Lmax	71.9
Time	2/23/2022 9:17
SEL	87.4
Leq	**58.0**

No.s	Date Time	Time	dB	Sound Energy
1	2/23/2022 9:15	9:15 AM	52.6	545910.2576
2	2/23/2022 9:15	9:15 AM	53.8	719649.8757
3	2/23/2022 9:15	9:15 AM	54.9	927088.6298
4	2/23/2022 9:15	9:15 AM	54	753565.9295
5	2/23/2022 9:15	9:15 AM	53.5	671616.3416
6	2/23/2022 9:15	9:15 AM	54.7	885362.768
7	2/23/2022 9:15	9:15 AM	52.6	545910.2576
8	2/23/2022 9:15	9:15 AM	51.3	404688.8648
9	2/23/2022 9:15	9:15 AM	50.5	336605.5363
10	2/23/2022 9:15	9:15 AM	48.3	202824.8926
11	2/23/2022 9:15	9:15 AM	51	377677.6235
12	2/23/2022 9:15	9:15 AM	53.2	626788.8393
13	2/23/2022 9:15	9:15 AM	52.6	545910.2576
14	2/23/2022 9:15	9:15 AM	50.5	336605.5363
15	2/23/2022 9:16	9:16 AM	49.8	286497.7758
16	2/23/2022 9:16	9:16 AM	50.8	360679.3304
17	2/23/2022 9:16	9:16 AM	50.7	352469.2665
18	2/23/2022 9:16	9:16 AM	51.6	433631.9312
19	2/23/2022 9:16	9:16 AM	56.5	1340050.776
20	2/23/2022 9:16	9:16 AM	59.9	2931711.663
21	2/23/2022 9:16	9:16 AM	70.1	30698789.77
22	2/23/2022 9:16	9:16 AM	61.6	4336319.312
23	2/23/2022 9:16	9:16 AM	53.4	656328.4872
24	2/23/2022 9:16	9:16 AM	51.7	443732.5165
25	2/23/2022 9:16	9:16 AM	51.9	464644.9857
26	2/23/2022 9:16	9:16 AM	51.5	423761.2634
27	2/23/2022 9:16	9:16 AM	53	598578.6945
28	2/23/2022 9:16	9:16 AM	54.2	789080.3976

29	2/23/2022 9:16	9:16 AM	51.5	423761.2634
30	2/23/2022 9:16	9:16 AM	54.5	845514.8794
31	2/23/2022 9:16	9:16 AM	53.5	671616.3416
32	2/23/2022 9:16	9:16 AM	53.1	612521.3834
33	2/23/2022 9:16	9:16 AM	51.8	454068.3745
34	2/23/2022 9:16	9:16 AM	52.2	497876.0722
35	2/23/2022 9:17	9:17 AM	52.7	558626.141
36	2/23/2022 9:17	9:17 AM	52.9	584953.3799
37	2/23/2022 9:17	9:17 AM	53.3	641388.6269
38	2/23/2022 9:17	9:17 AM	53.4	656328.4872
39	2/23/2022 9:17	9:17 AM	60.5	3366055.363
40	2/23/2022 9:17	9:17 AM	71.6	43363193.12
41	2/23/2022 9:17	9:17 AM	64.7	8853627.68
42	2/23/2022 9:17	9:17 AM	57.3	1611095.389
43	2/23/2022 9:17	9:17 AM	57.5	1687023.976
44	2/23/2022 9:17	9:17 AM	55	948683.2981
45	2/23/2022 9:17	9:17 AM	56.8	1435890.277
46	2/23/2022 9:17	9:17 AM	54.4	826268.611
47	2/23/2022 9:17	9:17 AM	54.3	807460.4412
48	2/23/2022 9:17	9:17 AM	53.8	719649.8757
49	2/23/2022 9:17	9:17 AM	53	598578.6945
50	2/23/2022 9:17	9:17 AM	53.9	736412.6747
51	2/23/2022 9:17	9:17 AM	53.4	656328.4872
52	2/23/2022 9:17	9:17 AM	53.4	656328.4872
53	2/23/2022 9:17	9:17 AM	51.9	464644.9857
54	2/23/2022 9:17	9:17 AM	53.9	736412.6747
55	2/23/2022 9:18	9:18 AM	51.1	386474.8655
56	2/23/2022 9:18	9:18 AM	48.8	227573.2725
57	2/23/2022 9:18	9:18 AM	51.1	386474.8655
58	2/23/2022 9:18	9:18 AM	49.7	279976.2902
59	2/23/2022 9:18	9:18 AM	50.1	306987.8977
60	2/23/2022 9:18	9:18 AM	48.9	232874.135
61	2/23/2022 9:18	9:18 AM	49.3	255341.4115
62	2/23/2022 9:18	9:18 AM	50.4	328943.4588
63	2/23/2022 9:18	9:18 AM	49.3	255341.4115
64	2/23/2022 9:18	9:18 AM	49.3	255341.4115
65	2/23/2022 9:18	9:18 AM	50	300000
66	2/23/2022 9:18	9:18 AM	51.1	386474.8655
67	2/23/2022 9:18	9:18 AM	51.7	443732.5165
68	2/23/2022 9:18	9:18 AM	52.6	545910.2576
69	2/23/2022 9:18	9:18 AM	52.2	497876.0722
70	2/23/2022 9:18	9:18 AM	53.5	671616.3416
71	2/23/2022 9:18	9:18 AM	53.2	626788.8393
72	2/23/2022 9:18	9:18 AM	54.4	826268.611
73	2/23/2022 9:18	9:18 AM	54.7	885362.768
74	2/23/2022 9:18	9:18 AM	55.9	1167135.435
75	2/23/2022 9:19	9:19 AM	54.8	905985.5161

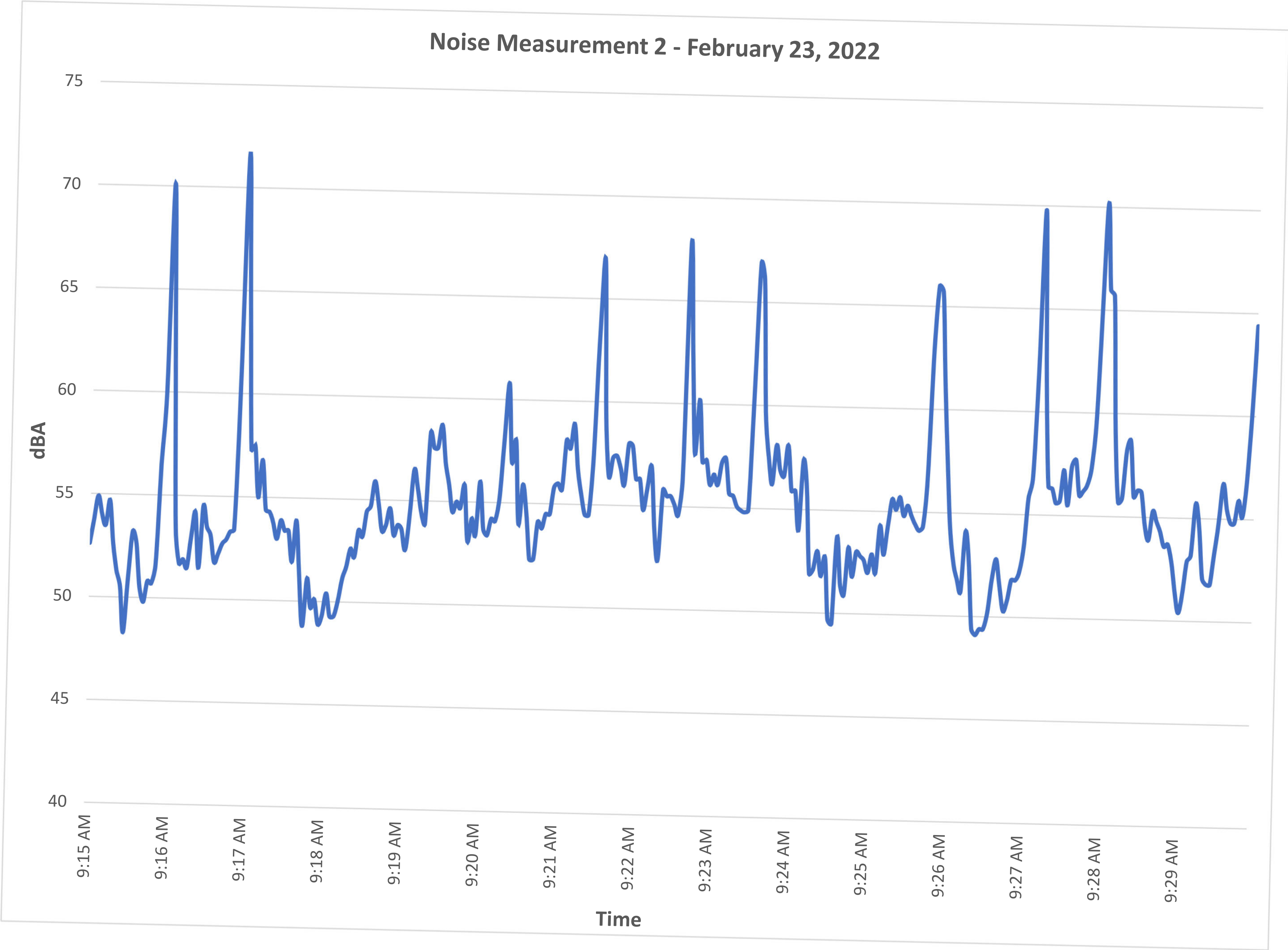
76	2/23/2022 9:19	9:19 AM	53.5	671616.3416
77	2/23/2022 9:19	9:19 AM	53.8	719649.8757
78	2/23/2022 9:19	9:19 AM	54.6	865209.4509
79	2/23/2022 9:19	9:19 AM	53.3	641388.6269
80	2/23/2022 9:19	9:19 AM	53.8	719649.8757
81	2/23/2022 9:19	9:19 AM	53.6	687260.2958
82	2/23/2022 9:19	9:19 AM	52.6	545910.2576
83	2/23/2022 9:19	9:19 AM	54.2	789080.3976
84	2/23/2022 9:19	9:19 AM	56.5	1340050.776
85	2/23/2022 9:19	9:19 AM	55.6	1089234.164
86	2/23/2022 9:19	9:19 AM	54.4	826268.611
87	2/23/2022 9:19	9:19 AM	53.9	736412.6747
88	2/23/2022 9:19	9:19 AM	58.3	2028248.926
89	2/23/2022 9:19	9:19 AM	57.6	1726319.812
90	2/23/2022 9:19	9:19 AM	57.6	1726319.812
91	2/23/2022 9:19	9:19 AM	58.7	2223930.724
92	2/23/2022 9:19	9:19 AM	56.9	1469336.458
93	2/23/2022 9:19	9:19 AM	55.8	1140568.189
94	2/23/2022 9:19	9:19 AM	54.5	845514.8794
95	2/23/2022 9:20	9:20 AM	55	948683.2981
96	2/23/2022 9:20	9:20 AM	54.7	885362.768
97	2/23/2022 9:20	9:20 AM	55.8	1140568.189
98	2/23/2022 9:20	9:20 AM	53.1	612521.3834
99	2/23/2022 9:20	9:20 AM	54.2	789080.3976
100	2/23/2022 9:20	9:20 AM	53.4	656328.4872
101	2/23/2022 9:20	9:20 AM	56	1194321.512
102	2/23/2022 9:20	9:20 AM	53.7	703268.6446
103	2/23/2022 9:20	9:20 AM	53.4	656328.4872
104	2/23/2022 9:20	9:20 AM	54.2	789080.3976
105	2/23/2022 9:20	9:20 AM	54.1	771118.7348
106	2/23/2022 9:20	9:20 AM	55.2	993393.3644
107	2/23/2022 9:20	9:20 AM	58	1892872.033
108	2/23/2022 9:20	9:20 AM	60.8	3606793.304
109	2/23/2022 9:20	9:20 AM	57	1503561.701
110	2/23/2022 9:20	9:20 AM	58	1892872.033
111	2/23/2022 9:20	9:20 AM	54	753565.9295
112	2/23/2022 9:20	9:20 AM	55.9	1167135.435
113	2/23/2022 9:20	9:20 AM	54.5	845514.8794
114	2/23/2022 9:20	9:20 AM	52.3	509473.0957
115	2/23/2022 9:21	9:21 AM	52.3	509473.0957
116	2/23/2022 9:21	9:21 AM	54.1	771118.7348
117	2/23/2022 9:21	9:21 AM	53.8	719649.8757
118	2/23/2022 9:21	9:21 AM	54.5	845514.8794
119	2/23/2022 9:21	9:21 AM	54.5	845514.8794
120	2/23/2022 9:21	9:21 AM	55.8	1140568.189
121	2/23/2022 9:21	9:21 AM	56	1194321.512
122	2/23/2022 9:21	9:21 AM	55.7	1114605.687

123	2/23/2022 9:21	9:21 AM	58.1	1936962.687
124	2/23/2022 9:21	9:21 AM	57.7	1766530.966
125	2/23/2022 9:21	9:21 AM	58.9	2328741.35
126	2/23/2022 9:21	9:21 AM	56.7	1403205.424
127	2/23/2022 9:21	9:21 AM	55.5	1064440.168
128	2/23/2022 9:21	9:21 AM	54.5	845514.8794
129	2/23/2022 9:21	9:21 AM	54.5	845514.8794
130	2/23/2022 9:21	9:21 AM	57.4	1648622.622
131	2/23/2022 9:21	9:21 AM	63.2	6267888.393
132	2/23/2022 9:21	9:21 AM	66.9	14693364.58
133	2/23/2022 9:21	9:21 AM	59.2	2495291.313
134	2/23/2022 9:21	9:21 AM	56.4	1309547.497
135	2/23/2022 9:22	9:22 AM	57.3	1611095.389
136	2/23/2022 9:22	9:22 AM	57.4	1648622.622
137	2/23/2022 9:22	9:22 AM	56.8	1435890.277
138	2/23/2022 9:22	9:22 AM	56	1194321.512
139	2/23/2022 9:22	9:22 AM	58	1892872.033
140	2/23/2022 9:22	9:22 AM	57.9	1849785.006
141	2/23/2022 9:22	9:22 AM	56.3	1279738.556
142	2/23/2022 9:22	9:22 AM	56.3	1279738.556
143	2/23/2022 9:22	9:22 AM	54.8	905985.5161
144	2/23/2022 9:22	9:22 AM	55.9	1167135.435
145	2/23/2022 9:22	9:22 AM	56.9	1469336.458
146	2/23/2022 9:22	9:22 AM	53.8	719649.8757
147	2/23/2022 9:22	9:22 AM	52.4	521340.2486
148	2/23/2022 9:22	9:22 AM	55.8	1140568.189
149	2/23/2022 9:22	9:22 AM	55.5	1064440.168
150	2/23/2022 9:22	9:22 AM	55.5	1064440.168
151	2/23/2022 9:22	9:22 AM	55.1	970780.9708
152	2/23/2022 9:22	9:22 AM	54.6	865209.4509
153	2/23/2022 9:22	9:22 AM	56.4	1309547.497
154	2/23/2022 9:22	9:22 AM	67.8	18076787.58
155	2/23/2022 9:23	9:23 AM	62.3	5094730.957
156	2/23/2022 9:23	9:23 AM	57.6	1726319.812
157	2/23/2022 9:23	9:23 AM	60.2	3141385.644
158	2/23/2022 9:23	9:23 AM	57.2	1574422.381
159	2/23/2022 9:23	9:23 AM	57.3	1611095.389
160	2/23/2022 9:23	9:23 AM	56.1	1222140.833
161	2/23/2022 9:23	9:23 AM	56.6	1371264.569
162	2/23/2022 9:23	9:23 AM	56.1	1222140.833
163	2/23/2022 9:23	9:23 AM	57.2	1574422.381
164	2/23/2022 9:23	9:23 AM	57.4	1648622.622
165	2/23/2022 9:23	9:23 AM	55.7	1114605.687
166	2/23/2022 9:23	9:23 AM	55.6	1089234.164
167	2/23/2022 9:23	9:23 AM	55.1	970780.9708
168	2/23/2022 9:23	9:23 AM	54.9	927088.6298
169	2/23/2022 9:23	9:23 AM	54.8	905985.5161

170	2/23/2022 9:23	9:23 AM	54.9	927088.6298
171	2/23/2022 9:23	9:23 AM	60.4	3289434.588
172	2/23/2022 9:23	9:23 AM	66.9	14693364.58
173	2/23/2022 9:23	9:23 AM	66.1	12221408.33
174	2/23/2022 9:23	9:23 AM	59.7	2799762.902
175	2/23/2022 9:24	9:24 AM	57.5	1687023.976
176	2/23/2022 9:24	9:24 AM	56.2	1250608.15
177	2/23/2022 9:24	9:24 AM	58.1	1936962.687
178	2/23/2022 9:24	9:24 AM	56.9	1469336.458
179	2/23/2022 9:24	9:24 AM	56.6	1371264.569
180	2/23/2022 9:24	9:24 AM	58.1	1936962.687
181	2/23/2022 9:24	9:24 AM	55.9	1167135.435
182	2/23/2022 9:24	9:24 AM	55.9	1167135.435
183	2/23/2022 9:24	9:24 AM	54	753565.9295
184	2/23/2022 9:24	9:24 AM	57.4	1648622.622
185	2/23/2022 9:24	9:24 AM	56	1194321.512
186	2/23/2022 9:24	9:24 AM	51.9	464644.9857
187	2/23/2022 9:24	9:24 AM	52.1	486543.0292
188	2/23/2022 9:24	9:24 AM	53	598578.6945
189	2/23/2022 9:24	9:24 AM	51.8	454068.3745
190	2/23/2022 9:24	9:24 AM	52.7	558626.141
191	2/23/2022 9:24	9:24 AM	49.7	279976.2902
192	2/23/2022 9:24	9:24 AM	49.5	267375.2814
193	2/23/2022 9:24	9:24 AM	53.7	703268.6446
194	2/23/2022 9:24	9:24 AM	51.4	414115.2794
195	2/23/2022 9:25	9:25 AM	50.9	369080.6312
196	2/23/2022 9:25	9:25 AM	53.2	626788.8393
197	2/23/2022 9:25	9:25 AM	51.8	454068.3745
198	2/23/2022 9:25	9:25 AM	53	598578.6945
199	2/23/2022 9:25	9:25 AM	52.8	571638.2154
200	2/23/2022 9:25	9:25 AM	52.6	545910.2576
201	2/23/2022 9:25	9:25 AM	52	475467.9577
202	2/23/2022 9:25	9:25 AM	52.9	584953.3799
203	2/23/2022 9:25	9:25 AM	52	475467.9577
204	2/23/2022 9:25	9:25 AM	54.3	807460.4412
205	2/23/2022 9:25	9:25 AM	52.9	584953.3799
206	2/23/2022 9:25	9:25 AM	54.3	807460.4412
207	2/23/2022 9:25	9:25 AM	55.6	1089234.164
208	2/23/2022 9:25	9:25 AM	55.1	970780.9708
209	2/23/2022 9:25	9:25 AM	55.7	1114605.687
210	2/23/2022 9:25	9:25 AM	54.8	905985.5161
211	2/23/2022 9:25	9:25 AM	55.3	1016532.468
212	2/23/2022 9:25	9:25 AM	54.8	905985.5161
213	2/23/2022 9:25	9:25 AM	54.4	826268.611
214	2/23/2022 9:25	9:25 AM	54.1	771118.7348
215	2/23/2022 9:26	9:26 AM	54.3	807460.4412
216	2/23/2022 9:26	9:26 AM	56.7	1403205.424

217	2/23/2022 9:26	9:26 AM	63	5985786.945
218	2/23/2022 9:26	9:26 AM	66	11943215.12
219	2/23/2022 9:26	9:26 AM	65.7	11146056.87
220	2/23/2022 9:26	9:26 AM	61.3	4046888.648
221	2/23/2022 9:26	9:26 AM	57.5	1687023.976
222	2/23/2022 9:26	9:26 AM	54.3	807460.4412
223	2/23/2022 9:26	9:26 AM	52.6	545910.2576
224	2/23/2022 9:26	9:26 AM	51.8	454068.3745
225	2/23/2022 9:26	9:26 AM	51.2	395477.0216
226	2/23/2022 9:26	9:26 AM	54.1	771118.7348
227	2/23/2022 9:26	9:26 AM	52.7	558626.141
228	2/23/2022 9:26	9:26 AM	49.4	261289.077
229	2/23/2022 9:26	9:26 AM	49.1	243849.1548
230	2/23/2022 9:26	9:26 AM	49.4	261289.077
231	2/23/2022 9:26	9:26 AM	49.4	261289.077
232	2/23/2022 9:26	9:26 AM	50.2	314138.5644
233	2/23/2022 9:26	9:26 AM	51.8	454068.3745
234	2/23/2022 9:26	9:26 AM	52.8	571638.2154
235	2/23/2022 9:27	9:27 AM	51.5	423761.2634
236	2/23/2022 9:27	9:27 AM	50.3	321455.7916
237	2/23/2022 9:27	9:27 AM	50.8	360679.3304
238	2/23/2022 9:27	9:27 AM	51.8	454068.3745
239	2/23/2022 9:27	9:27 AM	51.8	454068.3745
240	2/23/2022 9:27	9:27 AM	52.2	497876.0722
241	2/23/2022 9:27	9:27 AM	53.4	656328.4872
242	2/23/2022 9:27	9:27 AM	55.8	1140568.189
243	2/23/2022 9:27	9:27 AM	56.8	1435890.277
244	2/23/2022 9:27	9:27 AM	61.9	4646449.857
245	2/23/2022 9:27	9:27 AM	69.8	28649777.58
246	2/23/2022 9:27	9:27 AM	61.5	4237612.634
247	2/23/2022 9:27	9:27 AM	56.4	1309547.497
248	2/23/2022 9:27	9:27 AM	56.3	1279738.556
249	2/23/2022 9:27	9:27 AM	55.6	1089234.164
250	2/23/2022 9:27	9:27 AM	55.7	1114605.687
251	2/23/2022 9:27	9:27 AM	57.2	1574422.381
252	2/23/2022 9:27	9:27 AM	55.5	1064440.168
253	2/23/2022 9:27	9:27 AM	57.4	1648622.622
254	2/23/2022 9:27	9:27 AM	57.7	1766530.966
255	2/23/2022 9:28	9:28 AM	56	1194321.512
256	2/23/2022 9:28	9:28 AM	56.2	1250608.15
257	2/23/2022 9:28	9:28 AM	56.5	1340050.776
258	2/23/2022 9:28	9:28 AM	57.3	1611095.389
259	2/23/2022 9:28	9:28 AM	59.4	2612890.77
260	2/23/2022 9:28	9:28 AM	64.7	8853627.68
261	2/23/2022 9:28	9:28 AM	70.2	31413856.44
262	2/23/2022 9:28	9:28 AM	66	11943215.12
263	2/23/2022 9:28	9:28 AM	65.7	11146056.87

264	2/23/2022 9:28	9:28 AM	59.1	2438491.548
265	2/23/2022 9:28	9:28 AM	55.7	1114605.687
266	2/23/2022 9:28	9:28 AM	55.9	1167135.435
267	2/23/2022 9:28	9:28 AM	58.2	1982080.344
268	2/23/2022 9:28	9:28 AM	58.7	2223930.724
269	2/23/2022 9:28	9:28 AM	56	1194321.512
270	2/23/2022 9:28	9:28 AM	56.3	1279738.556
271	2/23/2022 9:28	9:28 AM	56.2	1250608.15
272	2/23/2022 9:28	9:28 AM	54.6	865209.4509
273	2/23/2022 9:28	9:28 AM	53.9	736412.6747
274	2/23/2022 9:28	9:28 AM	55.3	1016532.468
275	2/23/2022 9:29	9:29 AM	54.8	905985.5161
276	2/23/2022 9:29	9:29 AM	54.3	807460.4412
277	2/23/2022 9:29	9:29 AM	53.6	687260.2958
278	2/23/2022 9:29	9:29 AM	53.7	703268.6446
279	2/23/2022 9:29	9:29 AM	52.9	584953.3799
280	2/23/2022 9:29	9:29 AM	51.5	423761.2634
281	2/23/2022 9:29	9:29 AM	50.4	328943.4588
282	2/23/2022 9:29	9:29 AM	51.3	404688.8648
283	2/23/2022 9:29	9:29 AM	52.9	584953.3799
284	2/23/2022 9:29	9:29 AM	53.2	626788.8393
285	2/23/2022 9:29	9:29 AM	55.7	1114605.687
286	2/23/2022 9:29	9:29 AM	54.6	865209.4509
287	2/23/2022 9:29	9:29 AM	52.1	486543.0292
288	2/23/2022 9:29	9:29 AM	51.8	454068.3745
289	2/23/2022 9:29	9:29 AM	51.8	454068.3745
290	2/23/2022 9:29	9:29 AM	53.3	641388.6269
291	2/23/2022 9:29	9:29 AM	54.8	905985.5161
292	2/23/2022 9:29	9:29 AM	56.7	1403205.424
293	2/23/2022 9:29	9:29 AM	55.5	1064440.168
294	2/23/2022 9:29	9:29 AM	54.8	905985.5161
295	2/23/2022 9:30	9:30 AM	54.8	905985.5161
296	2/23/2022 9:30	9:30 AM	55.9	1167135.435
297	2/23/2022 9:30	9:30 AM	55.1	970780.9708
298	2/23/2022 9:30	9:30 AM	56.8	1435890.277
299	2/23/2022 9:30	9:30 AM	60	3000000
300	2/23/2022 9:30	9:30 AM	64.4	8262686.11



Noise Measurement 2 - February 23, 2022
dBA
75
70
65
60
55
50
45
40
9:15 AM
9:16 AM
9:17 AM
9:18 AM
9:19 AM
9:20 AM
9:21 AM
9:22 AM
9:23 AM
9:24 AM
9:25 AM
9:26 AM
9:27 AM
9:28 AM
9:29 AM
Time

Noise Measurement 3

Data Logger 2	
Duration (seconds)	3
Weighting	A
Response	SLOW
Range	40-100
L05	59
L10	57.6
L50	54.9
L90	52.3
L95	51.4
Lmax	65.4
Time	2/23/2022 9:42
SEL	85.2
Leq	**55.8**

No.s	Date Time	Time	dB	Sound Energy
1	2/23/2022 9:38	9:38 AM	55.9	1167135.435
2	2/23/2022 9:39	9:39 AM	55.2	993393.3644
3	2/23/2022 9:39	9:39 AM	55.5	1064440.168
4	2/23/2022 9:39	9:39 AM	54.5	845514.8794
5	2/23/2022 9:39	9:39 AM	55.4	1040210.551
6	2/23/2022 9:39	9:39 AM	55.1	970780.9708
7	2/23/2022 9:39	9:39 AM	55.7	1114605.687
8	2/23/2022 9:39	9:39 AM	55.6	1089234.164
9	2/23/2022 9:39	9:39 AM	59	2382984.704
10	2/23/2022 9:39	9:39 AM	59	2382984.704
11	2/23/2022 9:39	9:39 AM	57.1	1538584.152
12	2/23/2022 9:39	9:39 AM	54.2	789080.3976
13	2/23/2022 9:39	9:39 AM	53.1	612521.3834
14	2/23/2022 9:39	9:39 AM	53.1	612521.3834
15	2/23/2022 9:39	9:39 AM	56	1194321.512
16	2/23/2022 9:39	9:39 AM	54	753565.9295
17	2/23/2022 9:39	9:39 AM	53.1	612521.3834
18	2/23/2022 9:39	9:39 AM	52.7	558626.141
19	2/23/2022 9:39	9:39 AM	52.8	571638.2154
20	2/23/2022 9:39	9:39 AM	50.6	344446.0864
21	2/23/2022 9:39	9:39 AM	50.5	336605.5363
22	2/23/2022 9:40	9:40 AM	49.4	261289.077
23	2/23/2022 9:40	9:40 AM	49.1	243849.1548
24	2/23/2022 9:40	9:40 AM	51.1	386474.8655
25	2/23/2022 9:40	9:40 AM	53.1	612521.3834
26	2/23/2022 9:40	9:40 AM	55.7	1114605.687
27	2/23/2022 9:40	9:40 AM	59.2	2495291.313
28	2/23/2022 9:40	9:40 AM	53.6	687260.2958

29	2/23/2022 9:40	9:40 AM	51.9	464644.9857
30	2/23/2022 9:40	9:40 AM	51	377677.6235
31	2/23/2022 9:40	9:40 AM	52.3	509473.0957
32	2/23/2022 9:40	9:40 AM	54.2	789080.3976
33	2/23/2022 9:40	9:40 AM	54.6	865209.4509
34	2/23/2022 9:40	9:40 AM	55.5	1064440.168
35	2/23/2022 9:40	9:40 AM	56.3	1279738.556
36	2/23/2022 9:40	9:40 AM	57.1	1538584.152
37	2/23/2022 9:40	9:40 AM	59.6	2736032.518
38	2/23/2022 9:40	9:40 AM	56.1	1222140.833
39	2/23/2022 9:40	9:40 AM	55.1	970780.9708
40	2/23/2022 9:40	9:40 AM	55.9	1167135.435
41	2/23/2022 9:40	9:40 AM	56.6	1371264.569
42	2/23/2022 9:41	9:41 AM	56.2	1250608.15
43	2/23/2022 9:41	9:41 AM	55.1	970780.9708
44	2/23/2022 9:41	9:41 AM	56.6	1371264.569
45	2/23/2022 9:41	9:41 AM	56	1194321.512
46	2/23/2022 9:41	9:41 AM	55.6	1089234.164
47	2/23/2022 9:41	9:41 AM	55.8	1140568.189
48	2/23/2022 9:41	9:41 AM	56.7	1403205.424
49	2/23/2022 9:41	9:41 AM	59.2	2495291.313
50	2/23/2022 9:41	9:41 AM	57.4	1648622.622
51	2/23/2022 9:41	9:41 AM	54.5	845514.8794
52	2/23/2022 9:41	9:41 AM	54.6	865209.4509
53	2/23/2022 9:41	9:41 AM	54.8	905985.5161
54	2/23/2022 9:41	9:41 AM	53.9	736412.6747
55	2/23/2022 9:41	9:41 AM	53.7	703268.6446
56	2/23/2022 9:41	9:41 AM	55	948683.2981
57	2/23/2022 9:41	9:41 AM	56.4	1309547.497
58	2/23/2022 9:41	9:41 AM	57.2	1574422.381
59	2/23/2022 9:41	9:41 AM	57.7	1766530.966
60	2/23/2022 9:41	9:41 AM	59.1	2438491.548
61	2/23/2022 9:41	9:41 AM	58.9	2328741.35
62	2/23/2022 9:42	9:42 AM	56.2	1250608.15
63	2/23/2022 9:42	9:42 AM	55.6	1089234.164
64	2/23/2022 9:42	9:42 AM	56.2	1250608.15
65	2/23/2022 9:42	9:42 AM	56.2	1250608.15
66	2/23/2022 9:42	9:42 AM	58.5	2123837.353
67	2/23/2022 9:42	9:42 AM	61.3	4046888.648
68	2/23/2022 9:42	9:42 AM	59.1	2438491.548
69	2/23/2022 9:42	9:42 AM	56.8	1435890.277
70	2/23/2022 9:42	9:42 AM	61.1	3864748.655
71	2/23/2022 9:42	9:42 AM	61.8	4540683.745
72	2/23/2022 9:42	9:42 AM	63.4	6563284.872
73	2/23/2022 9:42	9:42 AM	62.1	4865430.292
74	2/23/2022 9:42	9:42 AM	62.3	5094730.957
75	2/23/2022 9:42	9:42 AM	56.5	1340050.776

76	2/23/2022 9:42	9:42 AM	54.2	789080.3976
77	2/23/2022 9:42	9:42 AM	53.5	671616.3416
78	2/23/2022 9:42	9:42 AM	54.4	826268.611
79	2/23/2022 9:42	9:42 AM	54.7	885362.768
80	2/23/2022 9:42	9:42 AM	54.4	826268.611
81	2/23/2022 9:42	9:42 AM	52.6	545910.2576
82	2/23/2022 9:43	9:43 AM	53.4	656328.4872
83	2/23/2022 9:43	9:43 AM	54.5	845514.8794
84	2/23/2022 9:43	9:43 AM	54.4	826268.611
85	2/23/2022 9:43	9:43 AM	55.9	1167135.435
86	2/23/2022 9:43	9:43 AM	56	1194321.512
87	2/23/2022 9:43	9:43 AM	56.5	1340050.776
88	2/23/2022 9:43	9:43 AM	56.4	1309547.497
89	2/23/2022 9:43	9:43 AM	56.6	1371264.569
90	2/23/2022 9:43	9:43 AM	58	1892872.033
91	2/23/2022 9:43	9:43 AM	57	1503561.701
92	2/23/2022 9:43	9:43 AM	55.9	1167135.435
93	2/23/2022 9:43	9:43 AM	53.6	687260.2958
94	2/23/2022 9:43	9:43 AM	54.4	826268.611
95	2/23/2022 9:43	9:43 AM	60	3000000
96	2/23/2022 9:43	9:43 AM	55.2	993393.3644
97	2/23/2022 9:43	9:43 AM	54.9	927088.6298
98	2/23/2022 9:43	9:43 AM	55.6	1089234.164
99	2/23/2022 9:43	9:43 AM	54.1	771118.7348
100	2/23/2022 9:43	9:43 AM	54.2	789080.3976
101	2/23/2022 9:43	9:43 AM	56.1	1222140.833
102	2/23/2022 9:44	9:44 AM	56.9	1469336.458
103	2/23/2022 9:44	9:44 AM	56.8	1435890.277
104	2/23/2022 9:44	9:44 AM	57.1	1538584.152
105	2/23/2022 9:44	9:44 AM	57.1	1538584.152
106	2/23/2022 9:44	9:44 AM	57.3	1611095.389
107	2/23/2022 9:44	9:44 AM	55.5	1064440.168
108	2/23/2022 9:44	9:44 AM	55.5	1064440.168
109	2/23/2022 9:44	9:44 AM	56.2	1250608.15
110	2/23/2022 9:44	9:44 AM	56.8	1435890.277
111	2/23/2022 9:44	9:44 AM	55.3	1016532.468
112	2/23/2022 9:44	9:44 AM	55.3	1016532.468
113	2/23/2022 9:44	9:44 AM	52.5	533483.823
114	2/23/2022 9:44	9:44 AM	53	598578.6945
115	2/23/2022 9:44	9:44 AM	54.4	826268.611
116	2/23/2022 9:44	9:44 AM	53.2	626788.8393
117	2/23/2022 9:44	9:44 AM	51.1	386474.8655
118	2/23/2022 9:44	9:44 AM	51.4	414115.2794
119	2/23/2022 9:44	9:44 AM	52.5	533483.823
120	2/23/2022 9:44	9:44 AM	53	598578.6945
121	2/23/2022 9:44	9:44 AM	53.1	612521.3834
122	2/23/2022 9:45	9:45 AM	50.9	369080.6312

123	2/23/2022 9:45	9:45 AM	51.4	414115.2794
124	2/23/2022 9:45	9:45 AM	53.8	719649.8757
125	2/23/2022 9:45	9:45 AM	54.3	807460.4412
126	2/23/2022 9:45	9:45 AM	55.8	1140568.189
127	2/23/2022 9:45	9:45 AM	57.2	1574422.381
128	2/23/2022 9:45	9:45 AM	57.3	1611095.389
129	2/23/2022 9:45	9:45 AM	56.5	1340050.776
130	2/23/2022 9:45	9:45 AM	55.7	1114605.687
131	2/23/2022 9:45	9:45 AM	54.9	927088.6298
132	2/23/2022 9:45	9:45 AM	55	948683.2981
133	2/23/2022 9:45	9:45 AM	56.3	1279738.556
134	2/23/2022 9:45	9:45 AM	55.9	1167135.435
135	2/23/2022 9:45	9:45 AM	55.5	1064440.168
136	2/23/2022 9:45	9:45 AM	55.3	1016532.468
137	2/23/2022 9:45	9:45 AM	54.6	865209.4509
138	2/23/2022 9:45	9:45 AM	54.2	789080.3976
139	2/23/2022 9:45	9:45 AM	55.3	1016532.468
140	2/23/2022 9:45	9:45 AM	54.1	771118.7348
141	2/23/2022 9:45	9:45 AM	54.3	807460.4412
142	2/23/2022 9:46	9:46 AM	52.7	558626.141
143	2/23/2022 9:46	9:46 AM	52	475467.9577
144	2/23/2022 9:46	9:46 AM	51.8	454068.3745
145	2/23/2022 9:46	9:46 AM	52.6	545910.2576
146	2/23/2022 9:46	9:46 AM	54.5	845514.8794
147	2/23/2022 9:46	9:46 AM	53.9	736412.6747
148	2/23/2022 9:46	9:46 AM	53.1	612521.3834
149	2/23/2022 9:46	9:46 AM	54.7	885362.768
150	2/23/2022 9:46	9:46 AM	54.4	826268.611
151	2/23/2022 9:46	9:46 AM	53.5	671616.3416
152	2/23/2022 9:46	9:46 AM	54	753565.9295
153	2/23/2022 9:46	9:46 AM	54.1	771118.7348
154	2/23/2022 9:46	9:46 AM	53.5	671616.3416
155	2/23/2022 9:46	9:46 AM	52.6	545910.2576
156	2/23/2022 9:46	9:46 AM	51.6	433631.9312
157	2/23/2022 9:46	9:46 AM	50.8	360679.3304
158	2/23/2022 9:46	9:46 AM	51.7	443732.5165
159	2/23/2022 9:46	9:46 AM	52.3	509473.0957
160	2/23/2022 9:46	9:46 AM	52.3	509473.0957
161	2/23/2022 9:46	9:46 AM	54.2	789080.3976
162	2/23/2022 9:47	9:47 AM	53.5	671616.3416
163	2/23/2022 9:47	9:47 AM	53.8	719649.8757
164	2/23/2022 9:47	9:47 AM	53.9	736412.6747
165	2/23/2022 9:47	9:47 AM	53.9	736412.6747
166	2/23/2022 9:47	9:47 AM	54.2	789080.3976
167	2/23/2022 9:47	9:47 AM	55	948683.2981
168	2/23/2022 9:47	9:47 AM	55.9	1167135.435
169	2/23/2022 9:47	9:47 AM	56.1	1222140.833

170	2/23/2022 9:47	9:47 AM	60.8	3606793.304
171	2/23/2022 9:47	9:47 AM	58.5	2123837.353
172	2/23/2022 9:47	9:47 AM	59.6	2736032.518
173	2/23/2022 9:47	9:47 AM	59	2382984.704
174	2/23/2022 9:47	9:47 AM	61.2	3954770.216
175	2/23/2022 9:47	9:47 AM	61.1	3864748.655
176	2/23/2022 9:47	9:47 AM	57.1	1538584.152
177	2/23/2022 9:47	9:47 AM	55.7	1114605.687
178	2/23/2022 9:47	9:47 AM	54.9	927088.6298
179	2/23/2022 9:47	9:47 AM	54.7	885362.768
180	2/23/2022 9:47	9:47 AM	54.4	826268.611
181	2/23/2022 9:47	9:47 AM	54.7	885362.768
182	2/23/2022 9:48	9:48 AM	53.4	656328.4872
183	2/23/2022 9:48	9:48 AM	52.1	486543.0292
184	2/23/2022 9:48	9:48 AM	53.6	687260.2958
185	2/23/2022 9:48	9:48 AM	58.2	1982080.344
186	2/23/2022 9:48	9:48 AM	56	1194321.512
187	2/23/2022 9:48	9:48 AM	54.6	865209.4509
188	2/23/2022 9:48	9:48 AM	54.9	927088.6298
189	2/23/2022 9:48	9:48 AM	55.8	1140568.189
190	2/23/2022 9:48	9:48 AM	54.2	789080.3976
191	2/23/2022 9:48	9:48 AM	54.3	807460.4412
192	2/23/2022 9:48	9:48 AM	54.7	885362.768
193	2/23/2022 9:48	9:48 AM	55.6	1089234.164
194	2/23/2022 9:48	9:48 AM	55.3	1016532.468
195	2/23/2022 9:48	9:48 AM	55.7	1114605.687
196	2/23/2022 9:48	9:48 AM	55.5	1064440.168
197	2/23/2022 9:48	9:48 AM	58.1	1936962.687
198	2/23/2022 9:48	9:48 AM	54.6	865209.4509
199	2/23/2022 9:48	9:48 AM	52.4	521340.2486
200	2/23/2022 9:48	9:48 AM	54.4	826268.611
201	2/23/2022 9:48	9:48 AM	54.5	845514.8794
202	2/23/2022 9:49	9:49 AM	55.1	970780.9708
203	2/23/2022 9:49	9:49 AM	55.1	970780.9708
204	2/23/2022 9:49	9:49 AM	56	1194321.512
205	2/23/2022 9:49	9:49 AM	57.2	1574422.381
206	2/23/2022 9:49	9:49 AM	57.3	1611095.389
207	2/23/2022 9:49	9:49 AM	56.2	1250608.15
208	2/23/2022 9:49	9:49 AM	55.6	1089234.164
209	2/23/2022 9:49	9:49 AM	56.5	1340050.776
210	2/23/2022 9:49	9:49 AM	56	1194321.512
211	2/23/2022 9:49	9:49 AM	55	948683.2981
212	2/23/2022 9:49	9:49 AM	55.2	993393.3644
213	2/23/2022 9:49	9:49 AM	56.8	1435890.277
214	2/23/2022 9:49	9:49 AM	56	1194321.512
215	2/23/2022 9:49	9:49 AM	54.7	885362.768
216	2/23/2022 9:49	9:49 AM	54	753565.9295

217	2/23/2022 9:49	9:49 AM	53.3	641388.6269
218	2/23/2022 9:49	9:49 AM	52.8	571638.2154
219	2/23/2022 9:49	9:49 AM	54.6	865209.4509
220	2/23/2022 9:49	9:49 AM	52.5	533483.823
221	2/23/2022 9:49	9:49 AM	51.4	414115.2794
222	2/23/2022 9:50	9:50 AM	52.1	486543.0292
223	2/23/2022 9:50	9:50 AM	50.9	369080.6312
224	2/23/2022 9:50	9:50 AM	50.2	314138.5644
225	2/23/2022 9:50	9:50 AM	51.6	433631.9312
226	2/23/2022 9:50	9:50 AM	54.8	905985.5161
227	2/23/2022 9:50	9:50 AM	58.6	2173307.88
228	2/23/2022 9:50	9:50 AM	56.7	1403205.424
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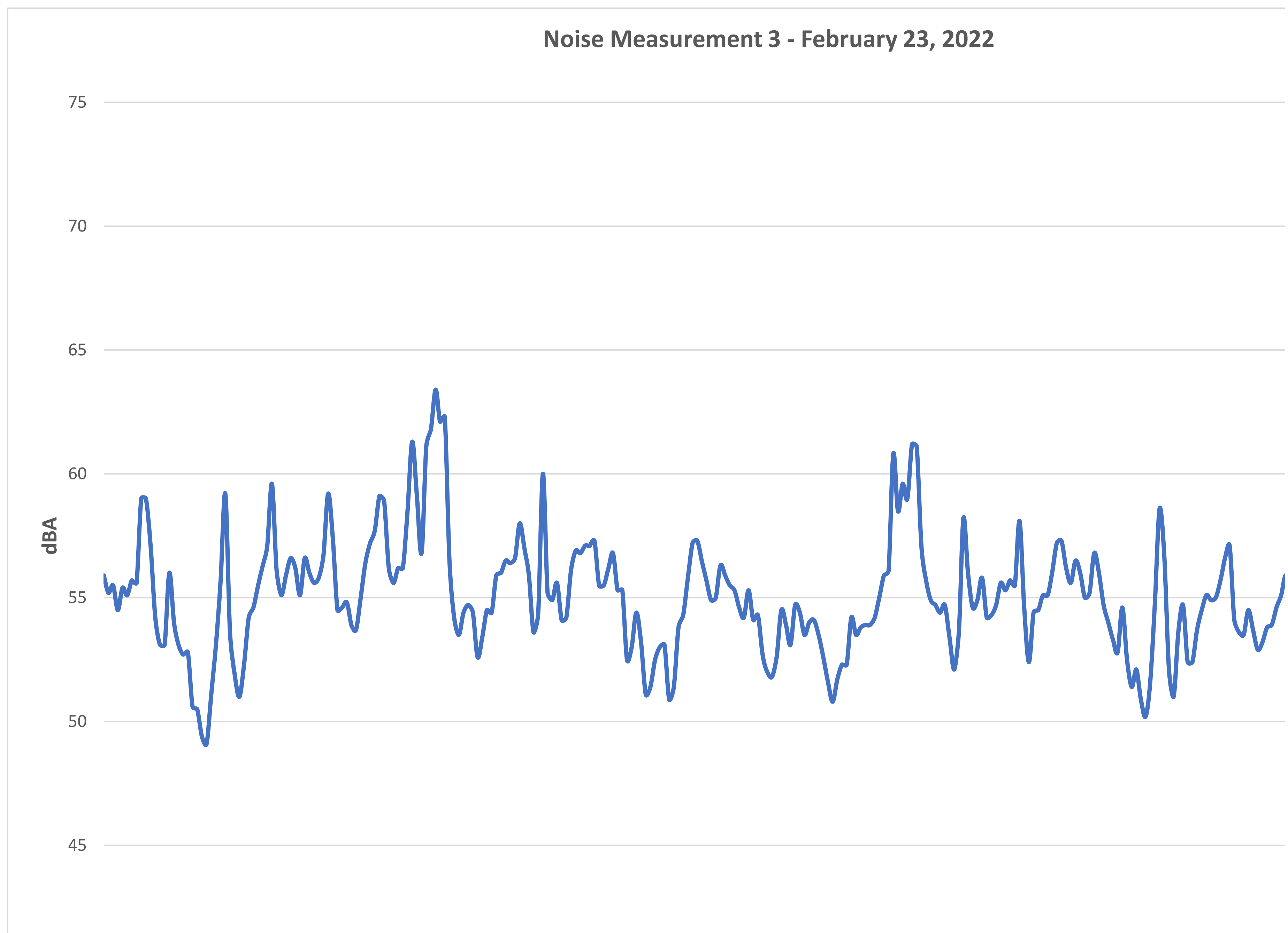
230	2/23/2022 9:50	9:50 AM	51	377677.6235
231	2/23/2022 9:50	9:50 AM	53.6	687260.2958
232	2/23/2022 9:50	9:50 AM	54.7	885362.768
233	2/23/2022 9:50	9:50 AM	52.4	521340.2486
234	2/23/2022 9:50	9:50 AM	52.4	521340.2486
235	2/23/2022 9:50	9:50 AM	53.7	703268.6446
236	2/23/2022 9:50	9:50 AM	54.5	845514.8794
237	2/23/2022 9:50	9:50 AM	55.1	970780.9708
238	2/23/2022 9:50	9:50 AM	54.9	927088.6298
239	2/23/2022 9:50	9:50 AM	55	948683.2981
240	2/23/2022 9:50	9:50 AM	55.7	1114605.687
241	2/23/2022 9:50	9:50 AM	56.6	1371264.569
242	2/23/2022 9:51	9:51 AM	57.1	1538584.152
243	2/23/2022 9:51	9:51 AM	54.1	771118.7348
244	2/23/2022 9:51	9:51 AM	53.6	687260.2958
245	2/23/2022 9:51	9:51 AM	53.5	671616.3416
246	2/23/2022 9:51	9:51 AM	54.5	845514.8794
247	2/23/2022 9:51	9:51 AM	53.7	703268.6446
248	2/23/2022 9:51	9:51 AM	52.9	584953.3799
249	2/23/2022 9:51	9:51 AM	53.2	626788.8393
250	2/23/2022 9:51	9:51 AM	53.8	719649.8757
251	2/23/2022 9:51	9:51 AM	53.9	736412.6747
252	2/23/2022 9:51	9:51 AM	54.6	865209.4509
253	2/23/2022 9:51	9:51 AM	55.1	970780.9708
254	2/23/2022 9:51	9:51 AM	55.9	1167135.435
255	2/23/2022 9:51	9:51 AM	54.9	927088.6298
256	2/23/2022 9:51	9:51 AM	54.6	865209.4509
257	2/23/2022 9:51	9:51 AM	55.1	970780.9708
258	2/23/2022 9:51	9:51 AM	54.8	905985.5161
259	2/23/2022 9:51	9:51 AM	55.1	970780.9708
260	2/23/2022 9:51	9:51 AM	54.7	885362.768
261	2/23/2022 9:51	9:51 AM	54.7	885362.768
262	2/23/2022 9:52	9:52 AM	54.2	789080.3976
263	2/23/2022 9:52	9:52 AM	54.7	885362.768

264	2/23/2022 9:52	9:52 AM	54.3	807460.4412
265	2/23/2022 9:52	9:52 AM	54.3	807460.4412
266	2/23/2022 9:52	9:52 AM	53.6	687260.2958
267	2/23/2022 9:52	9:52 AM	54.3	807460.4412
268	2/23/2022 9:52	9:52 AM	55.4	1040210.551
269	2/23/2022 9:52	9:52 AM	55.7	1114605.687
270	2/23/2022 9:52	9:52 AM	54.8	905985.5161
271	2/23/2022 9:52	9:52 AM	53.3	641388.6269
272	2/23/2022 9:52	9:52 AM	54.4	826268.611
273	2/23/2022 9:52	9:52 AM	56.7	1403205.424
274	2/23/2022 9:52	9:52 AM	55.5	1064440.168
275	2/23/2022 9:52	9:52 AM	59.9	2931711.663
276	2/23/2022 9:52	9:52 AM	55.8	1140568.189
277	2/23/2022 9:52	9:52 AM	55.2	993393.3644
278	2/23/2022 9:52	9:52 AM	55.3	1016532.468
279	2/23/2022 9:52	9:52 AM	56.4	1309547.497
280	2/23/2022 9:52	9:52 AM	56.6	1371264.569
281	2/23/2022 9:52	9:52 AM	57.3	1611095.389
282	2/23/2022 9:53	9:53 AM	57.2	1574422.381
283	2/23/2022 9:53	9:53 AM	56.8	1435890.277
284	2/23/2022 9:53	9:53 AM	55.9	1167135.435
285	2/23/2022 9:53	9:53 AM	56.2	1250608.15
286	2/23/2022 9:53	9:53 AM	55.3	1016532.468
287	2/23/2022 9:53	9:53 AM	55.3	1016532.468
288	2/23/2022 9:53	9:53 AM	53.5	671616.3416
289	2/23/2022 9:53	9:53 AM	51.9	464644.9857
290	2/23/2022 9:53	9:53 AM	52.5	533483.823
291	2/23/2022 9:53	9:53 AM	52.3	509473.0957
292	2/23/2022 9:53	9:53 AM	53.6	687260.2958
293	2/23/2022 9:53	9:53 AM	61.6	4336319.312
294	2/23/2022 9:53	9:53 AM	56.4	1309547.497
295	2/23/2022 9:53	9:53 AM	58.7	2223930.724
296	2/23/2022 9:53	9:53 AM	55.8	1140568.189
297	2/23/2022 9:53	9:53 AM	54.8	905985.5161
298	2/23/2022 9:53	9:53 AM	56.5	1340050.776
299	2/23/2022 9:53	9:53 AM	58.8	2275732.725
300	2/23/2022 9:53	9:53 AM	57	1503561.701


Noise Measurement 3 - February 23, 2022
75
70
65
60
55
50
45
dBA

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 09/02/2022
Case Description: S Wells Treatment Project - Equipment Install

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Residence - S6 Well	Residential	65.0	45.0	45.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Backhoe	No	40		77.6	100.0	0.0
Crane	No	16		80.6	100.0	0.0
Generator	No	50		80.6	100.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Backhoe	71.5	67.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	74.5	66.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	74.6	71.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	74.6	73.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #2 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Residence - S7 Well	Residential	65.0	45.0	45.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Backhoe	No	40		77.6	110.0	0.0
Crane	No	16		80.6	110.0	0.0
Generator	No	50		80.6	110.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Backhoe	70.7	66.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	73.7	65.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	73.8	70.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	73.8	73.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #3 ****

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
School - S8 Well and Pipe	Residential	65.0	45.0	45.0

Equipment

	Impact	Usage	Spec Lmax	Actual Lmax	Receptor Distance	Estimated Shielding

Description	Device	(%)	(dBA)	(dBA)	(feet)	(dBA)
Backhoe	No	40		77.6	110.0	0.0
Crane	No	16		80.6	110.0	0.0
Generator	No	50		80.6	110.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Backhoe	70.7	66.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	73.7	65.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	73.8	70.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	73.8	73.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #4 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Residences - S7 Pipe	Residential	65.0	45.0	45.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Backhoe	No	40		77.6	155.0	0.0
Crane	No	16		80.6	155.0	0.0
Generator	No	50		80.6	155.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Backhoe	67.7	63.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	70.7	62.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	70.8	67.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	70.8	70.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 09/02/2022
Case Description: S Wells Treatment Project - Grading

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Residence - Interconnection Pipe	Residential	65.0	45.0	45.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Backhoe	No	40		77.6	230.0	0.0
Compactor (ground)	No	20		83.2	230.0	0.0
Dozer	No	40		81.7	230.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Backhoe	64.3	60.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compactor (ground)	70.0	63.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	68.4	64.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	70.0	67.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #2 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
School - Treatment Facility	Residential	65.0	45.0	45.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Backhoe	No	40		77.6	435.0	0.0
Compactor (ground)	No	20		83.2	435.0	0.0
Dozer	No	40		81.7	435.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Backhoe	58.8	54.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compactor (ground)	64.4	57.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	62.9	58.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	64.4	62.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 09/02/2022
Case Description: S Wells Treatment Project - Well Drilling

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
School - Daytime	Residential	65.0	45.0	45.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	165.0	0.0
Generator	No	50		80.6	165.0	0.0
Crane	No	16		80.6	165.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	74.0	67.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	70.3	67.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	70.2	62.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	74.0	70.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 09/02/2022
Case Description: S Wells Treatment Project - Well Drilling

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Residence - Nighttime	Residential	65.0	45.0	45.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	360.0	0.0
Generator	No	50		80.6	360.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	67.2	60.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	63.5	60.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	67.2	63.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Barrier Performance Module

This module provides to the user a measure on the barrier's effectiveness on noise reduction. A list of the input/output variables and their definitions, as well as illustrations of different scenarios are provided.

Calculator

View Day/Night Noise Level Calculator (/programs/environmental-review/dnl-calculator/)

View Descriptions of the Input/Output variables.

Note: Tool tips, containing field specific information, have been added in this tool and may be accessed by hovering over the Input and Output variables with the mouse.

WARNING: If there is direct line-of-sight between the Source and the Observer, the module will report erroneous attenuation. "Direct line-of-sight" means if the 5' tall Observer can see the noise Source (cars, trucks, trains, etc.) over the Barrier (wall, hill/excavation, building, etc.), the current version of Barrier Performance Module will not accurately calculate the attenuation provided. In this instance, there is unlikely to be any appreciable attenuation.

Note: Barrier height must block the line of sight

Input Data

H	15	**R[1]**	10
S	10	**D[1]**	360
O	5	**α**	180

Calculate Output

Output Data

h	5	**R**	10
D	360	**FS**	8.6801

Reduction From Barrier (dB):

-8.6801

Refresh

Note: If you have separate Road and Rail DNL values, please enter the values below to calculate the new combined Road/Rail DNL :

Road DNL:

Rail DNL:

Calculate

Combined Road/Rail DNL with Barrier Reduction:

Input/Output Variables

Input Variables

The following variables and definitions from the barrier being assessed are the input required for the web-based barrier performance module:

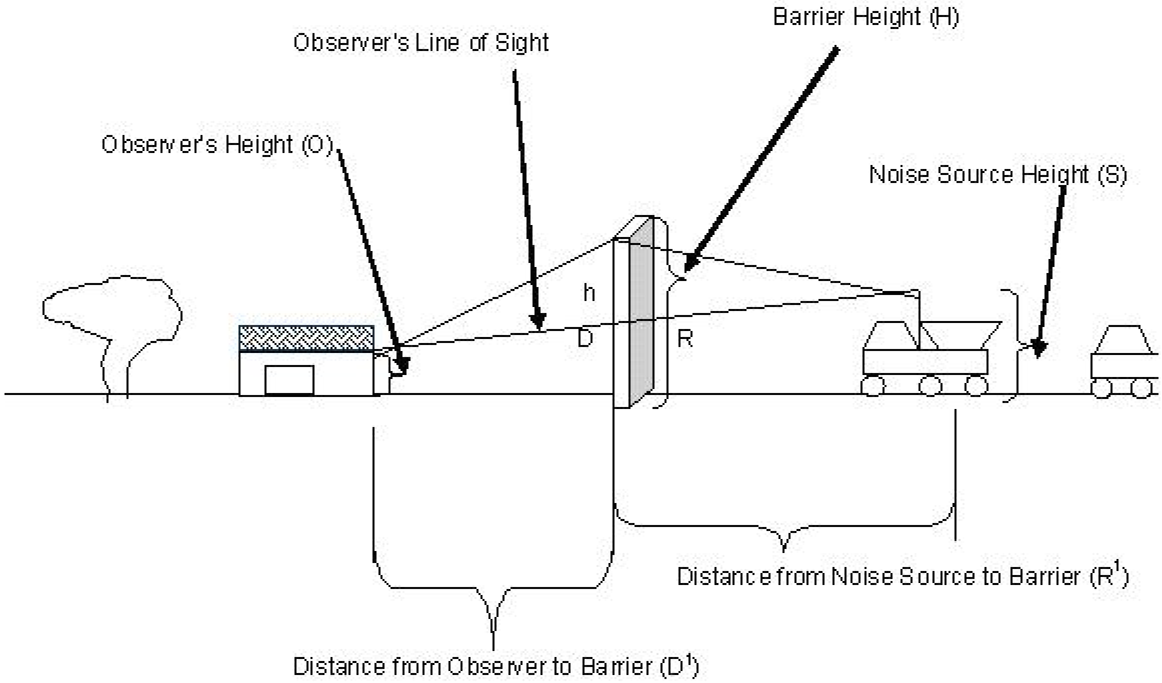
- H = Barrier Height
- S = Noise Source Height
- O = Observer Height (known as the receiver)
- R^1 = Distance from Noise Source to Barrier
- D^1 = Distance from the Observer to the Barrier
- α = Line of sight angle between the Observer and the Noise Source, subtended by the barrier at observer's location

Output Variables

Definitions of the output variables from the mitigation module of the Day/Night Noise Level Assessment Tools as part of the Assessment Tools for Environmental Compliance:

- h = The shortest distance from the barrier top to the line of sight from the Noise source to the Observer.
- R = Slant distance along the line of sight from the Barrier to the Noise Source
- D = Slant distance along the line of sight from the Barrier to the Observer

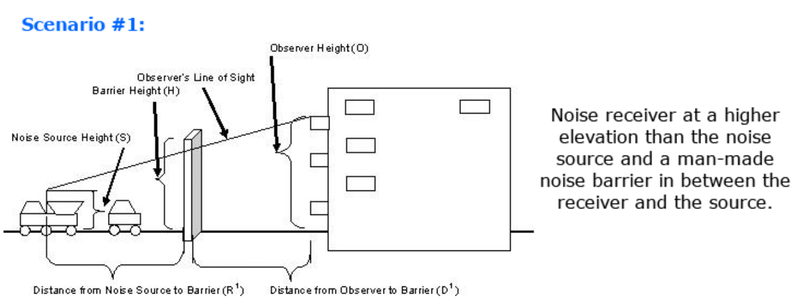
The “actual barrier performance for barriers of finite length” is noted on the worksheets(in the Guidebook) as **FS**.



Barrier Implementation Scenarios

Locate the cursor on the following thumbnails to enlarge the respective scenario as implementation examples of the barrier performance module.

Scenario #1:

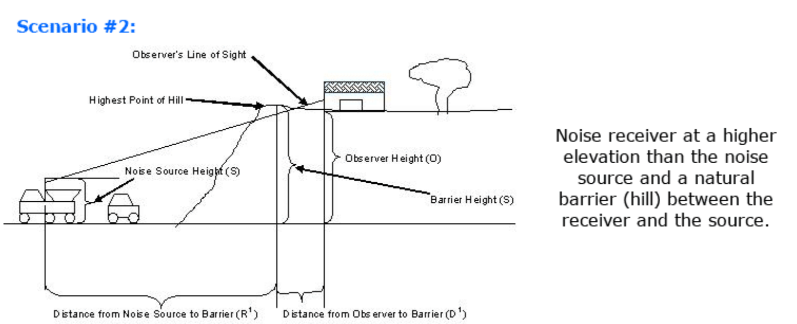


Noise receiver at a higher elevation than the noise source and a man-made noise barrier in between the receiver and the source.

(https://www.hudexchange.info/resources/documents/Barrier-Performance-Module-Barrier-Implementation-Scenario-1.gif)

view larger version of image (/resource/3841/barrier-performance-module-bpm-barrier-implementation-scenarios/)

Scenario #2:



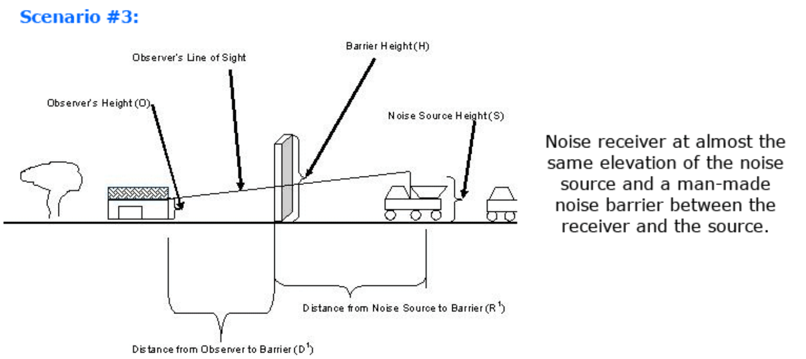
Noise receiver at a higher elevation than the noise source and a natural barrier (hill) between the receiver and the source.

(https://www.hudexchange.info/resources/documents/Barrier-

Performance-Module-Barrier-Implementation-Scenario-2.gif)

view larger version of image (/resource/3841/barrier-performance-module-bpm-barrier-implementation-scenarios/)

Scenario #3:

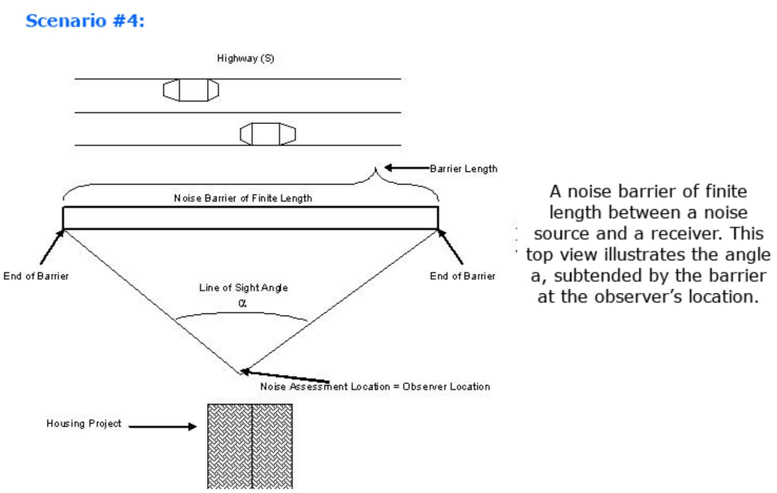


Noise receiver at almost the same elevation of the noise source and a man-made noise barrier between the receiver and the source.

(https://www.hudexchange.info/resources/documents/Barrier-Performance-Module-Barrier-Implementation-Scenario-3.gif)

view larger version of image (/resource/3841/barrier-performance-module-bpm-barrier-implementation-scenarios/)

Scenario #4:



A noise barrier of finite length between a noise source and a receiver. This top view illustrates the angle α, subtended by the barrier at the observer's location.

(https://www.hudexchange.info/resources/documents/Barrier-Performance-Module-Barrier-Implementation-Scenario-4.gif)

view larger version of image (/resource/3841/barrier-performance-module-bpm-barrier-implementation-scenarios/)

Contents

Groundborne Noise and Vibration Modeling

Notes
The reference distance is measured from the nearest anticipated point of construction equipment to the nearest structure.

	Reference Level Inputs			
Equipment	**PPV_{ref} (in/sec)**	**Lv_{ref} (VdB)**	**RMS_{ref} (in/sec)**	**Reference Distance**
Large bulldozer	0.089	87	0.022	25
Caisson drilling	0.089	87	0.022	25
Loaded trucks	0.076	83	0.014	25

	Vibration Level at Receiver		
Equipment	**Distance (feet)**	**PPV_x (in/sec)**	**RMS_x (in/sec)**
Large bulldozer	25	0.0890	0.022
Caisson drilling	365	0.0047	0.001
Loaded trucks	35	0.0525	0.010

Source

California Department of Transportation (Caltrans). 2020. Transportation and Construction Vibration Guidance Manual (CT-HWANP-RT-20-365.01.01). April. https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/tcvgm-apr2020-a11y.pdf.

Last Updated: 10/19/2020

Appendix F

Santa Clara River Valley East Groundwater Subbasin Groundwater Sustainability Plan

Santa Clara River Valley East Groundwater Subbasin Groundwater Sustainability Plan

January 2022

Prepared for:

SCV GSA

Santa Clarita Valley
Groundwater Sustainability Agency

Prepared by:

GSI Water Solutions, Inc.
418 Chapala Street, Suite H, Santa Barbara, CA 93101

Santa Clarita Valley Groundwater Sustainability Agency

Santa Clara River Valley East Groundwater Subbasin Groundwater Sustainability Plan

January 2022

Prepared for:
Board of Directors, Santa Clarita Valley Groundwater Sustainability Agency
c/o SCV Water – Santa Clarita
27234 Bouquet Canyon Road
Santa Clarita, CA 91350

GSI Water Solutions, Inc.

GSI Water Solutions, Inc. (GSI), Richard C. Slade & Associates LLC (RCS), Luhdorff and Scalmanini Consulting Engineers (LSCE), Environmental Science Associates (ESA), Geosyntec Consultants, Inc. (Geosyntec), and GHD, Inc. (GHD) are pleased to submit this Groundwater Sustainability Plan (GSP) prepared in accordance with California Code of Regulations, Title 23. Water, Division 2. Department of Water Resources, Chapter 1.5. Groundwater Management, Subchapter 2. Groundwater Sustainability Plans.

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Contents

Tables

Figures

Appendices

Abbreviations and Acronyms

µg	microgram
µg/L	micrograms per liter
AB	Assembly Bill
AF	acre-feet
AFY	acre-feet per year
ASR	aquifer storage and recovery
AVEK	Antelope Valley-East Kern Water Agency
Basin	Santa Clara River Valley Groundwater Basin, East Subbasin
Basin Operating Plan	Groundwater Management Plan, Santa Clara River Valley Groundwater Basin, East Subbasin, Los Angeles County, California
Basin Plan	Water Quality Control Plan: Los Angeles Region Basin Plan for the Coastal Watershed of Los Angeles and Ventura Counties
bc	basement complex
bgs	below ground surface
BMP	best management practice
BVRRB	Buena Vista and Rosedale Rio-Bravo Water Storage Districts
BVWSD	Buena Vista Water Storage District
CalGEM	California Geologic Energy Management Division
Caltrans	California Department of Transportation
CASGEM	California Statewide Groundwater Elevation Monitoring
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CGPS	continuous global positioning system
City	City of Santa Clarita
CLWA	Castaic Lake Water Agency
COC	constituent of concern
CRWQCB	California Regional Water Quality Control Board
DAC	disadvantaged community
DCR	Delivery Capability Report
DDT	dichlorodiphenyltrichloroethane
DDW	Division of Drinking Water
DEM	digital elevation model
DEW	drier with extreme warming
DMS	Data Management System
DQO	data quality objective
DTSC	Department of Toxic Substances Control
DWR	Department of Water Resources
E-log	electronic log

ESA	Environmental Science Associates
ESI	Environmental Simulations, Inc.
ET	evapotranspiration
FivePoint	FivePoint Holdings, LLC
Forest Service	U.S. Department of Agriculture Forest Service
FPB	Fillmore and Piru Basins
ft	foot or feet
ft/day	foot or feet per day
ft/ft	foot per foot
ft/mile	foot per mile
ft^2/day	square feet per day
ft^3/ft^3	cubic feet per square foot per foot
GDE	groundwater dependent ecosystem
General Plan	City of Santa Clarita General Plan
GHB	general head boundary
GIS	geographic information system
GPS	global positioning system
GSA	Groundwater Sustainability Agency
GSI	GSI Water Solutions, Inc.
GSP	Groundwater Sustainability Plan
GSSI	Geoscience Support Services, Inc.
GWE	groundwater elevation
GWMP	Groundwater Management Plan
I-5	Interstate 5
ID	identification
iGDE	GDE indicators
in/hr	inch per hour
in/yr	inch or inches per year
InSAR	Interferometric Synthetic Aperture Radar
IRWMP	Integrated Regional Water Management Plan
JPA	Joint Exercise of Powers Agreement
KJ	Kennedy Jenks
L	liter
LA	Los Angeles
LA County	County of Los Angeles
LACDPW	Los Angeles County Department of Public Works
LACDRP	Los Angeles County Department of Regional Planning
LACFCD	Los Angeles County Flood Control District
LACWD	Los Angeles County Waterworks District No. 36, Val Verde
LADPW	Los Angeles County Department of Public Works
LADWP	Los Angeles Department of Water and Power

LARWQCB	Los Angeles Regional Water Quality Control Board
LiDAR	Light Detection and Ranging
LSCE	Luhdorff and Scalmanini Consulting Engineers
MA	management area
MCL	maximum contaminant level
mg/L	milligrams per liter
MGD	million gallons per day
mm	millimeter
MO	measurable objective
MOU	memorandum of understanding
msl	mean sea level
MT	minimum threshold
NAD 83	North American Datum of 1983
NAVD 88	North American Vertical Datum of 1988
NCCAG	Natural Communities Commonly Associated with Groundwater
NCWD	Newhall County Water District
Newhall Land	The Newhall Land and Farming Company
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NWD	Newhall Water Division (formerly Newhall County Water District)
NWI	National Wetland Inventory
OVOV	One Valley One Vision
PCBs	polychlorinated biphenyls
PCE	tetrachloroethylene
PFAS	per- and polyfluoroalkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
Plan	Santa Clara River Valley East Groundwater Basin Groundwater Sustainability Plan
ppb	parts per billion
ppm	parts per million
PVC	polyvinyl chloride
Qa	Quaternary Alluvium
QA/QC	quality assurance/quality control
Qt	terrace deposits
QTs	Saugus Formation
QTsr	Sunshine Ranch Member
Qtsu	upper portion of Saugus Formation
RCH	Recharge Package for MODFLOW-USG
RCS	Richard C. Slade & Associates LLC
RL	reporting limit
RMS	representative monitoring site

RRBWBP	Rosedale-Rio Bravo Water Banking Program
RRBWSD	Rosedale-Rio Bravo Water Storage District
RWQCB	Regional Water Quality Control Board
S	storativity
SAC	Stakeholder Advisory Committee
SB	Senate Bill
SCAG	Southern California Association of Governments
SCV	Santa Clarita Valley
SCV Water	Santa Clarita Valley Water Agency
SCV-GSA	Santa Clarita Valley Groundwater Sustainability Agency
SCVGWFM	Santa Clarita Valley Groundwater Flow Model
SCVSD	Santa Clarita Valley Sanitation District of Los Angeles County
SCWD	Santa Clarita Water Division (formerly Santa Clarita Water Company)
SFR	Streamflow Routing Package for MODFLOW-USG
SGMA	Sustainable Groundwater Management Act
SMC	sustainable management criteria
SMCL	secondary maximum contaminant level
SMCs	sustainable management criteria
SMGA	Sustainable Groundwater Management Act
SNMP	Salt and Nutrient Management Plan
SWAMP	Surface Water Ambient Monitoring Program
SWP	State Water Project
SWRCB	State Water Resources Control Board
SWRU	Stored Water Recovery Unit
T	transmissivity
Tc	Castaic Formation
TCE	trichloroethene
TDS	total dissolved solids
Tms	Modelo Formation
Tm	Mint Canyon Formation
TNC	The Nature Conservancy
Tp	Pico Formation
Tt	Towsley Formation or Tick Canyon Formation
Tv	Vasquez Formation
Tvb	Violin Breccia
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UTS	unarmored three-spine stickleback
UWCD	United Water Conservation District
UWMP	Urban Water Management Plan

VOC	volatile organic compound
VWD	Valencia Water Division (formerly Valencia Water Company)
WDR	Waste Discharge Requirements (WDR)
WKWD	West Kern Water District
WMW	warmer with moderate warming
WQO	water quality objective
WRP	water reclamation plant
WUE SP	Water Use Efficiency Strategic Plan
WY	water year

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Definitions

California Water Code

Sec. 10721

Unless the context otherwise requires, the following definitions govern the construction of this part:

(a) Adjudication action means an action filed in the superior or federal district court to determine the rights to extract groundwater from a basin or store water within a basin, including, but not limited to, actions to quiet title respecting rights to extract or store groundwater or an action brought to impose a physical solution on a basin.

(b) Basin means a groundwater basin or subbasin identified and defined in Bulletin 118 or as modified pursuant to Chapter 3 (commencing with Section 10722).

(c) Bulletin 118 means the department's report entitled California's Groundwater: Bulletin 118 updated in 2003, as it may be subsequently updated or revised in accordance with Section 12924.

(d) Coordination agreement means a legal agreement adopted between two or more groundwater sustainability agencies that provides the basis for coordinating multiple agencies or groundwater sustainability plans within a basin pursuant to this part.

(e) De minimis extractor means a person who extracts, for domestic purposes, two acre- feet or less per year.

(f) Governing body means the legislative body of a groundwater sustainability agency.

(g) Groundwater means water beneath the surface of the earth within the zone below the water table in which the soil is completely saturated with water, but does not include water that flows in known and definite channels.

(h) Groundwater extraction facility means a device or method for extracting groundwater from within a basin.

(i) Groundwater recharge or recharge means the augmentation of groundwater, by natural or artificial means.

(j) Groundwater sustainability agency means one or more local agencies that implement the provisions of this part. For purposes of imposing fees pursuant to Chapter 8 (commencing with Section 10730) or taking action to enforce a groundwater sustainability plan, groundwater sustainability agency also means each local agency comprising the groundwater sustainability agency if the plan authorizes separate agency action.

(k) Groundwater sustainability plan or plan means a plan of a groundwater sustainability agency proposed or adopted pursuant to this part.

(l) Groundwater sustainability program means a coordinated and ongoing activity undertaken to benefit a basin, pursuant to a groundwater sustainability plan.

(m) In-lieu use means the use of surface water by persons that could otherwise extract groundwater in order to leave groundwater in the basin.

(n) Local agency means a local public agency that has water supply, water management, or land use responsibilities within a groundwater basin.

(o) Operator means a person operating a groundwater extraction facility. The owner of a groundwater extraction facility shall be conclusively presumed to be the operator unless a satisfactory showing is made to the governing body of the groundwater sustainability agency that the groundwater extraction facility actually is operated by some other person.

(p) Owner means a person owning a groundwater extraction facility or an interest in a groundwater extraction facility other than a lien to secure the payment of a debt or other obligation.

(q) Personal information has the same meaning as defined in Section 1798.3 of the Civil Code.

(r) Planning and implementation horizon means a 50-year time period over which a groundwater sustainability agency determines that plans and measures will be implemented in a basin to ensure that the basin is operated within its sustainable yield.

(s) Public water system has the same meaning as defined in Section 116275 of the Health and Safety Code.

(t) Recharge area means the area that supplies water to an aquifer in a groundwater basin.

(u) Sustainability goal means the existence and implementation of one or more groundwater sustainability plans that achieve sustainable groundwater management by identifying and causing the implementation of measures targeted to ensure that the applicable basin is operated within its sustainable yield.

(v) Sustainable groundwater management means the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results.

(w) Sustainable yield means the maximum quantity of water, calculated over a base period representative of long-term conditions in the basin and including any temporary surplus that can be withdrawn annually from a groundwater supply without causing an undesirable result.

(x) Undesirable result means one or more of the following effects caused by groundwater conditions occurring throughout the basin:

> (1) Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon. Overdraft during a period of drought is not sufficient to establish a chronic lowering of groundwater levels if extractions and groundwater recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods.
>
> (2) Significant and unreasonable reduction of groundwater storage.
>
> (3) Significant and unreasonable seawater intrusion.
>
> (4) Significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies.

(5) Significant and unreasonable land subsidence that substantially interferes with surface land uses.

(6) Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water.

(y) Water budget means an accounting of the total groundwater and surface water entering and leaving a basin including the changes in the amount of water stored.

(z) Watermaster means a watermaster appointed by a court or pursuant to other law.

(aa) Water year means the period from October 1 through the following September 30, inclusive.

(ab) Wellhead protection area means the surface and subsurface area surrounding a water well or well field that supplies a public water system through which contaminants are reasonably likely to migrate toward the water well or well field.

Official California Code of Regulations (CCR)

Title 23. Waters

Division 2. Department of Water Resources

Chapter 1.5. Groundwater Management

Subchapter 2. Groundwater Sustainability Plans

Article 2. Definitions

23 CCR § 351

§ 351. Definitions.

The definitions in the Sustainable Groundwater Management Act, Bulletin 118, and Subchapter 1 of this Chapter, shall apply to these regulations. In the event of conflicting definitions, the definitions in the Act govern the meanings in this Subchapter. In addition, the following terms used in this Subchapter have the following meanings:

(a) "Agency" refers to a groundwater sustainability agency as defined in the Act.

(b) "Agricultural water management plan" refers to a plan adopted pursuant to the Agricultural Water Management Planning Act as described in Part 2.8 of Division 6 of the Water Code, commencing with Section 10800 et seq.

(c) "Alternative" refers to an alternative to a Plan described in Water Code Section 10733.6.

(d) "Annual report" refers to the report required by Water Code Section 10728.

(e) "Baseline" or "baseline conditions" refer to historic information used to project future conditions for hydrology, water demand, and availability of surface water and to evaluate potential sustainable management practices of a basin.

(f) "Basin" means a groundwater basin or subbasin identified and defined in Bulletin 118 or as modified pursuant to Water Code 10722 et seq.

(g) "Basin setting" refers to the information about the physical setting, characteristics, and current conditions of the basin as described by the Agency in the hydrogeologic conceptual model, the groundwater conditions, and the water budget, pursuant to Subarticle 2 of Article 5.

(h) “Best available science” refers to the use of sufficient and credible information and data, specific to the decision being made and the time frame available for making that decision, that is consistent with scientific and engineering professional standards of practice.

(i) “Best management practice” refers to a practice, or combination of practices, that are designed to achieve sustainable groundwater management and have been determined to be technologically and economically effective, practicable, and based on best available science.

(j) “Board” refers to the State Water Resources Control Board.

(k) “CASGEM” refers to the California Statewide Groundwater Elevation Monitoring Program developed by the Department pursuant to Water Code Section 10920 et seq., or as amended.

(l) “Data gap” refers to a lack of information that significantly affects the understanding of the basin setting or evaluation of the efficacy of Plan implementation, and could limit the ability to assess whether a basin is being sustainably managed.

(m) “Groundwater dependent ecosystem” refers to ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface.

(n) “Groundwater flow” refers to the volume and direction of groundwater movement into, out of, or throughout a basin.

(o) “Interconnected surface water” refers to surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted.

(p) “Interested parties” refers to persons and entities on the list of interested persons established by the Agency pursuant to Water Code Section 10723.4.

(q) “Interim milestone” refers to a target value representing measurable groundwater conditions, in increments of five years, set by an Agency as part of a Plan.

(r) “Management area” refers to an area within a basin for which the Plan may identify different minimum thresholds, measurable objectives, monitoring, or projects and management actions based on differences in water use sector, water source type, geology, aquifer characteristics, or other factors.

(s) “Measurable objectives” refer to specific, quantifiable goals for the maintenance or improvement of specified groundwater conditions that have been included in an adopted Plan to achieve the sustainability goal for the basin.

(t) “Minimum threshold” refers to a numeric value for each sustainability indicator used to define undesirable results.

(u) “NAD83” refers to the North American Datum of 1983 computed by the National Geodetic Survey, or as modified.

(v) “NAVD88” refers to the North American Vertical Datum of 1988 computed by the National Geodetic Survey, or as modified.

(w) “Plain language” means language that the intended audience can readily understand and use because that language is concise, well-organized, uses simple vocabulary, avoids excessive acronyms and technical language, and follows other best practices of plain language writing.

(x) “Plan” refers to a groundwater sustainability plan as defined in the Act.

(y) “Plan implementation” refers to an Agency's exercise of the powers and authorities described in the Act, which commences after an Agency adopts and submits a Plan or Alternative to the Department and begins exercising such powers and authorities.

(z) “Plan manager” is an employee or authorized representative of an Agency, or Agencies, appointed through a coordination agreement or other agreement, who has been delegated management authority for submitting the Plan and serving as the point of contact between the Agency and the Department.

(aa) “Principal aquifers” refer to aquifers or aquifer systems that store, transmit, and yield significant or economic quantities of groundwater to wells, springs, or surface water systems.

(ab) “Reference point” refers to a permanent, stationary and readily identifiable mark or point on a well, such as the top of casing, from which groundwater level measurements are taken, or other monitoring site.

(ac) “Representative monitoring” refers to a monitoring site within a broader network of sites that typifies one or more conditions within the basin or an area of the basin.

(ad) “Seasonal high” refers to the highest annual static groundwater elevation that is typically measured in the Spring and associated with stable aquifer conditions following a period of lowest annual groundwater demand.

(ae) “Seasonal low” refers to the lowest annual static groundwater elevation that is typically measured in the Summer or Fall, and associated with a period of stable aquifer conditions following a period of highest annual groundwater demand.

(af) “Seawater intrusion” refers to the advancement of seawater into a groundwater supply that results in degradation of water quality in the basin, and includes seawater from any source.

(ag) “Statutory deadline” refers to the date by which an Agency must be managing a basin pursuant to an adopted Plan, as described in Water Code Sections 10720.7 or 10722.4.

(ah) “Sustainability indicator” refers to any of the effects caused by groundwater conditions occurring throughout the basin that, when significant and unreasonable, cause undesirable results, as described in Water Code Section 10721(x).

(ai) “Uncertainty” refers to a lack of understanding of the basin setting that significantly affects an Agency's ability to develop sustainable management criteria and appropriate projects and management actions in a Plan, or to evaluate the efficacy of Plan implementation, and therefore may limit the ability to assess whether a basin is being sustainably managed.

(aj) “Urban water management plan” refers to a plan adopted pursuant to the Urban Water Management Planning Act as described in Part 2.6 of Division 6 of the Water Code, commencing with Section 10610 et seq.

(ak) “Water source type” represents the source from which water is derived to meet the applied beneficial uses, including groundwater, recycled water, reused water, and surface water sources identified as Central Valley Project, the State Water Project, the Colorado River Project, local supplies, and local imported supplies.

(al) “Water use sector” refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation.

(am) “Water year” refers to the period from October 1 through the following September 30, inclusive, as defined in the Act.

(an) “Water year type” refers to the classification provided by the Department to assess the amount of annual precipitation in a basin.

Executive Summary

ES-1 Introduction

Even though you can't see it, groundwater is one of our most valuable resources. Some of the water you use for drinking, cooking, bathing, watering your yard, irrigating your land—even filling your pool—comes from groundwater pumped from aquifer systems underlying the Santa Clarita Valley. Without this important local supply, we would have to buy additional water from other sources. This imported water is more expensive and less reliable during drought. Managed by the Santa Clarita Valley Groundwater Sustainability Agency (SCV-GSA), the two local aquifers that comprise the Santa Clara River Valley East Groundwater Subbasin (Basin) are the primary sources of all local groundwater for prime farmland and hundreds of thousands of people living and working in the Santa Clara River Valley (Valley).

Under the Sustainable Groundwater Management Act (SGMA), which was passed in January of 2015 by the state legislature, local water agencies are required to develop a detailed road map for maintaining or bringing their groundwater basin into a healthy balance (i.e., a sustainable condition) within the next 20 years. When a basin is in a healthy balance, pumping water out of the aquifers is balanced with the inflow from rainfall that recharges the aquifers, thereby ensuring there is enough water for the Valley's population as well as for the Santa Clara River and the lush habitat for plants, fish, amphibians, reptiles, and birds that helps make this valley such an enjoyable place to live. We are very fortunate in our basin because we have a groundwater resource that is sustainable under a range of climate and pumping conditions and we believe, based on sound science, that this condition will continue into the foreseeable future without any undesirable results.

The SGMA law established deadlines for reaching sustainability (in this basin, our focus is on maintaining sustainability) and empowered local agencies to form groundwater sustainability agencies (GSAs) to manage groundwater basins and develop groundwater sustainability plans (GSPs), such as this document. In his signing statement, Governor Brown emphasized that "groundwater management in California is best accomplished locally." To that end, the Santa Clarita Valley Water Agency (SCV Water), the City of Santa Clarita (City), the County of Los Angeles (LA County), and the Los Angeles County Waterworks District No. 36, (LACWD), serving Val Verde, signed a legal agreement to collaborate as the SCV-GSA.

This Santa Clara River Valley East Groundwater Subbasin GSP provides information about the area affected by this plan, the basin setting, the quantitative methods (sustainable management criteria, or SMCs) for evaluating the health (sustainability) of the Basin, the monitoring networks, projects and management actions to achieve sustainability, and the implementation plan for the GSP. This document also includes the list of references and technical studies used in the development of this plan and several supporting appendices. The SCV-GSA has taken many steps, starting with stakeholder engagement, to complete the GSP in accordance with the requirements of the California Department of Water Resources (DWR). The following graphic shows the activities leading to the final accepted GSP.

Work on the GSP began in 2017 with community workshops, an active website, and input from a stakeholder advisory committee made up of local environmental and business interests, groundwater pumpers, and residents. This public process has focused on balancing the perspectives and well-being of all groundwater users. This plan considers the sources and uses of water from the Basin and the changes that might occur due to population growth and other factors, particularly changes in rainfall, streamflows, and climate change. SCV-GSA also studied groundwater dependent ecosystems, or GDEs, which are habitats in which plants and animals rely on groundwater for survival.

This background helped SCV-GSA establish sustainable management criteria to avoid undesirable results for a number of sustainability indicators spelled out in SGMA, including chronic lowering of groundwater levels, reduced groundwater in storage, degraded water quality, land subsidence, and depletion of surface water. SGMA also requires that GSAs identify GDEs and DWR requires assessing the effects of changing groundwater levels on GDEs. The GSP includes a robust monitoring program and defines projects and management actions that have been developed to ensure long-term groundwater sustainability. Fortunately, we have learned through development of this plan that the Basin is operating in a sustainable manner and the river habitat is resilient over wet and dry periods.

Over the past five decades, many studies have been conducted in the Basin relating to water demand, water supply, and water quality. For the first time, all this information has been assembled in one place, this GSP. This GSP also considers the interests of all those who depend on groundwater in the Basin, including domestic well owners, agricultural interests, municipal well owners and operators, and interest groups and individuals who work to protect GDEs—all of whom are represented on the SCV-GSA Stakeholder Advisory Committee. This GSP has been planned and developed collaboratively by the SCV-GSA member organizations, with review and input from the Stakeholder Advisory Committee, and input from the public. The organization of this plan is as follows:

- **Section 1 – Introduction to the Santa Clara River Valley East Subbasin Groundwater Sustainability Plan:** An introduction to the GSP, including a description of its purpose and a brief description of the Basin.
- **Section 2 – Agencies' Information:** Information on the SCV-GSA as an organization and a brief description of each of the SCV-GSA member organizations, including information on the legal authority of the GSA to plan and coordinate groundwater sustainability for the Basin.
- **Section 3 – Description of Plan Area:** A detailed description of the Basin, land uses in the Basin, existing wells and monitoring programs, existing groundwater management plans and regulatory programs, any programs for conjunctive use, and urban land use programs.
- **Section 4 – Hydrogeologic Conceptual Model:** An explanation of the hydrogeologic conceptual model developed for the Basin that includes water sources and uses, a general description of water quality, and a description of the data gaps in the current model.
- **Section 5 – Groundwater Conditions:** A detailed description of the groundwater conditions, including groundwater levels and flow directions, changes in storage, the potential for seawater intrusion or land subsidence to occur, locations where surface water and groundwater are interconnected, the identification and distribution of groundwater-dependent ecosystems (GDEs), and a discussion of groundwater quality for drinking water and agricultural irrigation.
- **Section 6 – Water Budgets:** A presentation of the historical, current, and projected future water budgets for the Basin, including quantification of the estimated change in storage for the historical, current, and projected future water budgets.
- **Section 7 – Monitoring Networks:** A detailed description of the monitoring objectives and monitoring programs for groundwater levels, storage, water quality, land subsidence, and interconnected surface water; the locations of representative monitoring sites and a description of the data management and reporting system.
- **Section 8 – Sustainable Management Criteria:** Defines the sustainability goal for the Basin, describes the process through which SMCs were established; describes and defines SMCs pertaining to chronic lowering of groundwater levels, reduction in groundwater storage, seawater intrusion, degraded water quality, land subsidence, and depletion of interconnected surface water; defines management areas for the Basin, and describes how management-area operations will avoid undesirable results.
- **Section 9 – Management Actions and Projects:** A list and description of each project and management action to address data gaps, describe procedures that will be followed if undesirable results are observed, and obtain information needed to manage the Basin. Optional projects intended to improve resiliency to drought are also included.
- **Section 10 – Groundwater Sustainability Plan Implementation:** Presents a planning-level estimate of implementation costs and a schedule for proposed projects and management actions.
- **Section 11 – Notice and Communications:** Presents SCV-GSA's communications and engagement planning and implementation, public feedback and stakeholder comments on the plan, how feedback was incorporated into the plan, and responses to comments received.

Summaries of the key technical sections of this GSP are presented below.

ES-2 Hydrogeologic Conceptual Model (GSP Sections 4 and 5)

Sections 4 and 5 of the GSP present a narrative that describes the physical setting of the Basin and its groundwater conditions. This narrative is called a hydrogeologic conceptual model; it describes how the Basin groundwater system works. The hydrogeologic conceptual model is based on the available body of data and prior studies of the Basin's geology, hydrology, and water quality. In this GSP, the hydrogeologic conceptual model is the foundation on which water budget analyses are conducted and sustainable management criteria are developed. However, the hydrogeologic conceptual model is not a static narrative; it also incorporates the results of the water budget and SMC development efforts and will continue to evolve over time as data from future monitoring programs described in this GSP are collected and interpreted.

ES-2.1 Principal Aquifer Systems

Figure ES-1 is a diagram depicting the two principal aquifers in the Basin (the surficial Alluvial Aquifer and the Saugus Formation), their sources of recharge, and the mechanisms by which groundwater is discharged from these aquifers in the Basin. The thickness of the Alluvial Aquifer varies along the length of the Santa Clara River, reaching a maximum thickness of about 200 feet at several wells in the center of the Valley. The alluvial sediments generally thin progressively away from the valley center towards the surrounding hills. The Saugus Formation underlies the Alluvial Aquifer and is present throughout all but the easternmost portion of the Basin. The upper portion of the Saugus Formation is up to 5,000 feet thick and consists of coarse-grained sand and gravel beds that contain usable groundwater. Generally, the upper 500 to 2,000 feet of the upper portion of the Saugus Formation is accessed by groundwater supply wells. The lower portion of the Saugus Formation (the Sunshine Ranch Member) is up to 3,500 feet thick and is composed of fine-grained sediments with low permeability and does not provide groundwater in sufficient quantity or adequate quality for municipal or other uses.

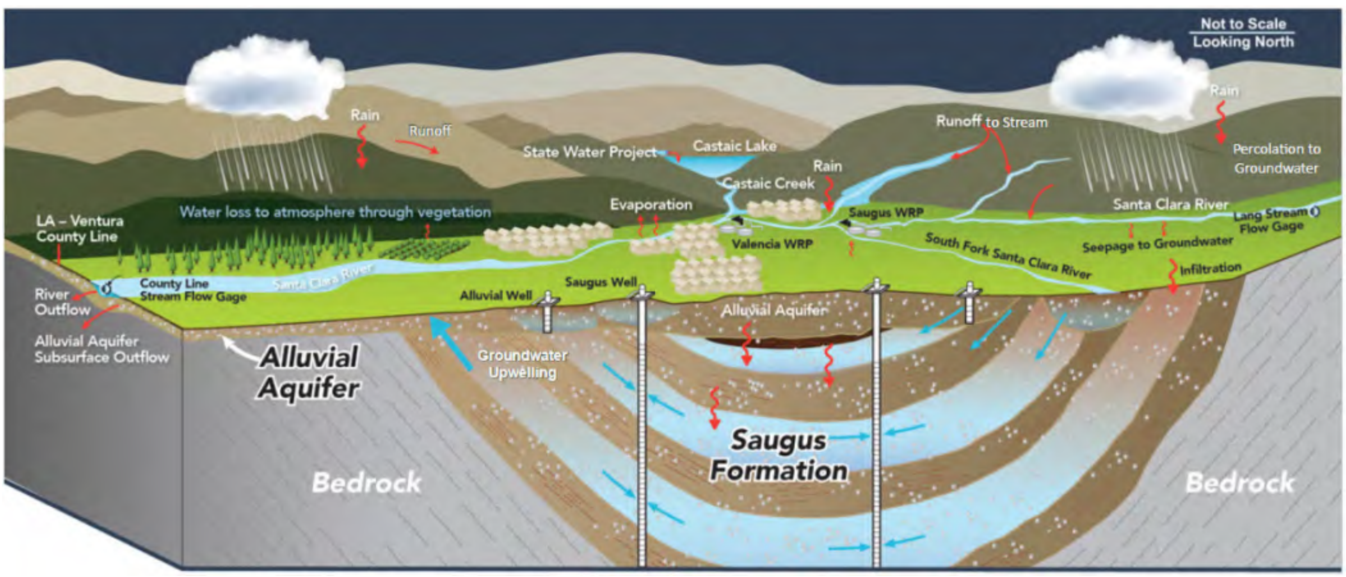


Figure ES-1. The Two Principal Aquifers in the Basin: the Alluvial Aquifer and the Saugus Formation

ES-2.2 Groundwater-Surface Water Interactions

The Santa Clara River is the primary surface water drainage feature in the Basin, flowing generally from east to west. The river is in direct connection with the Alluvial Aquifer system. In the eastern portion of the Basin, the river is ephemeral, with its periodic stormwater flows serving to recharge the Alluvial Aquifer. In the western and central portions of the Basin, groundwater discharges into the river beginning at approximately the mouth of San Francisquito Canyon (just east of I-5). The river also has an indirect connection with the Saugus Formation in the western portion of the Basin, which is an area where the Saugus Formation is discharging its water into the Alluvial Aquifer, and thereby providing an upwards driving force for groundwater to discharge into the Santa Clara River in certain localized reaches west of I-5 at certain times.

The amount and direction of the exchange between the Santa Clara River and the alluvial groundwater system in the Basin is dependent on a number of factors including cycles of wet/normal/dry rainfall conditions, water reclamation plant (WRP) discharges to the river, releases from Castaic Reservoir, evapotranspiration from riparian vegetation (native and invasive species) along the river corridor, stormwater flows, and groundwater pumping. Importation of State Water Project water into the Basin began in the 1980s and has increased the recharge into the Basin from urban irrigation and discharges from the WRPs, resulting in a net increase in the amount of water in the groundwater/surface water system.

ES-2.3 Recharge and Discharge in the Basin

Sources of natural recharge to groundwater in the Basin are:

- Streamflow infiltration from runoff along the Santa Clara River and its tributaries.
- Deep percolation of direct rainfall.
- Subsurface groundwater inflow from upstream areas along the Santa Clara River and its tributaries.
- Upward groundwater flow from certain portions of the Saugus Formation where it is overlain by alluvium, primarily in areas west of Bouquet Canyon.

Sources of anthropogenic (human-made) recharge to groundwater in the Basin are:

- Deep percolation of irrigation water as urban irrigation (landscape irrigation) in the developed areas of the groundwater basin and from areas that are farmed.
- Infiltration of reclaimed water that is actively treated by and discharged from the Saugus WRP and the Valencia WRP. Both plants are operated by the Los Angeles County Sanitation District and together discharge approximately 18 million gallons of treated water per day to the Santa Clara River, with an average annual discharge of approximately 20,000 acre-feet per year (AFY). A portion of the treated water from the Saugus WRP is discharged to the Santa Clara River northwest of the intersection of Bouquet Canyon Road and Valencia Boulevard, while the remainder is conveyed to the Valencia WRP for additional treatment and then released to the Santa Clara River west of Interstate 5.
- Treated water from septic systems in unsewered areas is an additional source of groundwater recharge.

Discharges from the Basin's groundwater system are:

- Groundwater extraction for municipal, agricultural, and domestic supply uses.
- Evapotranspiration (evaporation from plant leaves) by phreatophyte vegetation (plants living in proximity to the river and tributaries). Phreatophytes are native plants such as willows and cottonwoods, as well as invasive species such as *Arundo donax* (*Arundo*) and tamarisk, that root directly into or just above the water table in areas of shallow groundwater.
- Groundwater discharge from the Alluvial Aquifer to the Santa Clara River in the westernmost part of the Basin. The amount of flow into the river at any given time depends largely on water levels within the alluvium.
- Groundwater underflow out of the Basin into Ventura County, which occurs through a relatively thin veneer of alluvium that is present on top of the Pico Formation at the western basin boundary.

Groundwater wells completed in the Alluvial Aquifer in the eastern part of the Basin (at and upstream of the Saugus WRP) have water levels that are heavily influenced by climatic conditions, exhibiting gradual declines of several tens of feet over 5- to 10-year periods when there are below-normal periods of rainfall, followed by rapid recoveries during wet periods. Generally, one to two consecutive wet years can provide enough recharge to replenish the Alluvial Aquifer in the eastern part of the Basin. Alluvial Aquifer wells in the central and western portion of the Basin show smaller responses to rainfall cycles, particularly downstream of the

Valencia WRP where the Saugus Formation discharges groundwater into the Alluvial Aquifer. Saugus Formation wells also show smaller and more delayed responses to rainfall cycles than are seen in the eastern portion of the Alluvial Aquifer.

With some exceptions, the quality of groundwater in the Basin's two primary aquifer systems is suitable for drinking water and agricultural uses.

- Concentrations of salts and nutrients (e.g., total dissolved solids, chloride, sulfate, nitrate) meet federal drinking water standards, but in some cases, depending upon location, do not meet the state water quality objectives (WQOs) set by the Los Angeles Regional Water Quality Control Board (RWQCB). For example, concentrations of total dissolved solids (TDS, a measure of salt content) and sulfate exceed the WQO in some locations. A salt and nutrient management plan (SNMP) was approved by the RWQCB for the Basin in 2016 and this plan is used to manage salt and nutrient concentrations in the Basin.
- Groundwater contamination—including perchlorate, tetrachloroethylene (PCE), trichloroethylene (TCE), and per- and polyfluoroalkyl substances (PFAS)—has been detected in several wells. SCV Water is installing wellhead treatment on all affected wells to make sure water served to its customers meets drinking water standards and continues to closely monitor its wells. SCV Water is also actively coordinating with the state RWQCB and the Department of Toxic Substances Control, agencies that are investigating sources of contamination and managing the remediation of the contamination.

ES-2.4 Groundwater Dependent Ecosystems (GDEs)

GDEs are defined under SGMA as "ecological communities of species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface". GDE types include seeps and springs; wetlands and lakes; terrestrial vegetation connected to shallow groundwater; and rivers, streams and estuaries. Figure ES-2 shows the locations of GDEs in the Basin, as identified through screening methods developed by The Nature Conservancy, field mapping and verification, and local data on the spatial and temporal variations in the water table depth below ground surface. Much of the acreage associated with the mapped GDEs occurs in the main stem of the Santa Clara River. However, many smaller potential GDEs are identified in the tributaries reaching into the higher elevations. Some potential GDEs in the higher elevations may be fed from higher elevation seepage disconnected from the main groundwater basin.

The GDEs consist of both riparian and aquatic habitat.

- **Riparian habitat** in the Basin supports several special status avian species including the least Bell's vireo and southwestern willow flycatcher. These species are found in the willow and riparian mixed hardwood forests occurring along the length of the Santa Clara River in the central and western portions of the Basin. Riparian habitat requires a reliable water source. Willow forests occur in areas where groundwater is available year-round. Willow root zones occur most prominently within 1 to 5 feet below the surface but may reach depths of up to 8 feet. Root depths of mature cottonwood trees may reach over 16 feet.
- **Aquatic habitat** in the Basin may support several special status species, including the arroyo toad and native fishes, including the unarmored three-spined stickleback fish (UTS), and the Santa Ana sucker. The UTS have been found in only a few locations in the watershed upstream of the Valencia WRP. Recently, the UTS has been located upstream of the Valencia WRP outfall, making the short upstream segment at the Santa Clara River Bridge (I-5 Bridge) where small volumes of groundwater upwelling occur, a particularly important location.

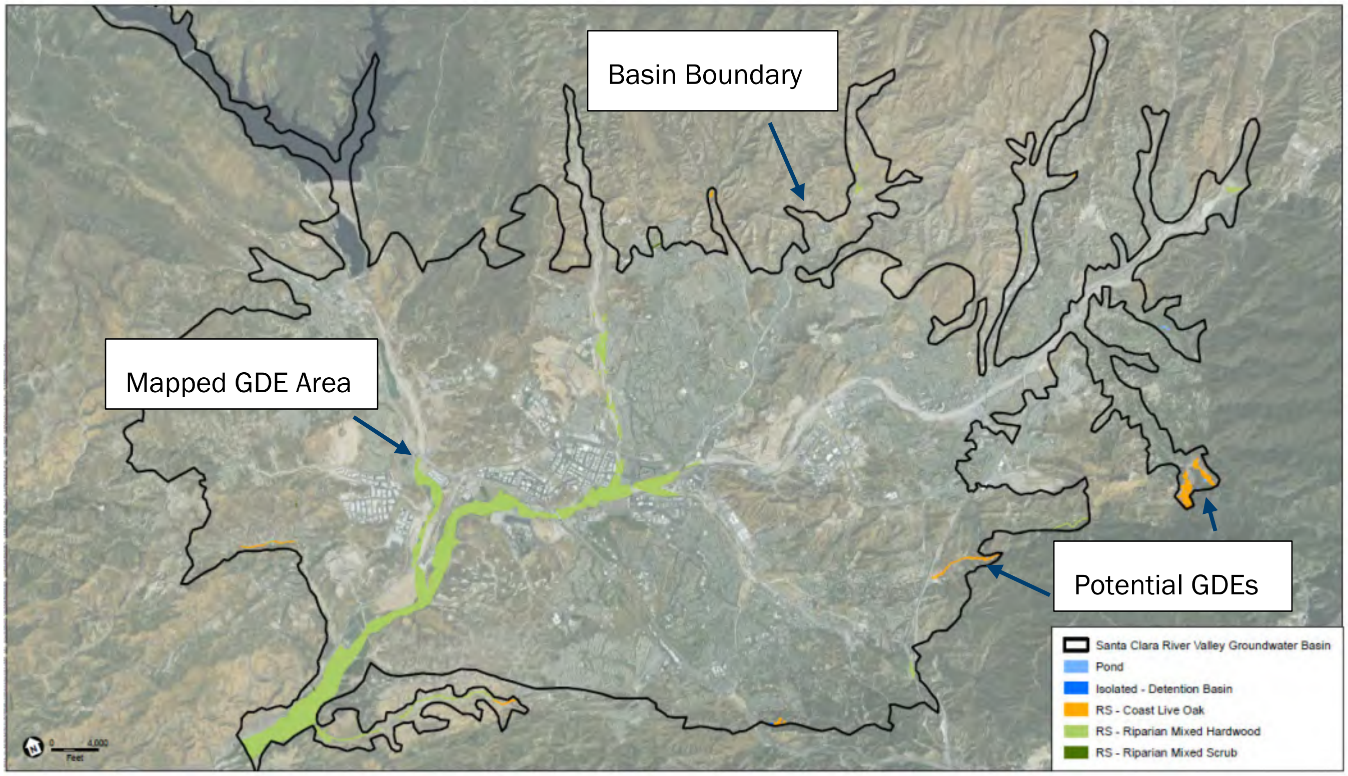
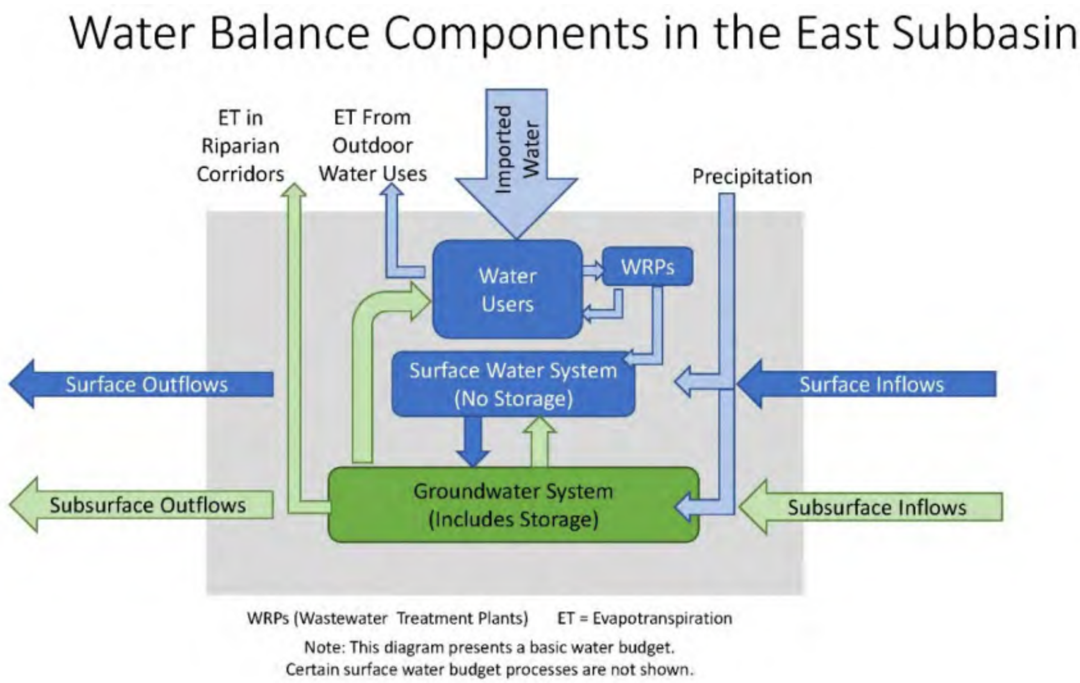


Figure ES-2. Distribution and Types of GDEs Mapped in the Basin

ES-3 Water Budgets (GSP Section 6)

A water budget defines the sources and uses of water in an area. The water budget for the Basin is a regional basin-wide water budget that accounts not just for groundwater, but also for surface water and for imported water supplies and uses. The regional water budget provides an accounting of all surface water and groundwater flowing into and out of the Basin over a specified period. A generalized depiction of the water budget processes (inflows and outflows) for surface water and groundwater in the Basin is shown below.



The interactions between surface water and groundwater can be complex and subtle. The water budget analysis presented in Section 6 first quantifies the water budgets under historical and current conditions in the Basin, then analyzes how future changes to supply, demand, hydrology, population, land use, and climatic conditions may affect the basin water budget. The historical, current, and projected water budgets in this GSP have been developed using a three-dimensional numerical computer model that simulates the natural and human-induced interactions that take place throughout the Basin between surface and groundwater. This numerical computer model conducts its calculations three times a month over a 95-year simulation period (reflecting historical rainfall patterns in the Basin) to estimate these interactions. The results from modeling the historical and current periods are consistent with observed groundwater levels and show that the Basin has been in a balanced condition in which inflows (recharge) balance outflows (e.g., pumping).

ES-3.1 Projected Water Budget

The projected water budget is the primary water budget analysis that is used to assess future conditions and to develop sustainable management criteria. The projected water budget simulates the effects of full build-out of land uses and human demands for water, which are expected to occur by the year 2050. Three alternative projected water budgets for future full build-out conditions (**no climate change**, **2030 climate change**, and **2070 climate change**) are presented in Section 6 for consideration as the projected water budget to use for evaluating basin sustainability under SGMA. The projected water budgets are examined to see how changes in climate could affect precipitation and evapotranspiration rates locally in the Basin, for the years 2030 and 2070 (as defined by DWR). The analysis of the projected water budget also includes a numerical groundwater flow model simulation that uses the historical climate without climate change, to help quantify the climate-change influence separately from the changes in land and water uses. All three of these projected water budgets are developed for the same 95-year historical climatic regime (1925 through 2019) that is used in the historical and current water budgets. DWR's local climate-change factors are applied to the historical climatic regime to describe the potential future effects of climate change on precipitation and evapotranspiration in 2030 and 2070.

Based on this analysis, the projected water budget that was used for further SGMA sustainability evaluations and groundwater management planning reflects full build-out conditions in the Basin, pumping in accordance with SCV Water's Basin Operating Plan *(Groundwater Management Plan, Santa Clara River Valley Groundwater Basin)*, and precipitation and evapotranspiration changes that are estimated by DWR to occur in 2030. This projected water budget is described as occurring for year 2042 conditions, as the year 2042 will be the end of the 20-year time frame for groundwater sustainability measures to be implemented under the GSP. The projected water budget for year 2042 conditions (full build-out with 2030 climate change) is shown in Figure ES-3, which presents a graphic showing the multiple groundwater inflows and outflows, with the inflows stacked as bars above the zero line and the outflows stacked as bars below the zero line. A yellow line shows the cumulative change over time in the volume of groundwater in storage in the Basin. Like the cumulative departure curve for precipitation, the cumulative change curve for groundwater storage indicates whether the Basin is experiencing long-term changes in groundwater storage, and, in particular, whether an overdraft condition might exist (as would be shown by a curve that is declining over a long period—i.e., sloping down and to the right over multiple decades). As shown in this plot, the cumulative change curve indicates that chronic declines in groundwater levels and groundwater storage are not projected to occur over long periods, which indicates that SCV Water's Basin Operating Plan for the Basin is unlikely to cause an overdraft condition in the local groundwater system (i.e., it is unlikely to exceed the basin yield) in the future under the assumed climatic conditions. A lack of chronic declines in groundwater levels and groundwater storage was also observed in the historical and current water budgets, as well as in the two other projected water budgets that simulated no climate change and a 2070 level of climate change.

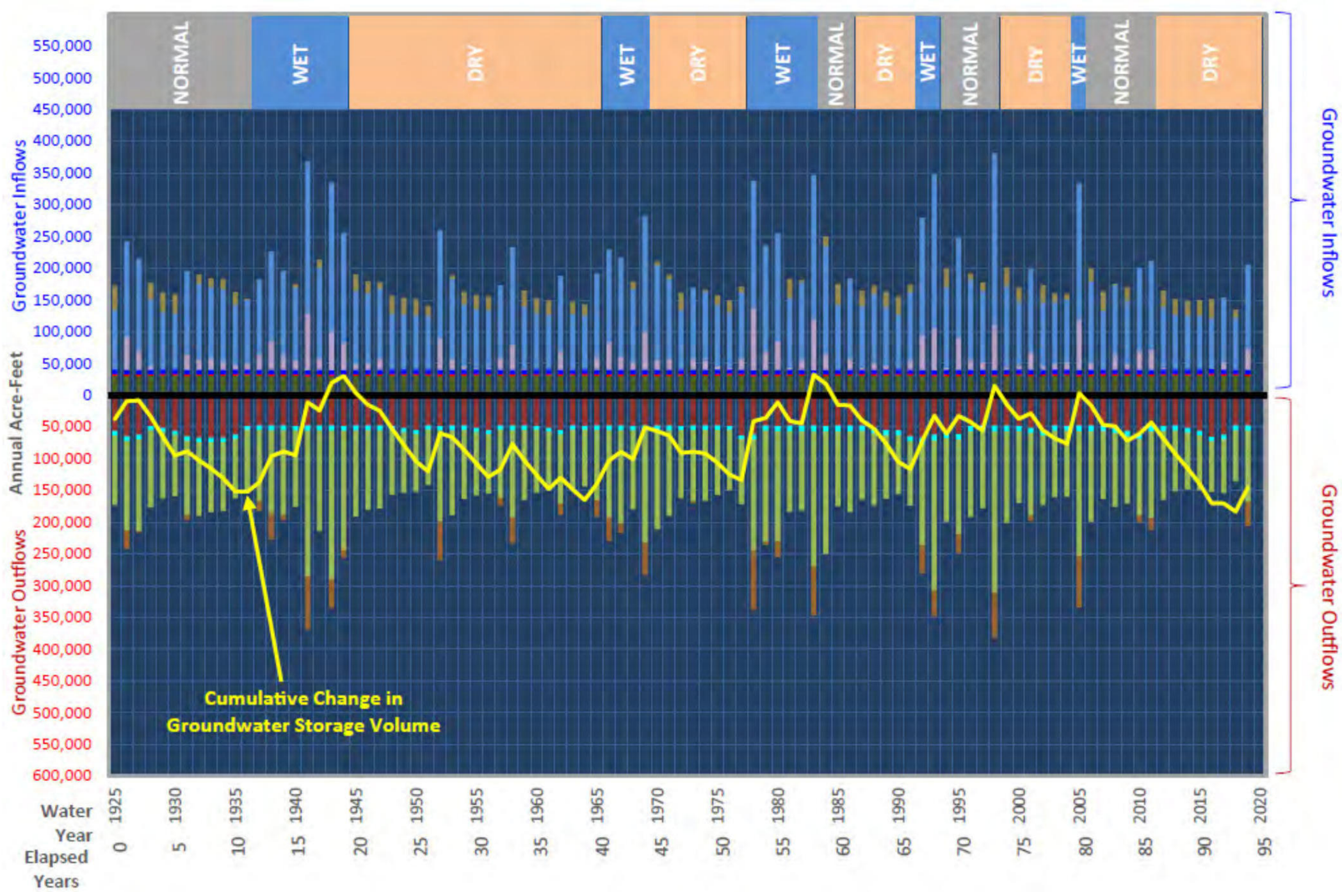


Figure ES-3. Projected Groundwater Budget for 2042 Conditions (Full Build-Out Conditions with 2030 Climate Change)

ES-3.2 Basin Yield

SGMA requires that basins be brought into balance within 20 years to avoid undesirable results and depletion of groundwater resources. A basin that is out of balance is characterized by a continual lowering of groundwater levels over time, a condition known as overdraft. Overdraft occurs when the average annual amount of groundwater extraction exceeds the long-term average annual supply of water to the basin. It is normal for groundwater basins to experience increases and decreases in storage in response to the normal dry and wet hydrologic cycles. In general, SGMA requires that a basin operate at or below its "basin yield" production volume, which is a long-term (multi-decadal) average annual production volume that does not create a long-term chronic overdraft condition

In all three of the projected water budgets described in Section 6, annual pumping volumes increase during dry years, which are defined as years when State Water Project water deliveries are significantly curtailed. The increase in groundwater pumping during these dry years (compared with normal years) occurs in the Saugus Formation. The projected water budgets for the Basin indicate that the *Basin Operating Plan* does not produce chronic declines in groundwater storage volumes or groundwater levels in the aquifer system on a long-term basis, including under the two different climate change scenarios evaluated. This means the basin yield volume for the Basin is likely higher than the average annual production volume of 52,200 AFY that was simulated for the projected water budget under full build-out of the land and water uses in the Basin.

The results of the projected water budget also indicate that, under the *Basin Operating Plan*, the Basin can be pumped at an annual rate of at least 67,500 AFY for multiple dry years without causing chronic water level declines. The number of consecutive dry years that the Basin can be pumped at or above 67,500 AFY without causing chronic water level declines has not been tested or determined. Thus, it is prudent to consider the basin yield volume for the Basin to be at least 52,200 AFY, based on the long-term average amount of pumping. However, as indicated by the projected water budget analyses, pumping at rates of 67,500 AFY (and potentially higher) can occur for multiple dry years without causing chronic groundwater level declines and exceeding the long-term basin yield for the Basin groundwater system.

ES-4 Monitoring Networks (GSP Section 7)

This section evaluates existing monitoring programs in the Basin and incorporates elements of existing monitoring programs into a GSP monitoring network program to be consistent with SGMA regulations. Existing monitoring programs considered relevant to monitoring of sustainability indicators were evaluated to identify monitoring sites and historical data that can be utilized in the development of a monitoring network for this GSP. Existing monitoring programs in the Basin that relate to sustainability indicators include efforts conducted by the following entities and agencies:

- Santa Clarita Valley Water Agency (SCV Water) groundwater elevation and quality monitoring programs (reported in the annual *Santa Clarita Valley Water Report*)
- County of Los Angeles Waterworks District 36 groundwater production well monitoring
- County of Los Angeles Flood Control District Groundwater Elevation monitoring
- Los Angeles County Department of Public Works (LACDPW) and U.S. Geological Survey streamflow monitoring
- LACDPW Land Surface Elevation Benchmark Surveys
- California Statewide Groundwater Elevation Monitoring (CASGEM) conducted by SCV Water – Santa Clara River Valley Basin – Santa Clara River Valley East
- University NAVSTAR Consortium (UNAVCO) Plate Boundary Observatory

- California Drinking Water Watch
- Department of Toxic Substances Control (Whittaker-Bermite Property)
- Santa Clarita Valley Water Agency Salt and Nutrient Management Plan monitoring
- Santa Clarita Valley Sanitation District of Los Angeles County
- Newhall Ranch Sanitation District of Los Angeles County

ES-4.1 Monitoring Plan for Water Levels, Change in Storage, Water Quality

The GSP monitoring network is composed of aquifer-specific wells that are screened in one of the principal aquifers in the Basin (the Alluvial Aquifer or the Saugus Formation). The representative monitoring well network does not include composite wells that span both aquifers. The network will enable the collection of data to assess sustainability indicators, evaluate the effectiveness of management actions and projects that are designed to achieve sustainability, and evaluate adherence to measurable objectives for each applicable sustainability indicator.

The Basin currently has more than 70 wells that are actively monitored for water level and/or groundwater quality data. However, for the purposes of the GSP monitoring program, SCV-GSA identified a subset of these wells that meet SGMA regulations for establishing the monitoring network and other program requirements. These selected representative monitoring sites, or representative monitoring wells, provide geographical coverage across the areas where groundwater is pumped from each of the two principal aquifers, and each well has a historical data record lasting from a few years to several decades (23 California Code of Regulations § 354.36). This effort resulted in the selection of **16 wells in the Alluvial Aquifer** and **9 wells in the Saugus Formation**; see Figures 7-10 and 7-11 in Section 7 of the GSP for their locations and Tables 7-7 and 7-8 for well construction summaries and a listing of the sustainability indicator(s) for which each well will be monitored. The GSA has compiled well construction information for these wells, which allows the GSA to determine with certainty the aquifer being monitored. The geographic distribution of this selection of monitoring wells accounts for the ability to use each monitoring well site for multiple sustainability indicators. As a collective group, the representative monitoring wells will be used for monitoring groundwater elevation, storage, and water quality, which will enable the GSA to have a streamlined and efficient GSP monitoring program.

This coverage allows for the collection of data to evaluate groundwater gradients and flow directions over time as well as the annual change in storage. Furthermore, the monitoring frequency of the wells will allow for the monitoring of seasonal highs and lows. Because wells were chosen with the existing length of historical data record in mind, future groundwater data will be comparable to the historical data.

ES-4.2 Monitoring for Land Subsidence

Monitoring of subsidence in the Basin will utilize InSAR data (satellite-based land surface elevation monitoring) and existing benchmarks established by LACDPW for subsidence monitoring in the Basin. Each year, SCV Water will survey on the order of 10 stations each January and August for land surface elevation. The locations of the LACDPW stations are shown on Figure 7-12 in Section 7 of the GSP. Locations will be selected for monitoring in collaboration with LACPW and SCV Water and will be selected because they are in an area of the Basin that is considered most susceptible to subsidence and where infrastructure (such as well V201, conveyance pipelines, and roadways) are located. The elevation of each benchmark station will be calibrated to benchmarks established by LACDPW so that consistency between historical elevations can be maintained.

ES-4.3 Monitoring Plan for Interconnected Surface Water and GDEs

The GSP monitoring plan also includes elements to ensure the avoidance of impacts to GDEs. It includes groundwater level monitoring at 10 locations within the identified GDE area; see Figure 8-7 for the locations of these wells, which consist of four existing and six new wells. The GDE monitoring program includes the following elements:

1. Install 6 shallow monitoring wells (also referred to as piezometers) at locations along the river corridor representing river segments and two locations in selected tributaries where GDEs are present.
2. Measure the elevation of the monitoring well measuring points and river channel (thalweg) nearest to the monitoring well.
3. Assess the relationship between water levels measured at the GDE monitoring wells, river flow, WRP discharges, rainfall, and nearby pumping to assess the validity of the data observed in the monitoring locations.
4. Calibrate the measured water levels with levels predicted by the groundwater flow model.
5. Conduct groundwater level monitoring to track water levels relative to the triggers identified in Section 8 of the GSP.
6. In monitoring wells that provide meaningful data, identify a trigger for each well based on historical low groundwater levels (actual data or estimate using the groundwater model). Identify an intermediate trigger above the historical low in areas where sensitive aquatic species reside (e.g., the I-5 Bridge).
7. Monitor flow at the Old Road Bridge streamflow gage (the only nearby gage) downstream from where sensitive species (e.g., UTS) are thought to exist in pools at the I-5 Bridge. Periodically visually observe and document surface water flow conditions at this location (I-5 Bridge and streamflow gage) if surface water gauging is not possible during low-flow conditions.

Section 8 of the GSP states that when a trigger is reached, an evaluation process will be initiated to determine whether the lowered groundwater levels are a result of pumping and could result in a significant and unreasonable impact on GDEs. The GSP monitoring plan includes a process to report the trigger event to the GSA Board as needed with an accompanying Trigger Evaluation Report that evaluates the need for management actions to be implemented. The evaluation would be conducted in a timely manner if it appears that groundwater levels are approaching or likely to exceed GDE trigger levels, as discussed in Section 8 of the GSP. Management actions for avoiding impacts to GDEs would be implemented if the lowering groundwater levels caused by groundwater extraction could result in permanent loss of GDEs anywhere in the GDE area or in cessation of surface flow during low-flow conditions in the river channel that currently provide essential habitat to UTS (sensitive aquatic species in the vicinity of I-5 Bridge).

ES-5 Sustainable Management Criteria (SMCs) (GSP Section 8)

Section 8 defines the criteria by which sustainability will be evaluated, defines conditions that constitute sustainable groundwater management, and discusses the process by which the SCV-GSA will characterize undesirable results and how it established minimum thresholds and measurable objectives for each sustainability indicator in the Basin. Section 8 presents the data and methods used to develop SMCs and demonstrates how these criteria influence beneficial uses and users. The SMCs are considered initial criteria and will be reevaluated and potentially modified in the future as new data become available.

Sustainability indicators are the effects caused by groundwater conditions occurring throughout the Basin that, when significant and unreasonable, become undesirable results. Undesirable results are one or more of the following effects:

- Chronic lowering of groundwater levels

- Reduction in groundwater storage
- Degraded groundwater quality
- Land subsidence
- Depletion of interconnected surface water

ES-5.1 Sustainability Goal

The Basin Sustainability Goal is presented below:

The SCV-GSA's sustainability goal is to manage the groundwater resources of the Basin for current and future beneficial uses of groundwater, including the river environment, through an adaptive management approach that builds on robust science and monitoring and considers economic, social, and other objectives of a wide variety of stakeholders.

This plan has two main objectives, reflecting the values of the local community to (1) maintain water supply for municipal, agricultural, and domestic uses in times of climate change and variability of imported supply, and (2) protect GDEs from permanent harm caused by groundwater pumping.

The context for the sustainability goal is the recognition that no undesirable effects have occurred in the Basin to date. Groundwater levels have declined during dry periods, and the Basin has refilled in wet periods. As described in Section 6, the *Basin Operating Plan* contemplates groundwater levels that could be lower than historical levels during dry years, to accommodate future build-out, conjunctive use operating strategies, and climate change. The principal question examined in Section 6 of the GSP is whether these lower groundwater levels will cause undesirable results. The groundwater model predicts that basin groundwater levels will continue to recover during wet years, even as groundwater levels are drawn down further in dry years. SGMA expressly allows for this result (Water Code §10721(x)(1)). Thus, undesirable results due to chronic lowering of groundwater levels or significant and unreasonable reduction of groundwater storage are unlikely to occur.

The other sustainability indicators will be closely monitored to ensure that lower groundwater levels do not cause unreasonable results (see Section 7). SCV-GSA will take action to close data gaps. In the case of depletions of interconnected surface water, trigger levels are set to recognize potential undesirable results in time to address them. Because the precise nature of these potential undesirable results is unknown, this plan includes a variety of possible management actions, to preserve flexibility in adaptive management (see Section 9).

ES-5.2 Qualitative Objectives for Meeting Sustainability Goals

Qualitative objectives are designed to help stakeholders understand the overall purpose (e.g., Avoid Chronic Lowering of Groundwater Levels) for sustainably managing groundwater resources and reflect the local economic, social, and environmental values within the Basin. A qualitative objective is often compared to a mission statement. The qualitative objectives for the Basin are the following:

- **Avoid Chronic Lowering of Groundwater Levels**
  - Maintain groundwater levels that continue to support current and future groundwater uses and a healthy river environment in the Basin

- **Avoid Chronic Reduction of Groundwater Storage**
  - Maintain sufficient groundwater volumes in storage to sustain current and planned groundwater use in prolonged drought conditions while avoiding permanent degradation of environmental values
- **Avoid Land Subsidence**
  - Reduce or prevent land subsidence that causes significant and unreasonable effects to groundwater supply, land uses, infrastructure, and property interests
- **Avoid Degraded Groundwater Quality**
  - Maintain access to drinking water supplies
  - Maintain access to agricultural water supplies
  - Maintain quality consistent with current ecosystem uses
- **Avoid Depletion of Interconnected Surface Water**
  - Avoid significant and unreasonable effects (i.e., undesirable results) on beneficial uses in the Basin, including GDEs, caused by groundwater extraction
  - Maintain sufficient groundwater levels and surface water flow in the river and pools to sustain aquatic habitat where UTS and other native fishes are present (e.g., at the I-5 Bridge), to the extent that such decreases are caused by groundwater extraction

ES-5.3 General Process for Establishing Sustainable Management Criteria

This section presents the process that was used to develop the SMCs for the Basin, how public input from local stakeholders was considered, the criteria used to define undesirable results, and how minimum thresholds and measurable objectives were established.

ES-5.3.1 Obtain Public Input

The public input process was built on the GSA member agencies' long history of engaging local stakeholders and interested parties on water issues. This included the formation of the Stakeholder Advisory Committee, which has representatives from large, medium, and small pumpers; local residents; businesses; and environmental groups. The SMCs and beneficial uses presented in this section were developed using a combination of information from public input, public meetings, comment forms, hydrogeologic analysis, and meetings with SCV Water staff and Stakeholder Advisory Committee members.

ES-5.3.2 Define Undesirable Results

Defining what is considered undesirable is one of the first steps in the SMC development process. The qualitative objectives for meeting sustainability goals are presented as ways of avoiding undesirable results for each of the sustainability indicators. The absence of undesirable results defines sustainability. The following are the general criteria used to define undesirable results in the Basin:

- Groundwater use must be causing significant and unreasonable effects in the Basin.
- A minimum threshold is exceeded in a specified number of representative wells over a prescribed period.
- Impacts to beneficial uses occur, including to GDEs and/or threatened or endangered species.

These criteria may be refined during the 20-year GSP implementation period based on monitoring data and analysis.

ES-5.3.3 Develop Information and Methodology Used to Establish Minimum Thresholds and Measurable Objectives

Information developed in previous sections of the GSP including hydrogeologic conceptual model, groundwater conditions and water level data, water budget, and surface water-groundwater interactions were used to define minimum thresholds and measurable objectives for each sustainability indicator. Minimum thresholds and measurable objectives are generally defined as follows:

- **Minimum Threshold** - A minimum threshold is the quantitative value that represents the groundwater conditions at a representative monitoring site that, when exceeded individually or in combination with minimum thresholds at other monitoring sites, may cause an undesirable result(s) in the Basin.
- **Measurable Objective** - Measurable objectives are quantitative goals or targets that reflect the Basin's desired groundwater conditions and allow the GSA to achieve the sustainability goal within 20 years.

ES-5.4 Summary of Sustainable Management Criteria

Table ES-1 summarizes the SMCs for the six groundwater sustainability indicators. The table first describes the type(s) of potential undesirable results associated with each sustainability indicator, then describes the minimum thresholds and measurable objectives for each indicator. Detailed discussions of the SMCs for each groundwater sustainability indicator are provided in Sections 8.6 through 8.11 of this GSP.

Table ES-1. Summary of Sustainable Management Criteria

Potential Undesirable Results	Minimum Threshold	Measurable Objective	Other Notes
Chronic Lowering of Groundwater Levels			
Groundwater levels fall below minimum thresholds in 25 percent of representative wells in the Alluvial Aquifer or 50 percent of representative wells in the Saugus Formation throughout a 3-year period.	Lowest groundwater elevation from the 95-year future-conditions model or Lowest historically observed groundwater elevation in modern era (i.e., since 1980), whichever is lower (as shown in Table 8-2).	Average of the future modeled or historically observed groundwater elevations (using the same data set as for the minimum threshold as shown in Table 8-2).	An undesirable result occurs if the same group of representative monitoring sites experiences this condition throughout the 3-year period. Use static groundwater level measurements collected twice per year (in the spring and late summer).
Chronic Reduction of Groundwater in Storage			
Same as for chronic lowering of groundwater levels. An additional undesirable result is an inability to meet groundwater demands during a multi-year drought.	Same as for chronic lowering of groundwater levels.	Same as for chronic lowering of groundwater levels.	Same as for chronic lowering of groundwater levels.
Seawater Intrusion			
Not applicable (this is an inland basin)			
Degraded Groundwater Quality			
Degradation of groundwater quality beyond WQOs and assimilative capacities established in the SNMP in 20 percent of representative wells.	WQOs for TDS, chloride, nitrate, and sulfate or ambient water quality if it exceeds the WQO.	Prevent water quality degradation for salts and nutrients and for contaminants.	Minimum thresholds are not established for contaminants because state regulatory agencies have the responsibility and authority to regulate and direct actions that address contamination.
Land Subsidence			
Substantial interference with land uses, impacts on the use of critical infrastructure and roads, or subsidence greater than minimum thresholds at 10 percent of monitoring locations.	The subsidence measured between June of one year and June of the subsequent year shall be no more than an average of 0.1 foot in any single year and a cumulative 0.5 foot in any 5-year period observed at 10 percent or more monitoring locations.	Maintenance of current ground surface elevations trends.	Based on InSAR-measured subsidence during June of each year and LA County *benchmark* elevation monitoring twice per year.
Depletion of Interconnected Surface Water			
Permanent loss or significant degradation of existing native riparian or aquatic habitat due to lowered groundwater levels caused by groundwater pumping throughout the GDE area. In areas that currently provide essential habitat to UTS and native fishes (sensitive aquatic species in the vicinity of I-5 Bridge), cessation of surface flow and pools during low-flow conditions in the river channel caused by groundwater extraction is an undesirable result.	Surface water depletion caused by groundwater extraction as measured by groundwater levels falling below the lowest predicted future groundwater elevation measured at GDE-area monitoring wells.	Average of future modeled groundwater elevations (using the same data set as for the minimum threshold).	GDE trigger levels (see Table 8-6) that are at or above historical low elevations (as estimated from the model) will be used to initiate an assessment of GDE conditions caused by groundwater extraction and management actions that might be needed to protect GDEs.

Notes

GDE = groundwater-dependent ecosystem
SNMP = Salt and Nutrient Management Plan
TDS = total dissolved solids
WQO = water quality objective

Figure ES-4 and ES-5 illustrate the minimum thresholds and measurable objectives for groundwater levels in the Alluvial Aquifer and Saugus Formation, respectively. As can be seen in these figures, the minimum threshold has been established at the projected future low water level in each aquifer based on the water levels predicted at each representative well by the groundwater model. Based on the modeling results, groundwater levels above the minimum threshold do not result in undesirable results and represent sustainable conditions. Additional details about the approach that will be taken if minimum thresholds are reached are presented in Section 9, Projects and Management Actions.

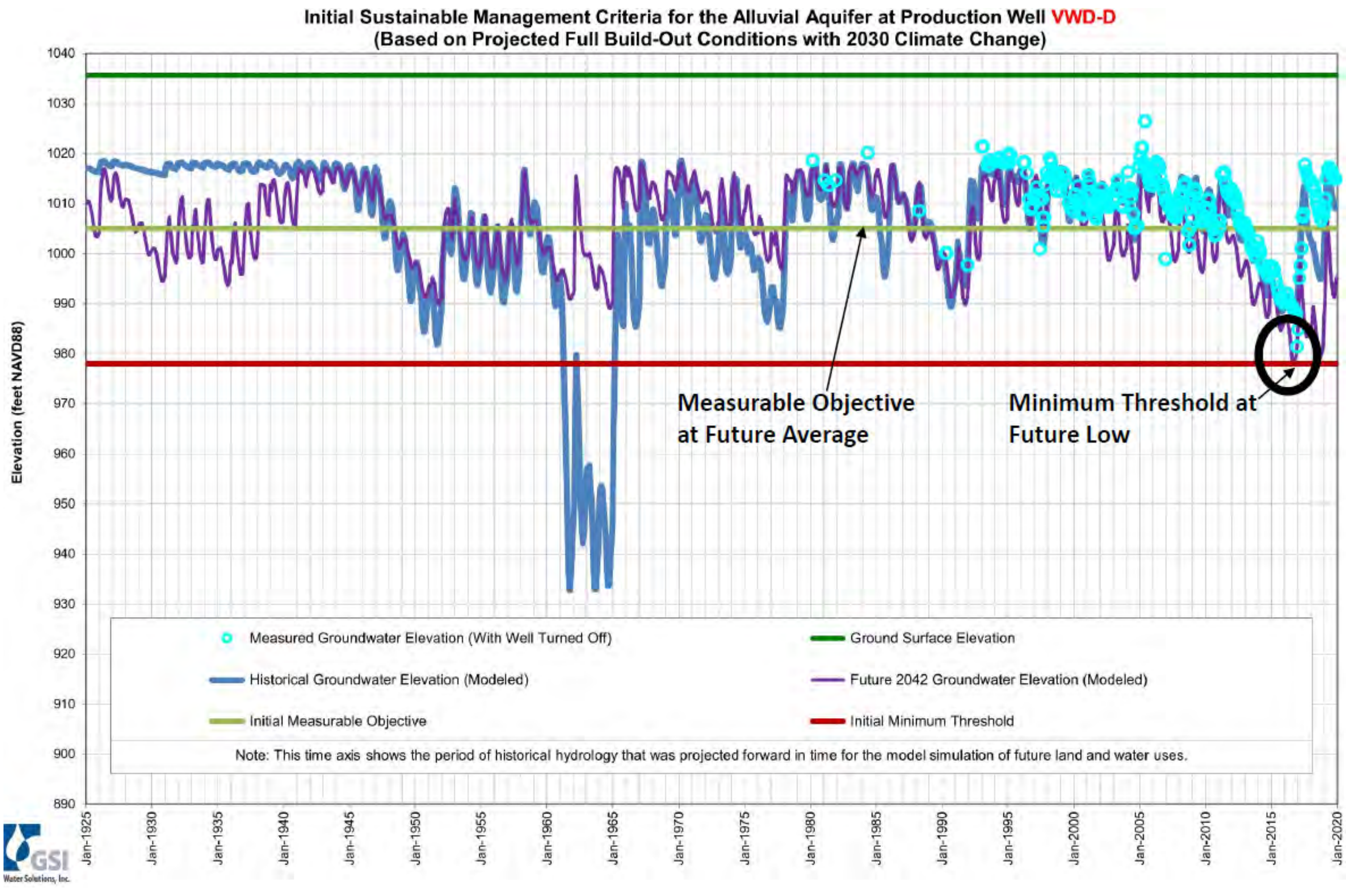


Figure ES-4. Initial Sustainable Management Criteria for the Alluvial Aquifer at Well VWD-D

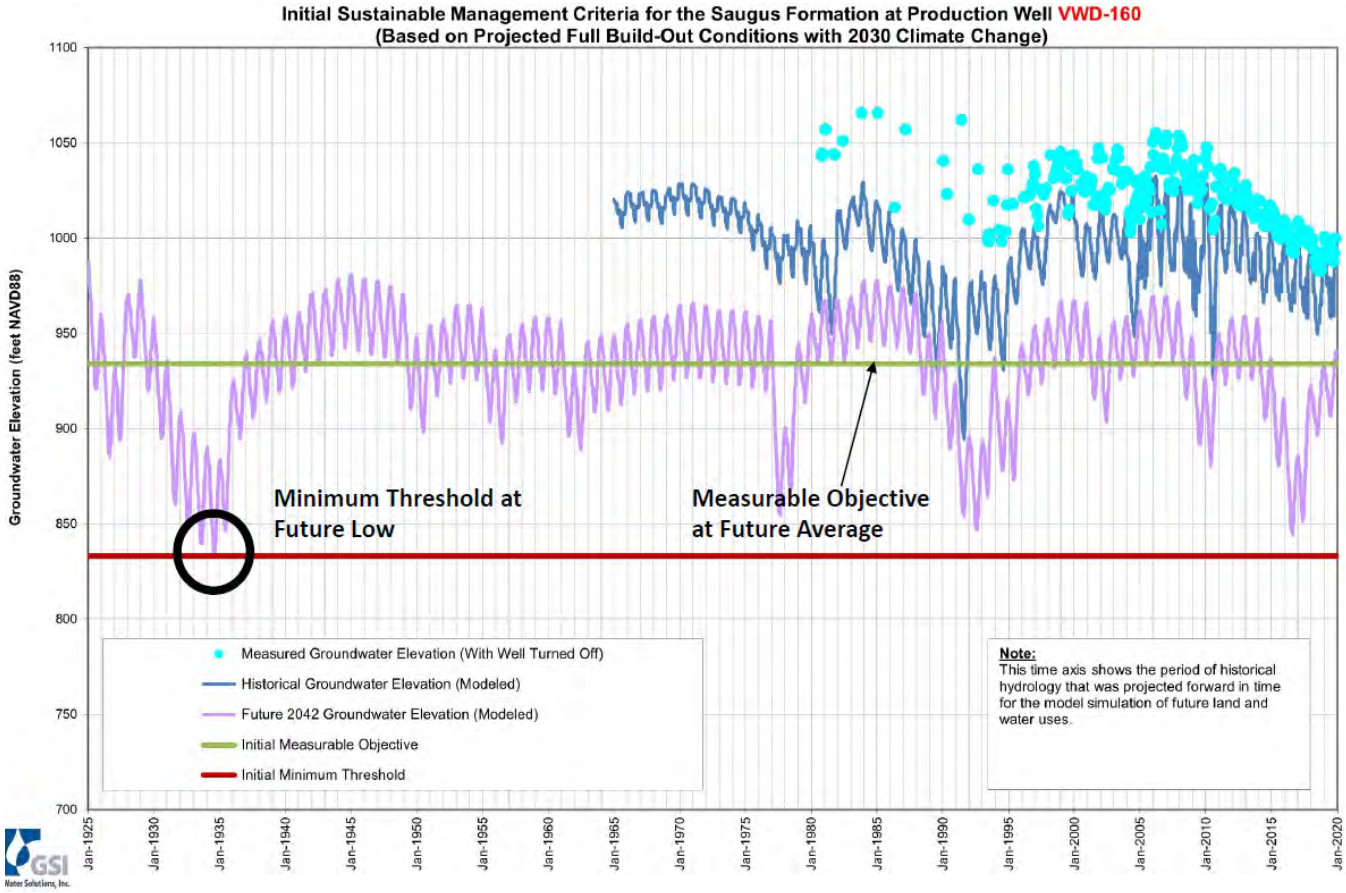


Figure ES-5. Initial Sustainable Management Criteria for the Saugus Formation at Well VWD-160

Because the members of SCV-GSA wish to maintain a healthy river corridor and avoid impacts to GDEs caused by groundwater extraction in the future, GDE trigger levels have been established for representative wells completed in various portions of the alluvial aquifer. GDE triggers include the following:

- Groundwater levels within GDE areas that are at the lowest historical (within previous 50 years) groundwater levels if caused by groundwater extraction
- Groundwater levels that are 2 feet above the lowest historical (within previous 50 years) levels where UTS and other native fishes are present (e.g., the I-5 Bridge area) that rely on surface flow and pools

Figures ES-6 and ES-7 illustrate the trigger level concept at one of the representative well locations. It is believed that the historical low level avoids significant and unreasonable effects on GDEs because the vegetation and species living within the GDE area have adapted to fluctuating groundwater levels in response to varying climatic and pumping conditions in the past.

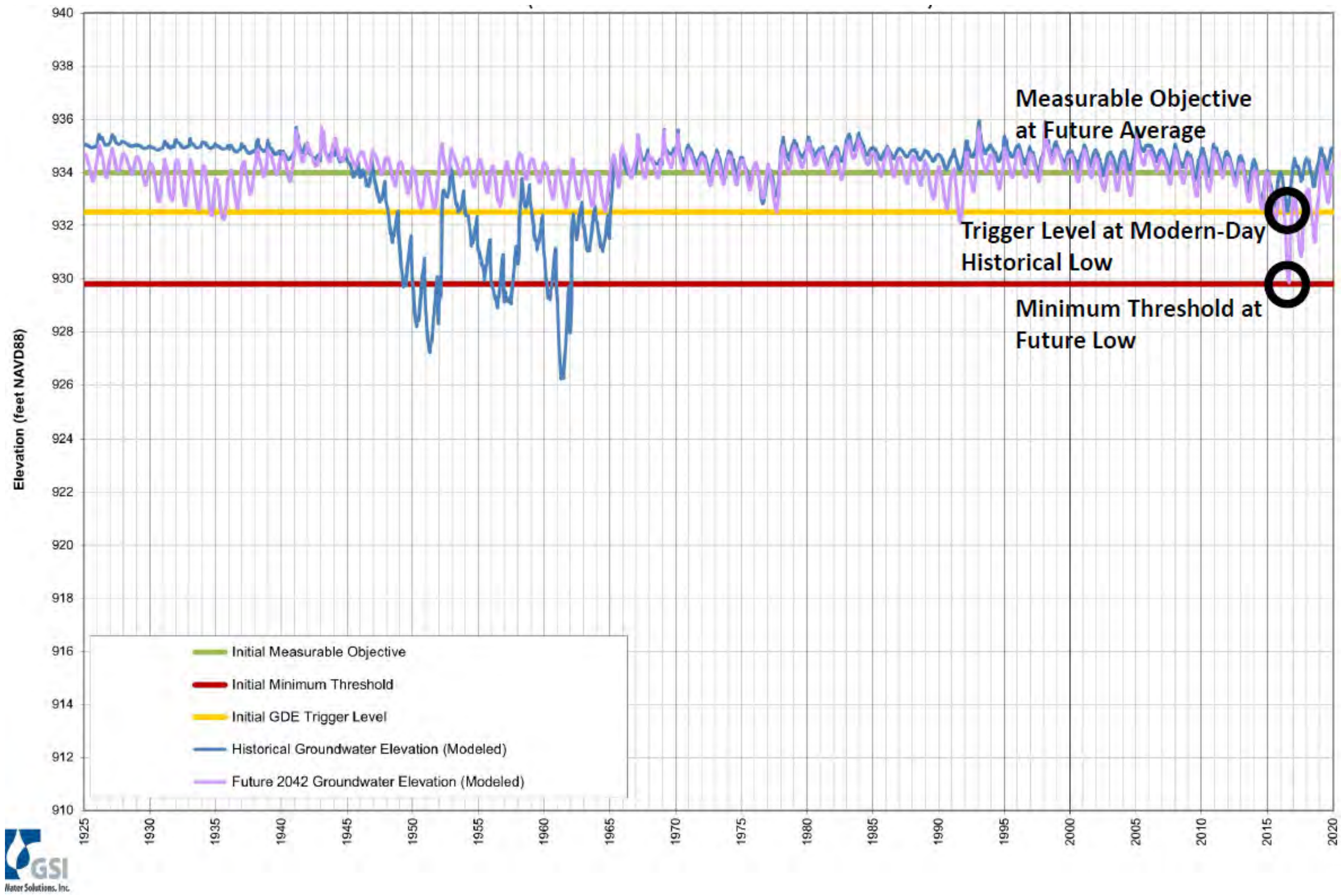


Figure ES-6. Initial Trigger Levels at GDE Monitoring Well GDE-D (Santa Clara River at Mouth of Castaic Creek)

The area in the river near the I-5 Bridge requires special attention because sensitive aquatic species (e.g., the UTS) live in pools within this area. It is important that flow be maintained in this area; therefore, an intermediate trigger level of 2 feet above the historical low has been established in this area.

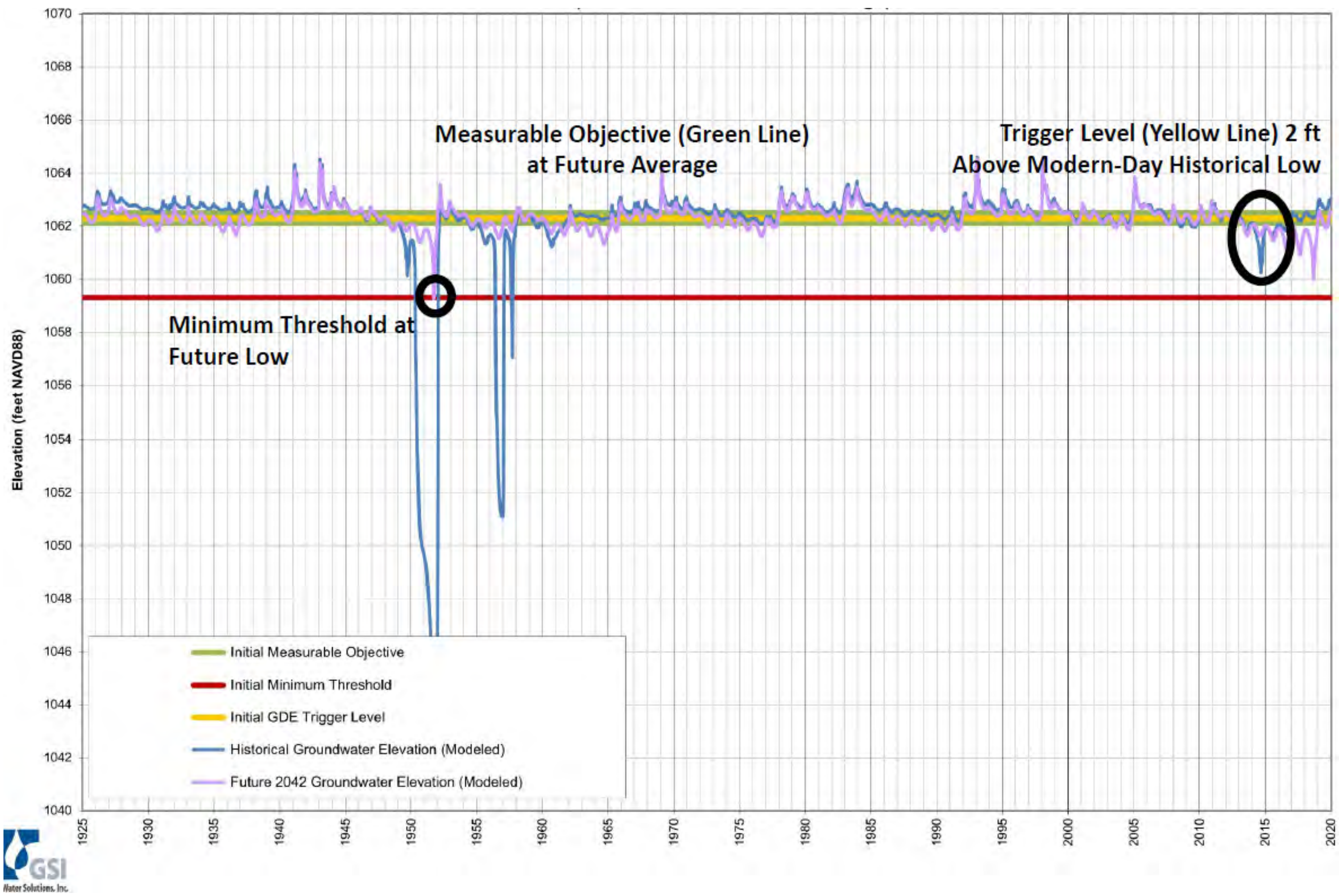


Figure ES-7. Initial Trigger Levels at GDE Monitoring Well GDE-B (Santa Clara River at I-5 Bridge)

If these GDE triggers are approached or reached, an evaluation will be performed to determine whether it is caused by groundwater extraction. Based on this evaluation, management actions may be implemented as described in Section 9 to avoid water levels falling below historical lows and trigger levels. A discussion of how GDEs were identified, how impacts to GDEs will be defined, trigger levels, and management actions if trigger levels are reached is incorporated into the development of SMCs and is presented in Appendix E. See Section 9.5.5 for further discussions of the actions that will be taken if GDE trigger levels are reached.

ES-6 Management Actions and Projects (GSP Section 9)

This section describes the management actions that will be developed and implemented in the Basin to attain and maintain sustainability in accordance with SGMA regulations. Management actions described herein are intended to optimize local groundwater use to avoid undesirable results, consistent with SGMA regulations. Many are also intended to help improve the understanding of the Basin, enhance the monitoring program, enhance improved water use practices, and improve information upon which the GSA may make decisions. The management actions described in this section include the following:

- Addressing data gaps
- Monitoring, reporting, and outreach
- Promoting best water use practices
- Actions if minimum thresholds are reached or undesirable results confirmed

- Actions if GDE triggers are reached
- Other management actions to promote sustainable groundwater management

This section also describes optional projects that in concept involve new or improved infrastructure to make new water supplies available to the Basin. These optional projects may be implemented to improve the resiliency of basin groundwater resources to extended drought. The optional projects are based on previous and ongoing feasibility studies conducted by SCV Water and its predecessor agencies.

Basin-wide management actions are described below.

ES-6.1 Addressing Data Gaps

Data gaps that have been identified thus far include the following:

- Water levels within the GDE area
- Reference point elevation for all monitoring locations, including the riverbed in selected areas by GDE monitoring wells
- Domestic well water quality
- Subsidence benchmarks for monitoring land surface elevation
- Upland GDE verification and assessment

ES-6.1.1 Installation of Piezometers within the GDE Area

GDE monitoring sites are needed within the GDE area (see Figure 8-2 in Section 8) to allow the GSA to monitor groundwater levels and assess whether groundwater pumping has or will cause impacts to GDEs related to lowered groundwater levels and depleted surface water. Eight GDE monitoring sites have been tentatively identified. Six piezometers will be installed in proximity to the existing Santa Clara River channel. Two other existing alluvial wells will be utilized; one along Castaic Creek, and one located along San Francisquito Creek. These locations were selected to provide meaningful groundwater level data in reaches of the river and tributaries that are connected to surface water. Exact locations will be determined after consultation with landowners, the California Department of Fish and Wildlife, and the Los Angeles County Flood Control District.

ES-6.1.2 Reference Point Elevation Survey

A survey of the reference point elevations is needed for all existing and planned new wells that are part of the basin monitoring program for the following reasons:

- Not all wells in the program have been surveyed
- Different datums have been used in the past

The planned reference point survey will ensure that all groundwater level data are referenced to the same vertical datum in the future. Further, some elevation surveys in the riverbed near GDE monitoring wells will be needed to better determine depth to groundwater beneath the riverbed.

ES-6.1.3 Domestic Well Water Quality

Domestic wells are presently not included in existing groundwater quality monitoring programs. Because this group of groundwater users may be affected by groundwater management actions initiated by the GSA in some areas of the Basin, it will be necessary to establish (1) where there are domestic wells that could be affected by groundwater management actions and (2) a water quality sampling program for selected wells to establish a baseline data set for domestic well water quality. Once the baseline has been established, specific need for future water quality sampling will be better understood.

ES-6.1.4 Subsidence Benchmarks

Section 7 describes the planned subsidence monitoring program for the Basin. A combination of InSAR data and measured land surface elevation data at selected benchmarks comprise the monitoring locations. As described in Section 7, the GSA intends to use a set of benchmarks that have previously been used by the County of Los Angeles to monitor land surface elevations in the Basin. The GSA intends to monitor subsidence twice per year at locations where future groundwater level declines could cause subsidence and damage critical infrastructure.

ES-6.1.5 Upland GDE Verification and Assessment

Potential GDEs were identified in upland areas (e.g., Placerita Canyon) outside the main Santa Clara River channel and tributaries. In response to comments from the Stakeholder Advisory Committee, this task includes additional field verification of these areas and assessment of groundwater elevations to assess whether these areas should be included in the ongoing GDE monitoring program.

ES-6.2 Monitoring, Reporting, and Outreach

Monitoring, reporting, and outreach are core functions that the GSA will provide to comply with SGMA regulations. The GSA will direct the monitoring programs outlined in Section 7 to track basin conditions related to the five applicable sustainability indicators. Data from the monitoring programs will be routinely evaluated to ensure progress is being made toward sustainability or to identify whether undesirable results are occurring. Data will be maintained in a data management system (DMS) operated by SCV Water. Data from the monitoring program will be used (1) by the GSA to guide decisions on management actions and to prepare annual reports to basin stakeholders and DWR and (2) by individual entities to guide decision-makers. SGMA regulations require that (1) the reports comply with DWR forms and submittal requirements and (2) all transmittals are signed by an authorized party. Data will be organized and available to the public to document basin conditions relative to the SMCs established for the Basin (see Section 8). In addition to compiling existing monitoring data, this management action includes conducting new monitoring not already being conducted in other programs including the following:

- Domestic water quality monitoring
- GDE monitoring
- Subsidence monitoring
- Receiving extraction data from non-de minimis well owners
- De Minimis Self-Certification Program (for domestic wells pumping less than 2 AFY)

ES-6.3 Promoting Best Water Use Practices

This GSP anticipates that the strong municipal water conservation programs already implemented by municipal agencies are sufficiently conservative so as not to require the GSA to develop separate municipal water conservation programs. However, if the GSA Board of Directors determines that additional conservation from municipal agencies would be appropriate the GSA will encourage additional conservation.

Because municipal agencies do not have specific outreach to private well operators regarding water conservation, the GSA will work with private well operators to facilitate workshops or other programs designed to communicate best water use practices for private wells. This GSP calls for the GSA to encourage private pumpers to implement the most effective water use efficiency methods applicable, often referred to as best management practices (BMPs). Effective BMPs could include the following:

- Efficient irrigation practices in urban and rural areas.
- Implementation of a recycled water program to reduce reliance on groundwater for irrigation.
- Achievement of more optimal irrigation practices by monitoring crop water use with soil and plant monitoring devices and by tying monitoring data to evapotranspiration estimates.

De minimis groundwater users will be encouraged to use BMPs as well. Promoting BMPs will include broad outreach to groundwater pumpers in the Basin to emphasize the importance of using BMPs and help groundwater pumpers understand the positive benefits of BMPs for water conservation to help with sustainability.

ES-6.4 Actions If Minimum Thresholds Are Reached or Undesirable Results Confirmed

The GSA anticipates that, if minimum thresholds are exceeded, the GSA will evaluate the cause. If the evaluation indicates the minimum thresholds were exceeded due to groundwater extraction, and/or if the trend of the data indicates that undesirable results arising from groundwater extraction are imminent, then management actions would be initiated as set forth in Section 9. The planned evaluations and possible management actions are presented below for each sustainability indicator:

ES-6.4.1 Chronic Lowering of Groundwater Levels and/or Chronic Reduction in Storage

The evaluation for these two groundwater sustainability indicators may include the following:

- Evaluate whether the decline is due to pumping, drought, or both.
- Evaluate whether the declining water levels are likely to continue.
- Evaluate whether other sustainability indicators are likely to be affected.

The following summarizes the management actions that will be taken until monitoring data indicate that undesirable results have been eliminated:

1. Redistribute pumping away from the affected area.
2. Reduce pumping in nearby wells.
3. Conduct additional releases from Castaic Lake if there is a benefit of doing so.
4. Bring in additional State Water Project water or other imported banked water to make up for reduced groundwater supply.
5. Implement tiered water conservation measures for the Basin.
6. Reduce pumping in the most affected aquifer.

ES-6.4.2 Degraded Water Quality

The evaluation for this groundwater sustainability indicator may include the following:

- Reviewing local land use information and activities (e.g., state records of groundwater contamination).
- Evaluating groundwater extraction information to understand whether it may cause migration of poor-quality groundwater associated with a contaminant plume or poor-quality groundwater residing in

geologic formations toward other wells. This does not pertain to SCV Water pumping for water supply and SCV Water efforts to contain and treat identified contaminants in the aquifer.

- Reviewing the effects of drought and lower water elevations on water quality constituents.
- Reviewing groundwater quality monitoring information, and/or conducting additional groundwater quality analysis.
- Considering the role of implementation of a recycled water program upon groundwater quality.
- Considering other water management actions not associated with the GSA (e.g., groundwater recharge projects developed by SCV Water, or others, that would have the potential to mobilize degraded groundwater).

The following summarizes the management actions that will be taken until monitoring data indicate that undesirable results have been eliminated:

1. Review alternatives for improving groundwater quality in the affected area.
2. Work with affected groundwater users to deploy well head treatment systems.
3. Arrange for an alternative water supply.
4. Shift pumping to other locations.
5. Reduce or stop pumping near the affected area.

ES-6.4.3 Subsidence

If it is determined that groundwater pumping is the likely cause of observed subsidence or exceedance of the minimum threshold and there is likely to be an undesirable result (e.g., damage to critical infrastructure or land uses), then the evaluation steps and management actions listed for chronic lowering of water levels will be implemented until the rate of subsidence is reduced. These management actions may be directed to certain regions of the Basin that are most affected.

ES-6.4.4 Depletion of Interconnected Surface Water and Impacts to GDEs

Questions that will be addressed as part of this evaluation process include, but are not limited to, the following:

1. Is the affected river segment supported by surface flow from WRP discharges? (Surface water may support habitats during temporary periods of lower-than-normal groundwater levels.)

2. Is the historically low groundwater level already below the tree/shrub root depths? (If so, further declines in the same year may not affect GDEs.)

3. Will the GDEs survive the temporary loss of access to groundwater? (Depending on the season, groundwater levels may be expected to rise above historically low levels within a month or two, avoiding permanent loss of habitat. When groundwater levels are restored sufficiently quickly in the winter months, effects to GDEs may not be significant.)

4. Has the trigger been reached often in recent years? Droughts that lower groundwater levels are a natural occurrence, but do not occur every year. To sustain GDEs over the long term, groundwater levels affected by drought conditions must recover sufficiently quickly and remain higher during most years to support healthy, sustainable habitats over the long term.

5. Are the declines in groundwater levels resulting from pumping?

6. Has new information been obtained that can be used to refine the trigger levels presented in Section 8 of the GSP?

If after performing evaluations there is potential for an undesirable result if water levels decline below minimum thresholds or GDE triggers, then one or more of the following management actions will be taken, following consultation with applicable landowners, until monitoring data indicate water levels have recovered so that undesirable results have been eliminated:

1. Pumping and water importation modifications.
   - Shift pumping to another location to reduce impact on GDEs, and/or
   - Stop pumping in wells near the GDEs, and/or
   - Increase the quantity of imported water or banked water into the Basin
   - Should any of the above be a consideration, the groundwater flow model may also be used to determine optimum pumping locations most likely to avoid undesirable results.
2. The GSA may coordinate with SCV Water to consider implementing a mandatory water conservation program so that overall pumping in the Basin can be reduced.
3. If the evaluation shows that non-municipal production wells are contributing to the problem, then the GSA will conduct outreach up to and including meeting with private well owners and stakeholders to discuss how to best respond to the concern. Ideally, this would occur prior to the time when significant and unreasonable impacts to GDEs are observed.
4. If monitoring data and weather predictions indicate that undesirable results are likely to persist into the following year and the above actions are not likely to mitigate the impacts, then it may be necessary to develop additional projects designed to increase the amount of water in the river system, as described in Section 9.6.3.

ES-6.5 Other Groundwater Management Actions and Projects

Although not specifically funded or managed as part of implementing this GSP, several associated actions will be encouraged by the GSA as part of good groundwater management practices.

ES-6.5.1 Agency Coordination

To effectively manage the groundwater resources within the Basin, there will be an ongoing need to coordinate with various state and local agencies that have authority over land use, water supply, and water quality in the watershed, including California Department of Fish and Wildlife, the RWQCB, DWR, California Department of Transportation (Caltrans), the State Water Resources Control Board, LA County, Sanitation Districts, and the City (refer to Section 3.3 for more details).

ES-6.5.2 Removal of Invasive Species

Invasive plant species, consisting primarily of *Arundo,* have become established within the riparian area along the Santa Clara River and some of its tributaries. While not required, the GSA will continue to support efforts by others to raise money for invasive species removal projects.

ES-6.5.3 Optional Managed Aquifer Recharge Projects

Managed groundwater recharge can utilize water sources such as stormwater, excess imported water, and/or recycled water to meet multiple goals within the watershed including reducing stormwater runoff, increasing the use of recycled water, and augmenting groundwater supplies for drought. Efforts to characterize additional groundwater recharge opportunities in the Basin have been underway for many years and, in recent years, some field studies have been implemented to test areas for recharge capability. Because undesirable results from over pumping have not been identified, implementation of these kinds of projects is not required and are considered optional. A description of these optional projects is presented in Section 9.6.

- Old Castaic School Site Recharge and/or Potential Eastern Recharge
- Recharge Using Potable Water in the Vicinity of the Placerita Nature Center
- Off Stream Recharge Using Recycled Water

ES-7 Groundwater Sustainability Plan Implementation (GSP Section 10)

Section 10 provides a conceptual road map for efforts to implement the GSP during the first 5 years and discusses implementation effects in accordance with SGMA regulations. A general schedule showing the major tasks and estimated timeline is provided as Figure 10-1. Section 9 presents a number of management actions to implement that will address data gaps and reduce uncertainty, improve understanding of basin conditions and how they may change over time, and actions intended to promote conservation and optimize water use in the Basin. New projects are not proposed at this time, suggested as optional only, because (1) the Basin is in balance and (2) no undesirable results have been observed and are not expected during the future planning horizon.

ES-8 Notice and Communications (GSP Section 11)

This section describes the methods and tactics used to involve individuals and organizations that have a direct interest in the development of this GSP and sustainable management of the Basin. A critical part of the GSP development is communication with, and the involvement of, the public and stakeholders, including private citizens, well owners, community organizations, environmental groups, tribal communities, and anyone with an interest in the prudent management of groundwater resources. Participation from a variety of stakeholders helps the SCV-GSA make decisions that consider varying needs and interests in the Basin. Section 11 and Appendix N describe the opportunities for engagement, including the formation of the Stakeholder Advisory Committee and the decision-making process, key messages, and schedule for accomplishing communication outreach tasks related to this GSP.

1 Introduction to the Santa Clara River Valley East Subbasin Groundwater Sustainability Plan

1.1 Purpose of the Groundwater Sustainability Plan

In September 2015, California Governor Jerry Brown signed into law a package of three bills that, together, constitute the Sustainable Groundwater Management Act (SGMA), codified in Section 10720 et seq. of the California Water Code. This framework for sustainable groundwater management requires governments and water agencies in medium- and high-priority basins to halt the overdraft of groundwater resources and balance groundwater pumping and rechange rates to achieve sustainability. This legislation created the statutory framework for planning and implementing groundwater management that can be sustained without causing undesirable results. Under SGMA, medium- and high-priority basins should reach sustainability within 20 years of implementing their Groundwater Sustainability Plans (GSPs), which is 2042 for the Santa Clara River Valley Groundwater Basin, East Subbasin (Basin).

SGMA has set deadlines for reaching sustainability (in this basin, our focus is on maintaining sustainability) and empowered local agencies to form Groundwater Sustainability Agencies (GSAs) to manage groundwater basins and develop GSPs, such as this document. In his signing statement, Governor Brown emphasized that "groundwater management in California is best accomplished locally." To that end, Santa Clarita Valley Water Agency (SCV Water); the City of Santa Clarita (City); the County of Los Angeles (LA County); and the Los Angeles County Waterworks District No. 36, Val Verde (LACWD) are collaborating under a Joint Exercise of Powers Agreement (JPA) as the Santa Clarita Valley Groundwater Sustainability Agency (SCV-GSA).

This Santa Clara River Valley East Groundwater Subbasin GSP provides information about the area affected by this plan, the basin setting, the sustainable management criteria (SMCs), the monitoring networks, projects and management actions to achieve sustainability, plan implementation, the list of references and technical studies used in the development of this plan, and the supporting appendices.

This GSP is a broad and comprehensive planning-level document, developed to comply with the statutory and regulatory requirements of California Water Code 10721 and 23 California Code of Regulations (CCR) Section 341, Definitions.[1] As such, the language of this GSP may differ from terminology used in other contexts, such as past studies, judicial rules, or analyses. Further, information in this GSP is not to be used to determine water rights.

1.2 Description of the Basin

Following the passage of SGMA into law, the California Department of Water Resources (DWR) revised its document titled *California's Groundwater* (Bulletin 118), an inventory and assessment of available information on the occurrence and nature of California's groundwater (DWR, 2018). In addition to the groundwater inventory and assessment of information, Bulletin 118 also does the following:

- Establishes basin boundaries and priority levels
- Determines which basins are subject to critical conditions of overdraft
- Describes the hydrologic characteristics of groundwater basins

[1] The full text of the California Water Code is available at the website of the California Legislature: https://leginfo.legislature.ca.gov/faces/codes_displayText.xhtml?lawCode=WAT&division=6.&title=&part=2.74.&chapter=2.&article=

- Provides GSAs with important groundwater-related data

Bulletin 118 designates the Basin (Number 4-4.07) as a high-priority basin that is not critically overdrafted (DWR, 2018). As shown on Figure 1-1, the Basin is the eastern-most and furthest upstream subbasin in the group of six subbasins that together comprise the Santa Clara River Valley Groundwater Subbasin.

Bulletin 118 (DWR, 2018) describes the Basin as:

> [. . .] located in the central-western portion of Los Angeles County. The subbasin is bound on the north by the Piru Mountains and on the east and southeast by the San Gabriel Mountains. The Santa Susana Mountains bound the south side of the subbasin. The subbasin is bound on the west by the Modelo Formation, the Saugus Formation, and a thinning of the alluvium near the adjoining Piru subbasin (DPW, 1933). The area overlying the basin is drained by the Santa Clara River, Bouqet *[sic]* Creek, and Castaic Creek.

For more detail on the Basin, see Section 3.1.

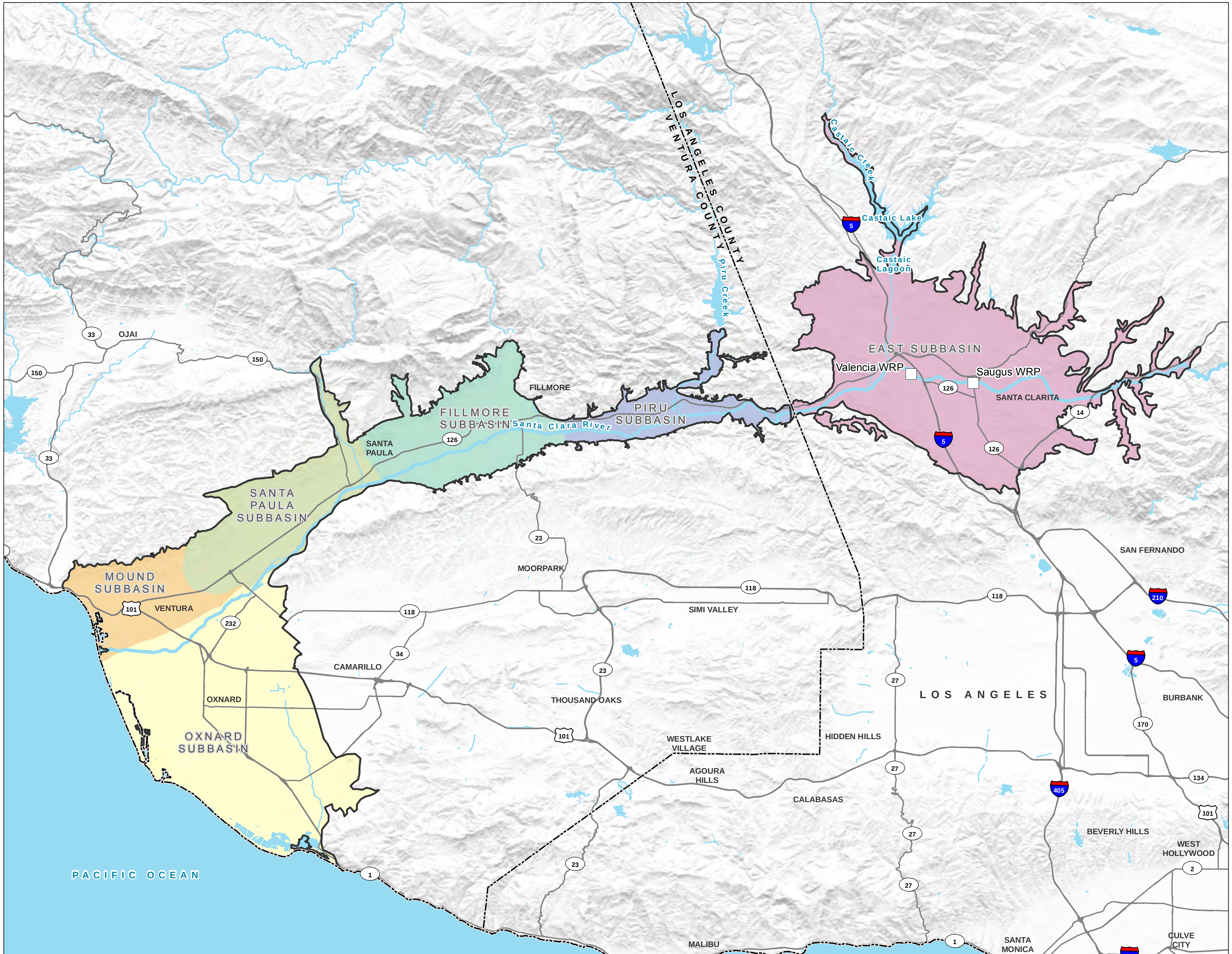


FIGURE 1-1

Santa Clara River Valley Groundwater Basin and Subbasins

Santa Clara River Valley East Groundwater Subbasin Groundwater Sustainability Plan

LEGEND

- Water Reclamation Plant (WRP)
- Santa Clara River Valley Groundwater Basin

Santa Clara River Valley Subbasins

- Santa Clara River Valley East
- Piru
- Fillmore
- Santa Paula
- Mound
- Oxnard

All Other Features

- County Boundary
- Major Road
- Watercourse
- Waterbody

N

0 12,500 25,000 37,500
Feet

Date: December 8, 2021
Data Sources: USGS, DWR Bulletin 118

GSI Water Solutions, Inc.

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1.3 How this GSP is Organized

This GSP has been planned and developed collaboratively by the SCV-GSA members. The organization of this plan is as follows:

- **Section 1 – Introduction to the Santa Clara River Valley East Subbasin Groundwater Sustainability Plan:** An introduction to the GSP, including a description of its purpose and a brief description of the Basin.
- **Section 2 – Agencies' Information:** Information on the SCV-GSA as an organization and a brief description of each of the SCV-GSA member organizations, including information on the legal authority of the GSA to plan and coordinate groundwater sustainability for the Basin.
- **Section 3 – Description of Plan Area:** A detailed description of the Basin, land use in the Basin, existing wells and monitoring programs, existing groundwater management plans and regulatory programs, any programs for conjunctive use, and urban land use programs.
- **Section 4 – Hydrogeologic Conceptual Model:** An explanation of the hydrogeologic conceptual model developed for the Basin that includes water sources and uses, a general description of water quality, and a description of the data gaps in the current model.
- **Section 5 – Groundwater Conditions:** A detailed description of the groundwater conditions, including aquifer elevations, changes in storage, any issues related to seawater intrusion or subsidence, locations where surface water and groundwater are interconnected, the identification and distribution of groundwater-dependent ecosystems (GDEs), and a discussion of groundwater quality for drinking water and agricultural irrigation.
- **Section 6 – Water Budgets:** A presentation of the historical, current, and projected future water budgets for the Basin, including quantification of estimated change in storage for historical, current, and the projected future water budget.
- **Section 7 – Monitoring Networks:** A detailed description of the monitoring objectives and monitoring for groundwater levels, storage, water quality, land subsidence, interconnected surface water, as well as representative monitoring sites, and a description of the data management and reporting system.
- **Section 8 – Sustainable Management Criteria:** Defines the sustainability goal for the Basin, describes the process through which SMCs were established; describes and defines SMC regarding chronic lowering of groundwater levels, reduction in groundwater storage, seawater intrusion, degraded water quality, subsidence, and depletion of interconnected surface water; defines management areas for the Basin, and describes how management-area operations will avoid undesirable results.
- **Section 9 – Management Actions and Projects:** A list and description of each project and management action to address data gaps, describe procedures that will be followed if undesirable results are observed, and obtain information needed to manage the Basin. Optional projects intended to improve resiliency to drought are also included.
- **Section 10 – Groundwater Sustainability Plan Implementation:** Presents a planning-level estimate of implementation costs and a schedule for proposed projects and management actions.
- **Section 11 – Notice and Communications:** Presents SCV-GSA's communications and engagement planning and implementation, public feedback and stakeholder comments on the plan, how feedback was incorporated into the plan, and responses to comments received.

1.4 References

DPW. 1933. *Ventura County Investigation.* Division of Water Resources. Bulletin 46. Prepared by the California Department of Public Works (DPW).

DWR. 2018. *California's Groundwater Bulletin 118. Santa Clara River Valley - Santa Clara River Valley East.* Available at: https://water.ca.gov/-/media/DWR-Website/Web- Pages/Programs/Groundwater-Management/Bulletin-118/Files/2003-B118-Basin- Descriptions/B118-Basin-Boundary-Description-2003---4_004_07.pdf. Accessed October 7, 2019. Prepared by the California Department of Water Resources.

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2 Agencies' Information (§ 354.6)

The addresses and telephone numbers for Santa Clarita Valley Water Agency (SCV Water), the City of Santa Clarita (City), the County of Los Angeles (LA County), and Los Angeles County Waterworks District No. 36, Val Verde (LACWD) are listed below:

Santa Clarita Valley Water Agency (SCV Water)
SCV Water – Santa Clarita
27234 Bouquet Canyon Road
Santa Clarita, CA 91350
(661) 297-1600

City of Santa Clarita
23920 Valencia Boulevard #120
Valencia, CA 91355
(661) 259-2489

County of Los Angeles (LA County)
550 South Vermont Avenue
Los Angeles, CA 90020
(213) 738-3700

Los Angeles County Waterworks District No. 36, Val Verde (LACWD)
1000 South Fremont Avenue Building A9-E, 4th Floor
Alhambra, CA 91803
(877) 637-3661

The Santa Clarita Valley Groundwater Sustainability Agency's (SCV-GSA's) mailing address is as follows:

Santa Clarita Valley Groundwater Sustainability Agency
c/o SCV Water – Santa Clarita
27234 Bouquet Canyon Road
Santa Clarita, CA 91350
(661) 297-1600

The SCV-GSA GSP manager is as follows:
Rick Viergutz, Principal Water Resources Planner
SCV Water – Santa Clarita
27234 Bouquet Canyon Road
Santa Clarita, CA 91350
(661) 297-1600
rviergutz@scvwa.org

2.1 Agencies' Organization and Management Structure

2.1.1 Santa Clarita Valley Groundwater Sustainability Agency

SCV-GSA was initially established through the Memorandum of Understanding to Form the Santa Clarita Valley Groundwater Sustainability Agency (MOU) on May 24, 2017, between Castaic Lake Water Agency (CLWA), Newhall County Water District (NCWD), LACWD, the Santa Clarita Water Division (SCWD), the City, and LA County. The members of the SCV-GSA determined that sustainable management of the Santa Clara River Valley Groundwater Basin, East Subbasin (Basin) would best be achieved through a Joint Exercise of Powers Agreement (JPA), which, once approved, would supersede and terminate the MOU. On September

18, 2018, SCV Water;[2] the City; LA County; and LACWD filed the JPA in the Office of the County Counsel for LA County. It is included in this Groundwater Sustainability Plan (GSP) as Appendix A.

The JPA authorized the members to create a joint powers authority, which is a public entity separate from the members, the purpose of which is to develop, adopt, and implement the GSP for the Basin. The SCV-GSA is governed by a board of seven directors, constituted from the following:

- Four directors appointed by the Board of Directors for SCV Water
- One director appointed by the City of Santa Clarita City Council
- One director appointed by the LA County Board of Supervisors
- One director appointed by LACWD

Directors serve a term of 2 years and may be removed or reappointed for multiple terms by the Groundwater Sustainability Agency (GSA) member agency. Each director has one vote. A majority of directors constitutes a quorum. All decisions of the Board of Directors require the affirmative vote of at least four directors, except for matters requiring a supermajority vote (of five affirmative votes), which include the adoption of the GSP and amendments.[3]

Each member agency may appoint alternate directors who may vote in lieu of a director if there is an absence or conflict of interest. Unless appearing as an alternate for a director, an alternate director has no vote and may not participate in board deliberations. The GSA officers include a chair, vice chair, secretary, and treasurer. The Board of Directors meet at least quarterly. SCV Water manages the administrative operations of the GSA and development of the GSP.

2.1.2 SCV Water

SCV Water is a special act agency created by the State of California pursuant to California SB 634, Chapter No. 833, 2017, and codified in the California Water Code Appendix (the "Act"). It is the successor agency to CLWA, a wholesale agency, and its three retail purveyors, SCWD, NCWD, and VWC and it came into existence on January 1, 2018. The Agency's functions include the ability to acquire, hold, and utilize water and water rights and to provide, sell, manage, and deliver imported surface water, groundwater, and recycled water for municipal, industrial domestic, and other purposes at retail and wholesale throughout its service area (SCV Water, 2019).

At formation, SCV Water was served by a 15-member board. As per SB 634, through attrition and the election process, SCV Water is currently governed by a 12-member Board of Directors, including one director who is appointed after nomination by member agency LACWD. This appointed seat will sunset in January 2023. Of the remaining 11 members, 6 were elected to a 4-year term in November 2020, and 5 are carried forward from the original agency formation. At the general election in November 2022, two additional seats will be eliminated, resulting in 9 members directly elected from three electoral divisions.

Officers of the board include a president and two vice presidents. The board also appoints a general manager and a treasurer or auditor, and employs a secretary and general counsel, who serves as the assistant secretary. Seven or more directors constitute a quorum of the board. Adoption of any ordinance, resolution, or motion requires an affirmative vote by a majority.

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[2] SCV Water is the successor to CLWA, SCWD, Valencia Water Company (VWC), and NCWD, which were dissolved pursuant to Senate Bill (SB) 634, Chapter 833 (see Appendix A).
[3] See Article 9 of the JPA for more information on the other matters requiring a supermajority vote (see Appendix A).

2.1.3 City of Santa Clarita

The City is a municipal government that provides open-space and land-use planning as well as stormwater capture and treatment, and creek restoration within the city borders. The City has a city manager form of government and a five-member City Council. At the first meeting in December each year, the five-person council designates one member to serve as mayor during the year. According to the Santa Clarita Municipal Code, the Santa Clarita City Council members adopt a legislative platform for the coming year and vote on ordinances and resolutions (1.01.003 Contents of Code).[4] The City Council appoints a city manager with the authority to authorize or assign City positions, similar to the authority of the City Council (2.08.010 Office Created—Term). The city manager is the administrative head of the city government (2.08.060 Powers and Duties) and advises and assists on all matters relating to the fiscal affairs of the City (2.12).

2.1.4 LA County

LA County serves multiple functions related to groundwater in the Basin, including flood management, wastewater treatment, infrastructure maintenance and construction, and land-use and environmental review (see Section 3.3.4 for more detail on LA County's responsibilities). The LA County Board of Supervisors serves as the executive and legislative head of county government. The five-member elected board is responsible for setting policies, enacting ordinances, and adopting resolutions. An Executive Office and civil service staff supports the board and LA County departments.

2.2 Authority of Agencies

California Water Code § 10723 et seq. requires that local agencies form GSAs with a joint powers agreement or memorandum of understanding. The legal agreement shall include the following:

> The service area boundaries, the boundaries of the basin or portion of the basin the agency intends to manage pursuant to this part, and the other agencies managing or proposing to manage groundwater within the basin.
> A copy of the resolution forming the new agency.
> A copy of any new bylaws, ordinances, or new authorities adopted by the local agency.
> A list of interested parties developed pursuant to Section 10723.2 and an explanation of how their interests will be considered in the development and operation of the groundwater sustainability agency and the development and implementation of the agency's sustainability plan.

2.2.1 Santa Clarita Valley Groundwater Sustainability Agency

The SCV-GSA was formed in accordance with the requirements of California Water Code § 10723 et seq. The process by which the SCV-GSA was formed and the key provisions of the JPA to form the GSA are described in the sections below.

2.2.2 Memorandum of Understanding

On May 24, 2017, CLWA, NCWD, LACWD, the SCWD, the City, and LA County signed the MOU to form the SCV-GSA (CLWA et al., 2017). In the fall of 2017, the California Legislature passed SB 634 that reorganized

[4] The Santa Clarita Municipal Code is available at https://www.codepublishing.com/CA/SantaClarita./ (Accessed June 3, 2021.)

the CLWA, NCWD, VWC, and the SCWD into SCV Water.[5] As successor, SCV Water was the party that signed the JPA to form the SCV-GSA.

2.2.3 Joint Exercise of Powers Agreement

On September 18, 2018, SCV Water,[6] the City, LA County, and LACWD filed the JPA in the County of Los Angeles County Counsel's office.[7] In broadest terms, the JPA gives the SCV-GSA the power to sustainably manage groundwater in the Basin. Specifically, the JPA authorizes the members to do the following:

- 4.1 To exercise all powers afforded to the SCV-GSA under SGMA, including without limitation:
    - 4.1.1 To adopt rules, regulations, policies, bylaws, and procedures governing the operation of the SCV-GSA.
    - 4.1.2 To develop, adopt, and implement a GSP for the Basin, and to exercise jointly the common powers of the Members in doing so.
    - 4.1.3 To obtain rights, permits, and other authorizations for, or pertaining to, implementation of a GSP for the Basin.
    - 4.1.4 To collect and monitor data on the extraction of groundwater from, and the quality of groundwater in, the Basin.
    - 4.1.5 To acquire property and other assets by grant, lease, purchase, bequest, devise, gift, or eminent domain, and to hold, enjoy, lease or sell, or otherwise dispose of, property, including real property, water rights, and personal property, necessary for the full exercise of the SCV-GSA's powers.
    - 4.1.6 To establish and administer a conjunctive use program for the purposes of maintaining sustainable yield in the Basin consistent with the requirements of SGMA.
    - 4.1.7 To exchange and distribute water.
    - 4.1.8 To regulate groundwater extractions as permitted by SGMA.
    - 4.1.9 To spread, sink, and inject water into the basin to recharge the groundwater Basin.
    - 4.1.10 To store, transport, recapture, recycle, purify, treat, or otherwise manage and control water for beneficial use.
    - 4.1.11 To develop and facilitate market-based solutions for the use, sale, or lease, and management of water rights.
    - 4.1.12 To impose assessments, groundwater extraction fees, or other charges, and to undertake other means of financing the SCV-GSA as authorized by Chapter 8 of SGMA, commencing at section 10730 of the Water Code.
    - 4.1.13 To exercise the common powers of its Members to develop, collect, provide, and disseminate information that furthers the purposes of the SCV-GSA, including but not limited to the operation of the SCV-GSA and adoption and implementation of a GSP for the Basin to the Members' legislative, administrative, and judicial bodies, as well as the public generally.

[5] SB 634, Chapter 833. October 15, 2017. Santa Clarita Valley Water Agency
[6] SCV Water is the successor to CLWA, SCWD, VWC, and NCWD, which were dissolved pursuant to SB 634, Chapter 833 (see Appendix A of this GSP).
[7] See Appendix A, Groundwater Sustainability Agency Member Resolutions, Memorandum of Understanding, and Joint Exercise of Powers Agreement, for relevant documents.

4.1.14 To perform other ancillary tasks relating to the operation of the SCV-GSA pursuant to SOMA, including without limitation, environmental review, engineering, and design.

- 4.2 To apply for, accept, and receive licenses, permits, water rights, approvals, agreements, grants, loans, contributions, donations, or other aid from any agency of the United States, the State of California, or other public agencies or private persons or entities necessary for the SCV-GSA's- purposes.
- 4.3 To make and enter contracts necessary to the full exercise of the SCV-GSA's power.
- 4.4 To employ, designate, or otherwise contract for the- services of agents, officers, employees, attorneys, engineers, planners, financial consultants, technical specialists, advisors, and independent contractors.
- 4.5 To incur debts, liabilities, or obligations, to issue bonds, notes, certificates of participation, guarantees, equipment leases, reimbursement obligations, and other indebtedness, as authorized by the Act.
- 4.6 To cooperate, act in conjunction, and contract with the United States, the State of California, or any agency thereof, counties, municipalities, public and private corporations of any kind (including without limitation, investor-owned utilities), and individuals, or any of them, for any and all purposes necessary or convenient for the full exercise of the powers of the SCV-GSA.
- 4.7 To sue and be sued in the SCV-GSA's own name. Third parties must comply with the requirements of the Government Claims Act prior to filing any action for money or damages against the SCV-GSA.
- 4.8 To provide for the prosecution of, defense of, or other participation in, actions or proceedings at law or in public hearings in which the Members, pursuant to this Agreement, have an interest and employ counsel and other expert assistance for these purposes.
- 4.9 To accumulate operating and reserve funds for the purposes herein stated.
- 4.10 To invest money that is not required for the immediate necessities of the SCV-GSA, as the SCV-GSA determines is advisable, in the same manner and upon the same conditions as Members, pursuant to Government Code section 53601, as that section now exists or may hereafter be amended.
- 4.11 To undertake any investigations, studies, and matters of general administration.
- 4.12 To perform all other acts necessary or proper to carry out fully the purposes of this Agreement.

2.2.4 Coordination Agreements

A coordination agreement is not required for the Santa Clara River Valley East Groundwater Subbasin because the SCV-GSA is the single GSA that manages the Basin.

2.2.5 Legal Authority to Implement Sustainable Groundwater Management Act Throughout the Plan Area

The SCV-GSA was formed in accordance with the requirements of California Water Code § 10723 et seq. The JPA for the formation of the GSA is provided as Appendix A of this GSP.

2.3 References

CLWA et al. 2017. *Memorandum of Understanding to Form the Santa Clarita Valley Groundwater Sustainability Agency.* Signed by Castaic Lake Water Agency (CLWA), Newhall County Water District, Los Angeles County Waterworks District No. 36, the Santa Clarita Water Division, the City of Santa Clarity, and the County of Los Angeles.

SCV Water. 2019. *Policies and Procedures for the Board of Directors of the Santa Clarita Valley Water Agency (SCV Water).* April 2, 2019: Santa Clarita Valley Water Agency.

3 Description of Plan Area (§ 354.8)

3.1 Santa Clara River Valley East Subbasin Introduction

The Santa Clara River Valley East Subbasin is located in the central-western portion of the County of Los Angeles (LA County), bounded on the north by the Piru Mountains, on the east and southeast by the San Gabriel Mountains, and on the south by the Santa Susana Mountains. The surface area of the Santa Clara River Valley Groundwater Basin, East Subbasin (Basin) is approximately 66,200 acres (approximately 103 square miles). The City of Santa Clarita is an urban area near the eastern boundary of the Basin. Major highways that intersect the Basin include Interstate 5 (I-5) and California State Routes 14 and 126 (DWR, 2018).

The area overlying the basin is drained by the Santa Clara River, Bouquet Creek, San Francisquito Creek, and Castaic Creek (DWR, 2018). Groundwater is found in alluvium, terrace deposits, and Saugus Formation. Groundwater in the subbasin is generally unconfined in the alluvium, but may be confined, semi-confined, or unconfined in the Saugus Formation (RCS, 2002). Developable quantities of groundwater are present in the alluvium (Alluvial Aquifer) and in portions of the Saugus Formation. These units are underlain and laterally bounded by non-water-bearing bedrock units that are Miocene, Oligocene, and pre-Tertiary in geologic age and which do not contain significant quantities of water that can be developed for municipal purposes (SCV Water, 2020). Figure 3-1 shows the location of the groundwater basin within the local watershed, and Figure 3-2 identifies the tributaries and subwatersheds that extend upstream of the groundwater basin boundary and contribute surface flow into the groundwater basin area (GSI, 2021).

Average annual precipitation in the Basin ranges from 14 inches to 16 inches (DWR, 2018). Rain falling in the upper elevations of the watershed infiltrates into the soil, where some of the water evaporates or is transpired by vegetation and the remainder becomes stormwater that can also infiltrate to groundwater. A portion of the rainfall runs off the land surface and flows into side canyons and tributaries to the river. In the urban areas, precipitation falling on impervious surfaces is directed to storm drains that flow to the river or the stormwater is directed to swales and allowed to percolate in some locations (GSI, 2021).

A detailed description of the Basin, including topography, boundaries, soil characteristics, geology, and aquifers and aquitards, is available in Sections 4.1 through 4.4 of this Groundwater Sustainability Plan (GSP).

3.2 Adjudicated Areas, Other GSAs, and Alternatives

The Santa Clara River Valley East Subbasin has not been adjudicated. In the larger Santa Clara River Valley Groundwater Basin, the westernmost Santa Paula Subbasin has been adjudicated. No other Groundwater Sustainability Agency (GSAs) have jurisdiction in the Santa Clara River Valley East Subbasin. Other GSAs with jurisdiction over subbasins within the Santa Clara River Valley Groundwater Basin include, from east to west, the Fillmore Piru GSA, the Santa Paula Adjudicated Groundwater Basin, and the Mound Basin GSA.

3.3 Other Jurisdictional Areas

Several agencies have jurisdictional authority that affects water management in the Basin. Each agency is discussed in Sections 3.3.1 through 3.3.5. Figure 3-3 shows areas of federal, state, and county jurisdictions and Figure 3-4 shows City of Santa Clarita jurisdiction and the service area for SCV Water.

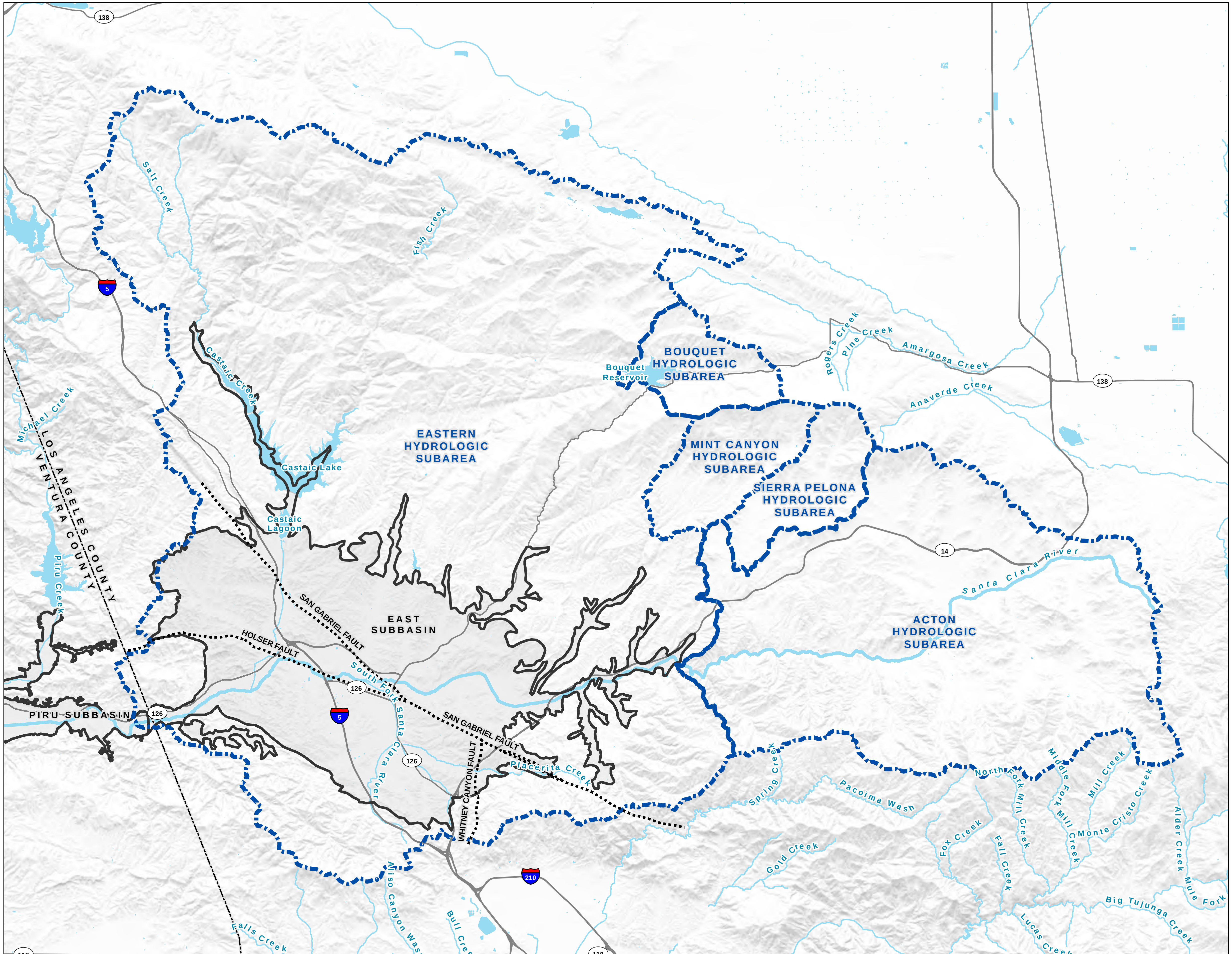

FIGURE 3-1

Watershed Boundaries for Upper Santa Clara River Hydrologic Area and Subareas

Santa Clara River Valley
East Groundwater Subbasin
Groundwater Sustainability Plan

LEGEND

- Fault
- Santa Clara River Valley Groundwater Basin
- Upper Santa Clara River Hydrologic Subbarea

All Other Features

- Major Road
- Watercourse
- Waterbody

N

0 9,000 18,000 27,000
Feet

Date: December 9, 2021
Data Sources: USGS, DWR Bulletin 118

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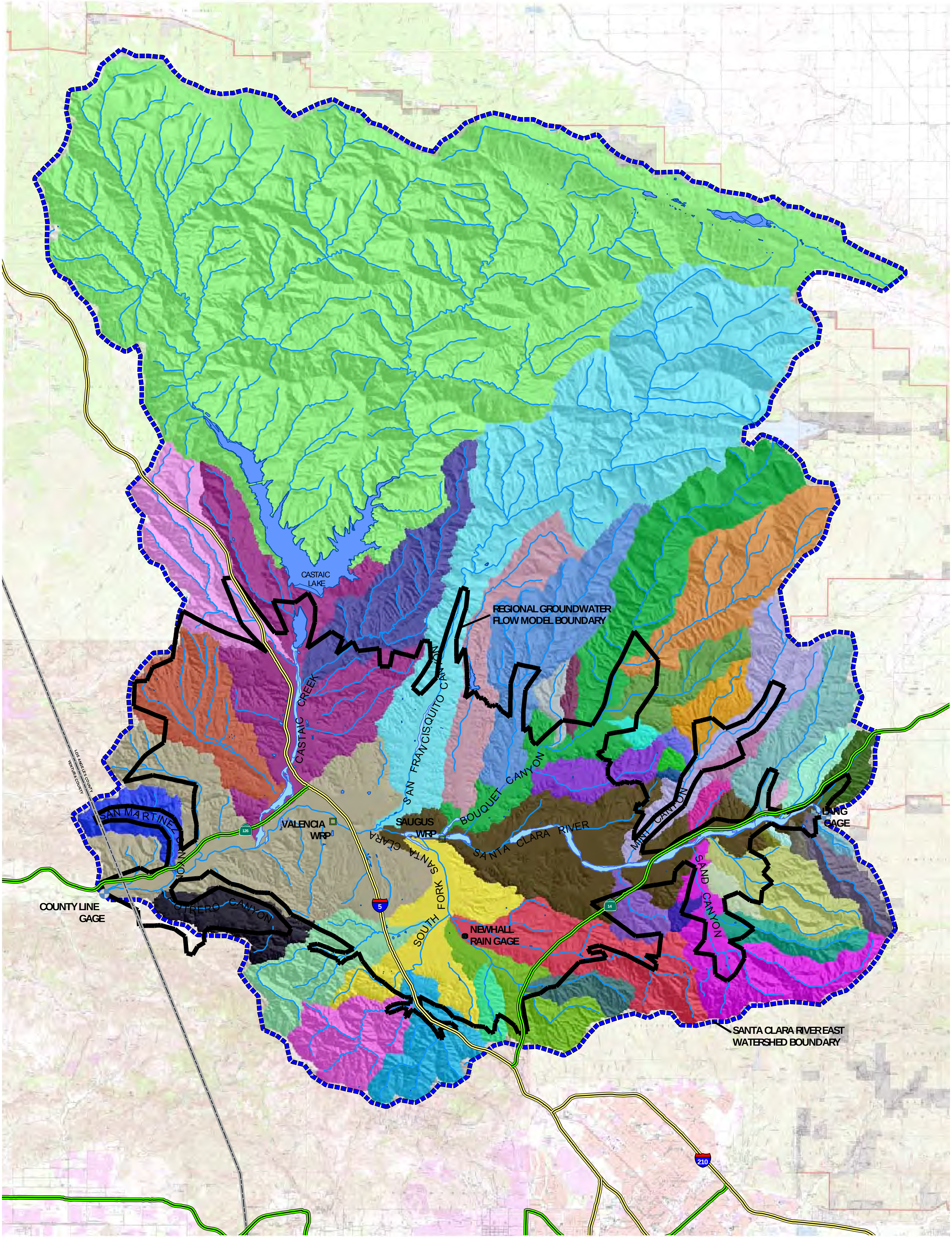

LEGEND

Hydrography

- Lake
- Stream
- Stream Gage
- Water Reclamation Plant (WRP)

Major Road

- Interstate
- State Highway

Data Sources: CH2MHILL, 2004

FIGURE 3-2

Contributing Watersheds to the Santa Clara River Valley East Groundwater Subbasin

Santa Clara River Valley
East Groundwater Subbasin
Groundwater Sustainability Plan

N

0 2.5 5
Miles

GSI Water Solutions, Inc.

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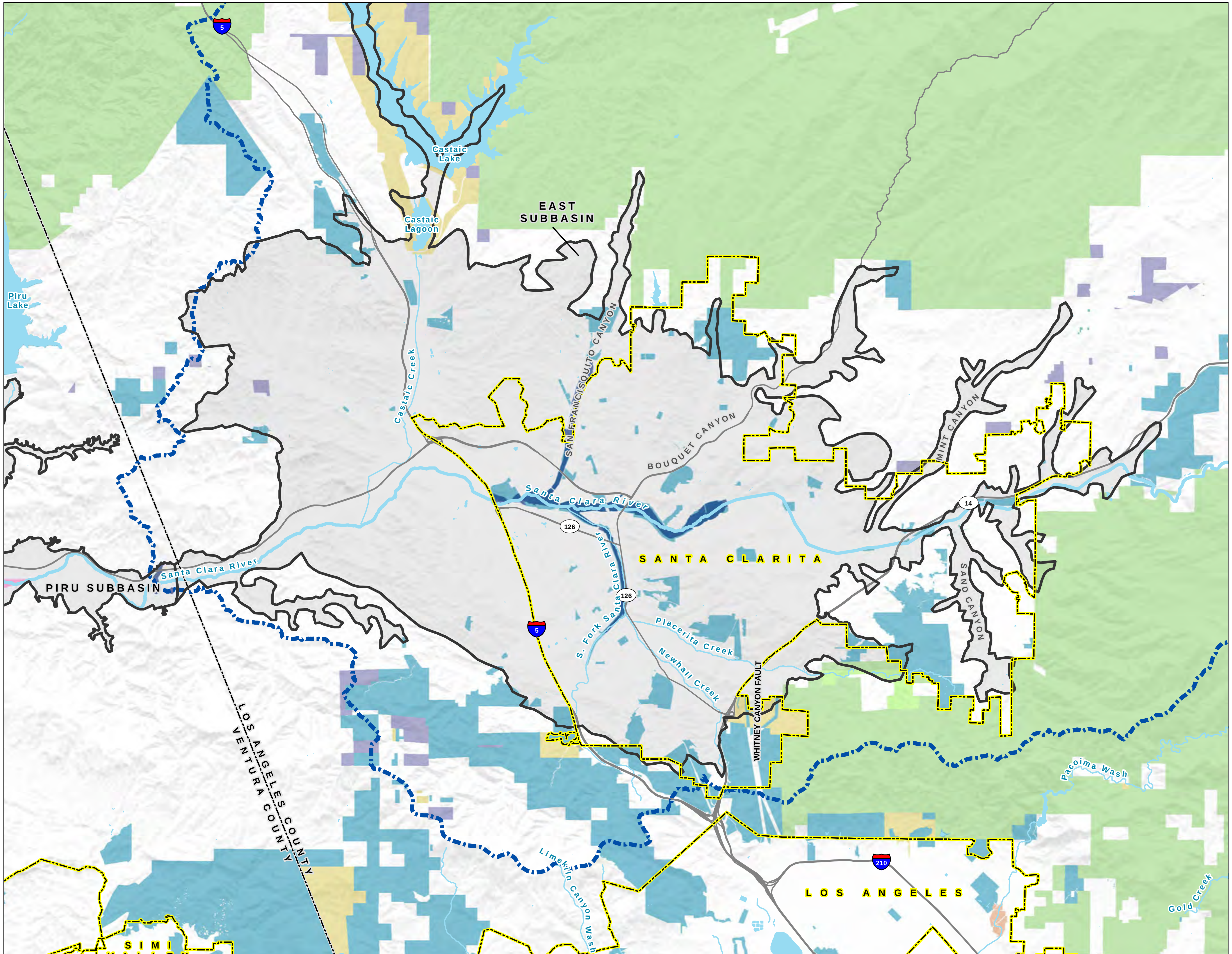
FIGURE 3-3

Federal, State, and County Jurisdictions in the Subbasin

Santa Clara River Valley
East Groundwater Subbasin
Groundwater Sustainability Plan



LEGEND

Land Ownership

- Bureau of Land Management
- CA Dept. of Parks and Recreation
- Department of Defense
- Local Government
- Non-Profit Conservancies and Trusts
- Other Federal Lands
- Other State Lands
- USDA Forest Service
- CDFW Conservation Easement

All Other Features

- City Boundary
- Santa Clara River Valley Groundwater Basin
- Watershed Boundary
- Major Road
- Watercourse
- Waterbody

NOTE

CDFW: California Department of Fish and Wildlife

N

0 5,000 10,000 15,000
Feet

GSI Water Solutions, Inc.

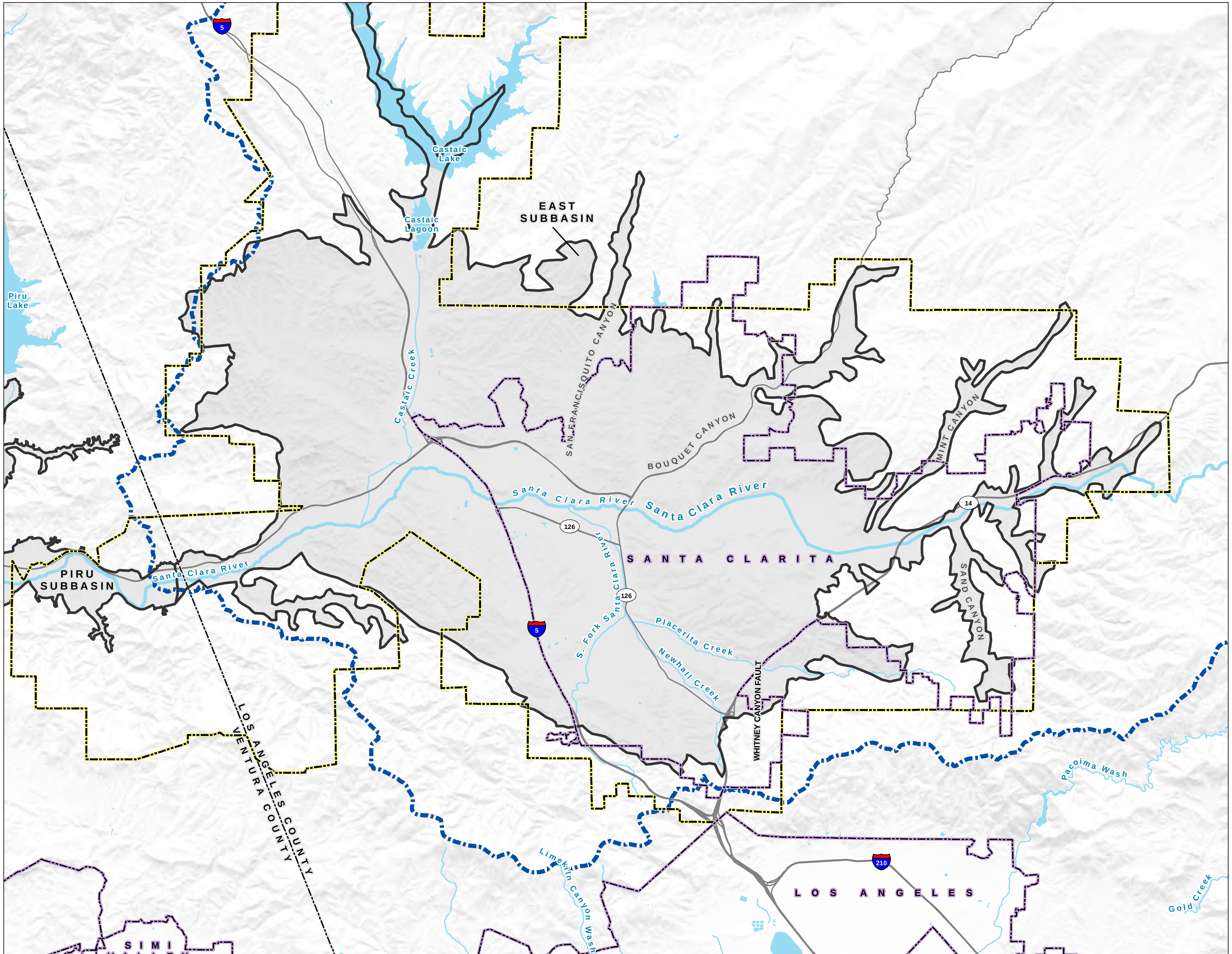
Date: December 9, 2021
Data Sources: USGS, DWR Bulletin 118, CA.gov

Document Path: Y:\0420_CLWA\Source_Figures\019_EastSubbasinGSP\GSP\Section3\Figure3_3_Jurisdictions.mxd, abarry

FIGURE 3-4

City of Santa Clarita Jurisdictions in the Subbasin

Santa Clara River Valley East Groundwater Subbasin Groundwater Sustainability Plan



LEGEND

- City Boundary
- Service Area Boundary for SCV Water
- Santa Clara River Valley Groundwater Basin
- Watershed Boundary

All Other Features

- Major Road
- Watercourse
- Waterbody

NOTE

SCV Water: Santa Clarita Valley Water Agency

N

0 5,000 10,000 15,000

Feet

Date: December 9, 2021

Data Sources: USGS, DWR Bulletin 118

GSI Water Solutions, Inc.

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3.3.1 Federal Jurisdictions

U.S. Department of Agriculture Forest Service (Forest Service) Angeles National Forest, U.S. Fish and Wildlife Service (USFWS), and U.S. Army Corps of Engineers (USACE) have jurisdiction in the Basin, as follows:

- **The Forest Service** administers land in the Angeles National Forest.
- **USFWS** provides for the conservation and protection of terrestrial and aquatic species and their habitats.
- **USACE** conducts projects and programs for flood risk management and ecosystem restoration in the Basin.

3.3.2 Tribal Jurisdictions

The Santa Clarita Valley is part of the region that the Fernandeño Tataviam Band of Mission Indians designates as its homeland. The Fernandeño Tataviam Band of Mission Indians are not federally recognized as an American Indian Tribe and therefore do not have tribal jurisdiction in the Basin (Dudek, 2019).

3.3.3 State Jurisdictions

Five state agencies have authority over land use and water resources in the Basin, as follows:

- **California Department of Fish and Wildlife** manages fish, wildlife, and plant resources and their habitats.
- **California Department of Water Resources (DWR)** manages water resources, systems, and infrastructure, including the State Water Project, and regulates the use of groundwater.
- **California Department of Transportation** manages highway and freeway rights of way.
- **State Water Resources Control Board** and the **California Regional Water Quality Control Board – Los Angeles Region** ensure the protection of water quality in stormwater, drinking water, wastewater treatment; oversee all beneficial uses of water and water rights, and ensures proper water resource allocation and efficient use. The State Water Resources Control Board Division of Drinking Water regulates public drinking water systems and is the lead agency for issuing the permits that allow perchlorate-treated groundwater from three SCV production wells to be used for municipal supply. The Los Angeles Regional Water Quality Control Board (LARWQCB) provided guidance for the Salt and Nutrient Management Plan for the Santa Clara River Valley East Subbasin (GSSI, 2016).

3.3.4 County Jurisdiction

LA County has jurisdiction over multiple water-related functions in the Basin:

- **Los Angeles County Department of Public Works (LACDPW)** is responsible for the design, construction, and maintenance of regional infrastructure related to water resources, environmental services transportation infrastructure, public buildings, development services, and emergency management.
- **Los Angeles County Waterworks District 36, Val Verde (LACWD)** is a special district operated by LACDPW to provide drinking water for urban use in Val Verde. This local water system is owned and operated by LACWD and obtains its water supplies from SCV Water and from a Saugus Formation production well that it owns and operates inside its service area.
- **Los Angeles County Flood Control District (LACFCD)** provides flood management services within District boundaries and has permitting authority for construction activities within the floodway.
- **Los Angeles County Department of Regional Planning (LACDRP)** performs all land-use planning and environmental review for unincorporated areas of LA County. LACDRP collaborated with the City of Santa

Clarita in a regional planning effort titled the Santa Clarita Valley Area Plan – One Valley One Vision to plan for concurrent growth and protection of natural resources.

3.3.5 City and Local Jurisdictions

The City of Santa Clarita is responsible for land-use planning, as articulated in the Santa Clarita Municipal Code and the City of Santa Clarita General Plan (General Plan), and implementation and funding plan elements through the passage of ordinances and resolutions.[8] The General Plan is an outcome of a joint collaborative planning effort between the City and LA County that is called One Valley One Vision. The purpose of this effort is to plan growth in the Santa Clarita Valley while preserving natural resources. The Conservation and Open Space element of the City's plan establishes a policy framework that provides for "water recharge and watershed protection" in the plan area (City of Santa Clarita, 2011).

The Santa Clarita Valley Sanitation District of Los Angeles County (SCVSD) is one of 24 sanitation districts that are public agencies that together make up the Los Angeles County Sanitation Districts. SCVSD provides wastewater treatment at the Valencia and Saugus Water Reclamation Plants (WRPs) for the City and adjoining unincorporated communities in the Los Angeles County Sanitation District's Santa Clarita/Newhall Ranch Service Area.

3.4 Land Use

Prior to the 1960s, the Santa Clarita Valley was primarily agricultural, and much of the valley was undeveloped. Urbanization began gradually in the 1960s, with a rapid increase beginning in the late 1970s and early 1980s and continuing to the present. Accompanying the rapid population increase has been a gradual change from largely agricultural land use to urban and suburban developments. Nevertheless, a considerable portion of the hills and low mountains bordering the main river valley remain in a natural, undeveloped condition, as shown on the accompanying land use map (see Figure 3-5) (GSI, 2020).

By 2019, the population of the Santa Clarita Valley was approximately 286,000, with the majority of the total water demand (more than 80 percent) from municipal users (GSI, 2020). LA County and the City of Santa Clarita collaborated on the Santa Clarita Valley Area Plan, in an effort called One Valley One Vision. The plan sets out standards for growth. The majority of the land within the planning area is undeveloped. The plan designates 21 land uses (Los Angeles County Department of Regional Planning and City of Santa Clarita, 2012).

The current water budget (Section 6) incorporates land uses from 2014.[9] The projected water budget uses future demands for water under full build-out land use conditions, which are expected to occur by the year 2050 (KJ, 2021). Land use mapping for recent periods and for the future full build-out of the Santa Clarita Valley are from information published in the Southern California Association of Governments (SCAG) 2008 land use survey[10] and the One Valley One Vision land use planning process (Los Angeles County Department of Regional Planning and City of Santa Clarita, 2012).

[8] The City of Santa Clarita Municipal Code and Genera Plan are both available at https://www.santa-clarita.com/ (Accessed October 2, 2020.)
[9] The 2014 land uses are believed to be within 1 percent of those found in 2019, based on the number of water accounts served by SCV Water. The depicted land uses are based on land uses published in the One Valley One Vision plan (Los Angeles County Department of Regional Planning and City of Santa Clarita, 2012) and the SCAG (2008) land use survey (available at https://scag.ca.gov/data-tools-geographic-information-systems).
[10] Available at https://scag.ca.gov/data-tools-geographic-information-systems. (Accessed June 3, 2021.)

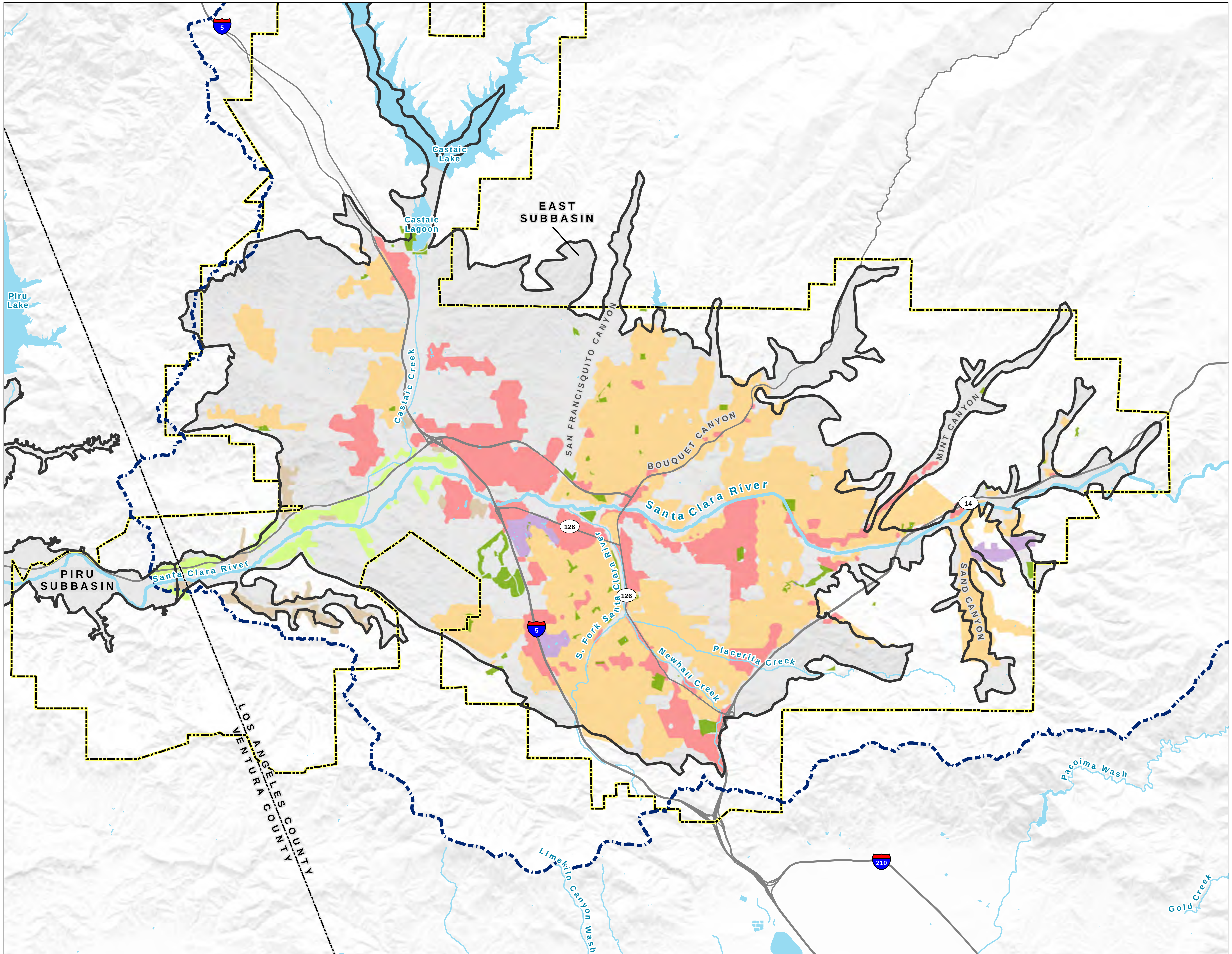

FIGURE 3-5

2014 Land Use

Santa Clara River Valley
East Groundwater Subbasin
Groundwater Sustainability Plan

LEGEND

Santa Clara River Valley Groundwater Basin
Watershed Boundary
Service Boundary Area for SCV Water

Land Use

- Agriculture (Dryland)
- Agriculture (Irrigated)
- Park
- Golf Course
- Commercial/Industrial
- Residential

All Other Features

- Major Road
- Watercourse
- Waterbody

NOTE

SCV Water: Santa Clarita Valley Water Agency

N

0 5,000 10,000 15,000
Feet

Date: December 9, 2021
Data Sources: USGS, Southern California Association of Governments (2008), LA County and City of Santa Clarita (2012), DWR Bulletin 118

GSI Water Solutions, Inc.

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As mentioned in Sections 3.3.4 and 3.3.5, the City/LA County collaborative One Valley One Vision planning effort encompassed the City of Santa Clarita General Plan (2011) and the Los Angeles County General Plan 2035 (Los Angeles County, 2015). The 2011 One Valley, One Vision Plan (City of Santa Clarita, 2011) categorizes land use in the basin in six major areas:

- **Residential** – Including a mix of housing developed at varying densities and types.
- **Commercial** – Including retail and commercial businesses.
- **Mixed Use** – Includes retail, office, and service uses with higher-density residential uses.
- **Industrial** – Including heavy manufacturing and light industrial uses, including resource extraction and businesses that use or generate hazardous materials.
- **Public and Institutional** – Including government buildings, hospitals, libraries, schools, other public institutions, correctional facilities and transportation and communication uses such as freeways and major roads, railroads, park and ride lots, truck terminals, airports, communication facilities, electrical power and natural gas facilities, solid waste and liquid waste disposal, transfer facilities, and maintenance yards.
- **Open Space and Recreation** – Including land used for agriculture, private and public recreational open spaces, local and regional parks, golf courses, the Angeles National Forest, water bodies and water storage, and some agricultural use in unincorporated Los Angeles County areas.

The 2016 Salt and Nutrient Management Plan (SNMP) (GSSI, 2016) categorizes land uses in designated Groundwater Management Zones to evaluate historical and current salt and nutrient loads. For this reason, the land use categories differ slightly from those used in the SCV General Plan Background Report; however, they provide acreages for each type of land use (see Table 3-1).

Table 3-1. Land Uses in Groundwater Management Zones, Santa Clara River Valley East Subbasin

Land Use	Acreage	Percentage of Total
Residential	14,140	7.00%
Commercial/Industrial	14,437	7.00%
Impervious Surfaces	208	0.10%
Agricultural/Parks/Golf Courses	2,653	1.00%
Water Bodies	663	0.33%
Open Space	167,377	84.00%

Source: *Final Salt and Nutrient Management Plan Santa Clara River Valley East Subbasin* (GSSI, 2016)

The SCV-GSA is not aware of any information regarding the implementation of land use plans outside the Basin that could affect the GSA's ability to achieve sustainable groundwater management.

3.4.1 Water Source Types

The Final Santa Clarita Valley 2020 Urban Water Management Plan (UWMP) (KJ, 2021) outlines regional water supplies and demands over the 2025 to 2050 planning horizon. Water sources include local groundwater, imported water, and recycled water. The following sections describe these water supplies in more detail.

3.4.1.1 Local Groundwater

The sole source of local groundwater for urban water supply in the Santa Clarita Valley is the groundwater basin identified in Bulletin 118, 2003 Update, as the Santa Clara River Valley Groundwater Basin, East

Subbasin (Basin No. 4-4.07). The Basin comprises two aquifer systems, the Alluvial Aquifer and the Saugus Formation. The UWMP includes a summary of the existing Groundwater Management Plan (GWMP)[11] that describes pumping from each of the two aquifers (KJ, 2021), as follows:

- Pumping from the Alluvial Aquifer in a given year is governed by local hydrologic conditions in the eastern Santa Clara River watershed. Pumping for municipal, agricultural, and private purposes ranges between 30,000 and 40,000 acre-feet per year (AFY) during normal and above-normal rainfall years. However, due to hydrogeologic constraints in the eastern part of the Basin, pumping is reduced to between 30,000 and 35,000 AFY during locally dry years.
- Pumping from the Saugus Formation in a given year is tied directly to the availability of other water supplies, particularly from the California State Water Project (SWP). During average year conditions within the SWP system, Saugus pumping ranges between 7,500 and 15,000 AFY. Planned dry-year pumping from the Saugus Formation ranges 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 and between 21,000 and 35,000 AFY if SWP deliveries are reduced for three consecutive years. Such high pumping would be followed by periods of reduced (average-year) pumping, at rates between 7,500 and 15,000 AFY, to further enhance the effectiveness of natural recharge processes that would recover water levels and groundwater storage volumes after the higher pumping during dry years.

3.4.1.2 Imported Water

SCV Water's imported water supply comprises SWP water as well as additional sources from the Buena Vista Water Storage District (BVWSD) and Rosedale-Rio Bravo Water Storage District (RRBWSD) in Kern County, and other sources outside of the Santa Clarita Valley (LCSE, 2020).

SCV Water's contractual amount of Table A SWP water is 95,200 acre-feet (AF). SCV Water receives 11,000 AFY under the 2007 Water Acquisition Agreement with BVWSD and the RRBWSD. SCV Water has entered into long-term groundwater banking and water exchange programs and, in aggregate, had more than 164,000 AF of recoverable water outside the local groundwater basin at the end of 2019. The first component of SCV Water's overall groundwater banking program is with Semitropic Water Storage District (SWSD). SCV Water participates in the Stored Water Recovery Unit (SWRU) banking program at SWSD, whereby SCV Water can withdraw up to 5,000 AFY from the water that was stored in the SWRU to meet Valley demands when needed in dry years (January 2020 storage balance of 45,279 AF). The second component, the Rosedale-Rio Bravo Water Banking Program in Kern County, had approximately 100,000 AF in storage as of January 2020 with a withdrawal capacity of 10,000 AFY after completion of the Rosedale-Rio Bravo Drought Relief Project in 2019. The other components are the Two-For-One Water Exchange Programs that SCV Water initiated with RRBWSD, West Kern Water District, Antelope Valley-East Kern Water Agency, and United Water Conservation District that had a combined amount of almost 19,200 AF of recoverable water at the end of 2019 (LCSE, 2020) and approximately 2,850 AF at the end of 2020.

In 2019, SCV Water's final allocation of SWP water was 75 percent of its Table A amount, or 71,400 AF. The total imported water supply in 2019 was 86,758 AF which consisted of 71,400 AF of delivered Table A supply, 11,000 AF purchased from BVWSD and RRBWSD, 750 AF returned from the Central Coast Water Authority Exchange, and 3,608 AF of 2018 SWP carryover water available in 2019. SCV Water deliveries of imported water to service connections and Los Angeles County Waterworks District No. 36, Val Verde (LACWD) were 42,072 AF with the remaining imported water banked (5,002 AF), exchanged in Two-For-One Water Exchange Programs (19,500 AF), sold (9,900 AF), delivered to Devil's Den (382 AF), carried over to

[11] According to Sustainable Groundwater Management Act (SGMA), the GWMP will be in place until this GSP is implemented in 2022.

2020 (9,013 AF), and some loss (889 AF) through meter reading differences and use through operations (LCSE, 2020).

In 2020, SCV Water's final allocation of SWP water was 20 percent of its Table A amount, or 19,040 AF. As identified in the 2020 UWMP (KJ, 2021), the total imported water supply in 2020 was 48,828 AF, which consisted of 14,587 AF of delivered Table A supply, 11,000 AF purchased from BVWSD and RRBWSD, and 284 AF of Yuba Accord water. SCV Water deliveries of imported water to its service connections and to LACWD totaled 48,196 AF, with the remaining imported water consisting of system losses (632 AF) arising from meter reading differences and use through operations.

3.4.1.3 Recycled Water

SCV receives recycled water from two sources: the Saugus WRP and the Valencia WRP. The Valencia WRP has a current treatment capacity of 21.6 million gallons per day (MGD), equivalent to 24,190 AFY, developed over time in stages. The Valencia WRP produces an average of 15,500 AFY of tertiary recycled water. The Saugus WRP has a current treatment capacity of 6.5 MGD (7,280 AFY). No future expansions of treatment capacity are possible at the Saugus WRP because of space limitations at the site. Use of recycled water from these two facilities is permitted under LARWQCB Order Nos. 87-49 and 97-072 (KJ, 2016b). In 2019 and 2020, SCV used approximately 458 AF and 468 AF of recycled water, respectively (LCSE, 2020; KJ, 2021).

An additional treated wastewater stream consists of groundwater that is pumped from extraction wells on the Whittaker-Bermite property and then discharged (after treatment) into the Santa Clara River about 1 mile upstream of the Saugus WRP. This system began operating in August 2017 and since that time has discharged approximately 500 AFY to the river.

3.4.2 Water Use Sectors

By far, the largest water use sector in the Basin is municipal use by SCV Water and LACWD, which together provided water to approximately 73,200 service connections as of 2019 (LCSE, 2020). Agricultural and small private wells[12] constitute the other users of groundwater in the Basin. As shown in Table 3-2, during 2019 municipal use accounted for 60,077 AF (83 percent) of total water use in the Basin, and agricultural and private well use accounted for 12,510 AF (17 percent of total water use in the Basin) (LCSE, 2020; KJ, 2021). In 2020, municipal use accounted for 65,996 AF (84 percent) of total water use in the Basin, and agricultural and private well use accounted for 12,300 AF (16 percent of total water use in the Basin) (KJ, 2021).

Table 3-2. Beneficial Uses and Water Sources

Beneficial Use Type	Imported	Groundwater	Recycled Water	Total
2019 Municipal Use	42,072	17,547	458	60,077
2019 Agriculture/Miscellaneous	NA	12,510	NA	12,510
2019 Total	**42,072**	**30,057**	**458**	**72,587**
2020 Municipal Use	48,196	17,332	468	65,996
2020 Agriculture/Miscellaneous	NA	12,300	NA	12,300
2020 Total	**48,196**	**29,632**	**468**	**78,296**

Notes
All values in acre-feet and are the amounts of water use that occurred during calendar years 2019 and 2020.
NA = not applicable

[12] The information on the locations, construction details, annual pumping, and other details for the small fraction of Santa Clarita Valley residents reliant on private wells for water supply approximately are not collected by any agency.

Beneficial uses and users of groundwater in the Basin include disadvantaged communities (DACs) (see Figure 3-6). Most DAC areas identified from the online mapping tool lie completely within the basin boundaries, but some include areas inside and outside of the basin boundary. The DACs lying within the Basin boundary reside primarily in neighborhoods that are served by municipal water supplies from either SCV Water or LACWD. The majority of the DAC area lying outside the basin boundary and the municipal water service areas consist of open range and pastureland.

The GSA also knows of two unmapped DACs in Bouquet Canyon that are not listed on the DWR mapping tool website: the LARC Ranch and Lily of the Valley Mobile Home Park, both of which are located along Bouquet Canyon Road. Both of these DACs presently utilize private wells or trucked water. SCV Water is currently working with the State and others to replace the private well water supply at these locations with an alternate municipal supply from SCV Water. Once these projects are completed, it is anticipated that all DAC areas within the subbasin will be serviced by SCV Water's municipal supply and that no DAC will rely on groundwater.

3.5 Existing Well Types, Numbers, and Density

A total of 78 production wells are listed as providing data for calibrating the regional model that provides information for the water budget in this GSP. The wells have been developed in the Alluvial Aquifer and the Saugus Formation. Section 7 provides detailed information on well development, status, and location data. Figure 3-7 shows the density of domestic wells in the Basin and average domestic well depth based on data obtained from the DWR Well Completion Report Database. Figure 3-8 shows the locations and density of production wells.

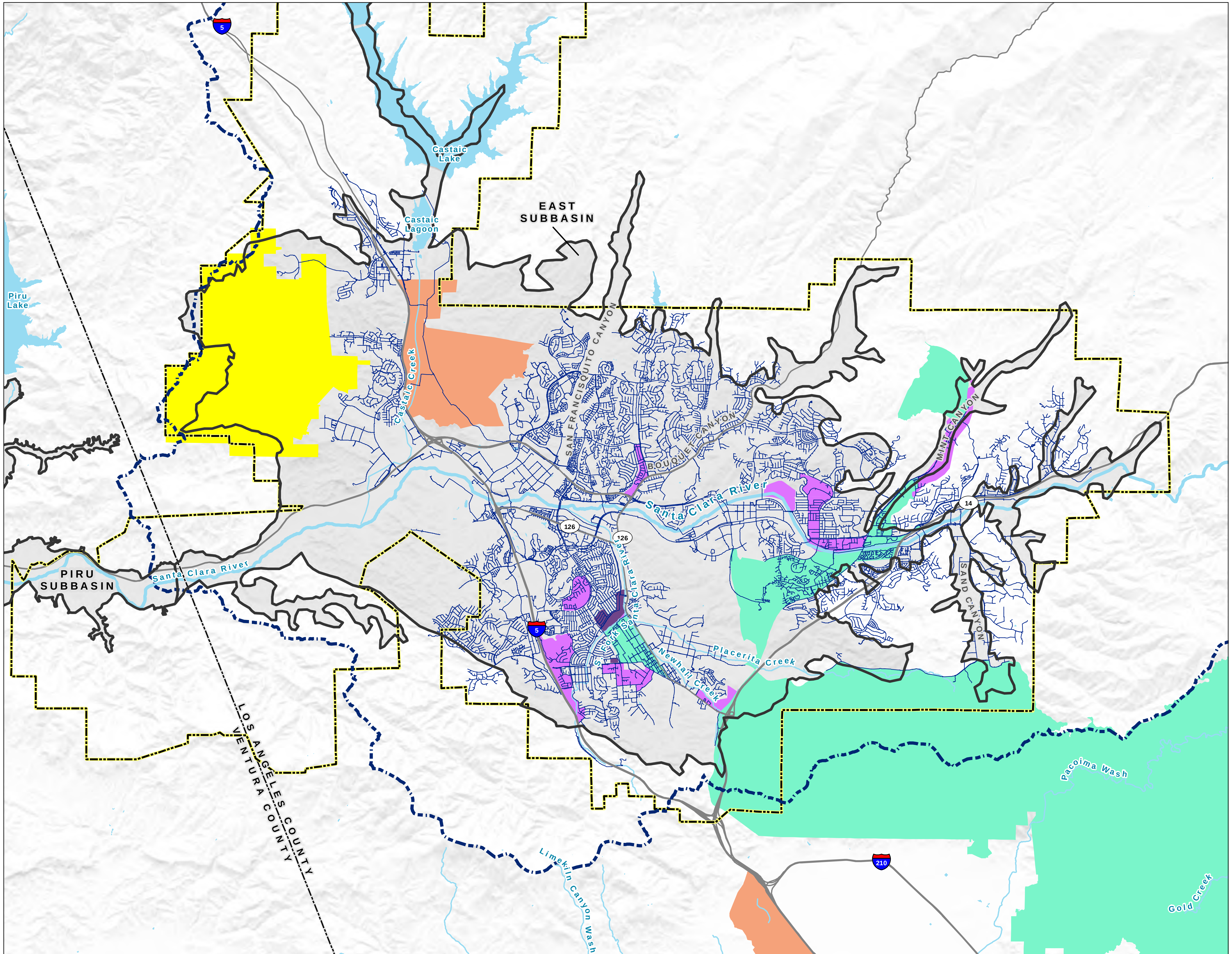

FIGURE 3-6

Disadvantaged Community Census Block Groups and Municipal Water Supply Area

Santa Clara River Valley
East Groundwater Subbasin
Groundwater Sustainability Plan

LEGEND

- SCV Watermain
- LACWWD36

Disadvantaged Communities Block Groups

- Severely Disadvantaged Communities (MHI < $42,737)
- Severely Disadvantaged Communities (MHI <= $56,982)

Disadvantaged Communities Tract

- Data Not Available
- Severely Disadvantaged Communities ($42,737 <= MHI < $56,982)

All Other Features

- Santa Clara River Valley Groundwater Basin
- Watershed Boundary
- Service Boundary Area for SCV Water
- Major Road
- Watercourse
- Waterbody

NOTES

MHI: median household income
SCV Water: Santa Clarita Valley Water Agency

N

0 5,000 10,000 15,000
Feet

Date: December 9, 2021
Data Sources: USGS, Southern California Association of Governments (2008), LA County and City of Santa Clarita (2012), DWR Bulletin 118, SCV Water (2021)

GSI Water Solutions, Inc.

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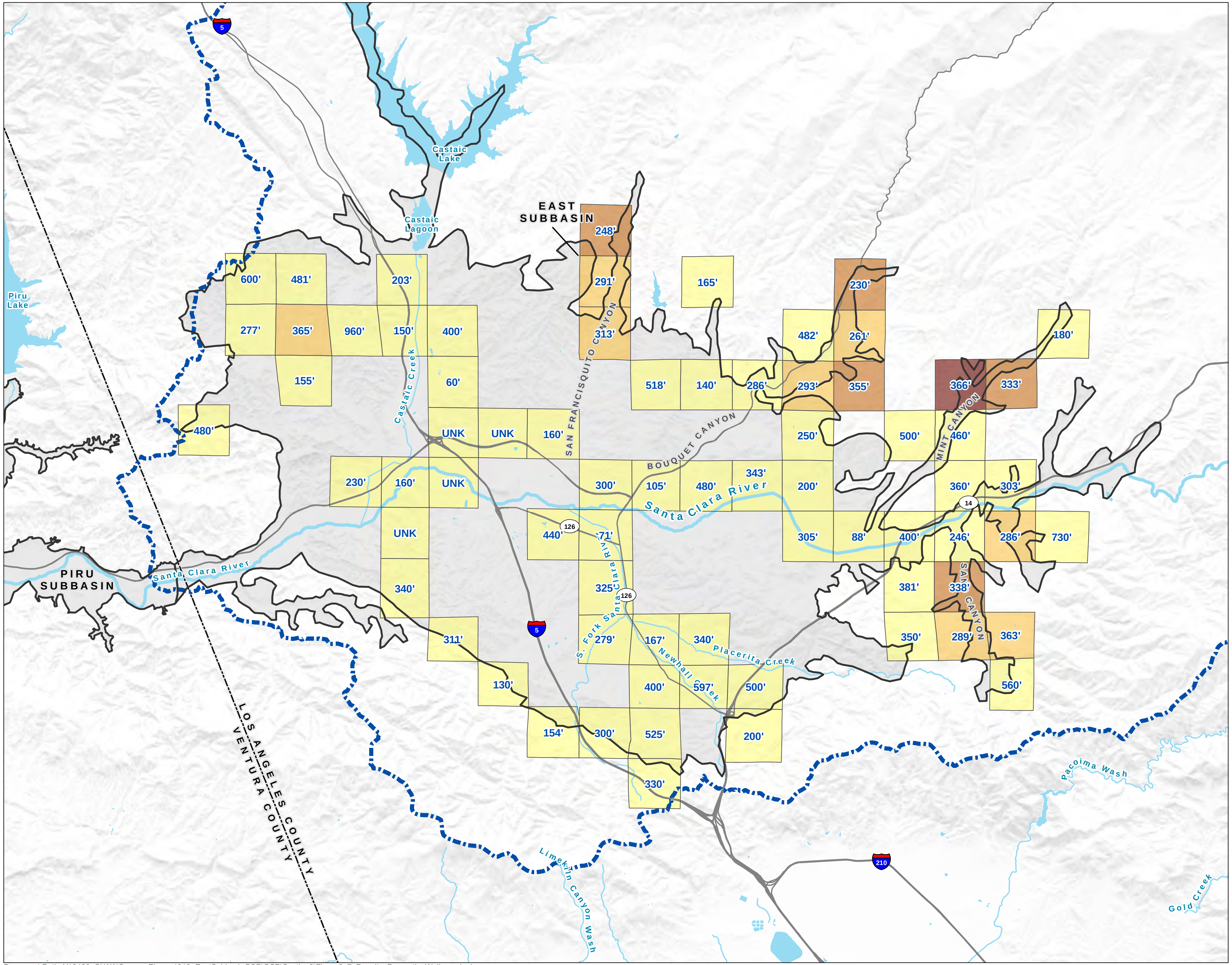

FIGURE 3-7

Density and Average Well Depth of Domestic Wells per Square Mile

Groundwater Sustainability Plan
Santa Clara River Valley East
Groundwater Subbasin

LEGEND

481' Average Well Depth (feet)

Domestic Well Count

- 1 - 5
- 6 - 10
- 11 - 15
- 16 - 24

All Other Features

- Santa Clara River Valley Groundwater Basin
- Watershed Boundary
- Major Road
- Watercourse
- Waterbody

NOTE

UNK: unknown

N

0 5,000 10,000 15,000
Feet

Date: December 9, 2021
Data Sources: USGS, DWR Bulletin 118, Luhdorff & Scalmanini (2021)

GSI Water Solutions, Inc.

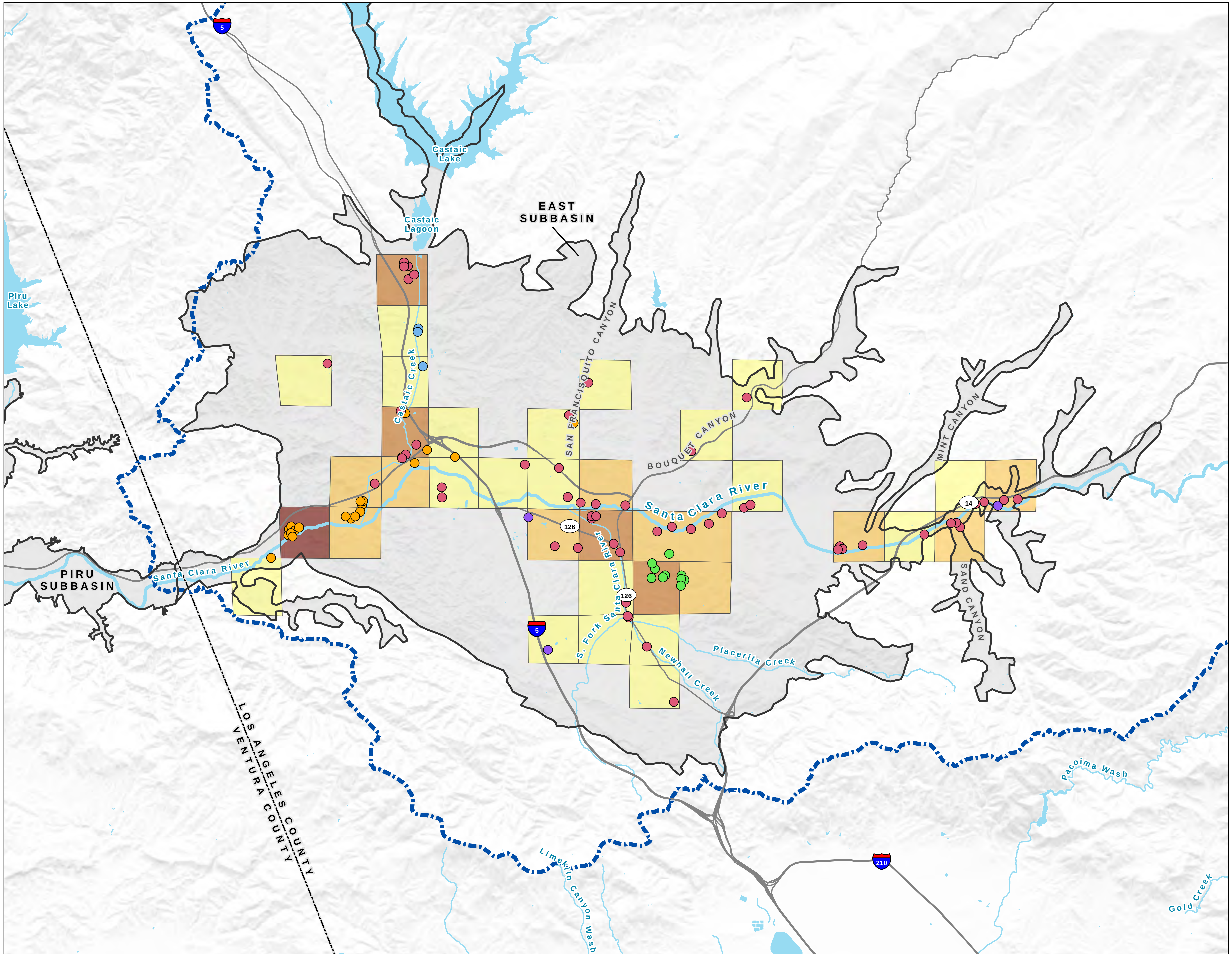

FIGURE 3-8

Density of Production Wells per Square Mile

Groundwater Sustainability Plan
Santa Clara River Valley East
Groundwater Subbasin

LEGEND

Operating Production Wells

Water Use Sector

- Agricultural
- Golf Course
- Municipal
- Small Public Water System
- Whittaker-Bermite Contaminant Treatment/Extraction

Production Well Count

- 1 - 2
- 3 - 4
- 5 - 6
- 7

All Other Features

- Santa Clara River Valley Groundwater Basin
- Watershed Boundary
- Major Road
- Watercourse
- Waterbody

N

0 5,000 10,000 15,000
Feet

Date: December 9, 2021
Data Sources: USGS, DWR Bulletin 118

GSI Water Solutions, Inc.

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3.6 Existing Monitoring Programs

Monitoring of groundwater levels and quality have been conducted by various agencies in the Basin; a detailed discussion of these monitoring programs is discussed in Section 7. A summary of existing monitoring programs is presented in the following subsections.

3.6.1 Groundwater Level Monitoring

The local water purveyors have collected groundwater levels at their production wells in the Saugus Formation and Alluvial Aquifer on a generally monthly basis from 1980 to present. Groundwater level records have been analyzed and shown in hydrographs of representative wells that are provided in annual reports, the latest of which is the 2019 Santa Clarita Valley Water Report (LCSE, 2020).[13]

3.6.2 Groundwater Quality Monitoring

SCV Water monitors water quality for its customers and reports on water quality in detail in the annual Water Quality Report that is provided to all Santa Clarita Valley residents who receive water from SCV Water or LACWD[14] and more broadly in the annual Santa Clarita Valley Water Report (LCSE, 2020). The latter report also provides information on the actions taken to address sources of contamination that are regulated by the California Department of Toxic Substances Control and the California State Water Resources Control Board.

Groundwater quality has not been reported for agricultural and domestic wells in the Basin. This is a data gap that is discussed further in Section 9.

3.6.3 Surface Water Monitoring

Historical annual streamflow in the Santa Clara River watershed has been monitored by the U.S. Geological Survey (USGS) and the LACDPW. Currently active and former gages for the Basin include an upstream gage in the Santa Clara River above Lang Railroad Station at the Capra Road Railroad Crossing (LACDPW station F93B-R), the Old Road Bridge gage just west of I-5 (LACDPW station F93C-R), and two downstream gages (the former County Line gage [USGS station 11108500], which was located 0.75 miles west of the western boundary of the Basin, and the current Piru gage [USGS station 11109000], which is located 3.5 miles west of the western boundary of the Basin). Stream gaging also occurs in Mint Canyon (LACDPW station F328B-R) and Bouquet Canyon (LACDPW station F377B-R).

The California Surface Water Ambient Monitoring Program (SWAMP) monitors, assesses, and reports on the conditions of surface waters throughout the state of California. Data from SWAMP are used to improve the state's water quality assessment and add or remove water bodies from the impaired water bodies list as required under Sections 305(b) and 303(d) of the Clean Water Act. The Central Coast Regional Water Quality Control Board is the regional agency that implements SWAMP in the Basin.

Water quality in the upper Santa Clara River is affected by natural and urban runoff, WRP discharges, reservoir releases (Castaic and Bouquet), and potentially groundwater inflow. Annually, during the dry summer season, the composition of the streamflow in the Santa Clara River in the Upper Santa Clara River is predominantly composed of WRP discharges, and the total dissolved solids (TDS) concentrations are generally higher compared to the wet winter/spring periods. During the wet season, streamflow in the river is composed of runoff from the watershed and urban areas, along with WRP discharges resulting in relatively

[13] Available at https://yourscvwater.com/wp-content/uploads/2020/08/2019-Santa-Clarita-Valley-Water-Report.pdf . (Accessed April 16, 2021.)
[14] Available at https://yourscvwater.com/water-quality/#waterqualityreports. (Accessed April 16, 2021.)

lower TDS concentrations. Water quality data from surface flows in the central part of the Santa Clarita Valley are available as part of surface water monitoring by the Upper Santa Clara River Watershed Management Group as required for the region's municipal stormwater permit. These monitoring efforts are described in the Coordinated Integrated Monitoring Program plan (LCSE, 2020) (Upper Santa Clara River Watershed Management Group, 2015).

3.6.4 Climate Monitoring

Precipitation and weather monitoring in the Basin have been performed at two locations in the Town of Newhall since the late 1800s. Precipitation gauges are currently located at Newhall Fire Station #73 (maintained by LACDPW) and at the SCV Water-owned Pine Street gage. One of the dominant uncertainties in water resource planning in California is climate change. Hydrology in California is highly variable, and forecasts of the effects of climate change suggest even greater variability in the coming years. Moreover, climate models suggest a general warming trend, which is likely to reduce SWP water deliveries and have other profound implications for management of water supplies in the state (GSI, 2020).

The Los Angeles Region Framework for Climate Change Adaptation and Mitigation, published by LARWQCB, states that "Climate change will likely impact both water demand and water supply through various pathways. Drought periods and a lower snowpack could trigger a drop in groundwater levels and a decrease in the amount of imported water available to the region, which would have major impacts on the water supply that require increased reliance on local groundwater supplies. In addition, higher temperatures will likely increase water demand. In order to cope with these added stresses on water supply and water demand, augmented pumping of local aquifers would exacerbate the decrease in groundwater levels" (LARWQCB, 2015).

When evaluating sustainable management of the Basin 50 years into the future, it is prudent to consider the potential impacts that climate change could have on the state's future management of water supplies and the change in hydrology within the local groundwater system. SGMA issues guidance to local GSAs for consideration of how to factor these forecasts and uncertainties into planning for local sustainability. Sustainable groundwater management provides a buffer against drought and climate change and contributes to reliable water supplies regardless of weather patterns. The Santa Clarita Valley depends on groundwater for a portion of its annual water supply, and sustainable groundwater management is essential to a reliable and resilient water system.

SCV Water has updated its UWMP, which includes reviewing and (as needed) revising the future water supply and demand values, including incorporating DWR's most current estimates of future SWP delivery reliability (DWR, 2020). The future water budgets presented in Section 6 of this GSP make use of DWR's most current estimates of future SWP delivery reliability and also evaluate three local climate-change conditions in the Basin (i.e., no climate change, 2030 climate change, and 2070 climate change), using local-scale climate-change factors provided by DWR on its SGMA web portal that are applied to the historical climate record for the Basin. Future updates of this GSP may need to adjust climate change factors and the amount of imported water that is assumed to be available for supply, particularly if severe drought conditions continue.

3.6.5 Incorporating Existing Monitoring Programs into the GSP

Section 7 provides a detailed discussion of all the existing monitoring programs in the Basin and describes how those monitoring programs are integrated into the GSP.

3.6.6 Limits to Operational Flexibility

DWR provides GSAs with one climate scenario for 2030 and three climate scenarios for 2070. The climate scenario for 2030 provides the best estimate of the variability in local hydrology (precipitation and evapotranspiration) that the Basin might experience during the next 20 years as the GSA works to obtain and/or maintain sustainability of local groundwater resources. The three climate scenarios for 2070 demonstrate the uncertainty of climate when considering a 50-year planning horizon under SGMA. The forecasts result in a fairly minor change in local hydrology compared with the effects of climate uncertainty and future climate change on future statewide policymaking and water resource management. When considering sustainability 50 years out, SCV Water anticipates there will be a need to consider and adjust to the influences of climate change in its water demand and supply management programs. Thus, it is prudent to focus on the 2030 climate scenario for addressing sustainability within the 20-year time frame required by SGMA, while also using the results of the 2070 water budget analysis to inform water managers about conditions that may be possible afterward (GSI, 2020).

3.7 Existing Management Plans, Studies, and Reports

Water providers in the Basin have prepared numerous plans and conducted numerous studies over many years to enhance water supply reliability and resilience to drought and to sustainably manage water resources in the Basin. These plans, studies, and reports include the following:

- *Analysis of Groundwater Supplies and Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin* (LCSE and GSI, 2009)
- *Castaic Lake Water Agency Water Resources Reconnaissance Study* (Carollo Engineers, 2015)
- *Upper Santa Clara River Integrated Regional Water Management Plan, 2018 Amendments* (KJ, 2018)
- *2021 Water Supply Reliability Plan Update* (Geosyntec, 2021)
- *Groundwater Management Plan, Santa Clara River Valley Groundwater Basin, East Subbasin* (LCSE, 2003)
- *State Water Project Delivery Capability Report 2019* (DWR, 2020)
- *2015 Urban Water Management Plan for Santa Clarita Valley* (KJ, 2016a)
- *Castaic Lake Water Agency 2016 Recycled Water Master Plan* (KJ, 2016b)
- *Santa Clarita Valley Family of Water Suppliers Water Use Efficiency Strategic Plan* (Maddaus, 2021a)
- *2019 Santa Clarita Valley Water Report* (LCSE, 2020)
- *Santa Clarita Valley Water Agency Groundwater Treatment Implementation Plan* (Rajagopalan and Bracewell, 2021)
- *Draft 2021 SCV Demand Study: Land-Use-Based Demand Forecast Analysis* (Maddaus, 2021b)
- *2020 Urban Water Management Plan for Santa Clarita Valley Water Agency* (KJ, 2021)
- *Final Salt and Nutrient Management Plan, Santa Clara River Valley East Subbasin* (GSSI, 2016)

3.7.1 Analysis of Groundwater Supplies and Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin

This analysis of groundwater supplies and groundwater basin yield provides an update to prior assessments; provides consideration of increased utilization of groundwater for wet/normal and dry-year water supply;

evaluates augmentation of basin yield using artificial groundwater recharge from stormwater runoff in selected areas; and describes the general impacts of climate change on the groundwater basin and yield. The findings from this report were incorporated into subsequent UWMPs.

3.7.2 Castaic Lake Water Agency Water Resources Reconnaissance Study

The study evaluates water supply augmentation alternatives, including modeling of some alternatives to evaluate potential benefits and impacts to the local groundwater supply, and recommends (1) groundwater recharge of the Alluvial Aquifer with recycled water and delivery to nonpotable customers and (2) aquifer storage and recovery for further development, analysis, and planning (Carollo Engineers, 2015).

3.7.3 Upper Santa Clara River Integrated Regional Water Management Plan

The Integrated Regional Water Management Plan (IRWMP) for the Upper Santa Clara River covers the upper Basin (bounded by the San Gabriel Mountains to the south and southeast, the Santa Susana Mountains to the southwest, the Transverse Ranges to the northeast, the Sierra Pelona Mountains to the east, and the Ventura County Line to the west) and encompasses the City of Santa Clarita and unincorporated surrounding communities. The Upper Santa Clara River Watershed is a logical region for integrated regional water management due to its history of cooperative water management, the topography and geography of the Region and the similarity of water issues facing agencies in the region. The IRWMP integrates planning and implementation efforts[15] and facilitates regional cooperation to help reduce potable water demands, increase water supply, improve water quality, promote resource stewardship over the long term, reduce negative effects from flooding and hydromodification, and adapt to and mitigate climate change (KJ, 2016a). The IRWMP was most recently updated in 2018 to be consistent with DWR’s Proposition 1 Integrated Regional Water Management Guidelines (DWR, 2019) (KJ, 2018).

3.7.4 2017 Water Supply Reliability Plan Update

The Water Supply Reliability Plan identifies current and future storage capacity and emergency storage needs and options for managing water supplies for SCV Water. The plan evaluates four supply scenarios from the 2015 UWMP, evaluating supplies under varying assumptions regarding projected SWP and local supply availability and reliability. Each supply scenario is evaluated against the 2015 UWMP projected demands with conservation scenario (Clemm and KJC, 2017). The plan has been recently updated (2021). The supply planning documented in this plan, combined with the operating plans in the GWMP and UWMP, form the basis for current and future water planning in the Santa Clarita Valley.

3.7.5 Groundwater Management Plan, Santa Clara River Valley Groundwater Basin, East Subbasin

In 2001, as part of legislation authorizing Castaic Lake Water Agency (CLWA) to provide retail water service in addition to its ongoing wholesale supply, California Assembly Bill (AB) 134 included a requirement for the preparation of groundwater management plan, which was enacted by AB 3030. Adopted in 2003, the GWMP complements and formalizes a number of existing water supply and water resource planning and management activities in the now-SCV Water service area, which effectively encompasses the basin of the Santa Clara River Valley Groundwater Basin. The four management objectives outlined in the GWMP include the following:

[15] Development of the IRWMP was informed by prior regional water management and planning efforts; agency facilities and master planning; and city, county, and federal land use planning efforts. See IRWMP Section 10.1.1. for a description of each of the referenced plans.

1. Development of an integrated surface water, groundwater, and recycled water supply to meet existing and projected demands for municipal, agricultural, and other water uses
2. Assessment of groundwater basin conditions to determine a range of operational yield values that use local groundwater conjunctively with supplemental SWP supplies and recycled water to avoid groundwater overdraft
3. Preservation of groundwater quality, including active characterization and resolution of any groundwater contamination problems
4. Preservation of interrelated surface water resources, which includes managing groundwater to not adversely impact surface and groundwater discharges or quality to downstream basin(s)

To accomplish these objectives, the GWMP includes multiple elements, such as monitoring groundwater; monitoring and management of surface water; development of emergency water supplies; continuation of conjunctive use; management of salinity; integration of recycled water; identification and mitigation of contamination in soil and groundwater; development of stakeholder relationships; reporting, public education, and conservation programs; identification and management of recharge and wellhead protection areas; identification of policies for well construction, abandonment, and destruction; and updates to the GWMP (KJ, 2018). The operating plans in the GWMP, combined with the supply planning documented in the Water Supply Reliability Plan and UWMP, form the basis for current and future water planning in the Santa Clarita Valley.

3.7.6 State Water Project Delivery Capability Report 2019

The State Water Project Delivery Capability Report 2019 updates the estimate of current (2019) and future (2040) SWP delivery capability and incorporates current regulatory requirements for SWP and Central Valley Project operations (DWR, 2020).

3.7.7 Santa Clarita Valley Urban Water Management Plans (2015 and 2020)

The UWMP is a collaboration of the Santa Clarita Valley agencies that were water providers in 2015.[16] The purpose of the UWMP is to provide a broad overview for decision-making on water supply issues, such as opportunities for exchanges or water transfers. The UWMP provides information on potential sources of supply and amounts available; projected area demand, given assumed growth and water management; and the relationship between supply and demand. The purpose of the UWMP is to provide cost-effective options and opportunities to develop supplies and meet demands (KJ, 2016a and 2021). SCV Water completed the 2020 UWMP in June 2021, with its Board adopting this plan on June 16, 2021, upon which the 2020 UWMP was submitted to DWR in compliance with the due date of July 1, 2021.

3.7.8 Castaic Lake Water Agency 2016 Recycled Water Master Plan

The Recycled Water Master Plan explores opportunities to maximize the utilization of recycled water in the Santa Clarita Valley (KJ, 2016). The 2016 plan analyzed the costs and benefits of several alternatives to use recycled water to augment the region's water supply. The analysis recommends implementation of Alternative 1 - Non-Potable Reuse Expansion Projects - Phase 2. Four projects planned to expand recycled water use within Santa Clarita Valley, collectively known as Phase 2, are currently in various stages of design. Phases 2A, 2C, and 2D would use recycled water from the Valencia WRP and Phase 2B would use

[16] At the time, the area water providers were CLWA service area, which included four retail water purveyors: SCWD, NCWD, Valencia Water Company (VWC), and LACWD. As discussed in Section 2.2.2, SB 634 consolidated the four retail providers into SCV Water, leaving SCV Water and LACWD as the two regional water providers.

recycled water produced at the Vista Canyon Water Factory, which is being constructed to treat flows from the planned Vista Canyon Development. SCV Water intends to update this plan within the next couple of years.

3.7.9 Santa Clarita Valley Family of Water Suppliers Water Use Efficiency Strategic Plan

An essential theme of the Water Use Efficiency Strategic Plan (WUE SP) is to maximize the use of existing water and fiscal resources and maintain the flexibility to adjust planning to meet changing conditions. The WUE SP provides a comprehensive approach supported by a thorough economic analysis of water conservation efforts in the coming years. The WUE SP also quantifies the benefits of meeting a significant portion of future water demands through water conservation measures compared with the economic benefit of adding recycled water infrastructure. The WUE SP will be updated during SCV Water's 2021/2022 fiscal year to reflect water efficiency goals established by the state legislature (AB 1668 and Senate Bill 606).

3.7.10 2019 Santa Clarita Valley Water Report

Each year, SCV Water and LACWD prepare an annual water report. The report provides information about local groundwater resources, SWP and other imported water supplies, treated and recycled water, and water conservation. It also includes discussion about the Santa Clarita Valley's Groundwater Operating Plan, the 2015 UWMP, and the development of this GSP. The 2019 report (LSCE, 2020) reviews the sufficiency and reliability of supplies in the context of existing water demand with focus on actual conditions in 2019, and it provides a short-term outlook of water supply and demand for 2020. The 2020 report is anticipated to be completed during the summer of 2021.

3.7.11 Santa Clarita Valley Water Agency Groundwater Treatment Implementation Plan

The Santa Clarita Valley Water Agency Water Groundwater Treatment Implementation Plan includes a feasibility evaluation of compliance alternatives for SCV Water wells impacted by perchlorate and per- and polyfluoroalkyl substances (PFAS), develops planning-level treatment costs, updates tables in the 2015 UWMP, and informs the upcoming 2020 UWMP. The plan recommends single-use ion exchange treatment for perchlorate and PFAS and provides a planning-level conceptual process and site diagrams as well as recommendations for prioritizing wells for compliance (Rajagopalan and Bracewell, 2021).

3.7.12 Draft 2021 SCV Demand Study: Land-Use-Based Demand Forecast Analysis

This 2021 analysis of current and projected demand for SCV Water includes the most recently obtainable data, climate change factors that rely on assumptions that are similar to those used in this GSP (see Section 6 and Appendix G), an inclusion of water savings from passive measures and demand reduction due to active conservation programs, demand due to increased work from home as a result of the COVID-19 pandemic, and estimated overwater or irrigation inefficiencies. The study presents the demand forecast for SCV Water since formation[17] and projects water demand to 2050, the year by which full buildout is expected to occur. The study scope includes SCV Water service areas and anticipated annexations and the service area for LACWD. This study is an input to the 2020 UWMP (due to be published in July 2021) and the full buildout demand projections from this study have been incorporated into the water budgets for this GSP.

[17] Since the formation of SCV Water in 2018 from the merger of CLWA, SCWD, NCWD, and VWC.

3.8 Process for Permitting New or Replacement Wells

The California Division of Drinking Water regulates municipal water companies (those with service connections greater than 200) under the provisions of the Safe Drinking Water Act and California Code of Regulations (CCR) Titles 17 and 22.[18] The LA County Department of Public Health Drinking Water Program is responsible for reviewing the plans and approving private residential water wells in designated cities and unincorporated areas of the county.

Under DWR, a public water system must submit an application for a permit or amended permit to install a water supply well pursuant to the California Health and Safety Code Division 104, (12)(4) § 116525 or § 116550, respectively. For proposed water system improvements, new water systems, or a “project” (as defined in CCR Title 14 § 15378, for which environmental documentation is required), a copy of the documentation must be included in the application.[19]

The LA County Department of Public Health Drinking Water Program requires the following for permitting new or replacement private residential water wells in the Basin:

- Submittal of an Application for Well/Exploration Hole Permit, which includes details about construction materials, contractor licenses, local geology, and nearby environmental remediation sites.
- A written narrative with work plan details
- A well diagram detailing depth, size, thickness, and materials of the following:
  - The casing
  - The annular space
  - Sanitary seal
  - The screen or slots in the casing
  - Any pertinent geological features
- A scaled drawing to include the following:
  - Roads
  - Property lines
  - Private sewage disposal systems
  - Surface water features
  - Any other possible sources of contamination within 200 feet of the well site
- A county inspector visits the well site and witnesses the placement of the sanitary seal.

Upon completion of the work, the applicant must submit a well completion report to the DWR using the Online System for Well Completion Reports.

[18] Drinking water regulations under CCR Titles 17 and 22 are available here: https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/lawbook/dw_regulations_2019_04_16.pdf. (Accessed June 4, 2021.)
[19] Information on California Environmental Quality Act requirements is available here https://resources.ca.gov/CNRALegacyFiles/ceqa/docs/2010_CEQA_Statutes_and_Guidelines.pdf. (Accessed June 4, 2021.)

3.9 Existing Groundwater Regulatory Programs

3.9.1 Salt and Nutrient Management Plan for the Santa Clara River Valley East Subbasin

In 2014, a SNMP was prepared for the Santa Clara River Valley East Subbasin in accordance with the State Water Resources Control Board's (SWRCB's) Recycled Water Policy (SWRCB, 2019). This SNMP is intended to provide the framework for water management practices to ensure protection of beneficial uses and allow for the sustainability of groundwater resources consistent with the Water Quality Control Plan: Los Angeles Region Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties (Basin Plan) (LARWQCB, 1994).

The SNMP for the Basin determined current water quality conditions to ensure that all water management practices (including the use of recycled water) are consistent with site-specific water quality objectives (WQOs) set by the LARWQCB for the Basin (GSSI, 2016). WQOs have been set by the LARWQCB for the Alluvial Aquifer but not for the Saugus Formation. The SNMP identifies WQOs for TDS, chloride, and nitrate, but state that further analysis is necessary in order to establish meaningful WQOs. As part of the SNMP, a monitoring plan has been developed for the Basin that identifies key monitoring locations within each subunit for both surface water and groundwater (GSSI, 2016).

The Santa Clara River, the predominant surface waterbody in the Basin, also influences groundwater quality in the losing reaches of the river (where river water infiltrates to groundwater). The Santa Clara River has been identified as an impaired water body and listed in the Clean Water Act Section 303(d) list published by the U.S. Environmental Protection Agency (EPA). The Upper Santa Clara River has been listed for the following contaminants: coliform bacteria, boron, and sulfates (GSSI, 2016).

The Basin consists of six groundwater management zones: five shallow alluvial groundwater basins and the Saugus Formation (see Figure 8-6). Water use associated with land uses and the form of the water that enters the groundwater system (i.e., irrigation runoff, septic seeps, precipitation percolation, underflow from upgradient zones, and other forms) determine the salt and nutrient load carried into each management Basin Plan.

Responsibility for the protection of surface water and groundwater quality in California rests with the SWRCB and nine Regional Water Quality Control Boards (RWQCBs). The SWRCB establishes statewide water quality control policy and regulation and coordinates with and reviews RWQCB efforts to provide reasonable protection and enhancement of the quality of both surface waters and groundwaters in the region. Region-specific water quality regulations are outlined in water quality control plans that recognize regional beneficial uses, water quality characteristics, and water quality problems.

The LARWQCB has jurisdiction over the coastal drainages between Rincon Point (on the coast of western Ventura County) and eastern LA County, which includes Santa Clarita Valley. LARWQCB prepared the Basin Plan (LARWQCB, 1994).

The Basin Plan is designed to preserve and enhance water quality and protect the beneficial uses of all regional waters. Specifically, the Basin Plan (1) identifies beneficial uses for surface and ground waters, (2) includes the narrative and numerical water quality objectives that must be attained or maintained to protect the designated beneficial uses and conform to the State's anti-degradation policy, and (3) describes implementation programs and other actions that are necessary to achieve the water quality objectives established in the Basin Plan. In combination, beneficial uses and their corresponding water quality objectives are called water quality standards. Table 8-2 lists the water quality standards for private drinking water wells.

3.10 Monitoring and Management Programs with GSP

3.10.1 Incorporation into GSP

Information in these plans have been incorporated into this GSP and used during the preparation of sustainability goals when setting minimum thresholds and measurable objectives, and also were considered during development of the projects and management actions. This GSP specifically incorporates the plans and programs, described above, into the following sections:

Section 6 – Water Budgets

- Groundwater Management Plan, Santa Clara River Valley Groundwater Basin, East Subbasin
- 2015 and 2020 Urban Water Management Plans for Santa Clarita Valley[20]
- 2021 Water Supply Reliability Plan Update (Geosyntec, 2021)
- State Water Project Delivery Capability Report 2019
- 2019 Santa Clarita Valley Water Report (LCSE, 2020)
- Draft 2021 SCV Demand Study: Land-Use-Based Demand Forecast Analysis (Maddaus, 2021b)

Section 8 – Sustainable Management Criteria

- Salt and Nutrient Management Plan—Santa Clara River Valley East Subbasin
- 2015 and 2020 Urban Water Management Plans for Santa Clarita Valley
- Water Quality Control Plan: Los Angeles Region Basin Plan for the Coastal Watershed of Los Angeles and Ventura Counties

3.10.2 Limits to Operational Flexibility

SCV Water has developed an integrated plan and related infrastructure to meet water demands under a wide range of conditions including supplies from local groundwater sources, imported water sources, and banked water sources from outside of the Basin. These various sources, associated infrastructure, and operational aspects are described in detail in Section 6. Groundwater contamination, including perchlorate, volatile organic compounds (VOCs) and PFAS, has been identified in the Basin (refer to Section 7) and has necessitated construction of wellhead treatment facilities at some wells. During planning and construction of these treatment facilities, affected wells have been shut down and SCV Water (and its predecessor agencies) have relied on other wells and/or imported water to make up for the temporary reduction in supply. These temporary reductions in supply from some wells have not impacted the ability of SCV Water to continue to provide high quality groundwater to its customers. These responses to contamination have been conducted under the oversight of the Division of Drinking Water.

The SNMP has not limited operational flexibility thus far; however, the assimilative capacity of the aquifers to additional salt loadings may be an issue in the future in some parts of the Basin as recycled water projects are planned and implemented.

[20] The UWMP is one of the primary sources for the Water Budget (Section 6) of this GSP. The UWMP incorporates the planning described in *Upper Santa Clara River Integrated Regional Water Management Plan, 2018 Amendments*; *Castaic Lake Water Agency 2015 Recycled Water Master Plan*; and the *Santa Clarita Valley Family of Water Suppliers Water Use Efficiency Strategic Plan*.

3.10.3 Conjunctive Use Programs

Conjunctive use is the coordinated operation of surface water storage and use, groundwater storage and use, and the necessary conveyance facilities. In 2017 SCV Water updated its Water Supply Reliability Plan (Reliability Plan). While the plan focuses on increasing imported water reliability, water banking, groundwater storage, and the groundwater operating plan are key elements that SCV Water uses to conjunctively use and manage groundwater (Clemm and KJC, 2017). The Reliability Plan includes the following:

- An implementation schedule that allows for gradually increasing banked storage and pumping capacity through to 2050. Target capacities include an additional 10,000 AF by 2025 and an additional 10,000 AF by 2035.
- A Groundwater Operating Plan with flexibility to vary pumping from year to year to allow for increased groundwater use during dry periods and increased recharge during wet periods.

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4. Hydrogeologic Conceptual Model

This section is a description of the hydrogeologic conceptual model of the Santa Clara River Valley Groundwater Basin, East Subbasin (Basin). This section describes the physical characteristics of the Basin as they relate to groundwater occurrence in the aquifers. Data and interpretations compiled herein are based on the long-term experience of Richard C. Slade & Associates LLC (RCS) performing hydrogeologic services for various water agencies and private parties in the Basin, coupled with information from a number of publicly available resources.

Note that, as part of ongoing GSP development, an updated groundwater flow model will be utilized to further quantify ranges of key terms listed below.

4.1 Basin Setting

4.1.1 Topography and Boundaries

Figure 4.1-1 shows the boundary of the local groundwater basin superimposed on a topographic map of the area, and the locations of select wells that are known to exist or to have existed in the region. Topographically, the area surrounding the groundwater basin is defined by higher elevations on the north, south, and east, and lower elevations on the west. This topography defines the watershed of the Santa Clara River, which has its headwaters in Soledad Canyon and a drainage area of several hundred square miles. The Santa Clara River provides regional drainage in an east-to-west direction across the groundwater basin and it continues westerly across Ventura County and into the Pacific Ocean. In general, the local groundwater basin is oriented along the Santa Clara River.

Principal tributaries draining the northern side of the groundwater basin include, from east to west, Mint Canyon, Bouquet Canyon, San Francisquito Canyon, and Castaic Creek Canyon. Principal tributaries draining the southern side of the Basin include, from east to west, Oak Spring Canyon, Sand Canyon, and Potrero Canyon. The South Fork of the Santa Clara River, which drains in a northerly direction toward its confluence with the main reach of the Santa Clara River (located just west of Bouquet Junction), has Placerita Creek Canyon, Newhall Creek Canyon, and Pico Canyon as its main tributaries.

The boundaries of the groundwater basin as defined by the California Department of Water Resources (DWR) are based on ground surface exposures of the two main aquifers that comprise the local groundwater basin: the Alluvial Aquifer, and the Saugus Formation (RCS, 1988, 2001). Depending on the location of the boundary, the boundary of the Basin is either defined as the geologic contact of the Saugus Formation with other geologically older, non-water-bearing formations, or the contact of the alluvium of the Santa Clara River and its tributaries with geologically older, non-water-bearing formations. The same is true for the “bottom” of the Basin in the subsurface: in some instances, the Alluvial Aquifer is in contact with non-water bearing sediments where no Saugus Formation is present (as in the western portion of the groundwater basin), and in areas where the Saugus Formation is relatively thick, the Basin is defined as its contact with the underlying Pico Formation, or even other older, non-water-bearing formations. Additional discussions of the nature of these geologic contacts are discussed below.

LEGEND

- Santa Clara River Valley Groundwater Basin, East Subbasin
- Santa Clara River

Wells (Type / Status)

- Destroyed
- Municipal
- Monitoring
- Monitoring (?)
- Groundwater Extraction
- Public
- Irrigation
- Domestic
- Oil /Gas Well

RCS

FIGURE 4.1-1
LOCATION MAP

RCS Job No. 693-LAS01

May 2021

4.1.2 Soil Infiltration Potential

Soil infiltration is defined as the ability of a soil to allow water movement through the soil profile. The infiltration rate of a soil is the velocity or speed at which water enters and flows into the soil under gravity. Publicly available databases of soil types and estimated infiltration rates of these soils were reviewed and are summarized below.

4.1.2.1 Soil Types in the Basin

Soils in the region have been mapped and described by the Natural Resources Conservation Service (NRCS, 1999), a division of the United States Department of Agriculture (USDA). Figure 4.1-2 shows the locations of soil groups within the boundaries of the Basin and the surrounding region. Four groups of soil types are shown to exist within the boundaries of the Basin on Figure 4.1-2. Below is a description of these four soil groups as adapted from the NRCS (1999), shown in order of relative abundance within the Basin:

- **Entisols** are the most prevalent soil group within the Basin, and are exposed throughout the Basin. Entisols are made up of mineral soils that have not yet developed distinct soil horizons. Because entisols have no diagnostic horizons, these soils appear unaltered from their parent material, which can be unconsolidated sediment or rock. Entisols are the most abundant soil order on earth, occupying about 16 percent of the global ice-free land area.
- **Inceptisols** are the second most prevalent soil group and are exposed primarily in the western portion of the Basin. These soils are made up of freely draining soils in which the formation of distinct horizons is not far advanced. By definition, Inceptisols are more developed than Entisols, but have no accumulation of clays or organic matter. Inceptisols develop more rapidly from parent material than do Entisols,
- **Alfisols** are similar in abundance to inceptisols, but occur primarily in the eastern portion of the Basin. Alfisols consist of a group of leached basic or slightly acidic soils, exhibiting clay-enriched subsoils. These subsoils are considered mineral soils and contain higher concentrations of aluminum (Al) and iron (Fe) than other soils. Alfisols typically are found to have formed on late-Pleistocene aged geologic deposits.
- **Mollisols** are the least abundant soil type within the Basin, generally found along the Santa Clara River. These soils are commonly very dark colored, base-rich, mineral soils and contain high concentrations of calcium and magnesium. These soils typically develop under grassland cover.

4.1.2.2 Soil Infiltration Rates

To help provide a general understanding of estimated infiltration capacity of the soils within the boundaries of the Basin, infiltration rates for these soils were compiled from the Los Angeles County Department of Public Works (LACDPW) *Hydrology Manual* (LACDPW, 2006). Infiltration rates throughout the County of Los Angeles (LA County) were obtained by LACDPW by performing double-ring infiltrometer tests of various soil types (LACDPW, 2006). Results of these infiltration tests were reportedly used by LACDPW to produce runoff coefficient curves of the tested soil type, from which infiltration rates were interpreted. Compiled results from the LACDPW infiltration tests are presented in Figure 4.1-3. Reported infiltration rates ranged from 0.1 to 1.0 inch per hour (in/hr). Lower infiltration rates of 0.1 in/hr were observed in individual areas located in the southern portion of the Basin. Spatially, an infiltration of 0.3 in/hr was more prevalent than others.

LEGEND

Santa Clara River Valley Groundwater Basin, East Subbasin
Santa Clara River

USDA Taxonomic Soil Order
- Alfisols
- Entisols
- Inceptisols
- Mollisols
- Vertisols
- No Soil
- Data Not Available

FIGURE 4.1-2
NRCS SOIL CLASSIFICATIONS

RCS Job No. 693-LAS01

May 2021

LEGEND

Santa Clara River Valley Groundwater Basin, East Subbasin

Santa Clara River

Infiltration Rates

inches per hour

- ≤0.10
- ≤0.20
- ≤0.30
- ≤0.60
- ≤1.00

RCS

FIGURE 4.1-3
INFILTRATION RATES
LA COUNTY

RCS Job No. 693-LAS01

May 2021

4.1.3 Regional Geology

The regional geologic conditions in and around the Basin consist predominantly of continental to marine deposits of clay, silt, sand, and gravel divided among several formations ranging in geologic age from late-Tertiary (approximately 25 million years old) through the present. The oldest of these formations lies unconformably (a separation of two or more units by a geologic time gap) upon basement complex rock, which consist of undifferentiated crystalline granitic rocks and metamorphic-type rocks of late Mesozoic age (greater than 66 million years old). Figure 4.1-4 shows the locations and lateral extents of these various earth materials as mapped at ground surface by others. This map, which provides the basis for the following discussion of the geologic conditions of the region, has been adapted from geologic maps published by RCS (RCS, 1986, 1988), created by updating interpretation on various geologic mapping efforts by others combined with subsurface interpretation of geologic materials derived over time during the drilling of deep boreholes. Among the geologic references used by RCS (1986, 1988) were those by Oakeshott (1958), Dibblee (1991), and others. For Figure 4.1-4, various crystalline rocks have been simplified and grouped into a single unit named basement complex, and no distinction is provided between the various rock types that comprise the crystalline rocks. Also, alluvial deposits are shown as one unit, although efforts to map Quaternary deposits by others in the past have separated those into more discrete units based on slight differences in age or location. The legend to the map provides information on the names and basic earth materials of each formation shown on that map. The locations of several geologic faults are also shown on the Figure 4.1-4 map; these faults are discussed later in this section. It should be noted that the locations of the faults have been somewhat simplified for this study. In some cases, faults actually exist as en echelon faults within a fault zone, with a number of approximately parallel, similarly trending smaller faults. For this study, however faults are represented by a single line-trace on Figure 4.1-4. For the geologic cross sections (discussed in Section 4.1.5), where data support the interpretation, multiple fault line traces may be shown for a single named fault. Also shown on Figure 4.1-4 are the alignments of several geologic cross sections which are discussed later in this text.

4.1.3.1 Geologic Formations within the Basin

There are three relatively young geologic formations that comprise the local Basin, namely: alluvium, terrace deposits and the Saugus Formation. These formations, except for the terrace deposits, are generally utilized by high-capacity water production wells for municipal-supply purposes by Santa Clarita Valley Water Agency (SCV Water) and the Los Angeles County Waterworks District No. 36, Val Verde (LACWD), and, thus, provide a major portion of the water supply to valley residents. Privately owned wells that utilize these formations (primarily the Alluvial Aquifer) are owned by FivePoint Holdings, LLC (FivePoint, formerly Newhall Land and Farming Company), the Disney Company, multiple golf courses, and others for agricultural irrigation, turf irrigation or local domestic purposes. The spatial distribution of the extraction, and general rates of those extractions are described in Section 6.

LEGEND

Santa Clara River Valley Groundwater Basin, East Subbasin
Santa Clara River

Cross Section Trace
- By RCS
- By Geosyntec

Well Type
- Destroyed Well
- Municipal Well
- Irrigation Well
- Domestic Well
- Oil/Gas Well

Formations
- Undifferentiated Alluvium (Qa)
- Terrace Deposits (Qt)
- Saugus Formation (QTs [undifferentiated])
- Pico Formation (Tp)
- Towsley Formation (Tt)
- Castaic Formation (Tc)
- Modelo Formation (Tms)
- Violin Breccia (Tvb)
- Mint Canyon Formation (Tmc)
- Tick Canyon Formation (Ttc)
- Vasquez Formation (Tv)
- Basement Complex (bc)

Faults
- Fault Trace (Simplified)
- Bedding Plane Orientation with Dip

RCS

FIGURE 4.1-4
GEOLOGIC MAP SHOWING CROSS-SECTIONS

RCS Job No. 693-LAS01

May 2021

Alluvium

The Quaternary Alluvium (Qa) is of Holocene (Recent) geologic age, ranging from 10,000 years in age to the present. These recent alluvial deposits consist primarily of stream channel and floodplain materials along the course of the Santa Clara River and its tributaries. The alluvial sediments are composed of complexly interlayered and interfingered beds of unconsolidated gravel, sand, silt, and clay containing variable concentrations of cobbles and boulders. The source material for this alluvium is from weathering and erosion of the surrounding hills and mountains bordering the Santa Clarita Valley. In general, alluvium along the main reach of the Santa Clara River ranges from medium-grained sand in the west, to cobbly- or gravelly-sand in the east. The maximum thickness of the alluvium varies along the course of the Santa Clara River, but can attain a maximum thickness of ± 200 feet (ft). Typically, the alluvium tends to be thickest near the central portion of the river channel and thins or pinches out as the base of the adjoining hills is approached.

The alluvium in the tributary canyons is generally thinner than that along the main river valley. Larger watershed areas such as Castaic Creek and Bouquet Canyon are typically underlain by more extensive and thicker accumulations of alluvium than what exists within the smaller tributaries, such as the Oak Spring or Pico canyons. In these latter canyons, the maximum alluvial thickness occurs near the confluence with the main river valley, where it may be from 75 to 125 ft in thickness.

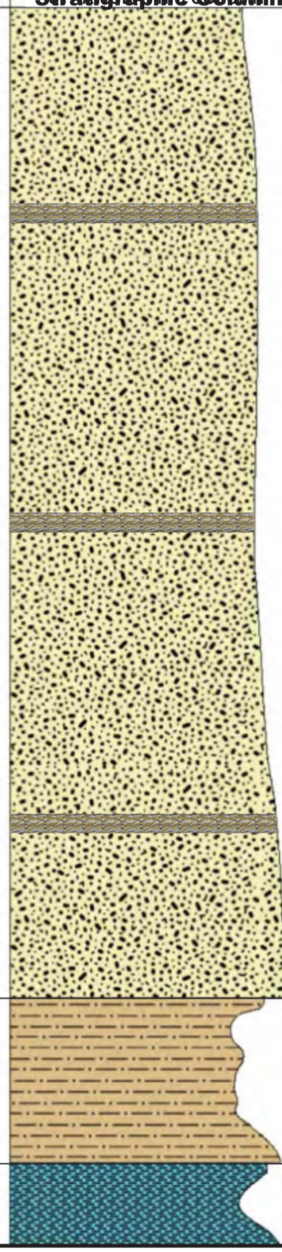
Terrace Deposits

Terrace deposits (Qt) are isolated remnants of what was, during the late Pleistocene (129,000 years or less in age), a continuous blanket of alluvial material covering the entire floor of the Santa Clara River Valley (Winterer and Durham, 1962). Tectonic uplift of the valley floor led to downcutting and incision of this somewhat geologically older alluvial material by the Santa Clara River, leaving the terrace deposits restricted to platforms or benches that are topographically higher than the Santa Clara River, and hence above the regional water table. Sediments comprising the terrace deposits include crudely stratified, poorly consolidated reddish-brown gravel, sand and silt (Winterer and Durham, 1962). Terrace deposits are sometimes weakly cemented by iron oxides, clay minerals, or calcium carbonate.

Terrace deposits may be up to 200 ft thick in some areas, but, because of the limited areal extent of these deposits and because they are generally above the regional water table, they are not a viable source for the development of groundwater resources. However, limited zones of perched groundwater may be locally present in some areas on a seasonal basis within these Terrace Deposits.

Saugus Formation

The Saugus Formation (QTs), of late-Pliocene to early-Pleistocene geologic age (ranging from approximately 3.6 to 1.8 million years in age), has traditionally been divided into two stratigraphic units: a lower, geologically older Sunshine Ranch Member (QTsr) of mixed marine to terrestrial origin; and an overlying, upper portion of the formation (QTsu), which is entirely terrestrial (non-marine) in origin (Winterer and Durham, 1962). Figure 4.1-5 graphically illustrates these two stratigraphic units and the overall characteristics of each. Ground surface exposures of the Saugus Formation shown on Figure 4.1-4 are labeled as undifferentiated Saugus Formation (QTs) because data necessary to distinguish the upper portion (QTsu) from the Sunshine Ranch Member (QTsr) are not available for all areas of the Basin. For the cross sections (discussed in Section 4.1.5), the upper portion of the Saugus Formation (QTsu) and the Sunshine Ranch Member (QTsr) are labeled discretely where data allow for interpretation of the contact between the members; otherwise, the same undifferentiated Saugus Formation (QTs) label is used.

GEOLOGIC AGE	FORMATION/DEPTH	Stratigraphic Column	GENERAL LITHOLOGIC DESCRIPTION	ORIGIN
Quaternary /Tertiary	Upper Saugus Formation (QTsu) to ±5,300 ft bgs		Coarse-grained conglomerates and sandstones interbedded with clays/mudstones.	Terrestrial Depositional Environment (Fluvial & Floodplain)
Quaternary /Tertiary	Sunshine Ranch Member Saugus Formation (QTsr) to ±7,700 ft bgs		Predominantly Claystones, Siltstones & Sandstones, thinly interbedded	Transitional Terrestrial to Marine Depositional Environment
Tertiary	Pico Formation (Tp)		Bluish gray to gray Claystones	Deep Marine Depositional Environment

Note: Information above based on RCS correlation of the electric log for oil well Badger Oil Co. Magic Mountain No. 1 - 04N/16W-17Ka. Interpreted depths differ in other portions of the Basin.

RCS

FIGURE 4.1-5
GENERALIZED SAUGUS FORMATION STRATIGRAPHY

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The upper stratigraphic unit of the Saugus Formation consists of terrestrial fluvial and floodplain deposits that are composed of slightly cemented, interfingered and interbedded conglomerate, sandstone, and clay/mudstone layers. These deposits generally extend to a maximum depth of 5,300 ft in the local groundwater basin, based on an electric log (E-log) for a deep oil well [21] located in the approximate center of the Basin; these depths vary in other parts of the Basin. This deep wildcat (exploratory) oil well was drilled near the east end of a prominent topographic high (called Round Mountain), which is an isolated outcrop of the Saugus Formation, just southeast of Rye Canyon Rd and Avenue Stanford, within the course of the Santa Clara River.

Strata within the Saugus Formation tend to become coarser-grained and generally more permeable in an upward direction, which is from the older and less permeable beds within the Sunshine Ranch Member, to the coarser and somewhat younger beds within the main part of the formation. The formation consists mainly of lenticular beds of light-gray and brown sandstone and conglomerate intercalated with lesser amounts of reddish-brown sandy mudstone. These terrestrial sediments were deposited in stream channels, floodplains, and alluvial fans of an ancestral drainage system in the Santa Clarita Valley. The coarser-grained sand and gravel beds of the Saugus Formation were deposited in the main channels of the ancient drainage system, and these more permeable beds constitute the principal, potential water-bearing materials within the present-day Saugus Formation. As the locations of the ancestral drainage channels changed during the approximately 3 million-year period of deposition of the Saugus Formation strata, the distribution of the coarse-grained channel deposits also changed, both laterally and vertically (in space and time, respectively).

In contrast, the underlying and older Sunshine Ranch Member of the formation is comprised of interfingered, fine-grained, shallow marine, brackish-water to non-marine deposits of generally thinly interbedded gray to greenish-gray sandstone and siltstone. The base of this member occurs at a depth of approximately 7,700 ft bgs and attains a maximum thickness of approximately 2,400 ft in the central part of the local groundwater basin.

Because of the marine origin and the fine-grained nature and relatively low-permeability of the Sunshine Ranch Member, it is not considered to be a target for groundwater exploration or production. Wells drilled near the periphery of the Saugus Formation surface exposures in the Santa Clarita River Valley (i.e., in those areas where the Sunshine Ranch Member is at or very near to ground surface) have typically produced groundwater at rates too low for municipal supply purposes but may provide sufficient water for small-capacity domestic supply wells or irrigation wells, depending on water quality. Evidence from oil field E-logs suggests that the groundwater in much of the Sunshine Ranch Member may be brackish and hence not useful for municipal supply purposes.

4.1.3.2 Geologic Formations Surrounding the Basin

There are a number of geologically older formations that underlie the alluvium and the Saugus Formation and that occur outside of the Basin; refer to Figure 4.1-4 for DWR-derived boundaries of this local groundwater basin. Each of these older formations is considered to be non-water bearing for large-scale water supply purposes (i.e., high-volume production wells), though groundwater in these formations could possibly be utilized for small-scale residential or landscape purposes (depending on water quality). Because they are not a significant source of groundwater for municipal water-supply purposes, these essentially non-water bearing formations will be discussed only briefly in this section. As noted above, none of these older geological formations lie within the local groundwater basin as defined by DWR Bulletin 118, update 2016 (DWR, 2016).

[21] Badger Oil Company, Magic Mountain No. 1 - 04N/16W-17Ka

The formations that are present differ slightly on the north and south sides of the San Gabriel Fault, as defined in Figures 2 and 3 of the report by Oakeshott (1958). Many of the named formations in those figures are not exposed at ground surface in the Basin and some of their names have been reassigned to other formations or have been renamed by others over time. Thus, the formations discussed below are in accordance with, and confined to, only those depicted on the surface geology shown on Figure 4.1-4 within the Basin.

South of the San Gabriel Fault

South of the San Gabriel Fault, the Saugus Formation lies conformably and gradationally upon the Pico Formation of late-Pliocene to Pleistocene geologic age (ranging approximately from 3 to 1.8 million years old). The Pico Formation is of marine origin and consists of gray clay, siltstone, fine-grained sandstone, and light-colored sandstone and conglomerate. The Pico Formation is present at or near ground surface on the west end of the Basin where the Saugus Formation ceases to exist (or pinches out). Local residents sometimes refer to an area called blue cut, which is a location where the Santa Clara River has incised into the Pico Formation; sediments in the Pico Formation often exhibit a blue hue.

Conformably underlying the Pico Formation (Tp) is the Towsley Formation (Tt) of late-Miocene to early-Pliocene geologic age, approximately 6 to 3(?) million years in age. This unit is composed of terrestrial fluvial deposits consisting of well-consolidated to cemented and interbedded shales, siltstones, sandstones, and conglomerates. The Towsley Formation is, in turn, unconformably underlain by sedimentary rocks of the Modelo Formation (Tms) of middle- to late-Miocene age, ranging from approximately 16 to 7 million years ago, and consisting chiefly of cemented sandstone and siliceous, diatomaceous shales.

The above-described bedrock units unconformably overlie pre-Tertiary basement complex rocks (bc) of the San Gabriel Mountains. These geologically old materials consist of the crystalline rocks of quartz diorite, hornblende diorite, gabbro, and gneiss; they were likely emplaced during the Cretaceous period; i.e., approximately 145 to 90 million years before the present.

North of the San Gabriel Fault

North of the San Gabriel Fault, the formations below the Saugus Formation are not the same as those on the south side of the fault. Movement along the fault during and following formation of the Basin-area sediments caused the Saugus Formation to be deposited on top of different, geologically older formations. On the north side of the fault, the Saugus Formation unconformably overlies Miocene-aged (ranging from 23 to 5.2 million years ago) terrestrial sediments of the Castaic (Tc), Tick Canyon (Tt), Mint Canyon (Tm), Vasquez (Tv) formations and the Violin Breccia (Tvb, northwest of Castaic Lake); refer to Figure 4.1-4. These older formations that underlie the water-bearing alluvium and Saugus Formation (within the local groundwater basin) tend to be well-consolidated and cemented and have relatively low porosity and permeability. The Violin Breccia, in particular, of late Miocene age, is considered to be a facies (unit within the rock formation with unique chemical or physical characteristics) of the Ridge Basin Group and is an assemblage of hard sand, gravel, and breccia derived from basement rocks southwest of the San Gabriel Fault (Dibblee, 1997a). These rocks were deposited as debris flows, talus, and alluvial fans accumulating along the San Gabriel Fault scarp (Link and Osborne, 1978; Link, 2003), during development of the San Gabriel Fault at that time.

These older rocks essentially form the local bedrock and are not considered water-bearing in terms of their ability to supply groundwater in useable quantities and of acceptable quality for municipal or agricultural supply purposes. Wells and test holes drilled into these bedrock materials have typically encountered low groundwater production rates and sometimes less than favorable water quality.

The assemblage of bedrock units, discussed above, also unconformably overlie all pre-Tertiary basement complex rocks of the San Gabriel Mountains. The rocks in this area of the mountains consist of crystalline, intrusive igneous rock granite, and metamorphic rocks of the Pelona Schist, both of late Mesozoic age (approximately 80 to 66 million years in geologic age), and augen gneiss, of Pre-Cambrian geologic age (approximately 1.65 billion years old).

4.1.3.3 Regional Geologic Structures

The Quaternary alluvium along the Santa Clara River and its tributaries generally overlies the older terrace deposits and the Saugus Formation in the area. As such, a significant unconformity (a separation of two or more units by a geologic time gap) occurs between those two older formations and the alluvium. The alluvium appears to be undeformed by any recent tectonic activity (occurring since the beginning of the Holocene period), such as folding or faulting. To some extent this is also the case for the terrace deposits, although they have been tectonically uplifted in some areas and are slightly folded. One such fold has been mapped in an area where the terrace deposits crop out in the hills east of San Fernando Road and the South Fork of the Santa Clara River.

However, the alluvium generally exhibits sedimentary structures associated with deposition by the typical mode of meandering rivers and streams. Examples of such sedimentary structures are cross-bedding (where one set of sediments have been laid at an angle to previously deposited sediments) and cut and fill structures (where one stream bed has cut into underlying previously deposited sediments and then subsequently filled in by more recent material).

The general overall structure of the slightly geologically older Saugus Formation is one of an isolated bowl that has been cut (at least in part) by two major faults, namely the San Gabriel Fault and the Holser Fault, and also folded along a number of generally east-west trending folds. The sedimentary layering in the Saugus Formation and in the underlying bedrock dips (i.e., the beds are inclined) generally toward the center of the bowl from all locations along the outer (perimeter) contact of the Saugus Formation. However, there is some degree of localized folding of the layers along the San Gabriel Fault, resulting in small and large anticlinal and synclinal structures with axes trending from the northwest to the southeast (Dibblee, 1996a).

The San Gabriel Fault system and the Holser Fault generally cut across the Saugus Formation and all older formations in the region. The San Gabriel Fault system has a relative right-lateral movement (where land on one side or the other moves to the right, relative to the other side); whereas the Holser Fault is considered to have left lateral movement However, these two faults also show some vertical component of movement. The San Gabriel fault is theorized to have a horizontal displacement on the order of 20 miles and vertical displacement of 1,400 ft (Crowell, 1954). Displacement on the Holser Fault has been estimated to be roughly 4 miles horizontally, and perhaps 3,000 to 5,000 ft vertically (RCS, 1988). Further, these two faults divide the Saugus Formation into three distinct fault-bounded blocks, sometimes referred to as the South, Central, and Northern blocks.

4.1.4 Principal Aquifer Systems

4.1.4.1 Alluvial Aquifer System

The Alluvial Aquifer system overlies the Saugus Formation and serves as one major source of groundwater to groundwater users in the region. Data from the numerous shallow wells in the valley show that the maximum thickness of alluvium varies along the Santa Clara River and it appears to reach a maximum depth to 200 ft bgs in several wells in the approximate center of the valley. The alluvial sediments generally thin and pinch out traversing from the valley center and progressing outward towards the surrounding hills. The Alluvial Aquifer is replenished/recharged chiefly by rainfall and infiltration of surface water runoff in the Santa Clara River and its tributaries, as evidenced by static water level changes shown on hydrographs from the numerous wells in the valley that obtain groundwater solely from this aquifer. Those hydrographs (presented in Section 6) show that static water levels exhibit rapid responses and large fluctuations during rainfall events and intervening drought periods. The Alluvial Aquifer along the main stem of the river is also replenished from discharge of treated wastewater from the Saugus and Valencia water reclamation plants (WRPs).

Exclusion of Portrero Canyon from GSP Management

Potrero Canyon lies in an unincorporated portion of LA County west, of Interstate 5 and south of the Santa Clara, and just west of the LA/Ventura County line (county line) (see Figure 4.1-1). The canyon is nearly 4 miles long, extends westward from its headwaters near Stevenson Ranch to its outlet just south of the Santa Clara River, about 1 mile upstream of the county line and the western terminus of the groundwater basin. Because the floor of the canyon is shallowly underlain by alluvium, it is included as part of the DWR-defined groundwater basin shown on Figure 4.1-1. However, for the reasons described below, Potrero Canyon will not be included as an area that is subject to management under this GSP.

Available geologic and water quality data indicate that groundwater in the alluvium of Potrero Canyon and the underlying Pico Formation bedrock is saline. Furthermore, those earth materials do not readily transmit groundwater to wells. As shown on Figure 4.1-4, the principal geologic units in the canyon are shallow alluvium (Qa) and the underlying Pico Formation (Tp). As noted in Section 4.1.3.2, the Pico Formation is considered to be non-water bearing for large-scale water supply purposes. Within Portrero Canyon, the alluvium is also fine-grained and contains saline groundwater (RCS, 2002). No water supply wells are currently present in the Potrero Canyon area. Available water quality data in Potrero Canyon indicate that alluvial groundwater and surface water are saline, likely because the alluvium is derived from the weathering, transport, and redeposition in the Potrero Canyon watershed of Pico Formation strata, which are of marine origin (RCS, 2002).

Potrero Canyon is largely undeveloped and is owned by FivePoint. A cattle ranching operation was formerly present in the canyon, but is not currently in operation. No agricultural or other irrigation-dependent activities are present or are known to have existed in the past, except for domestic outdoor use at the existing ranch (now owned by FivePoint). The limited water use in the canyon has been mainly for domestic purposes and has been supplied by a pipeline that imports water from a water well located outside of Potrero Canyon.

Three sensitive plant communities have been identified by others in Potrero Canyon: the community in the riparian strip along the main stream channel in the canyon, the Salt Grass community, and the Mesic Meadow. Shallow saline groundwater is supporting each of the sensitive plant communities in the canyon. Because the local groundwater has high concentrations of total dissolved solids, the predominant plant species living in the Salt Grass and Mesic Meadow areas (e.g., those that are characteristic of a cismontane alkali marsh) are salt tolerant. Evapotranspiration processes occurring in and around these plant communities also tend to concentrate salts in the upper soil profile, and as a result, salt is visible at the ground surface in some locations.

4.1.4.2 Saugus Formation

Depending on location within the local basin groundwater basin, the Saugus Formation may exist under confined, semi-confined or even unconfined conditions. This formation serves as the other major source of groundwater in the region. In the center of the valley, the sedimentary layering of the formation is nearly horizontal and some confining layers of low permeability (fine-grained silts and clays) may limit groundwater movement in an upward or downward direction. Consequently, groundwater occurs under pressure within the intervening sand and gravel units, and water levels in Saugus Formation water wells tend to be above the top of the perforated casing intervals that intersect these coarse-grained aquifer units, thereby providing evidence that groundwater is under confined or semi-confined conditions.

In contrast, near the outer perimeter of the Saugus Formation, near the boundaries of the groundwater basin, the sedimentary layering is tilted downward toward the center of the bowl and the permeable sand and gravel beds of the formation are in direct contact with either the ground surface or with highly permeable alluvial or Terrace Deposit materials. In these areas, the Saugus Formation aquifer may be essentially under unconfined, water-table conditions.

Virtually all known existing and historical Saugus Formation water wells have been drilled south of the San Gabriel Fault. Only one known attempt has been made to drill and construct a Saugus Formation water well into the lower and geologically older Sunshine Ranch Member of the Saugus Formation, which predominates in the area north of the San Gabriel Fault. That well did not produce groundwater in sufficient quantities or acceptable quality for municipal supply purposes, and was subsequently destroyed.

As discussed above, the San Gabriel and Holser faults divide the Saugus Formation into three distinct blocks: the South, Central, and North blocks. These fault blocks control the geographic distribution of potential sand and gravel aquifers within the Saugus formation; wherein the Central block contains the thickest accumulation of potentially water-bearing sediments, the South block has the second-greatest accumulation of such sediments, and the North block has the thinnest accumulation of sediments. Details regarding the sediment thickness of the Saugus Formation within each block are described below in the subsection Depth to the Base of Freshwater and Santa Clarita Zone.

RCS (2002) identified an important stratigraphic zone of coarse-grained sediments near the base of the Upper Saugus Formation through the correlation of E-logs of several existing oil wells and water wells. This correlated stratigraphic zone was informally termed the Santa Clarita Aquifer Zone by RCS (2002). This zone in the subsurface can be identified on E-logs of wells over a wide area of the Basin and generally occurs at depths ranging from 800 to 1,500 ft bgs. Existing Saugus Formation water wells with the highest pumping rates generally tend to produce groundwater from within and stratigraphically above this Santa Clarita Aquifer Zone.

4.1.4.3 Aquifer Properties

Alluvial Aquifer

The Alluvial Aquifer generally consists of unconsolidated and intercalated (i.e., interfingering lenticular beds) deposits of clay, silt, sand and gravel. Groundwater within the Alluvial Aquifer in the Basin occurs under unconfined (i.e., water table conditions) and groundwater within this aquifer is generally contained within the interstitial pore spaces (known as porosity). Moreover, the degree of interconnectedness of these pore spaces is a measure of its permeability, which is the ability of the material to transmit water. Permeability values are generally used in groundwater flow and transport modeling studies.

Groundwater in the Alluvial Aquifer system, because it is under the direct influence of atmospheric conditions of pressure (water table conditions), moves (flows) from higher to lower elevations via the force of gravity. Thus, the slope of the water table surface is known as the hydraulic gradient and is governed by both elevation and the amount of groundwater moving through the alluvium. In addition, because of the unconsolidated nature of the aquifer materials, the permeability (hydraulic conductivity) of the Alluvial Aquifer is relatively higher than that of the underlying Saugus Formation. As such, wells perforated in the Alluvial Aquifer system tend to be relatively efficient, compared to that in the less permeable aquifer systems in the underlying Saugus Formation.

Porosity and Specific Yield

The porosity of the Alluvial Aquifer system may range from 10 percent to 30 percent, or slightly greater, depending on the grain size distribution in the type of earth materials present; an average value of 20 percent is often assumed for the purposes of evaluating aquifer characteristics. The porosity of the alluvial sediments is governed by the type of earth materials present in the aquifer system. Generally, clays tend to have the highest porosities whereas sands and gravels tend to have lower porosity values. However, porosity values for the alluvial sediments of the Santa Clarita Valley were estimated based on a review of over 300 drillers' logs for historical alluvial water-supply wells throughout the Basin. These porosities were estimated by RCS (1986) to range from 9 percent to 16 percent.

Specific yield is a measure of the amount of groundwater that can flow to a well under gravity drainage only. For unconsolidated alluvial sediments, the porosity is approximately equal to the specific yield. Thus, the specific yield for the alluvium is estimated to be in that aforementioned range of 9 percent to 16 percent.

Hydraulic Conductivity, Transmissivity, and Storativity Values

As noted above, hydraulic conductivity is a measure of the ability of geologic media to transport water through the pore spaces in the sediments of an aquifer system. Generally, clays have the lowest hydraulic conductivities whereas gravels tend to display the highest values. This character is usually determined through aquifer testing of wells, although values can be estimated using empirical relationships. Based on the results of aquifer testing, calculation of the aquifer coefficients of transmissivity (T) and storativity (S) can be made. The parameter T is a measure of the transmitting property of an aquifer and can expressed in units of square ft per day (ft^2/day). The parameter S is a measure of the volume of water that can be released from an aquifer per unit area of the aquifer and per unit reduction in hydraulic head (water level change). This value is usually expressed in cubic ft per square foot per foot (ft^3/ft^3) and thus is a dimensionless quantity. In alluvial aquifer systems, S can be considered to be equal to the specific yield. Hydraulic conductivity, which is a measure of the velocity at which groundwater moves through a formation, is expressed as k, in units of ft per day (ft/day). This parameter can be calculated directly from T values, by dividing T by the saturated thickness of the aquifer section perforated in a well. As such, calculated k values reflect the intrinsic property of the aquifer and do not change, whereas T values could change, based on the differences in the saturated thickness of the aquifer system.

For the Alluvial Aquifer system, RCS (1986, Plate 7 and updated with results of constant rate pumping test data from numerous alluvial wells constructed between 1986 and 2009) provided values for T and k values. These values tend to vary spatially in the Alluvial Aquifer system. The following table summarizes the ranges of those T and k values for the Alluvial Aquifer system along the Santa Clara River and its tributary watersheds, from the west (near the county line) to the east (near Lang):

Table 4-1. Estimates of T and k Values for the Alluvial Aquifer along the Santa Clara River and Its Tributaries

River Section	k Values (ft/day)	T Values (ft^2/day)
Dell Valle to Castaic Junction	40 to 735	2,850 to 67,300
Castaic Valley Tributary	25 to 710	1,778 to 60,600
San Francisquito Canyon Tributary	11 to 285	1,000 to 22,000
Castaic Junction to Bouquet Junction	3 to 460	3,000 to 29,400
Bouquet Canyon Tributary	10 to 440	700 to 55,200
Bouquet Junction to Newhall (South Fork of Santa Clara River)	2 to 47	1,400 to 19,300
Saugus to Solemint	<7 to 935	<670 to 84,600
Solemint to Lang	<7 to 930	<670 to 67,600

Notes

ft^2 = square feet

ft = feet

Table 4-1 shows that both T and k values in the alluvium tend to show a great degree of variability. Such variability is likely due to local lithologic differences in the alluvial sediments between different well locations, methods of well construction, depth interval of the perforated section(s) of the well, degree of plugging of the casing perforations, and/or differences between the efficiency of the well, or a combination of some or all of these factors.

Historical Groundwater in Storage Calculations

The amount (i.e., the total volume) of groundwater contained within pore spaces within the alluvial sediments that is present at any one particular time is known as the groundwater in storage. The amount of groundwater in storage in an alluvial aquifer system depends on the following:

- The total volume of the alluvial sediments in the defined alluvial aquifer system of the local groundwater basin
- The specific yield of those sediments
- The proportion of those sediments that is saturated with groundwater at a specific water level monitoring date

Because the volume of sediments and specific yield of an aquifer do not generally change over time, the amount of groundwater in storage in the Alluvial Aquifer is directly related to its saturated thickness (i.e., to a specific water level monitoring date for wells in the alluvium). This is indicated by measured groundwater levels at a specific date in water wells within the alluvial sediments. A rising water table increases the thickness of the saturated water-bearing section, thereby increasing the volume of groundwater in storage; the converse is true for a declining water table.

Groundwater levels in the Alluvial Aquifer are highly influenced by local rainfall and recharge (a highly variable factor in southern California). The amount of groundwater in storage in the Alluvial Aquifer has varied considerably over the past 50 to 60 years as the local climate has experienced periods of both higher than average rainfall (wet years) and lower than average rainfall (dry years). RCS (1986 and 2002) estimated the volume of groundwater in storage (in units of acre ft, AF) for the years 1945, 1965, 1985, and 2000; those volumes ranged from 100,000 AF to 200,000 AF. As part of the GSP development, current groundwater storage estimates will be calculated using a groundwater flow model, and reported in Section 6, Water Budgets.

Saugus Formation

Groundwater moves slowly through the Saugus Formation because it is slightly more consolidated in comparison to that in the overlying alluvial sediments, and groundwater must travel through more restricted pore spaces within the individual sand and gravel aquifer units in the Saugus Formation. The groundwater velocity at any location within this formation depends on (1) the hydraulic conductivity (permeability) of the aquifer materials, which differs from one individual sand and gravel unit to the next, and (2) the hydraulic gradient that drives the groundwater movement. The hydraulic gradient is defined as the slope of the water level surface (or more correctly, the slope of the piezometric surface where the formation is under confined conditions), and this slope will vary on both seasonal and longer-term cycles over time.

Hydraulic Conductivity, Transmissivity, and Storativity Values

Transmissivity (T) and hydraulic conductivity (k) values of the Saugus Formation sediments also show some degree of variation across the local groundwater basin. T values determined from aquifer (pumping) tests in several Saugus Formation wells located in different parts of the local groundwater basin have generally ranged from 400 ft^2/day to as high as 24,300 ft^2/day (RCS, 1988, 1989, 2001). Calculated k values for wells exhibiting these T values ranged from 1 ft/day to 34 ft/day. Only a few additional Saugus Formation wells have been constructed since 1988. Testing of these more recently constructed deep wells have yielded T values of 3,300 ft^2/day and 8,300 ft^2/day (VWD-207 and VWD-206, respectively). Values of k for these two wells were 1 ft/day to 34 ft/day, respectively. The distribution of the T and k values in the wells indicates a general trend from lower transmissivity values near the southeastern edge of where the Saugus Formation is exposed at ground surface to higher transmissivity values near the center of the local groundwater basin.

Storativity, which is a term typically used for confined aquifer systems, is a dimensionless measure of the volume of water that will be discharged from an aquifer per unit area of the aquifer and per unit reduction in hydraulic head. These values for wells in the Saugus Formation are on the order of 1.0×10^{-4}.

Depth to the Base of Freshwater and Santa Clarita Zone

Groundwater in the Saugus Formation is classified into two basic conditions, depending upon salinity. These conditions exist where the groundwater grades from fresh water, considered to be 3,000 parts per million (ppm) or less in salinity, to brackish and saline groundwater, which may display salinity values above 3,000 ppm. Estimation of the maximum depth to which fresh groundwater occurs within the Saugus Formation, defined as the base of fresh water, had been performed with some degree of accuracy through an evaluation of both water well and oil well E-logs. More than 250 of these E-logs, located throughout the river valley, were utilized in previous studies (RCS 1988, 2002), as a part of the effort to define the base of fresh water within the local groundwater basin. On some E-logs, the vertical transition from the overlying fresh water to the underlying saline water is very abrupt and unambiguous, and thus can be identified at a specific depth. On other E-logs, the transition from fresh water to saline water is gradual and may occur over a vertical distance of hundreds of feet. In such cases, and to be conservative, the base of fresh water was chosen, insofar as possible, at the top of the zone of transition from fresh water to saline water (RCS, 1988, 2002).

The depth and thickness of the water-bearing deposits in each of the fault blocks (areas bounded by faults) in the valley are as follows:

- **North Block.** Northeast of the San Gabriel fault, the maximum depth to the base of fresh water within the Saugus Formation is approximately 1,500 ft. By comparison, the maximum total thickness of the Saugus Formation, based on E-logs, is on the order of 2,000 ft in this area. In this fault block, the Santa Clarita Aquifer Zone does not exist, and instead only deposits of the underlying Sunshine Ranch Member are considered to occur.
- **Central Block.** In the wedge-shaped central fault block between the San Gabriel fault and the Holser fault, the maximum depth to the base of fresh water within the Saugus Formation is approximately 5,500 ft. In this area, the maximum total thickness of the Saugus Formation is approximately 8,500 ft. The top of the Santa Clarita Aquifer Zone in this fault block was determined to occur at a depth ranging from 100 ft in the north-northwestern portion of the block, to 1,500 ft in the southeastern corner of the block adjacent to the San Gabriel fault, and to as great as 2,900 ft bgs in the central (deepest) portion of this block.
- **South Block.** Southwest of the Holser fault, the maximum depth to the base of fresh water within the Saugus Formation is approximately 5,000 ft. The Saugus Formation obtains a maximum total thickness on the order of 7,500 ft in this block. The depth to the top of the Santa Clarita Zone is estimated to be roughly 2, 200 ft bgs.

Confining Beds

The Saugus Formation generally contains disconnected and interbedded layers of clay, silt, sand, and gravel. The interbedded clay layers may act as local aquitards (confining beds), thereby providing at least a partial barrier to the vertical migration of groundwater. Interbedded clay layers range in thickness from 10 ft to as much as 50 ft. However, the depths and thicknesses of these clay layers have not been defined to date in any studies of the groundwater basin, but, depending on the locations of a well in the Basin, there is likely to be several such clay layers dispersed throughout a vertical section of the formation.

4.1.5 Cross Sections

As part of the geologic and hydrostratigraphic characterization of the Basin, five geologic cross sections have been prepared by RCS to further describe and illustrate the vertical and lateral extent of the aforementioned geologic formations and units. Figure 4.1-4 illustrates the ground surface traces and alignments of these cross sections plotted on a geologic map of the Basin. These five cross sections (AA-AA' through EE-EE'), prepared by RCS, are presented in Figures 4.1-6 through 4.1-10, respectively and illustrate the subsurface interpretation based on a comparative review of available geologic data and electric log data.

4.1.5.1 Cross Section Preparation

Preparation of the five RCS cross sections utilized a step-wise multifaceted approach combining previous studies with additional more recent geologic data. Cross section data were obtained from previous basin-wide studies completed by RCS (1986, 1988, 2001, and 2002), as well as from review of published geologic maps and geophysical well logs (E-logs) from the California Geologic Energy Management Division (CalGEM) well database. Some data were reinterpreted, and prior interpretations were updated based on the availability of newer subsurface data that were available in some areas of the local groundwater basin.

FIGURE 4.1-6
CROSS-SECTION AA-AA'

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FIGURE 4.1-7
CROSS-SECTION BB-BB'

LEGEND

Formations & Units

		Geologic Age
Qa	Undifferntiated Alluvium	Holocene - Pliestocene
Qt	Terrace Deposits	Holocene - Pliestocene
QTs	Saugus Formation (QTs - Undifferentiated QTsu - Upper zone); QTsu; QTsr Sunshine Ranch Member	Pleistocene - Pliocene
Tp	Pico Formation	Pliocene
Tt	Towsley Formation	Pliocene
Tc	Castaic Formation	Miocene
Tmc	Mint Canyon Formation	Miocene
bc	Basement Complex	Pre-Tertiary

Symbols

- Santa Clara River Valley Groundwater Basin, East Subbasin Boundary
- Inferred Contact
- Unknown Contact
- Oil/Gas Well Borehole Trace
- Municipal Well Borehole Trace
- Irrigation Well Borehole Trace
- Destroyed Well Borehole Trace
- Domestic Well Borehole Trace
- Inferred Fault Plane
- Interpreted Fault Motion
- TD Total depth of borehole

Horizontal Scale

0 — 4,000 ft

Scale 1:13,200
Vertical Exageration = 1.275

RCS

FIGURE 4.1-8
CROSS-SECTION CC-CC'

RCS Job No. 693-LAS01

May 2021

LEGEND

Formations & Units

		Geologic Age
Qa	Undifferntiated Alluvium	Holocene - Pliestocene
Qt	Terrace Deposits	
QTs	QTsu Saugus Formation (QTs - Undifferentiated QTsu - Upper zone); QTsr Sunshine Ranch Member	Pleistocene - Pliocene
Tp	Pico Formation	Pliocene
Tt	Towsley Formation	
Tc	Castaic Formation	Miocene
Tmc	Mint Canyon Formation	
bc	Basement Complex	Pre-Tertiary

Symbols

- Santa Clara River Valley Groundwater Basin, East Subbasin Boundary
- Inferred Contact
- Unknown Contact
- Oil/Gas Well Borehole Trace
- Municipal Well Borehole Trace
- Irrigation Well Borehole Trace
- Destroyed Well Borehole Trace
- Domestic Well Borehole Trace
- Inferred Fault Plane
- Interpreted Fault Motion
- TD Total depth of borehole

Horizontal Scale

0 — 4,000 ft

Scale 1:13,200
Vertical Exageration = 1.275

RCS

FIGURE 4.1-9
CROSS-SECTION DD-DD'

RCS Job No. 693-LAS01

May 2021

FIGURE 4.1-10
CROSS-SECTION EE-EE'

RCS Job No. 693-LAS01

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4.1.5.2 Cross Section Traces

Cross section traces were selected to illustrate the stratigraphy and general geologic structure of the groundwater basin. Cross section line traces AA-AA', DD-DD', EE-EE' (see Figure 4.1-4) extend past opposite basin boundaries in a semi-orthogonal orientation to provide representative subsurface illustrations of the long and short axes of the Basin. Obliquely oriented cross sections BB-BB' and CC-CC' illustrate subsurface conditions along the Santa Clara River and the southeastern zone of the Basin, respectively. Each of these cross sections is presented at the same vertical scale, but due to the small horizontal scales of the sections, the cross sections are vertically exaggerated, as shown on the figures. Cross section FF-FF', Figure 4.1-11 (the section trace is shown on Figure 4.1-4 for reference), was created by Geosyntec Consultants, Inc. (Geosyntec), using a different methodology than that used by RCS and for a separate purpose and does not use the same horizontal or vertical scale as the five other cross sections discussed herein. Specific discussion of cross section FF-FF' is provided in Section 4.1.5.5.

4.1.5.3 Geologic Structures

Construction of the five cross sections required derivation and correlation of geologic formations in the subsurface using various data and methods. First, shallow formation contacts were interpreted and derived from mapped surface contacts and structural geology features. Surface mapped contacts and bedding orientations were plotted and projected from surface to depth, allowing for an initial starting point to correlate geologic formations.

Additional review of regional geologic structures was conducted with respect to previous studies. Fault traces and contact planes were compared to available geographic information system (GIS) data sets. Similarly, local fold structures, escarpments, and topography GIS data sets were reviewed to provide a summary representation of local fault structures and geologic contacts. As discussed in Section 4.1.3, a majority of the fault traces depicted in the figures created for this document have been simplified to be represented by single-line traces, and not by a series of en echelon faults within various fault zones.

4.1.5.4 Well Log Analysis and Interpretation

After plotting surficial contacts and regional structural features, formation depth intervals were derived from analysis of available groundwater and oil/gas well E-logs. Formation identification and interpretation based on E-logs is a common method and is a practice that is routinely used in the energy and resource sectors. The process involves comparing different geophysical logs such as gamma-ray, spontaneous potential, resistivity, and density-neutron in combination with other geologic data gathered during drilling (core, cuttings, drilling progression, etc.) to help identify formations and changes in subsurface materials. For further detail on well logging see, for example, Asquith and Krygowski (2004).

Due to the nature and availability of E-logs from the CalGEM database, short and long normal resistivity logs were primarily used to identify and correlate the respective formations within the Basin. To demonstrate how the well log and E-log information was correlated, Figure 4.1-12 plots three sequential (west to east) resistivity logs that were used to correlate formation contacts in cross section AA-AA'. Higher resistivity values (ohm meters per meter) plotted in Figure 4.1-12 infer higher porosity within the local subsurface material, which can be inferred to be coarser-grained strata. Thus, the vertical resistivity profile can show a stratigraphic package(s) of geologic units (and may even suggest depositional environments) when coupled with drill hole cuttings and core logs. These geologic or stratigraphic packages or units were correlated with similar geologic units in selected E-logs to infer the subsurface extent and continuity of each respective formation as shown on the cross sections.

GM faulted - Fault System

Holser

Geological Model

Holser Fault

Stream Gauge Location

GM faulted

1. Qa - Undifferentiated Alluvium
3. QTs - Saugus Formation
5. Tp - Pico Formation

FIGURE 4.1-11
CROSS SECTION FF-FF'

Geosyntec consultants

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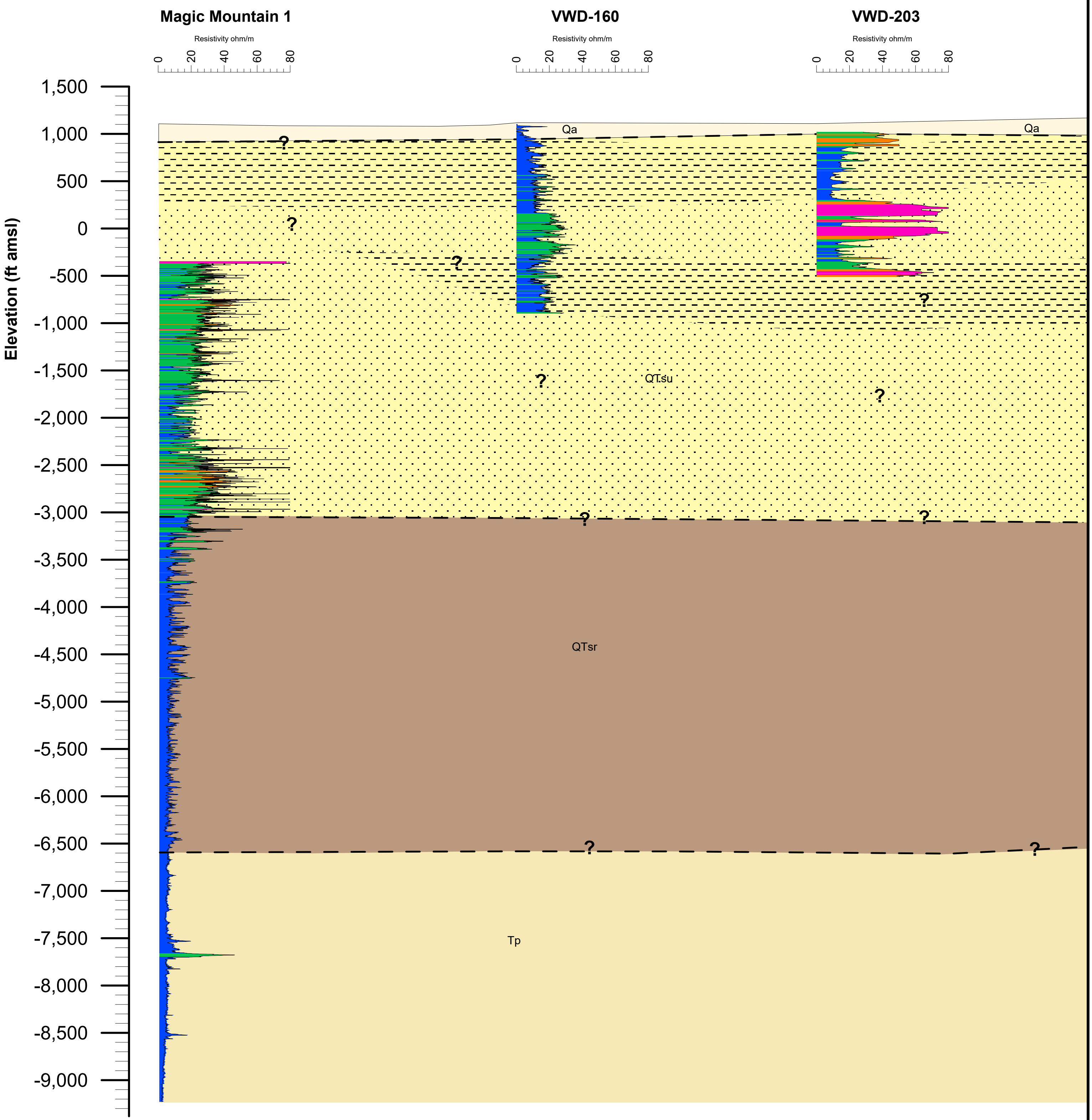

LEGEND

Formations

- Qa — Undifferntiated Alluvium
- QTs — QTsu Saugus Formation (QTs - Undifferentiated / QTsu - Upper zone); QTsr Sunshine Ranch Member
- Tp — Pico Formation

Lithology

- Silty / Clay
- Clayey Sand / Silty Sand
- Sand with Silt / Sand
- Gravel / Cobbles

Units

- Fine Grained
- Coarse Grained
- Inferred Contact
- Unknown Contact

RCS

FIGURE 4.1-12 DETAILED STRATIGRAPHIC INTERPRETATION

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Additionally, lithologic interpretation of the resistivity logs shown in Figure 4.1-12 was also conducted to show sedimentary variance within the Saugus Formation. Interpretation of lithology based on resistivity is provided in a color sequence in Figure 4.1-12. Lithologic comparison between resistivity logs of wells VWD-160 and VWD-203 show correlative units of coarser-grained sediments but with varying intensity of resistivity. The lithology logs show finer-grained (lower resistivity) units are interbedded with coarser-grained units within both well logs, as documented in previous studies (Winterer and Durham, 1962). Moreover, resistivity signatures in the well log for the wildcat oil well Magic Mountain 1 indicate coarser-grained sediments at the same elevation where finer-grained sediments are correlated in well VWD-160, further indicating lateral formation variation within the Saugus Formation.

4.1.5.5 Cross Section FF-FF'

As discussed above, cross section FF-FF' (Figure 4.1-11) was created by Geosyntec using different methodology than that used by RCS to create the other five cross sections shown on Figure 4.1-4 and therefore does not use the same horizontal or vertical scale as the other five cross sections presented on Figures 4.1-6 through 4.1-10. Further, cross section FF-FF' was created by Geosyntec to help evaluate the interaction of groundwater between the shallow alluvium of the Santa Clara River, the Saugus Formation, and the Pico Formation.

Cross section FF-FF' is aligned along the approximate center of the Santa Clara River channel, traversing approximately east to west, beginning in the vicinity of an outcrop of the Saugus Formation known as Round Mountain. From there, this cross section continues westerly to a point outside of the western boundary of the groundwater basin (see Figure 4.1-4) that coincides with the edge of the existing MODFLOW model boundary; the MODFLOW model is discussed in *Development of a Numerical Groundwater Flow Model for the Santa Clara River Valley East Groundwater Subbasin* (model development report) (GSI, 2020).

To create cross section FF-FF', Geosyntec incorporated the five RCS-prepared cross sections (AA-AA' through EE-EE') into the Leapfrog Geological Modeling software package. Geologic contacts on those sections were digitized and interpolated across the model domain by Geosyntec. Cross sections AA-AA', DD-DD', and EE-EE' (Figures 4.1-6, 4.1-9, and 4.1-10, respectively) reportedly provided the most influence on lithologic interpretations by Geosyntec along the central and eastern portions of cross section FF-FF'. The depth of alluvium on those three cross sections serve as the primary drivers for depth of alluvium in the central and eastern potions of cross section FF-FF'. Cross section A-A' from the RCS (1988) report was also used to support the interpreted depth of alluvium in the eastern portion of cross section FF-FF' by Geosyntec.

Because the ground-surface profile of cross section FF-FF' is relatively shallow compared to the other five cross sections, Geosyntec used a high-resolution Light Direction and Ranging (LiDAR) survey to supplement the existing 1/3-arcsecond digital elevation model (DEM) from the U.S. Geological Survey that was used to create the ground surface profiles for cross sections AA-AA' through EE-EE'. The high-resolution LiDAR survey was conducted by others along the Santa Clara River in the vicinity of cross section FF-FF' and provided for a more accurate ground surface profile of cross section FF-FF'. LiDAR survey data were downsampled to 0.5-meter resolution to maintain a manageable file size and were converted from their native coordinate system (North American Datum of 1983 [NAD 83] 2011 Universal Transverse Mercator [UTM] Zone 11 North) into the Leapfrog model projection (NAD 83 CA State Plane V).

Alluvium depths shown on cross section FF-FF' that were interpreted using the RCS cross sections and the Leapfrog Modeling software were calibrated using a series of surface geophysical transects that were performed by Geosyntec in February and March 2007. Data from four seismic refraction lines were collected in the vicinity of the blue cut perpendicular to Henry Mayo Drive (near the west end of the groundwater basin). Data collected were used to digitize the survey profiles into the Leapfrog model and were calibrated using the existing 0.5-meter resolution DEM (created using the LiDAR data). The depth of alluvium interpreted from each of the four seismic refraction surveys was used to establish control points along each profile and interpolated between adjacent transects. Those data were then used to adjust the alluvial depths shown on cross section FF-FF'.

4.2 Groundwater Recharge and Discharge Areas within the Basin

4.2.1 Groundwater Recharge

4.2.1.1 Alluvial Aquifer System

Groundwater in the Alluvial Aquifer is recharged by both natural and artificial (human-made) sources. The relative volume of each of the recharge sources discussed below is variable depending on a number of factors, including annual variations in precipitation and temperature.

Sources of natural recharge to the sediments of this aquifer include:

- Streamflow infiltration from runoff along the Santa Clara River and its tributaries.
- Deep percolation of direct rainfall.
- Subsurface groundwater inflow from upstream areas along the Santa Clara River or its tributaries.
- Upward groundwater flow from certain portions of the Saugus Formation where it is overlain by alluvium. This interaction between the alluvium and the underlying Saugus Formation is discussed in the 2003 *Groundwater Management Plan, Santa Clara River Valley Groundwater Subbasin, East Subbasin, Los Angeles County, California* (LSCE 2003). In general, groundwater moves from the Saugus Formation aquifers to the Alluvial Aquifer in areas west of Bouquet Canyon (LSCE, 2003).

Sources of anthropogenic (man-made) recharge to the sediments of this aquifer include:

- Recharge to the alluvium also occurs from deep percolation of irrigation water and is obtained from urban irrigation (landscape irrigation) in the developed areas of the groundwater basin and from areas that are farmed. Agricultural irrigation was historically widespread in the valley; current irrigated acreage is on the order of 1250 acres.
- Recharge also occurs indirectly as a result of the infiltration of reclaimed water that is actively treated by and discharged from the Saugus WRP, placed into operation in 1962, and located east of the intersection of Cinema Drive and Bouquet Canyon Road; and the Valencia WRP, in operation since 1967, and located west of the intersection of Rye Canyon Road and the Old Road. Both plants are operated by the Los Angeles County Sanitation District, and together discharge approximately 18 million gallons of treated water per day to the Santa Clara River, with an average annual discharge of approximately 20,000 AF per year. A portion of the treated water from the Saugus WRP is discharged to the Santa Clara River northwest of the intersection of Bouquet Canyon Road and Valencia Boulevard, while the remainder is conveyed to the Valencia WRP for additional treatment and then released to the Santa Clara River west of Interstate 5. Treated water from septic systems in unsewered areas is an additional source of groundwater recharge.
- Artificial recharge of the Alluvial Aquifer system, via spreading basins or injection wells, has not been conducted within the Santa Clarita Valley; however, SCV Water is presently conducting studies to evaluate the feasibility of managed aquifer recharge.

4.2.1.2 Saugus Formation

Direct natural recharge to the Saugus Formation occurs via deep percolation of rainfall within and around the perimeter of the outcrop area where the permeable sand and gravel beds are either exposed at ground surface or lie directly beneath the relatively thin, permeable Alluvial and Terrace Deposits. Natural recharge to the Saugus Formation also takes place in the eastern end of the outcrop area due to leakage from overlying portions of the saturated alluvium, as originally discussed by RCS (1988). Groundwater recharge from the alluvium to the Saugus Formation generally occurs in areas east of Bouquet Junction where the alluvium overlies the Saugus (LSCE, 2003).

Anthropogenic sources of recharge to the Saugus Formation chiefly include deep percolation of landscape irrigation water in existing areas, and areas subject to future development, where the Saugus Formation crops out at the surface. Agricultural returns are not likely to contribute significant amounts of recharge, as agricultural operations have generally been situated over alluvial areas.

To date, artificial recharge of the Saugus Formation via injection wells or highland spreading basins has not been undertaken in the region (RCS, 2001). However, an injection and recovery study carried out in 2000 at Saugus Formation well VWD-205 located in the vicinity of McBean Parkway and Valencia Boulevard (RCS 2001) demonstrated that it is feasible to conduct and operate an aquifer storage and recovery (ASR) program in the Saugus Formation.

4.2.2 Groundwater Discharge

4.2.2.1 Alluvial Aquifer

Discharges from the Alluvial Aquifer occur primarily through pumping extraction for municipal-supply use by the water purveyors and for agricultural-supply use by others. As previously noted, FivePoint farms utilizes irrigation-supply water wells in the western end of the Basin. Other agricultural operations and golf courses extract groundwater and there are also an unknown number of other privately owned wells that utilize groundwater from the Alluvial Aquifer system for private irrigation and/or domestic use.

Evapotranspiration by phreatophyte vegetation is also a significant component of discharge of groundwater from the alluvium. Phreatophytes are plants, such as willows and cottonwoods, as well as invasive species, such as *Arundo* and tamarisk, that root directly into the water table in areas of shallow groundwater.

The westernmost part of the Basin is also an area of groundwater discharge from the alluvium to the Santa Clara River. The amount of flow into the river will depend largely on water levels within the alluvium. Groundwater also flows out of the Basin into Ventura County, but this occurs solely as underflow from groundwater present within relatively thin alluvium at the western basin boundary. The only other water to flow from the valley into Ventura County is via surface water flow along the Santa Clara River, including releases from Castaic Reservoir into Castaic Creek that flows into the Santa Clara River and WRP discharges to the river, and from direct discharge via an agricultural supply line operated by FivePoint, which is supplied via its alluvial wells at the western end of the valley.

4.2.2.2 Saugus Formation

Discharge from the Saugus Formation has historically occurred primarily through natural discharge into the Alluvial Aquifer on the western end of the basin and through pumping of the several municipal-supply water wells in the Saugus Formation that are situated throughout the central portion of the valley. At the time of this study, there are only a limited number of wells that extract groundwater from the Saugus Formation for agricultural-supply or landscape irrigation purposes. Saugus Formation wells currently in operation for irrigation purposes are located at Vista Valencia Golf Course and Valencia Country Club. Agricultural irrigation using groundwater pumped from the Saugus Formation also occurs at the Disney Company property in the southeastern portion of the groundwater basin, east of the Whitney Canyon fault. An additional natural discharge source occurs at the west end of the valley where Saugus Formation groundwater is considered to flow upward into the overlying alluvium in the western portion of the Saugus Formation (LSCE, 2003).

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5. Groundwater Conditions

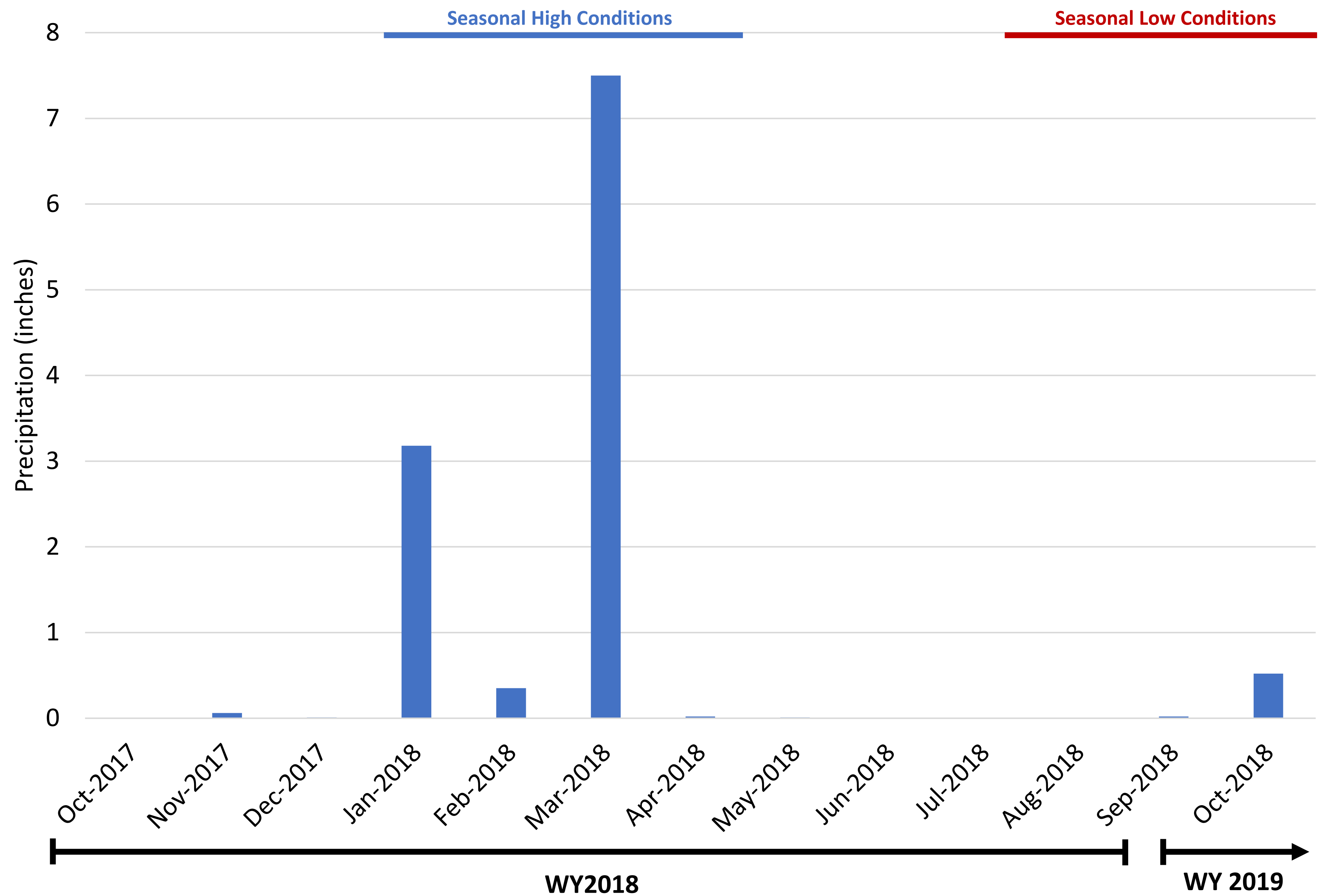
This section presents a description of groundwater conditions present in the Santa Clara River Valley Groundwater Basin, East Subbasin (Basin) and describes the hydrogeologic framework of the Basin. It is intended to provide a general understanding of the physical controls that influence the flow of groundwater and groundwater quality conditions and the interactions between groundwater and surface water in the Basin. This section focuses on the groundwater conditions portion of the hydrogeologic conceptual model. Following are the elements discussed:

- Groundwater occurrence, flow direction, horizontal and vertical gradient (Section 5.1)
- Groundwater-surface water interaction (Section 5.2)
- Groundwater dependent ecosystems (GDEs) (Section 5.3)

5.1 Groundwater Occurrence, Flow Direction, Horizontal and Vertical Gradient

The occurrence and movement of groundwater in the Basin are described in this section. Water level contours for seasonal high and seasonal low conditions for water year (WY) 2018 are presented as it is a year that had the most complete data set at the time this document was first drafted in early 2020. The water year refers to the 12-month period from October 1 through September 30 for any given year for which precipitation and surface water supply totals are measured (see Figure 5-1). Under the Sustainable Groundwater Management Act (SGMA), the California Department of Water Resources (DWR) requires that groundwater related data be represented as a WY rather than a calendar year or other year type.

Historically, seasonal high groundwater conditions occur in the winter and early spring between January and April. This time frame is generally associated with the least amount of groundwater pumping and the greatest amount of recharge from rainfall and streamflow. The greatest amount of precipitation in WY 2018 (October 2017 through September 2018) occurred in January (3.18 inches) and March (7.5 inches). Seasonal low conditions occur at the end of the water year following the summer and early fall which are associated with the least amount of recharge from precipitation and the greatest amount of groundwater pumping. Historical groundwater elevation data are presented in hydrographs for wells that are representative of conditions in each principal aquifer (refer to Appendix C, the *Hydrogeologic Conceptual Model: Groundwater Conditions in the Santa Clara River Valley Groundwater Basin, East Subbasin*; hydrographs are included in Appendix A of that report). There are two principal aquifers in the Basin: the Alluvial Aquifer and the Saugus Formation. The areal extent of each of these aquifers are presented in Figure 5-2 and described in the following sections. The areal extent of these aquifers has been generalized to conform to the DWR Bulletin 118 Basin boundary.



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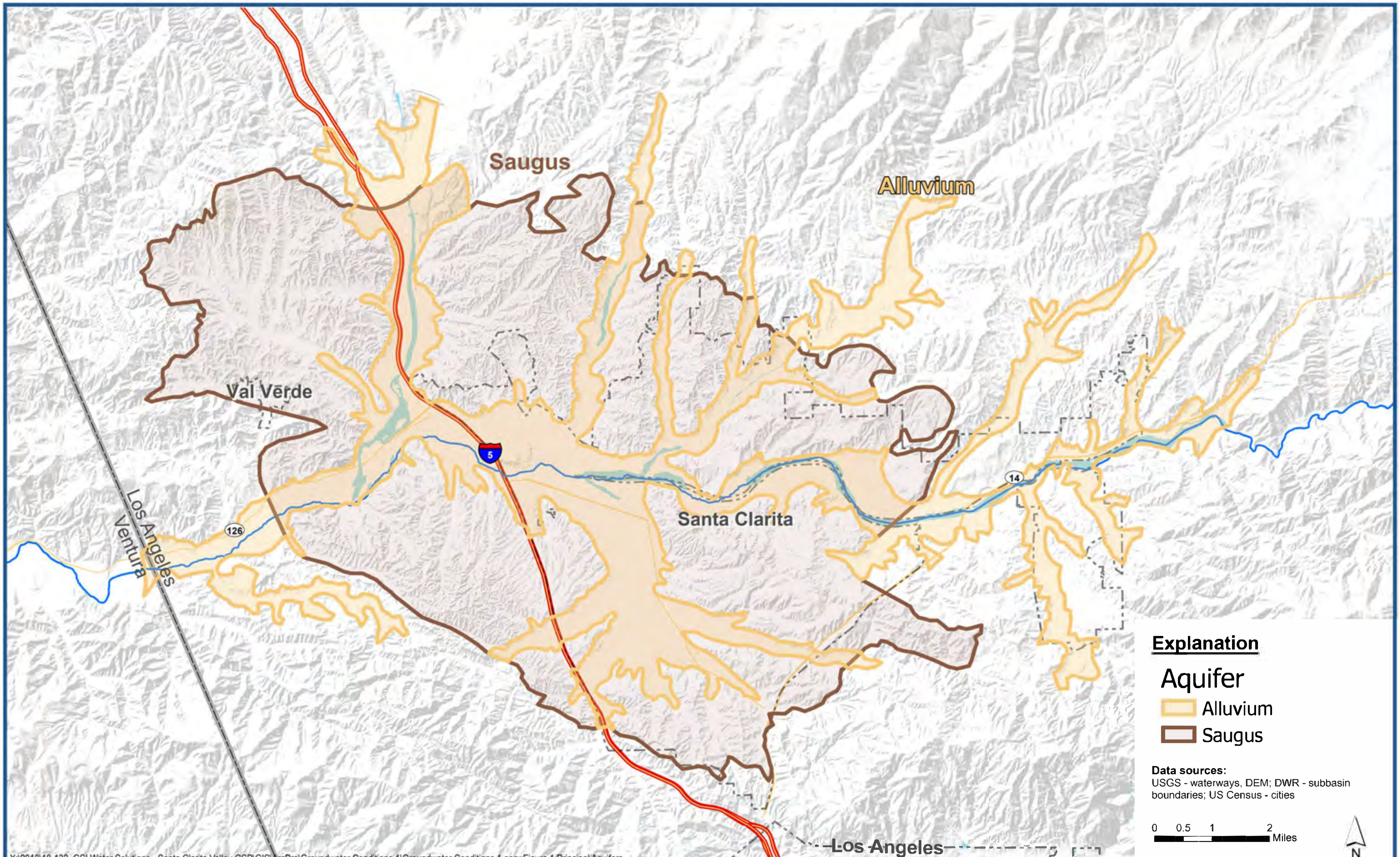
Water Year 2018 Calendar and Precipitation Totals (Newhall Water Division Gage)

Santa Clara River Valley East Subbasin Groundwater Sustainability Plan

Figure 5-1



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Santa Clara East Subbasin
Principal Aquifers

Santa Clara River Valley East Subbasin
Groundwater Sustainability Plan

Figure 5-2

5.1.1 Alluvial Aquifer

5.1.1.1 Groundwater Occurrence

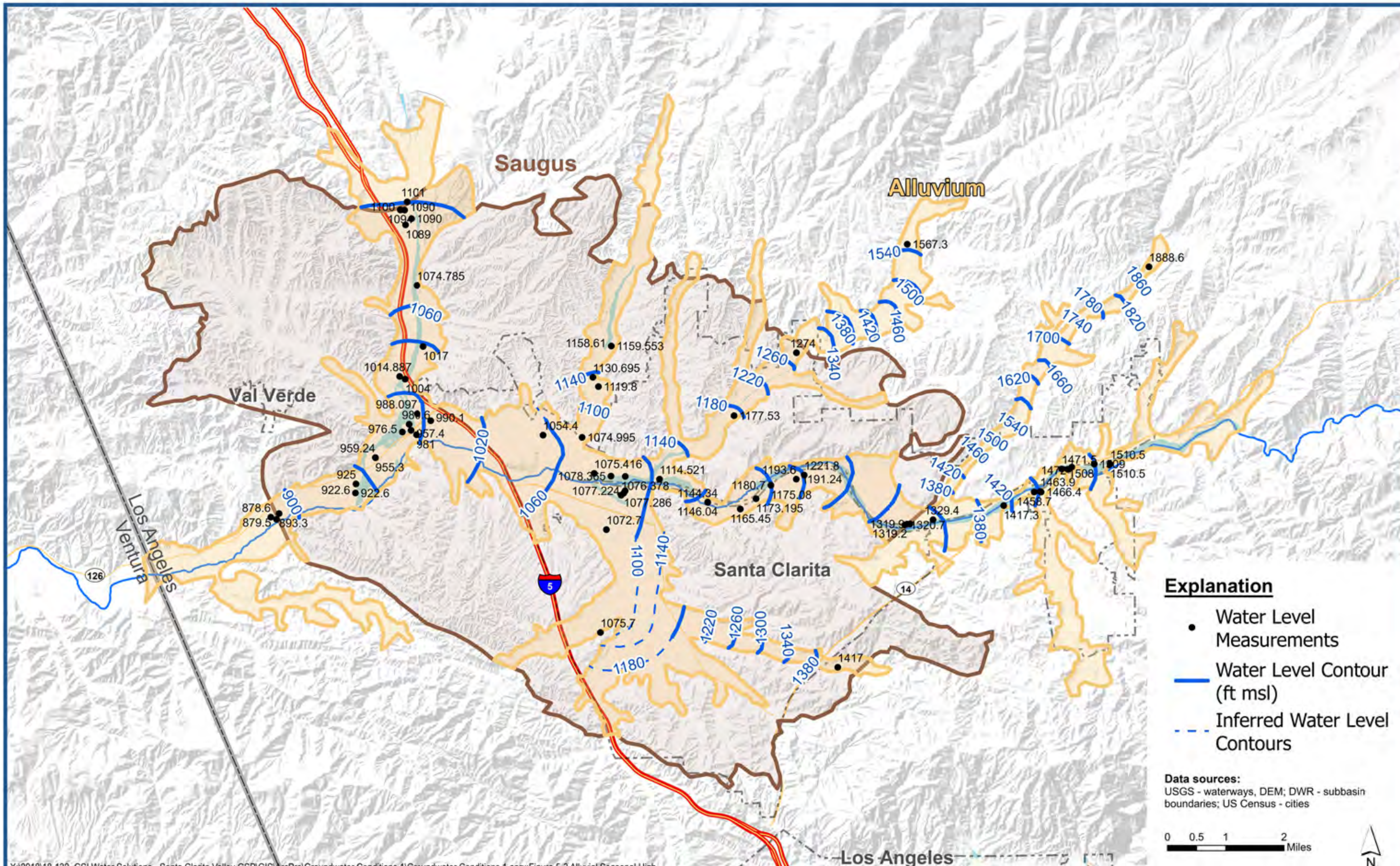
The Alluvial Aquifer is the uppermost principal aquifer in the Basin. Primary sources of recharge include precipitation, recharge from the Santa Clara River, recharge from the Saugus Formation, and mountain front recharge (LSCE, 2003). Sources of manmade recharge include infiltration of irrigation water, infiltration of stormwater runoff from urban areas, infiltration of surface flow and underflow from Castaic Dam, infiltration releases by the Los Angeles County Department of Public Works (LADPW) from its reservoir facilities in the San Francisquito and Bouquet Canyon area, and infiltration associated with discharges from the water reclamation plants (WRPs).

Discharge from the Alluvial Aquifer occurs through pumping of irrigation and municipal supply wells, discharge to the Santa Clara River in the western portion of the Basin, subsurface discharge to the neighboring Piru Basin to the west, and evapotranspiration (ET) by riparian vegetation. Discharge also occurs in the form of seepage to the underlying Saugus Formation.

5.1.1.2 Flow Direction - Water Level Contours

Figures 5-3 and 5-4 present water level contours for seasonal high and seasonal low conditions for 2018. Contours of equal groundwater elevations provide information on the elevation of groundwater in various parts of the Basin where the aquifer exists, and data is collected. Contour maps also provide information on the direction of groundwater flow. Groundwater flow is in the direction from high elevation to lower elevations and are perpendicular to the contour lines. The general pattern and orientation of the contours shown in Figures 5-3 and 5-4 are generally representative of historical conditions in the Basin, although the elevation values on the contour lines may change from year to year.

Under seasonal high conditions, groundwater depths range between 10 feet and 150 feet below ground surface (bgs) with groundwater elevations between 878 and 1,888 feet above mean sea level (msl) using the North American Vertical Datum 1988 (NAVD 88). Groundwater flow is toward the Santa Clara River on the flanks of the Basin and to the west in the lower portions of the valley along the Santa Clara River (see Figure 5-3). Under seasonal low conditions, groundwater depths range between 12 feet and 150 feet bgs with groundwater elevations between 877 and 1,887 feet msl. Contours are not shown where there is a lack of water level data. The groundwater flow directions in the seasonal low conditions are similar to seasonal high directions (see Figure 5-4). During both seasonal high and seasonal low conditions, the highest groundwater elevations occurred in the northeastern part of the Basin and the lowest occurred in the southwest part of the Basin. For WY 2018, there was minimal variation between seasonal high and seasonal low groundwater conditions. Groundwater flow conditions based on 2018 data are consistent with the observation of Richard C. Slade & Associates LLC (RCS 1986) and with water level contours presented in the Salt and Nutrient Management Plan for 2016 (GSSI, 2016).

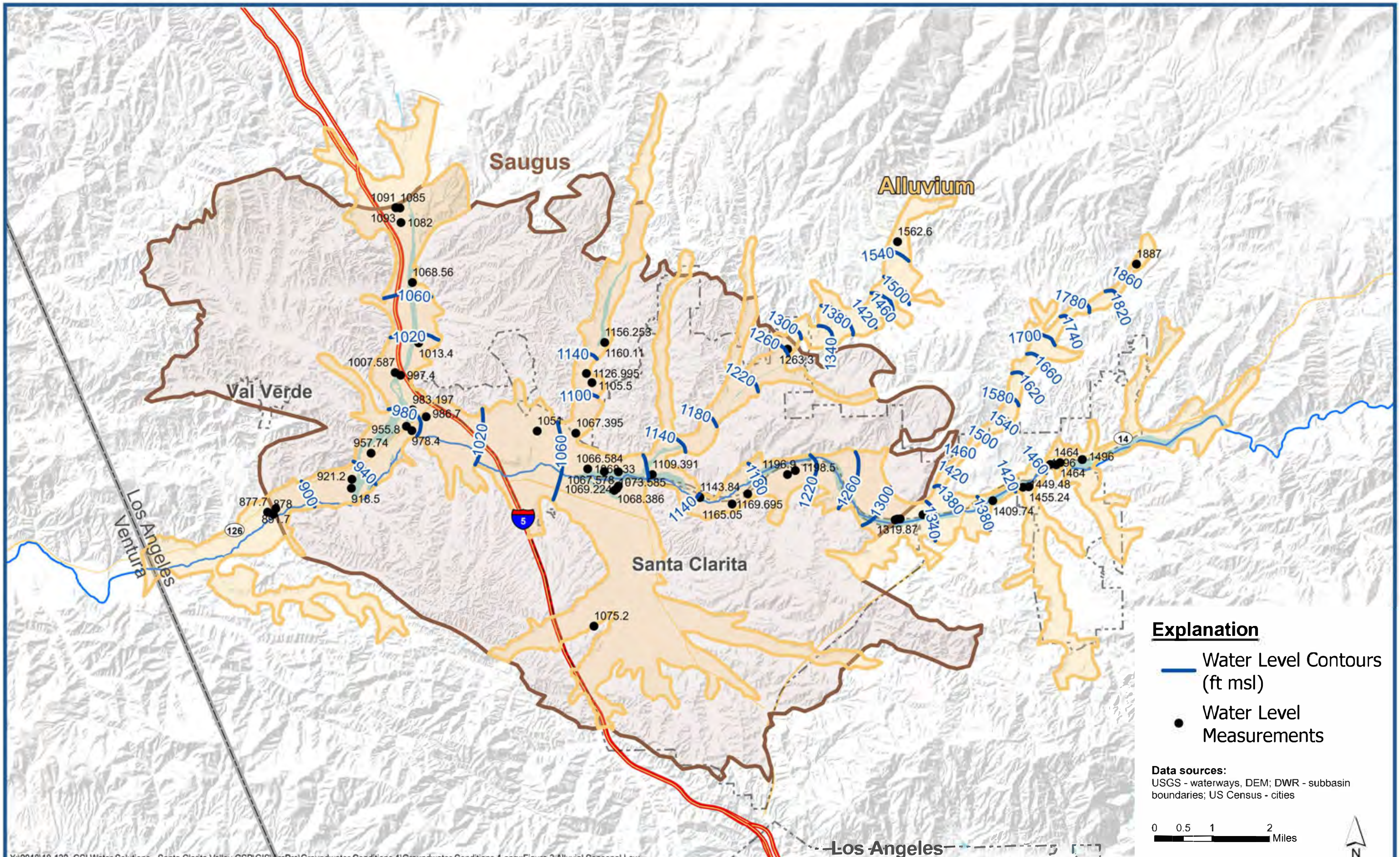


Water Year 2018 Seasonal High Water Level Contours - Alluvial Aquifer

Santa Clara River Valley East Subbasin Groundwater Sustainability Plan

Figure 5-3

Luhdorff & Scalmanini Consulting Engineers



Water Year 2018 Seasonal Low
Water Level Contours - Alluvial Aquifer

Santa Clara River Valley East Subbasin
Groundwater Sustainability Plan

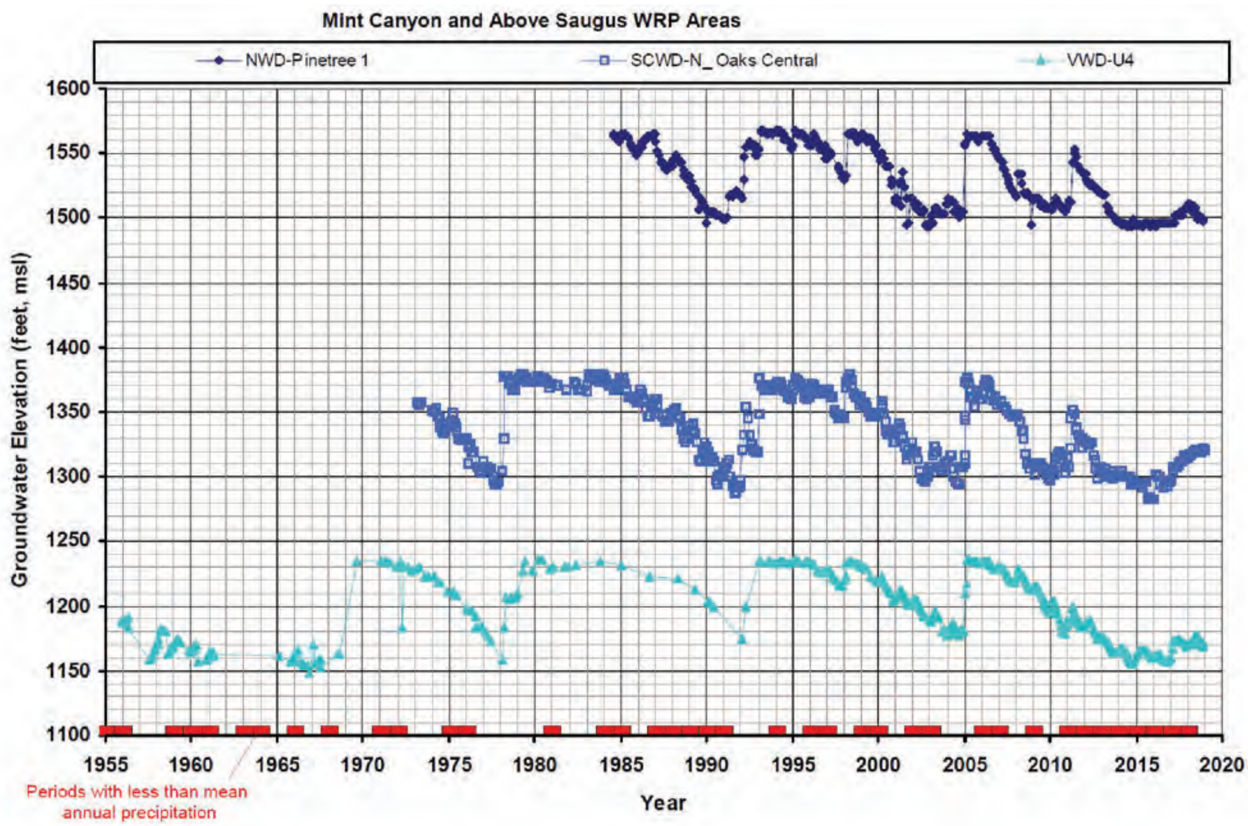
Figure 5-4

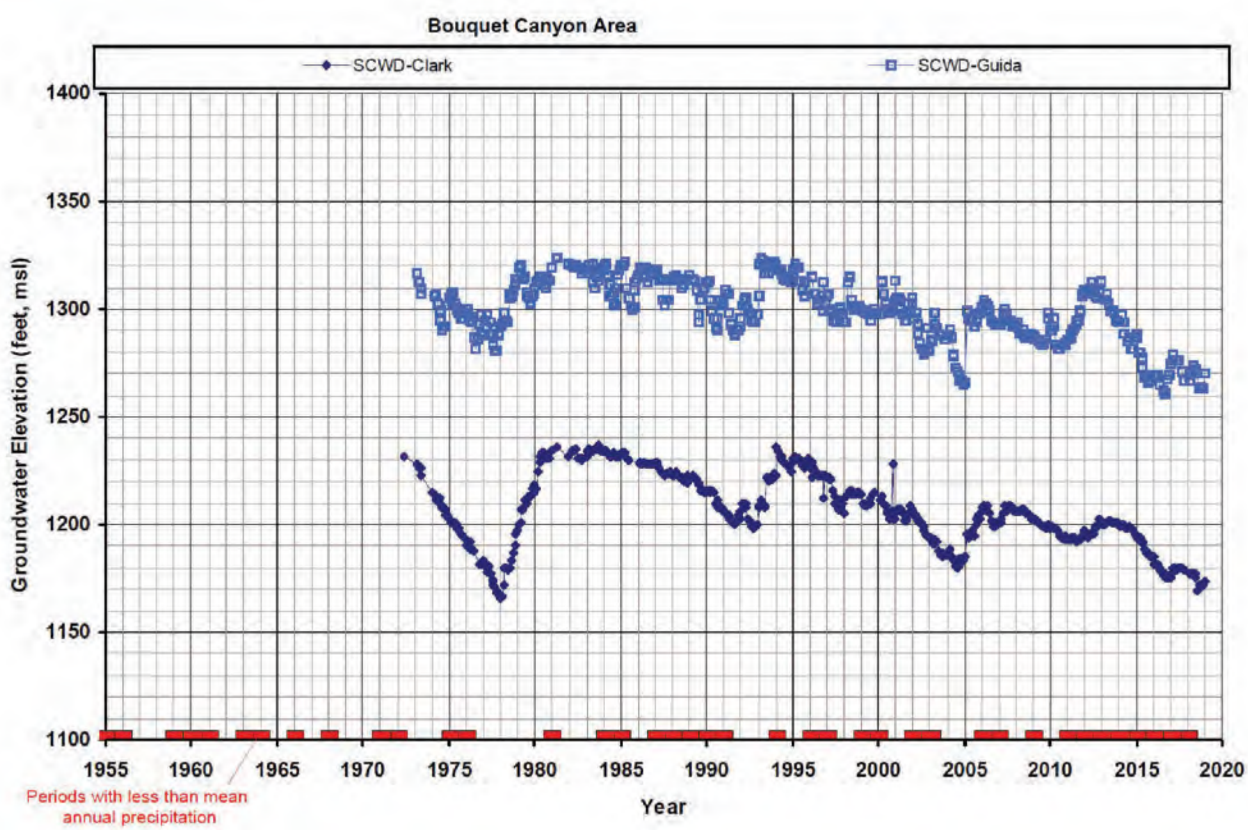
Luhdorff & Scalmanini
Consulting Engineers

5.1.1.3 Water Level Hydrographs

Historical water level trends for wells in the subareas of the Basin that represent groundwater levels in those subareas are presented in Figures 5-5 and 5-6. The wells presented in these hydrographs are located in different areas of the Basin and represent groundwater levels in the Alluvial Aquifer in those areas (see Figure 5-7). Figure 5-5 includes wells in the eastern part of the Basin (Mint Canyon, Santa Clara River area above Saugus WRP, and Bouquet Canyon) where water levels are heavily influenced by climatic conditions and seasonal pumping. Wells in the Mint Canyon area and Santa Clara River area above the Saugus WRP all exhibit a similar pattern of gradual declines over 5- to 10-year periods when there are below normal periods of rainfall, followed by rapid recoveries during wet periods. Generally, one to two consecutive wet years can provide enough recharge to replenish the Alluvial Aquifer in the eastern areas of the Basin. Wells in the eastern portion of the Basin have shown substantially lower water levels during extended drought periods (e.g., 2006–2019), causing a reduction in well production in this area. Since 2006, the Basin has experienced a long-term dry period interrupted by a wet year in 2011 and 2017. Over the past 10 years, the average seasonal variation between high and low conditions in the Mint Canyon and above Saugus WRP area was approximately 16 feet. This small amount of variation is due primarily to a lack of recharge and the effect depressed groundwater levels in this area have had on minimizing groundwater production. Over multi-year drought periods, water levels can decline by as much as 70 feet, which occurred in the Santa Clarita Water Division (formerly Santa Clarita Water Company) (SCWD)-North Oaks Central from 2011 through 2016. Wells in the Bouquet Canyon area show a less rapid decline and recovery. Declines in groundwater levels during extended dry periods is not an indication of overdraft, which is why it is important to look at a long-term period of time that represents average annual climatic conditions. With this in mind, over the past 30 years, these wells have exhibited stable water levels with periods of rising levels during wet periods and declining water levels during droughts. Over the past 10 years, the average seasonal variation in water levels was approximately 10 feet.

Figure 5-6 represents the historical groundwater levels measured in wells located in the western part of the Basin (San Francisquito Canyon, Santa Clara River below Saugus WRP, Castaic Valley, and below Valencia WRP). Groundwater levels in the western part of the Basin exhibit similar trends to those in the eastern portion of the Basin (San Francisquito and below Saugus WRP) VWD-W11, VWD-9, VWD-Q2, and NLF-W5. However, the magnitude of water level declines during periods of reduced rainfall are significantly less due to the recharge from the two WRPs and the upward vertical gradient from the Saugus Formation into the Alluvial Aquifer. This influence is indicated in the hydrograph for well VWD-I. Since 2010, the average variation between seasonal high and seasonal low water levels was approximately 10 feet. Over drought periods, depth to water has ranged between 20 and 50 feet as exhibited in VWD-I and VWD-W11 from 2011 through 2016, respectively. All the Alluvial Aquifer wells completed in the Castaic Creek drainage and the western portion of the Basin below the Valencia WRP along the Santa Clara River remained stable over various hydrologic wet and dry periods. Since 2010, the average variation between seasonal high and low water levels on average is approximately 9 feet, similar to other areas of the Basin in the Alluvial Aquifer. Over drought periods, water levels have declined by as much as 40 feet as exhibited in VWD-D from 2011 through 2016. Other wells, such as NLF-B10 and NLF-B4, have shown almost no change in water levels over dry periods. Refer to Appendix C, the *Hydrogeologic Conceptual Model: Groundwater Conditions in the Santa Clara River Valley Groundwater Basin, East Subbasin* (Appendix A of that report) for hydrographs of historical groundwater elevations for all Alluvial Aquifer wells having long-term monitoring data.





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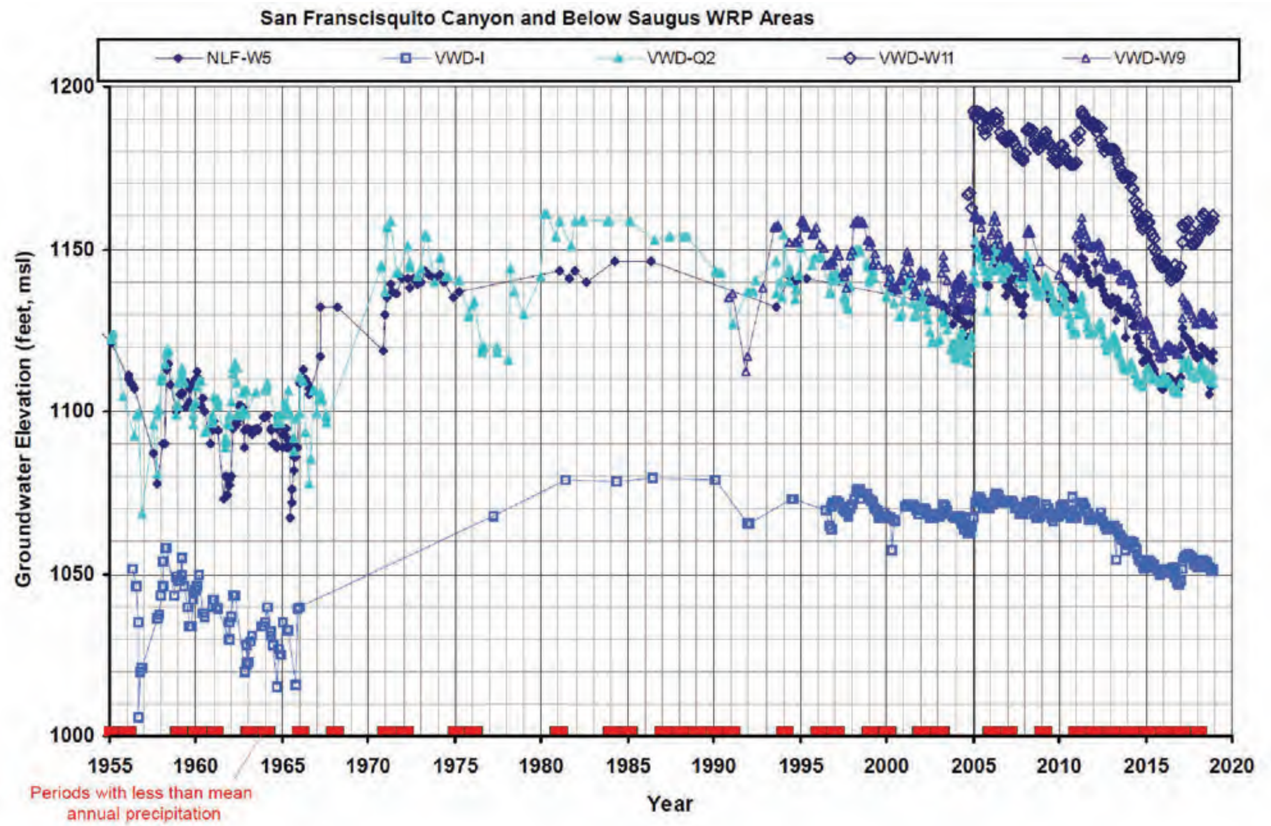
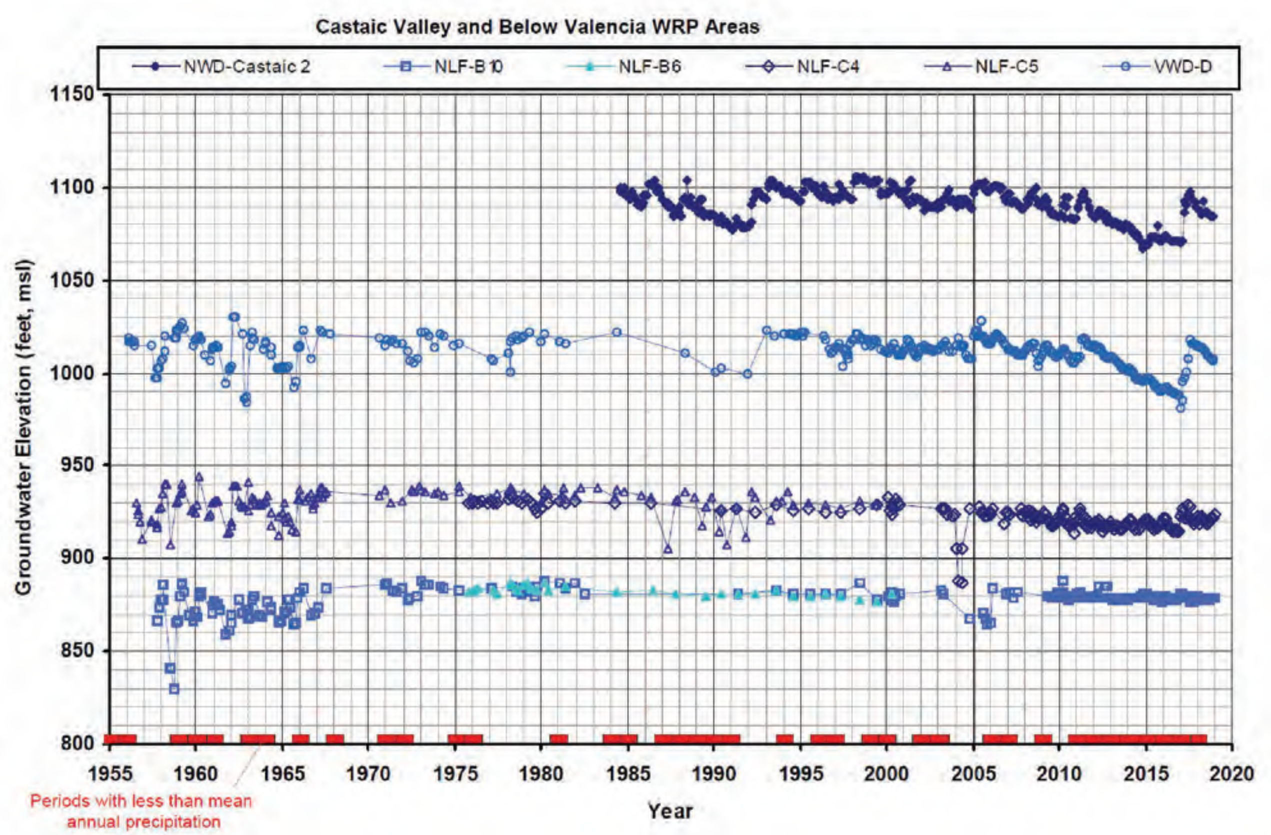
Consulting Engineers

Groundwater Elevations in Eastern Santa Clarita Valley Alluvial Wells

Santa Clara River Valley East Subbasin
Santa Clarita Valley, Los Angeles County, California

Figure 5-5





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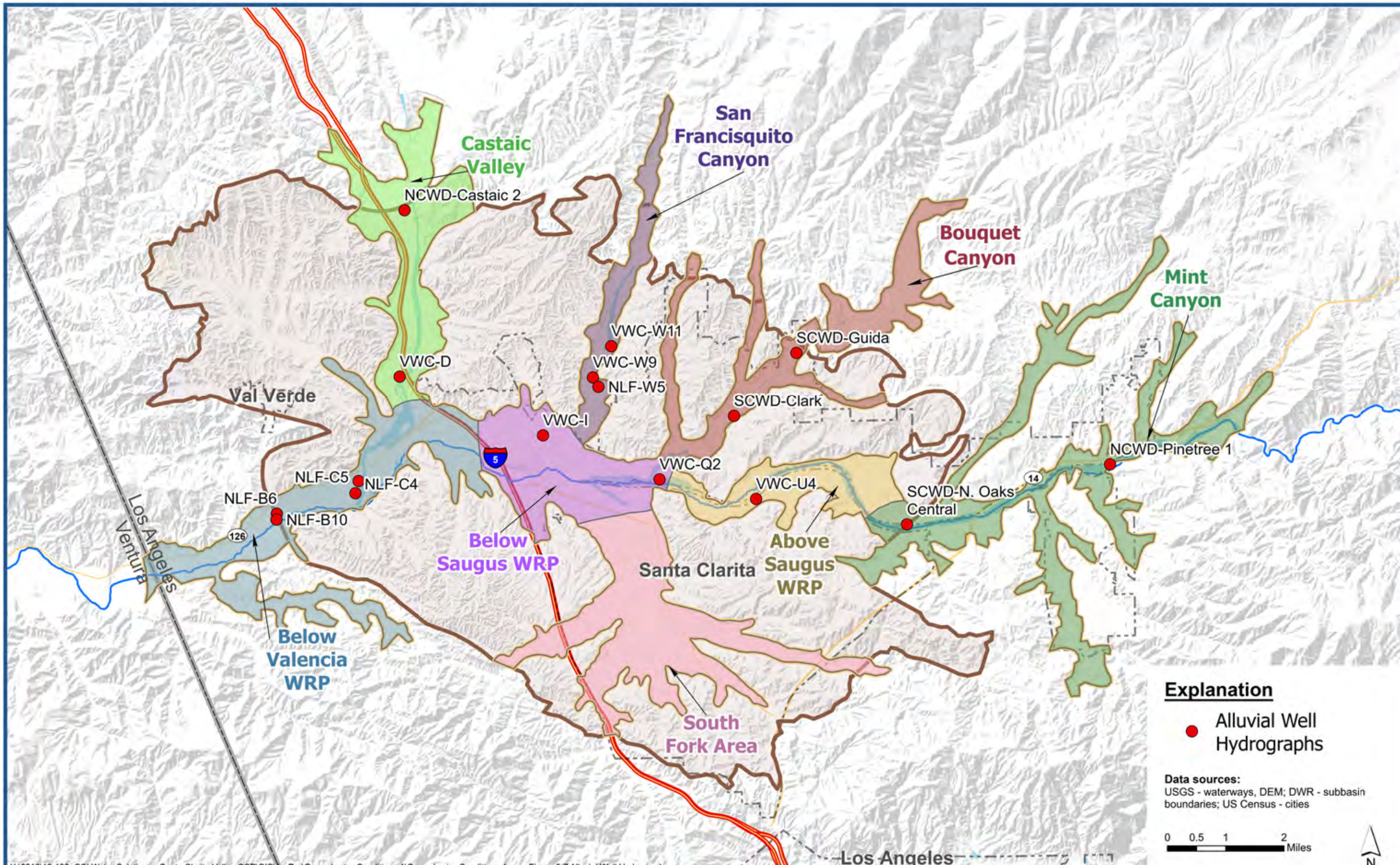
Groundwater Elevations in Western Santa Clarita Valley Alluvial Wells

Santa Clarita Valley Water Report
Santa Clarita Valley, Los Angeles County, California

Figure 5-6



X:\2018\18-132_GSI Water Solutions - Santa Clarita Valley GSP\GIS\ArcPro\Groundwater Conditions 1\Groundwater Conditions 1.aprx:Figure 5-7 Alluvial Well Hydrographs

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Alluvial Well Hydrographs

Santa Clara River Valley East Subbasin
Groundwater Sustainability Plan

Figure 5-7

5.1.2 Saugus Formation Aquifer

5.1.2.1 Groundwater Occurrence

The Saugus Formation Aquifer underlies the Alluvial Aquifer and is present throughout the entire Basin, unlike the Alluvial Aquifer. The Saugus Formation can be further subdivided into two units. The upper portion, which is up to 5,000 feet thick and consists of coarse-grained sand and gravel beds, contains the majority of the accessible groundwater. The lower portion, known as the Sunshine Ranch Member, is up to 3,500 feet thick and is composed of fine-grained sediments with low permeability. The Sunshine Ranch Member does not provide groundwater in sufficient quantity or adequate quality for municipal use (RCS, 2002). Generally, the upper 1,000 to 2,000 feet of the upper portion of the Saugus Formation is utilized for municipal groundwater production. The underlying 3,000 feet is not utilized for municipal supply.

The primary sources of recharge to the Saugus Formation include percolation from the Alluvial Aquifer (particularly on the east end of the Basin), direct recharge from precipitation, and inflow from outside the Basin (LSCE, 2003). Discharge from the Saugus Formation is primarily from groundwater extraction and flow to the Alluvial Aquifer in the western portion of the Basin (CH2M HILL, 2004).

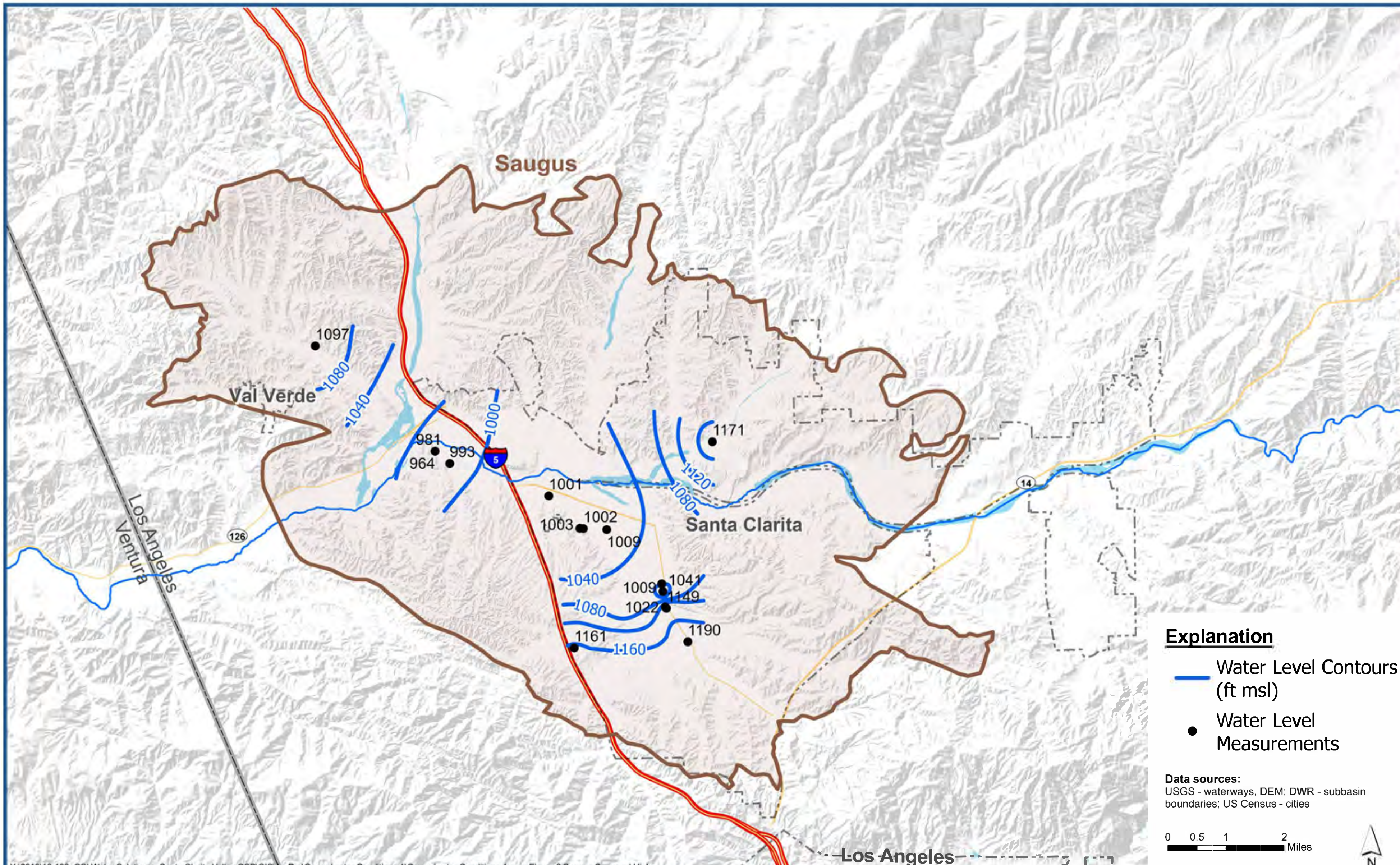
5.1.2.2 Flow Direction - Water Level Contours

Under seasonal high conditions, groundwater depths range between 50 and 185 feet bgs with groundwater elevations ranging between 964 and 1,190 feet msl (see Figure 5-8). Water level measurements across the Saugus Formation are limited due to the lack of wells in many areas of the Basin where the Saugus Formation is present. However, utilizing available data, the general groundwater flow direction is predominantly east to west toward Interstate 5 (I-5). West of I-5, data are limited; however, the direction of flow in this part of the Basin is thought, based upon groundwater modeling results, to be generally westerly toward where the Saugus Formation naturally discharges to the alluvium. As shown on Figure 5-8, there also appears to be a component of flow from the northwest to southeast, perhaps toward major production wells in the central part of the Basin. During seasonal low conditions, groundwater depths range between 50 and 217 feet bgs and groundwater elevations range between 956 and 1,192 feet msl (see Figure 5-9). The direction of flow during seasonal low conditions is similar to seasonal high directions. Groundwater flow conditions based on 2018 water level measurements are similar to the contours presented for the fall 2000 in CH2M HILL, 2004.

5.1.2.3 Water Level Hydrographs

Historical water level trends for selected Saugus Formation wells are presented in Figure 5-10 and well locations are illustrated in Figure 5-11. The spatial extent and availability of groundwater level data for the Saugus Formation is limited to two areas (South and Central/West). Groundwater elevation data extends to the mid-1960s in only one well. VWD-160 shows a trend of gradual rising and falling groundwater elevations in response to wet and dry periods with historical highs occurring in the mid-1980s. Two dry periods that occurred in the early 1990s and from the mid-2000s to 2019, resulted in groundwater levels declines of approximately 100 feet. Following the first dry period, groundwater levels recovered, however full recovery from the most recent dry period has not occurred by 2019 as the Basin has been in an extended dry period since 2006, with the exception of 2011.

All the Saugus Formation wells show this general trend. The downward trend in the most recent dry period was a result of lower amounts of recharge rather than from an increase in groundwater extractions from the Saugus Formation. In recent years in the South Area groundwater levels have shown an upward trend (NWD-12 and VWD-159) due to increased rainfall since 2016 as compared to prior years. Since 2010, the average variation between seasonal high and seasonal low water levels in the south area was approximately 18 feet, and the average variation in the central/west area was approximately 16 feet. All available historical water level data for Saugus Formation wells are included in Appendix C, the *Hydrogeologic Conceptual Model: Groundwater Conditions in the Santa Clara River Valley Groundwater Basin, East Subbasin* (Appendix A of that report).



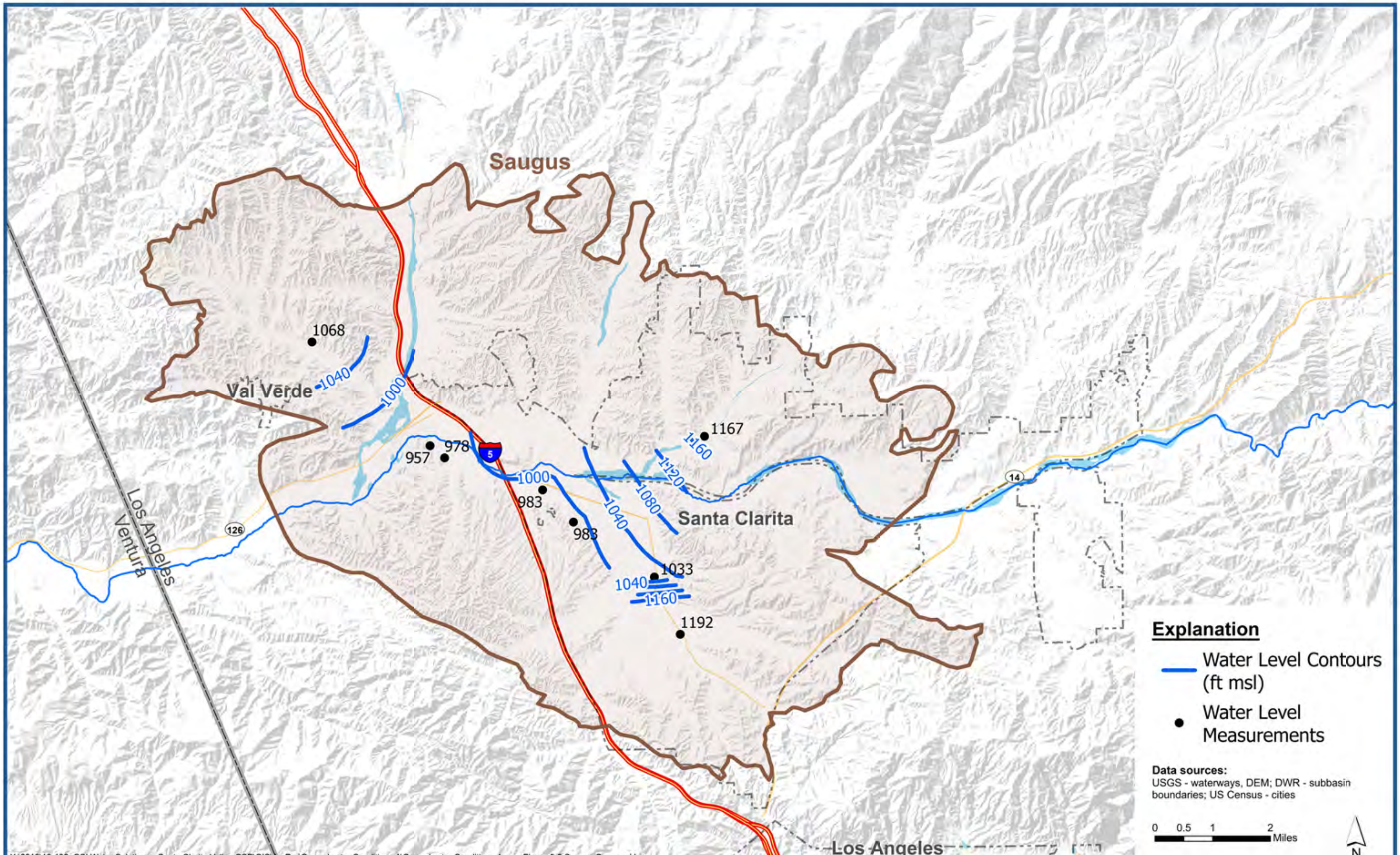
X:\2018\18-132_GSI Water Solutions - Santa Clarita Valley GSP\GIS\ArcPro\Groundwater Conditions 1\Groundwater Conditions 1.aprx:Figure 6 Saugus Seasonal High

Luhdorff & Scalmanini Consulting Engineers

Water Year 2018 Seasonal High
Water Level Contours - Saugus Formation Aquifer

Figure 5-8

Santa Clara River Valley East Subbasin
Groundwater Sustainability Plan



Water Year 2018 Seasonal Low
Water Level Contours - Saugus Formation Aquifer

Santa Clara River Valley East Subbasin
Groundwater Sustainability Plan

Figure 5-9

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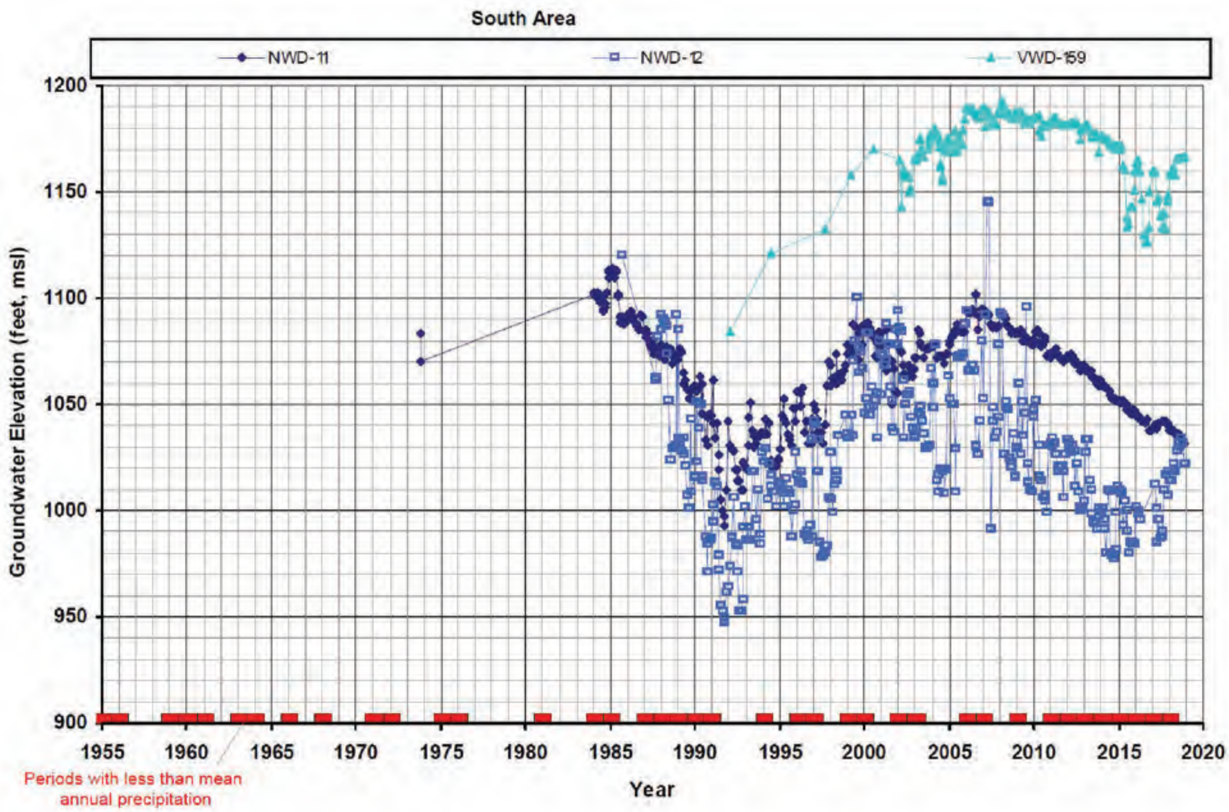

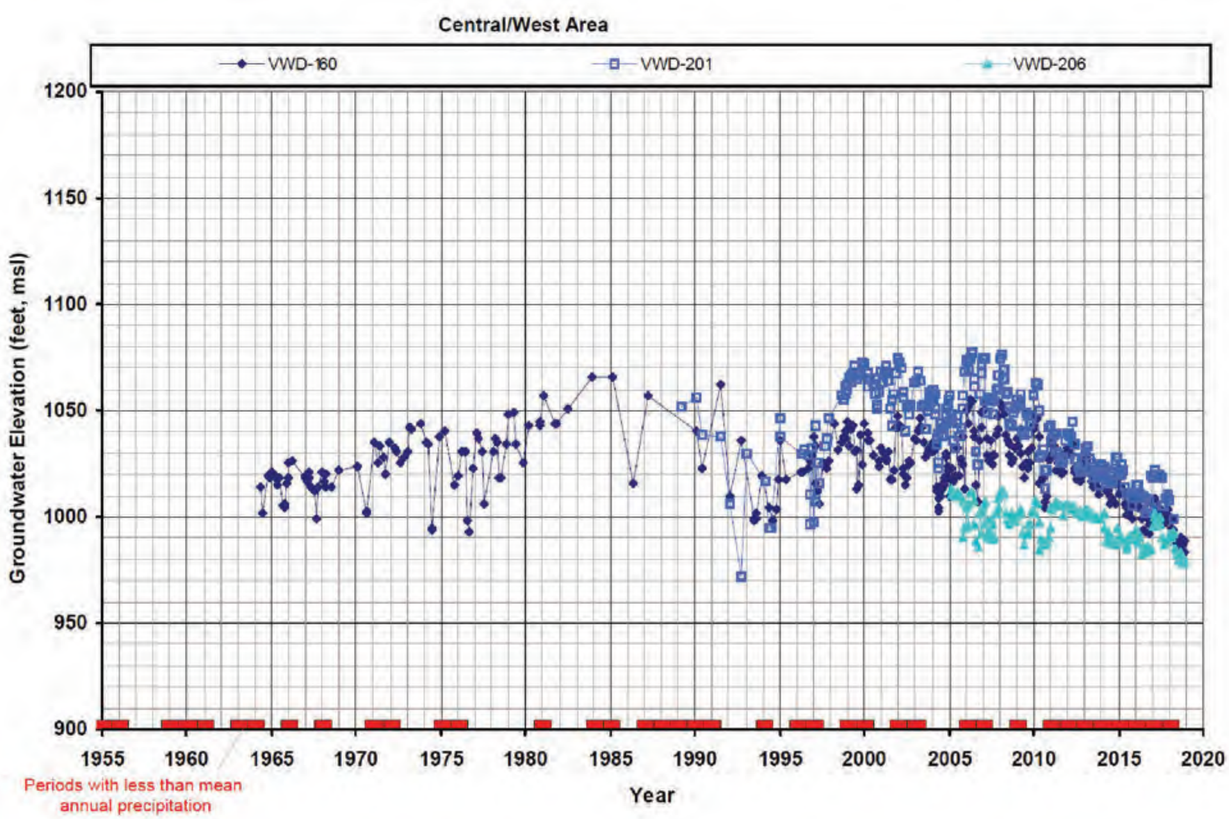

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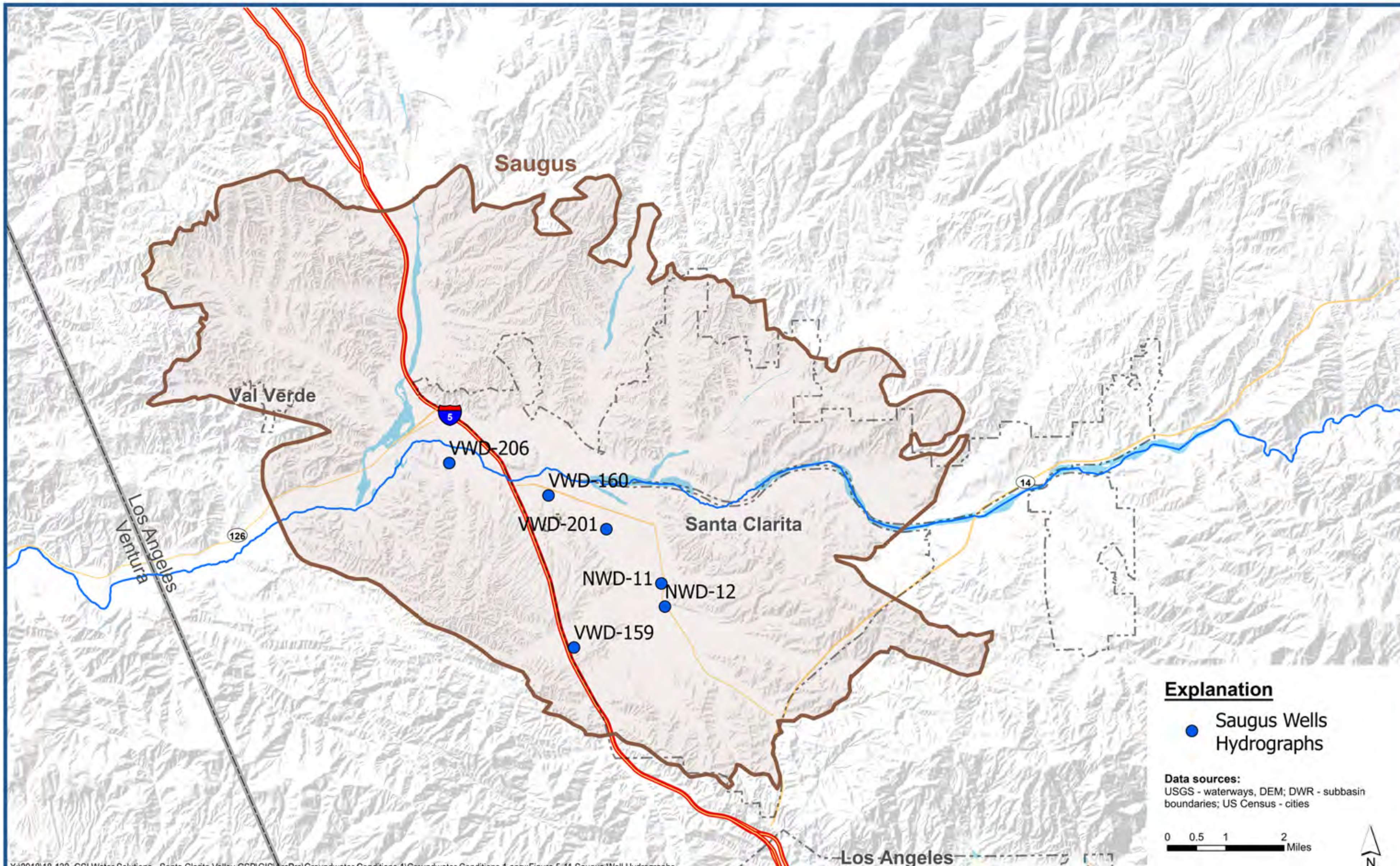
Groundwater Elevations in Saugus Wells

Santa Clara River East Subbasin
Groundwater Sustainability Plan

Figure 5-10



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Saugus Well Hydrographs

Santa Clara River Valley East Subbasin
Groundwater Sustainability Plan

Figure 5-11

5.1.3 Horizontal Gradient

5.1.3.1 Alluvial Aquifer

The horizontal hydraulic gradient is as high as 0.018 foot per foot (ft/ft) (95 feet per mile [ft/mile]) in eastern portions of the Basin in the Mint Canyon area and as low as 0.005 ft/ft (29 ft/mile) in the west along the Santa Clara River (see Figure 5-3). Under seasonal low conditions, the gradient in the east is the same as seasonal high conditions at approximately 0.018 ft/ft (95 ft/mile), but with a slightly steeper gradient in the west at 0.006 ft/ft (31 ft/mile) (see Figure 5-4).

5.1.3.2 Saugus Formation

Under seasonal high conditions, the horizontal hydraulic gradient is approximately 0.008 ft/ft (42 ft/mile) (see Figure 5-8). Under seasonal low conditions, the hydraulic gradient is approximately 0.007 ft/ft (35 ft/mile) (see Figure 5-9). Gradient values are based on groundwater flow from east to west. In the western portion of the Basin where the groundwater flow directions are northwest to southeast in the area east of I-5, there was insufficient data to calculate a horizontal flow gradient.

5.1.4 Vertical Gradient Between Principal Aquifers

The vertical gradient between the Alluvial Aquifer and Saugus Formation is the mechanism to assess flow between the two aquifers. Vertical gradients or flow can be either in an upward or downward direction. For example, if the water level in the Alluvial Aquifer is higher than the water level in the Saugus Formation at a particular location, there is the potential for groundwater to move vertically from the Alluvial Aquifer to the Saugus Formation. The reverse can also occur in areas where groundwater elevations in the Saugus Formation are higher than those in the Alluvial Aquifer. The magnitude and direction of vertical gradients were determined based on the average seasonal high-water level since 2010 at two locations in the Basin where groundwater level data from Saugus Formation wells is generally available along with nearby wells screened in the Alluvial Aquifer. The average vertical gradient was determined in the vicinity of Saugus well VWD-201 located in the south area, and at the Saugus well VWD-207 area located in the western portion of the Basin. Results are presented in Table 5-1. The negative value in the South area indicates a downward gradient (i.e., groundwater elevations in the Alluvial Aquifer at this location are higher than groundwater elevations measured in the Saugus Formation). The positive values indicate an upward gradient from the Saugus Formation to the Alluvial Aquifer. These estimates are based on available groundwater level measurements in both aquifers.

Table 5-1. Approximate Aquifer Vertical Gradient

<table>
<tr><th>Basin Area</th><th>Aquifer – Seasonal Condition</th><th>Average GWE</th><th>Gradient (ft/ft)</th></tr>
<tr><td rowspan="2">South Area</td><td>Alluvial – All VWD Monitor Wells</td><td>1079</td><td rowspan="2">-0.04</td></tr>
<tr><td>Saugus – VWD-201</td><td>1024</td></tr>
<tr><td rowspan="2">Western Area</td><td>Alluvial – VWD-E14</td><td>983</td><td rowspan="2">0.003</td></tr>
<tr><td>Saugus – VWD-207</td><td>984</td></tr>
</table>

Notes

ft/ft = foot per foot GWE = groundwater elevation
VWD = Valencia Water Division (formerly Valencia Water Company)

5.1.5 Change in Groundwater Storage

Change in groundwater storage can be estimated using groundwater elevation data from successive seasonal high periods; or using water budget results from a groundwater flow model. The change in storage of water using the change in water level approach is a function of aquifer storage coefficients, amount of water level change, and areal extent of water level changes. A change in storage calculation using the water budget approach calculates the difference between recharge and discharge terms. The water budget approach using the Basin groundwater model is used in this Groundwater Sustainability Plan (GSP) for each of the principal aquifers when it is available. The groundwater flow model will calculate the change in groundwater storage for the historical, current, and projected water budget periods.

5.1.6 Subsidence

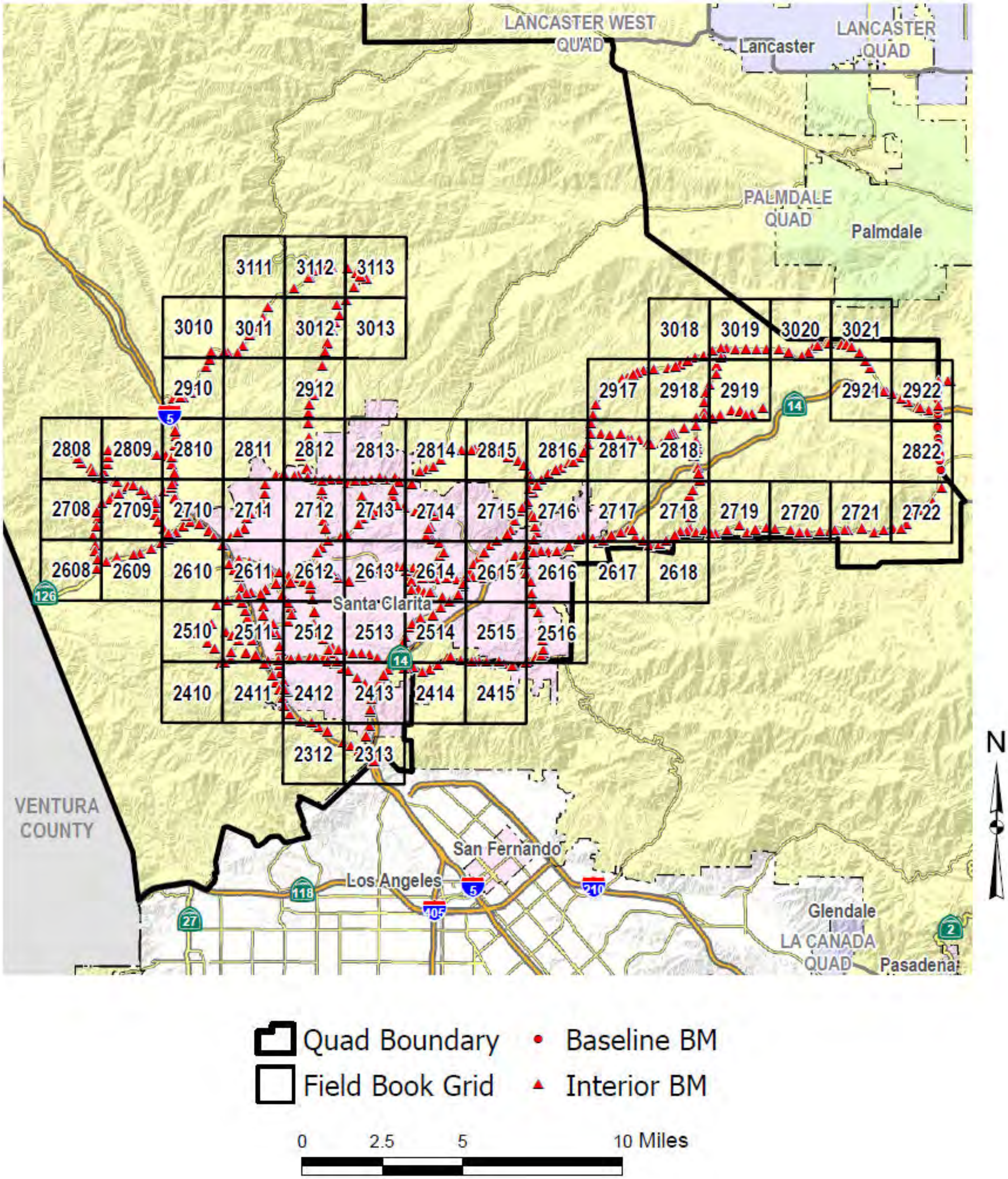
This section presents a summary of the available information pertaining to subsidence in the Basin. A more detailed discussion can be found in Appendix C (LSCE Subsidence TM, 2021). According to the U.S. Geological Survey (USGS), land subsidence is a phenomenon found across the United States, affecting 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 or groundwater). The principal causes of land subsidence are aquifer system compaction (caused by reduction in hydraulic head affecting the physical structure and orientation of clay minerals and drainage of organic soils. Subsidence can occur in two forms, elastic and inelastic (or permanent). Generally, subsidence occurs on a seasonal basis. When groundwater pumping occurs and groundwater levels decline, the land surface can subside. When groundwater levels recover following wetter conditions and reduced groundwater pumping, the land surface can recover, similar to compressing and releasing a spring. The amount that the ground surface subsides and subsequently “springs back” is considered elastic subsidence. This cycle occurs every year and is common everywhere there are seasonal variations in groundwater levels. Conversely, the amount of decline in the ground surface elevation that remains regardless of groundwater level recovery is considered to be inelastic subsidence. Under SGMA, only inelastic subsidence is to be evaluated in this GSP. For inelastic subsidence to occur in an area, that area generally requires two primary conditions. One is to have wells screened in aquifers that contain substantial amounts of clay within the depth interval that the well is constructed. The second condition is that there needs to be a multi-year period during which groundwater levels in the aquifer are at elevations below historical low levels in that area of the Basin. If both conditions do not occur, then inelastic subsidence related to groundwater pumping is unlikely to occur in appreciable quantities to impact critical infrastructure. Short term declines in groundwater levels over one or two years likely will not result in significant amounts of inelastic subsidence and impacts to infrastructure. This is based on data collected areas in the San Joaquin Valley that have experienced significant amounts of subsidence and where there have been significant investments in subsidence monitoring networks.

As mentioned above, when discussing the potential for inelastic land subsidence in any area, it is important to consider the type of subsurface materials that could contribute to subsidence combined with well construction data, pumping records and groundwater level measurements through a multi-year period of record. As described above, the upper portion of the Saugus Formation generally consists of sands and gravels, while the Sunshine Ranch member is composed primarily of fine-grained materials. However, the upper portion of the Saugus Formation, in some but not all areas where there are current wells, contains lenses of silt and clay, which are located within the depth interval that some Saugus Formation wells are perforated and extract groundwater. However, based on an evaluation of existing geologic data for Saugus Formation wells, these materials are not laterally continuous. In addition, the Saugus Formation has not been pumped significantly to cause extended periods of groundwater level declines and there has been no evidence that groundwater pumping-induced subsidence has occurred. Through the last 19 years of reviewing and reporting on the geology and water resources in the Basin, there has not been evidence of chronic groundwater level declines in areas with Saugus Formation geology with silts and clays within the screened intervals of municipal supply wells that would contribute to subsidence (LSCE, 2017).

5.1.6.1 Subsidence Data Sources

There are three sources of information on subsidence in the region. These sources include benchmark survey data from LADPW from a comprehensive network of benchmarks located throughout the County of Los Angeles (LA County). Unfortunately, LADPW provides general benchmark locations on maps, but exact coordinate information is not available at this time. The second source of data is from the Department of Water Resources SGMA Data viewer. The TRE Altamira InSAR Dataset contains vertical displacement data from 2015 through September 2019. These data were collected by the European Space Agency Sentinel-1A satellite and processed by TRE Altamira. The data set covers more than 200 groundwater basins across the state at a resolution of approximately 100 square meters. The third source of data involves land surface elevation monitored at two continuous global positioning system (CGPS) sites, one located in the Basin north of the Santa Clara River (station SKYB) and the other outside the Basin to the north just east of I-5 (station CTDM) as shown in Figure 5-12. The data from these two stations are reported by UNAVCO from its Data Archive Interface (http://www.unavco.org/data/data.html). Data collection has been ongoing since the early 2000s with daily measurements.

The LACDPW has a network of over one hundred benchmarks in the Basin as part of a larger survey network in LA County (http://dpw.lacounty.gov/sur/BenchMark/). LACDPW reportedly surveys these benchmarks approximately every 6 years. The last survey in the Basin was conducted in 2018 and the surveys began in the 1950s and 1960s; however, prior to the 1995 survey, the vertical datum was NGVD27 and not NAVD 88. The NGVD27 and NAVD 88 referenced data cannot be compared without conducting a complex conversion. These benchmarks could be utilized as part of a subsidence monitoring network, pending LACDPW approval. These benchmarks are located in the "Newhall Quad." The index of benchmarks contained in this quad is depicted in Figure 5-12 and the benchmarks are listed in Table 5-2. Land surface elevation data from these benchmarks that were measured using the NAVD 88 vertical datum required by DWR, date back to 1995. Benchmark measurements reflect a basic accuracy of ± 0.017 feet. Between 1995 and 2018, the total elevation decline of benchmarks located in the south/central area of the Basin in the vicinity of wells Saugus 1, Saugus 2, V201, and V205 ranged between 0.01 to 0.17 feet. West of these wells near wells V206 and V207 and south near well NCWD Saugus Formation wells, the total elevation decline over 1995 and 2018 ranged between 0.08 to 0.15 feet. These represent slight declines that average about 0.004 feet/year over this 24-year period. Groundwater elevations in the Saugus Formation historically have been most depressed in the early 1990s which corresponded to the highest amount of pumping form the Saugus Formation. The 1995 data set was collected by LACDPW about 1 or 2 years after the peak decline in groundwater levels. Due to experience in evaluation of subsidence occurrence in the San Joaquin Valley during short-term dry periods with high amounts of groundwater pumping (1 to 2 years in length), the amount of inelastic subsidence is dependent on local conditions and often include large proportions of elastic subsidence. Following the early 1990s when Saugus Formation pumping reached peak levels, groundwater pumping has not reached those levels. The yearly rate of subsidence that occurred between 1995 and 2018 was 0.0008 feet per year given the maximum subsidence of -0.179 feet. That rate is within the accuracy of the benchmark surveying equipment and is negligible. In the central and western areas, it not clear whether the measured declines in land surface elevation are caused by groundwater extraction, time of year measurements, or tectonics (given the proximity of the San Gabriel Fault).



Data sources:
LA County Department of Public Works

:\2018\18-132 GSI Water Solutions - Santa Clarita Valley GSP\GIS\ArcPro\Groundwater Conditions 2\Groundwater Conditions 2.aprx

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Newhall Quad Benchmark Index

Santa Clarita Valley Water Report
Santa Clarita Valley, Los Angeles County, California

Figure 5-12

Table 5-2. Benchmark Elevation Data

Basin Area	Nearby Well	Benchmark	Year	Elevation (ft, NAVD 88)	Total Elevation Change 1995–2018 (ft)
Southern Saugus	VWD-206	1947	1995	1,059.463	-0.082
			2009	1,059.359	
			2018	1,059.381	
		1948	1995	1,034.371	-0.092
			2009	1,034.287	
			2018	1,034.279	
		5210	1995	1,061.530	-0.097
			2009	1,061.448	
			2018	1,061.433	
		5402	1995	1,031.950	-0.126
			2009	1,031.831	
			2018	1,031.824	
		7104	1995	No Data	No Data
			2009	1,047.77	
			2018	1,047.76	
		7106	1995	No Data	No Data
			2009	1,043.68	
			2018	1,043.67	
		7103	1995	No Data	No Data
			2009	1,023.59	
			2018	1,023.58	
	VWD-207	4511	1995	1,012.295	-0.149
			2009	1,012.182	
			2018	1,012.146	
		7204	1995	No Data	No Data
			2009	1,018.51	
			2018	1,018.51	
		6082	1995	No Data	No Data
			2009	1,019.99	
			2018	1,019.97	
	VWD-201	6077	1995	No Data	No Data
			2009	1,146.896	
			2018	1,146.766	
	VWD-205/205M	6078	1995	No Data	No Data
			2009	1,182.083	
			2018	1,182.019	
		5267	1995	1,151.717	-0.099
			2009	1,151.683	
			2018	1,151.618	

Basin Area	Nearby Well	Benchmark	Year	Elevation (ft, NAVD 88)	Total Elevation Change 1995—2018 (ft)
Southern Saugus		6076	1995	No Data	No Data
			2009	1,151.860	
			2018	1,151.785	
	Saugus-1	611	1995	1,157.803	-0.068
			2009	1,157.800	
			2018	1,157.735	
		6068	1995	No Data	No Data
			2009	1,166.50	
			2018	1,166.43	
		5311	1995	1,159.535	0.011
			2009	1,159.575	
			2018	1,159.546	
	Saugus-2	5260	1995	1,170.900	-0.056
			2009	1,170.923	
			2018	1,170.844	
		5312	1995	1,168.039	-0.041
			2009	1,168.086	
			2018	1,167.998	
		5259	1995	1,177.996	-0.089
			2009	1,178.015	
			2018	1,177.907	
	VWD-159	5375	1995	1,276.700	-0.042
			2009	1,276.714	
			2018	1,276.658	
		7054	1995	N/A	No data
			2009	1,329.124	
			2018	1,329.073	
		7055	1995	N/A	No Data
			2009	1,348.352	
			2018	1,348.324	
		5085	1995	1,317.921	0.005
			2009	1,317.966	
			2018	1,317.926	
	NWD-12	5256	1995	1,217.960	-0.074
			2009	1,217.936	
			2018	1,217.886	
		6066	1995	No Data	No Data
			2009	1,201.063	
			2018	1,201.025	

Basin Area	Nearby Well	Benchmark	Year	Elevation (ft, NAVD 88)	Total Elevation Change 1995—2018 (ft)
	NWD-13	5337	1995	1,192.215	-0.059
			2009	1,192.211	
			2018	1,192.156	
		6067	1995	No Data	No Data
			2009	1,193.131	
			2018	1,193.054	

Notes

ft = foot or feet

NAVD 88 = North American Vertical Datum of 1988

The TRE Altamira InSAR Dataset contains vertical displacement data from June 2015 through September 2019. These data were collected by the European Space Agency Sentinel-1A satellite and processed by TRE Altamira. As discussed above, the evaluation of subsidence occurrence requires the ability to quantify the occurrence of inelastic subsidence and not elastic subsidence. Elastic subsidence is greatest during seasonal periods (normally summer and fall) when seasonal groundwater levels are lowest. Inelastic subsidence generally is best quantified by evaluating changes in ground surface elevations during the winter/early spring periods when groundwater levels are generally at higher elevations and over a multi-year period. For the InSAR data, vertical displacement for the winter-to-winter period from 2015/2016 through 2018/2019 period over the entire Basin from the TRE Altamira InSAR Dataset is presented in Figure 5-13. This period of time represents the least amount of elastic subsidence which results in the change in elevation data being primarily related to inelastic subsidence and/or tectonic activity. Vertical displacement values in the Basin ranged between -0.25 and +0.25 feet between that 3-year period. In the south-central area of the Basin in the vicinity of wells V201, V205, Saugus 1, and Saugus 2 the range was 0.025 to 0.032 feet during that 3-year period.

The relatively stable trend of these plots, along with the positive values of displacement, indicate that no long-term subsidence is occurring in these monitored areas and the variations observed appear to be related to tectonic factors rather than from activities associated with groundwater pumping. Since the beginning of data collection in the early 2000s at both locations, the net vertical displacement is positive (0.05 feet) at the CTDM site and zero at the SKYB site. This means that the land surface has actually risen (positive displacement) or stayed the same in these areas since 2000. In any given year, the vertical displacement is generally less than 0.05 feet, with the exception of 2006 to 2007 at the SKYB site. Within the context of complex southern California geology, the elevation change (less than 0.2 feet vertical change over the last 20 years) seen at the two UNAVCO stations is likely due to tectonic activity as mentioned above.

The three data sets pertaining to subsidence all indicate minimal or no subsidence occurring in the Basin. LADPW benchmarks indicate an average ground surface elevation decline of less than 0.008 feet per year, the TRE Altamira InSAR Dataset indicates a ground surface elevation increase in the area of Saugus Formation wells, and the UNAVCO CGPS Dataset also indicates a ground surface elevation increase at various points in the Basin.

5.1.6.2 Projected Saugus Formation Pumping

The hydrographs in Appendix C, *Hydrogeologic Conceptual Model: Groundwater Conditions in the Santa Clara River Valley Groundwater Basin, East Subbasin and Subsidence Vulnerability Technical Memorandum* (LSCE, 2021) (see Appendix A of that document for the hydrographs) were prepared using results from the Basin numerical model and show historical groundwater level data along with projected (future) groundwater elevations. The comparison of the projected and historical data at each well shows simulated future groundwater levels, including during normal and drought periods. The future water levels are representative of "full build-out land use conditions" that include the sustained operation of wells V201 and V205 (in part for perchlorate removal), along with additional source capacity for extraction of groundwater from the Saugus Formation in the V206 and V207 area of the Basin that would allow SCV Water to extract approximately 35,000 acre-feet per year during multiple dry years.

Central Area

Projections of Saugus Formation groundwater pumping volumes in the central area (Saugus 1 and 2, V201, V205) are expected to be higher than historical amounts during normal *and* dry years. Groundwater model simulations of future normal year conditions (Saugus 1 and 2, V201) indicate groundwater levels will be maintained approximately 100 to 150 feet lower in normal years than in the past, with some shorter-term decreases in water level beyond these during drought.

Western Area

Projections of Saugus Formation groundwater pumping in the western area (V206, V207 and four to-be-constructed Saugus wells) are expected to be higher than historical amounts during dry years. Groundwater model simulations of future conditions (V206 and V207) indicate groundwater levels will be similar to historical normal year levels, but in drought years are projected to be approximately 100 to 150 feet lower than in the past.

5.1.6.3 Conclusions Regarding Potential for Subsidence

The potential for subsidence in the various areas of the Basin to occur in the future is difficult to predict or quantify based on the data sets evaluated and documented above. Groundwater elevations in the future, in particular at full build-out, will be lower than in the past. In some areas, groundwater elevations will be lower than past drought water elevations (western area), and in other cases groundwater elevations will be lower in both normal and drought conditions (central area). The central area appears to contain more compressible fine-grained layers than does the west and, because of these factors, there may be a potential for future subsidence, but it is difficult to predict, and should be monitored.

Further, these fine-grained materials are at depths that are several hundreds of feet below the potentiometric head in the Saugus Formation when observing both historical Saugus Formation groundwater levels and projected elevations based on model simulations (see Appendix C of this GSP and Appendix A of that appendix [LCSE, 2021]). This fine-grained unit placement is considered a more favorable condition than physically dewatering clays as the groundwater potentiometric surface becomes lower. These clay units are not as extensive in the western portion of the Saugus Formation in the vicinity of V206 and V207 and pinch out (become very thin) toward the South Fork area of the Basin where wells NC12 and NC13 are present. As mentioned above, data on the occurrence of clay beds in the vicinity of the four planned new Saugus Formation wells near the Magic Mountain area are not available, as the exact location of these wells has not been finalized nor the borings drilled.

5.1.7 Primary Uses of Each Aquifer

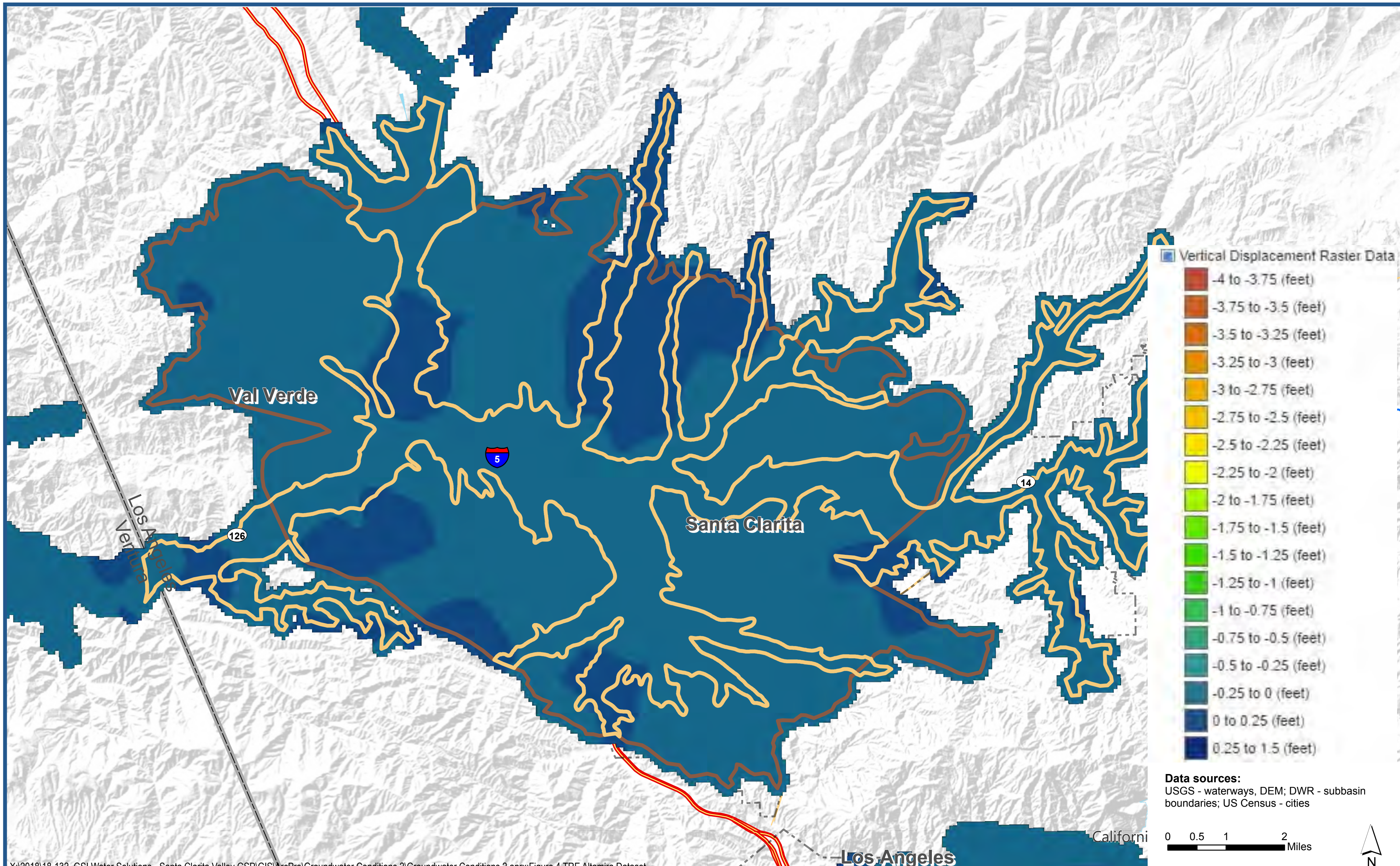
Groundwater production rates presented in this section for municipal/industrial, agricultural, domestic water users were obtained from the 2018 Santa Clarita Valley Water Report (LSCE, 2019). Each is summarized in the following sections.

5.1.7.1 Municipal/Industrial

Municipal/Industrial groundwater production for both the Alluvial Aquifer and the Saugus Formation from 1980 to 2018 are presented in Figure 5-15. Groundwater production in the Alluvial Aquifer has ranged from 8,684 to 27,919 acre-feet per year (AFY) with an average of 19,400 AFY. Production increased until the late 1990s, after which production remained at this level until 2015 when it began to decline rapidly. Saugus Formation production has ranged from 2,728 to 14,417 AFY with a long-term average of 6,750 AFY. Saugus Formation production peaked in the early 1990's for a short period before reaching its lowest point in 1999. Production gradually returned to normal levels and was relatively stable thereafter.

5.1.7.2 Agricultural

Agricultural production for both the Alluvial and Saugus Formation aquifers from 1980 to 2018 are presented in Figure 5-16. Alluvial Aquifer production ranged from 5,951 to 13,824 AFY with an average of 10,194 AFY. Alluvial Aquifer production has been relatively steady over the four decades presented in Figure 5-16 with year-to-year variation typically within 2,000 acre-feet (AF). Agricultural production from the Saugus Formation has been minor. Presently, there is no agricultural production from the Saugus Formation.



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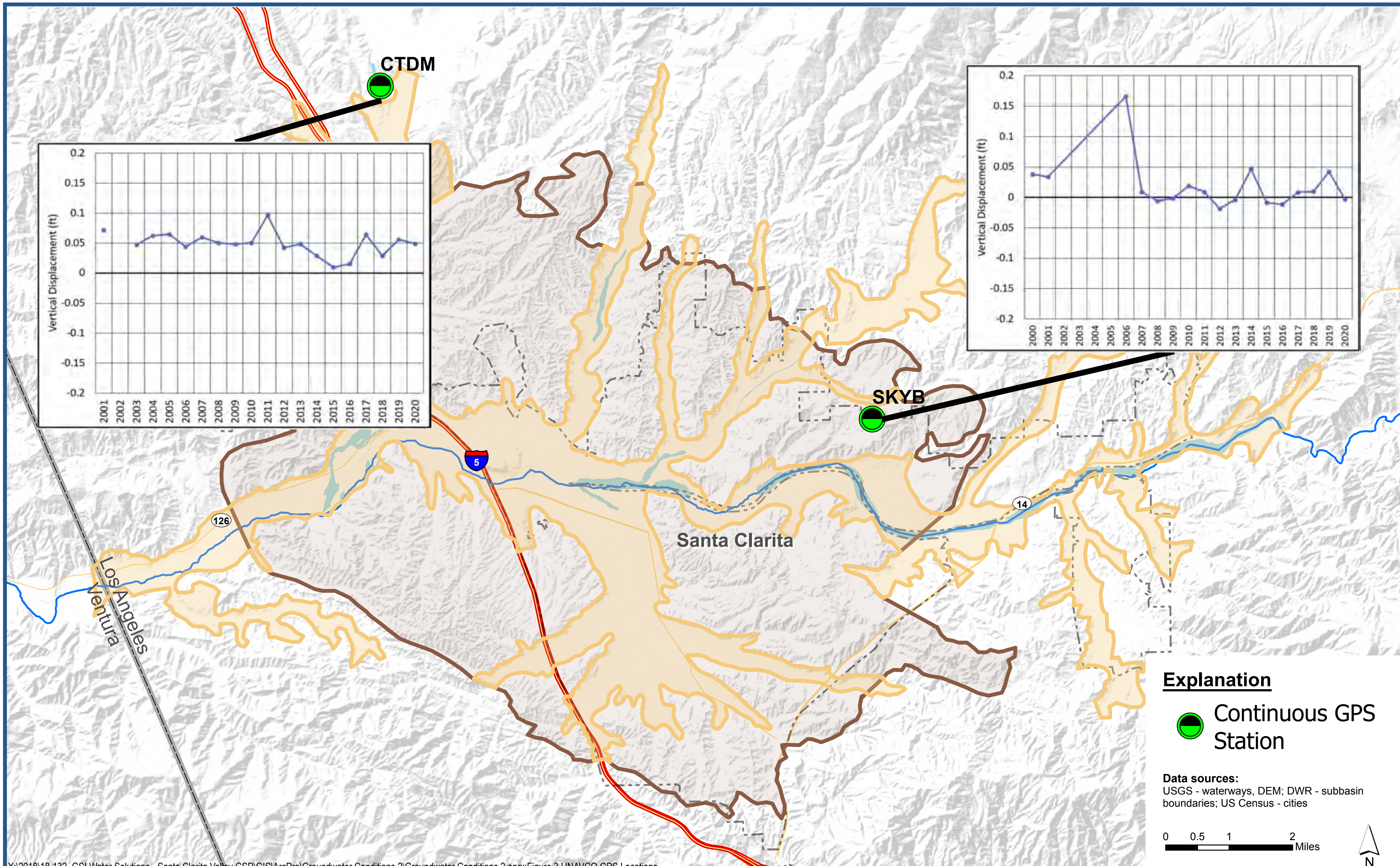
TRE Alatamira InSAR Dataset
(June 2015 - March 2019)

Santa Clara River Valley East Subbasin
Groundwater Sustainability Plan

Figure 5-13



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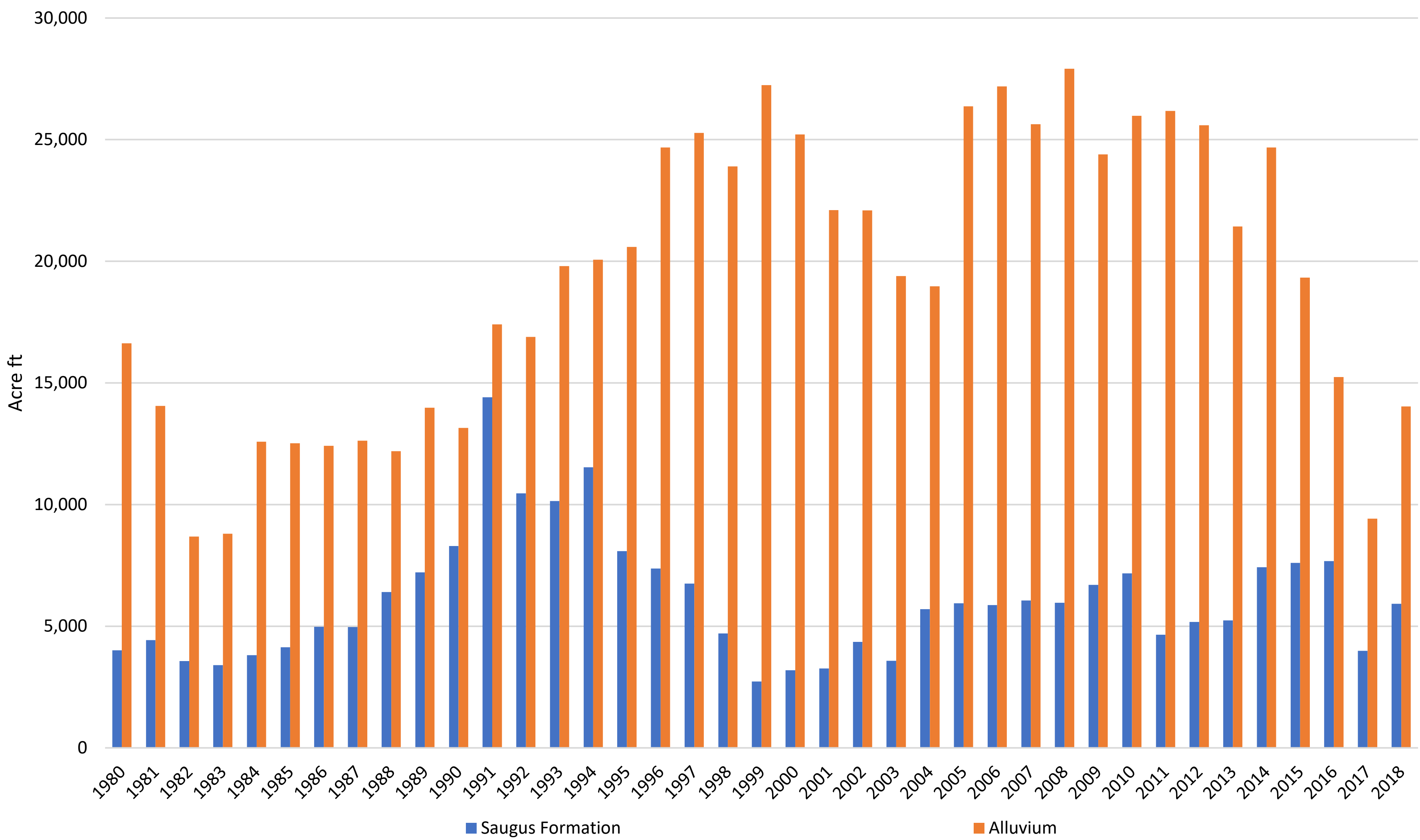
UNAVCO Continuous GPS Station Locations

Santa Clara River Valley East Subbasin
Groundwater Sustainability Plan

Figure 5-14



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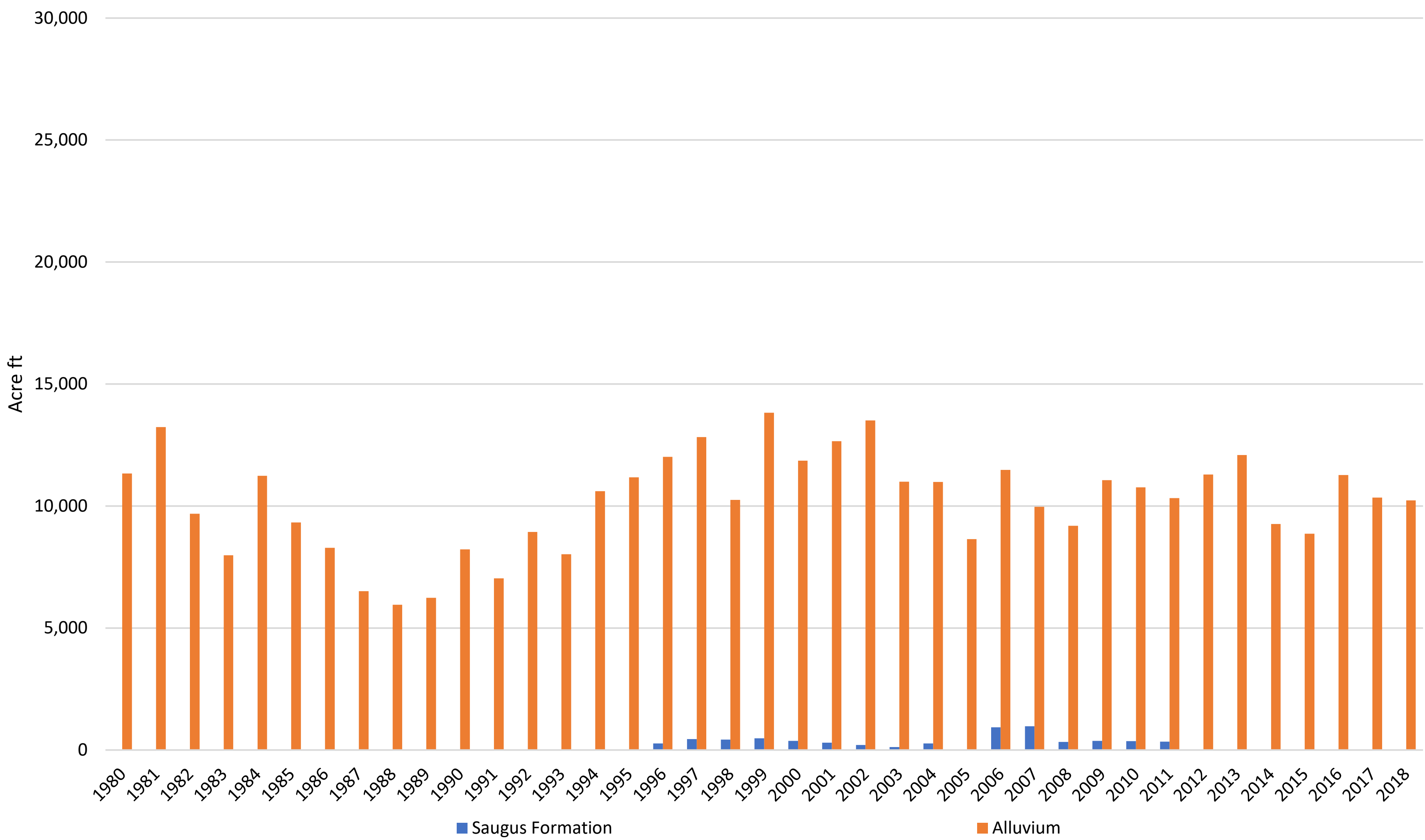
Municipal Groundwater Use

Santa Clara River Valley East Subbasin
Groundwater Sustainability Plan

Figure 5-15



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Agricultural Groundwater Use

Santa Clara River Valley East Subbasin
Groundwater Sustainability Plan

Figure 5-16

5.1.7.3 Private Domestic Uses

Private domestic uses of groundwater constitute a minor percentage of the total groundwater extraction in the Basin. Private domestic also includes groundwater production used for golf courses. Total domestic groundwater extractions by aquifer are presented in Figure 5-17. Alluvial Aquifer domestic well production values are estimated to range from 500 to 1,369 AFY with an average of 741 AFY.

5.1.8 Groundwater Quality

This section summarizes the constituents of general groundwater quality (from both natural and human-made sources) for both principal aquifers based on previous technical studies and monitoring performed by the Santa Clarita Valley Water Agency (SCV Water). Natural constituents discussed in Section 5.1 include total dissolved solids (TDS), chloride, nitrate, and sulfate. These constituents are naturally occurring in groundwater, but some constituents can also result from human activities.

Also discussed are anthropogenic groundwater constituents of concern (COCs) that have been observed in the Basin. The Santa Clarita Valley Water Report identifies perchlorate and volatile organic compounds (VOCs) as the primary human caused COCs. The most frequently detected VOCs in the Basin are trichloroethylene (TCE) and tetrachloroethylene (PCE). Less frequently detected compounds include chloroform, and 1,1-dichloroethene which have been detected in trace amounts below the state drinking water standards maximum contaminant level (MCL) in the Basin (LSCE, 2019). The Salt and Nutrient Management Plan (SNMP) prepared by SCV Water in 2016 identified dichlorodiphenyltrichloroethane (DDT) and polychlorinated biphenyls (PCBs) as other COCs. A contaminant of emerging concern in the Basin are per- and polyfluoroalkyl substances (PFAS).

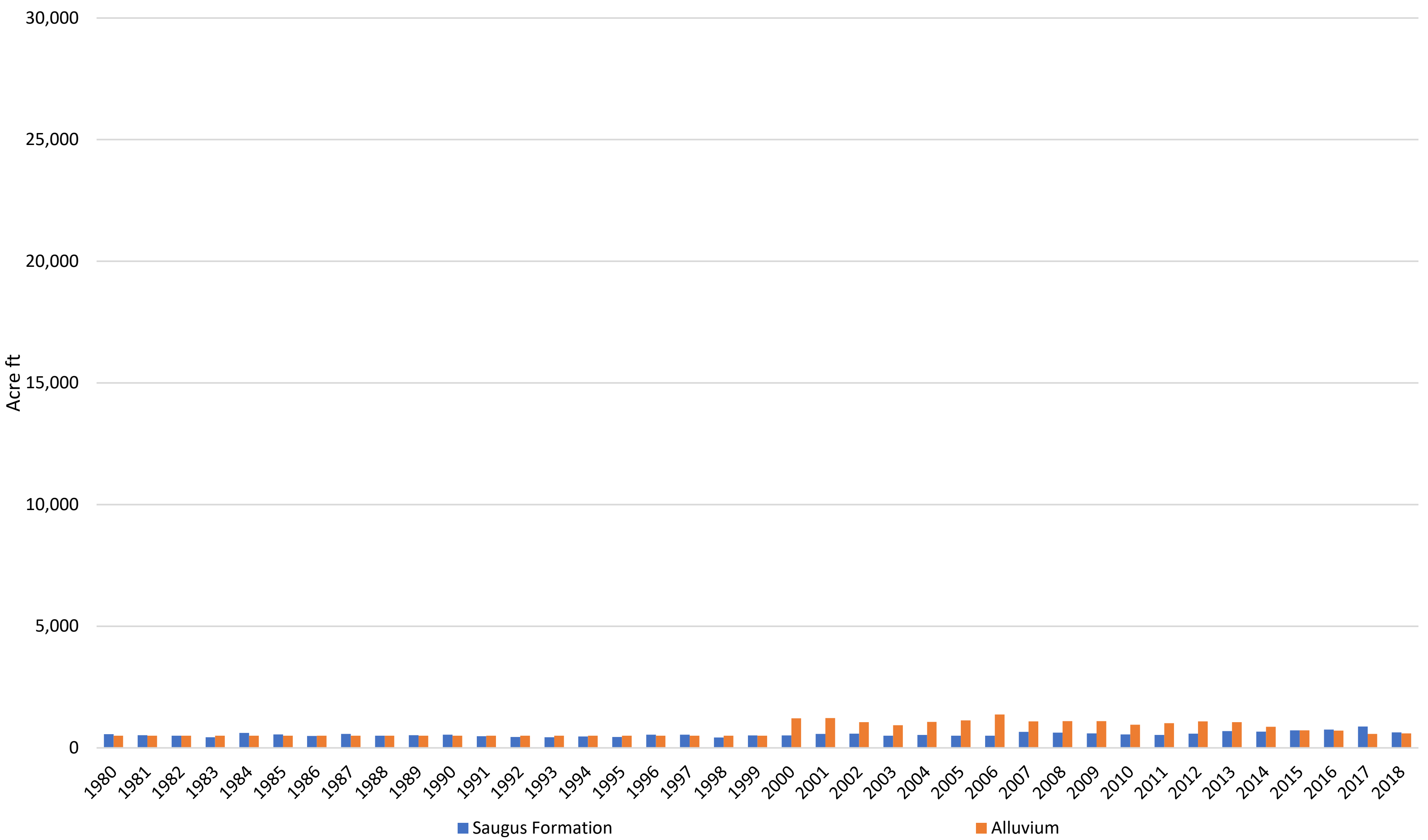
Groundwater quality concentration data are expressed in terms of milligrams per liter (mg/L) or parts per million (ppm) and also micrograms per liter (µg/L) or parts per billion (ppb). Historical and recent concentrations are compared to MCL and secondary maximum contaminant level (SMCL) that are based on California Division of Drinking Water (DDW) and U.S. Environmental Protection Agency standards. These are generalized standards for drinking water, which are set to protect public health. Groundwater quality concentrations are also compared to water quality objectives (WQOs) as set by the Los Angeles Regional Water Quality Control Board (LARWQCB) that are site specific based on location conditions. WQOs have been set by the LARWQCB for the Alluvial Aquifer but not for the Saugus Formation. The SNMP identifies WQOs for TDS, chloride, and nitrate, but state that further analysis is necessary to establish meaningful WQOs (GSSI, 2016).

Water quality concentration graphs for TDS, chloride, nitrate, and sulfate are presented in Appendix C, the *Hydrogeologic Conceptual Model: Groundwater Conditions in the Santa Clara River Valley Groundwater Basin, East Subbasin* (Appendix B of that report). Data through 2018 are included in the individual concentration graphs. A summary of groundwater quality data for each principal aquifer is presented below.

5.1.8.1 Groundwater Quality – Alluvial Aquifer

Total Dissolved Solids

The amount of dissolved solids or salts in water is represented by TDS. Water quality in terms of TDS has been described in the Water Report prepared for SCV Water for about 20 years. Groundwater quality conditions in the Alluvial Aquifer are described for the different zones shown in Figure 5-7. DDW recommends an SMCL for TDS of 500 mg/L, with an upper limit of 1000 mg/L and a short-term limit of 1,500 mg/L. In addition to the SMCL, the WQO values range between 700 and 1,000 mg/L.



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Private Domestic Groundwater Use

Santa Clara River Valley East Subbasin
Groundwater Sustainability Plan

Figure 5-17

In the Mint Canyon and Above Saugus WRP areas (see Figure 5-18), TDS concentrations show a long-term stable trend over the past 30 years except for well VWD-U4 that has shown an increasing trend overall with concentrations above the WQO. Concentrations in this well have decreased over the past 3 years.

In Bouquet Canyon, TDS concentrations show long-term stable trends over the past 30 years with minimal variation and may be correlated with periods of flow in Bouquet Canyon Creek (see Figure 5-18). TDS concentrations in Bouquet Canyon have ranged from approximately 400 to almost 900 mg/L historically. In 2018, TDS concentrations exceeded the historical range with a value of 910 mg/L in one of the wells in this area while another well was within the range. The WQO for Bouquet Canyon is 700 mg/L. The SNMP found that the average TDS concentration for this area was 710 mg/L, slightly above the WQO.

TDS concentrations in the western areas of the Basin exhibited similar patterns and responses to wet and dry periods as those observed in the eastern portions of the Valley (see Figure 5-19). TDS concentrations in San Francisquito Canyon and Below Saugus WRP areas historically have ranged from approximately 300 to 1,100 mg/L. In 2018, TDS concentrations were within historical ranges and ranged from approximately 580 to 960 mg/L. The WQO for San Francisquito Canyon and Below Saugus WRP is 700 mg/L.

In the Castaic Valley and Below Valencia WRP areas, TDS concentrations have historically ranged between 300 to 1,100 mg/L (see Figure 5-19). At times, variations in TDS concentrations appear to be related to wet and dry periods along with discharge from Castaic Lake. In 2018, there was only one analysis for TDS with a concentration of 460 mg/L, which is within the historical range. The WQO for the Castaic Valley and Below Valencia WRP areas is 1000 mg/L. The SNMP found that the average TDS in this area was 727 mg/L.

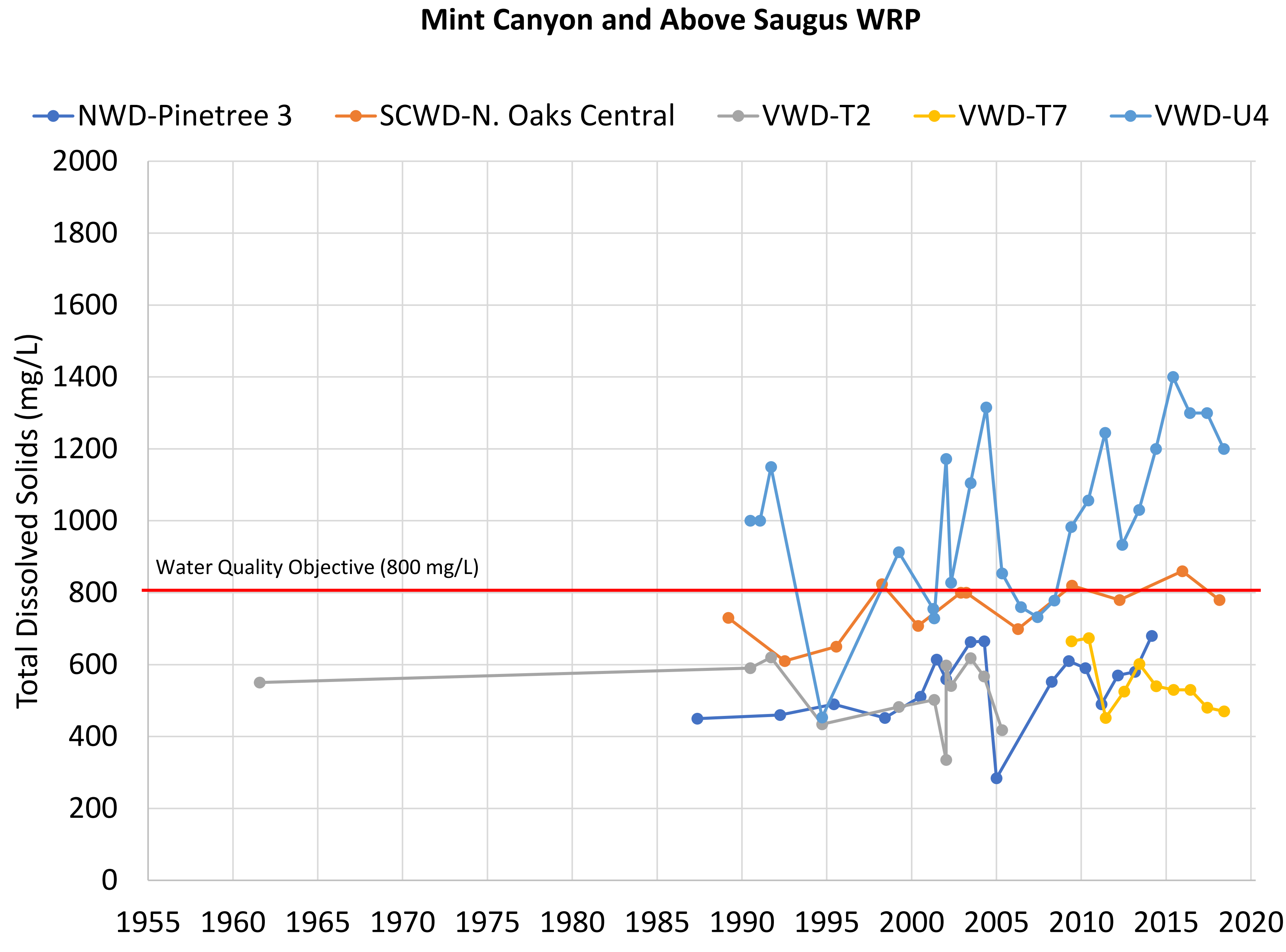
Box and Whisker plots illustrating summary statistics for TDS measured in wells located in each area are shown in Figure 5-20. This figure is based on data collected from 1990 through 2018. The largest range of values and highest concentration occurred in the Above Saugus WRP area. The Below Valencia WRP area displayed the smallest range but also the highest median value. Castaic Valley has the lowest median TDS concentrations. Below Saugus WRP, Bouquet Canyon, and Mint Canyon all exhibited similar distributions of TDS concentrations.

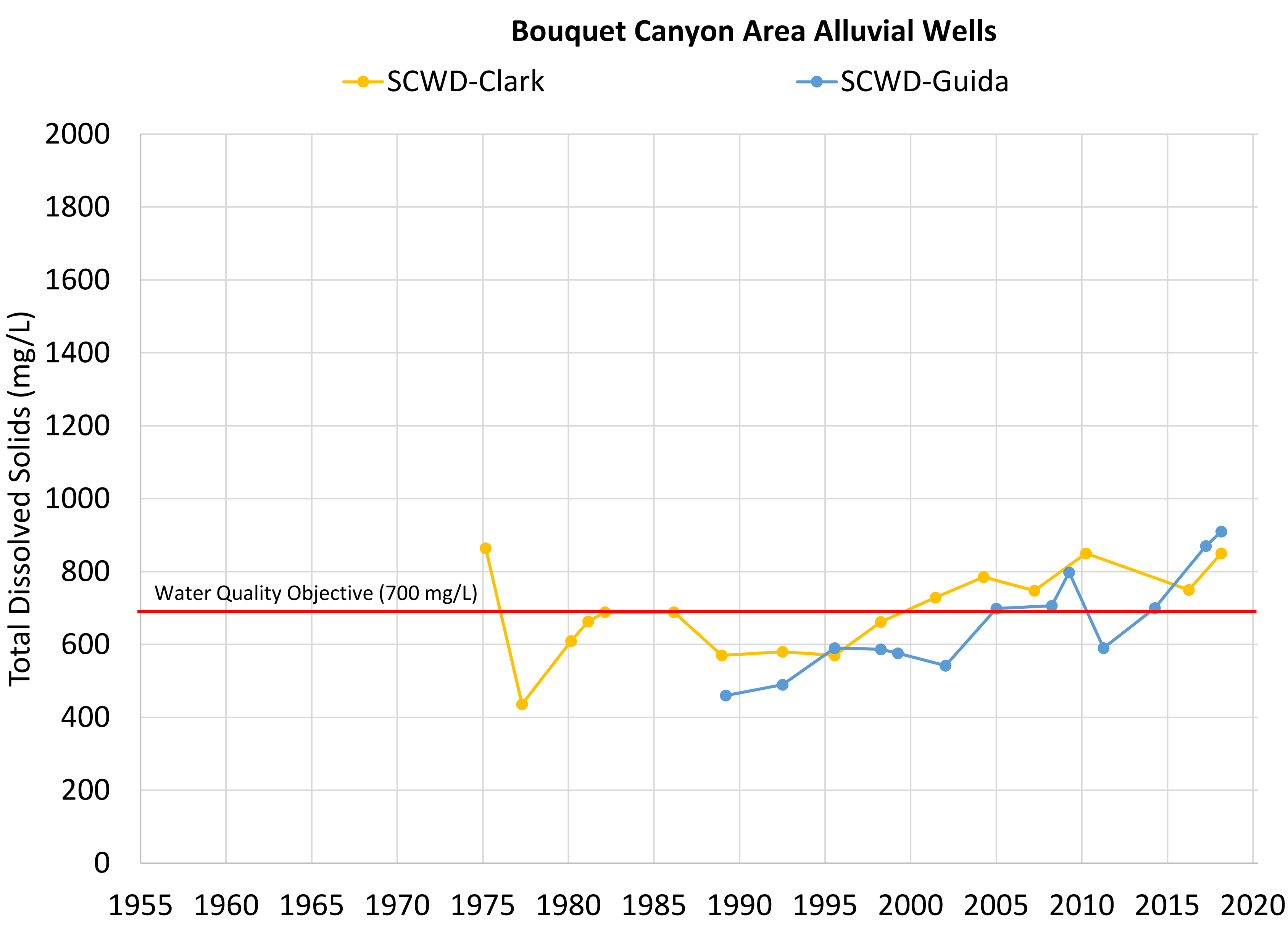
Long-term groundwater quality monitoring data for TDS shows a consistent pattern of meeting drinking water standards, although it appears to be intermittently affected by wet and dry cycles. This supports the conclusion that the Alluvial Aquifer remains a viable ongoing water supply source in terms of groundwater quality even with short-term exceedances of water quality standards in a few of the wells.

Chloride

Chloride is a naturally occurring inorganic salt, but higher concentrations in groundwater can be associated with anthropogenic activities such as urban runoff or discharge of recycled water (GSSI, 2016). High concentrations result in a salty taste when used for drinking water. The SCML for chloride recommended by DDW is 250 mg/L, with and upper limit of 500 mg/L and a short-term limit of 600 mg/L. The WQOs for chloride range from 100 to 150 mg/L.

Chloride concentrations in the Mint Canyon and Above Saugus WRP areas have historically ranged from 17 to 160 mg/L. Values in 2018 were between 46 and 120 mg/L (see Figure 5-21). Concentrations have increased and decreased over time likely due to wet and dry conditions. WQO for this area is 150 mg/L and all representative wells are currently below this level. The SNMP found that the average concentration for the Mint Canyon and Above Saugus WRP area was 89 mg/L and 72 mg/L, respectively.





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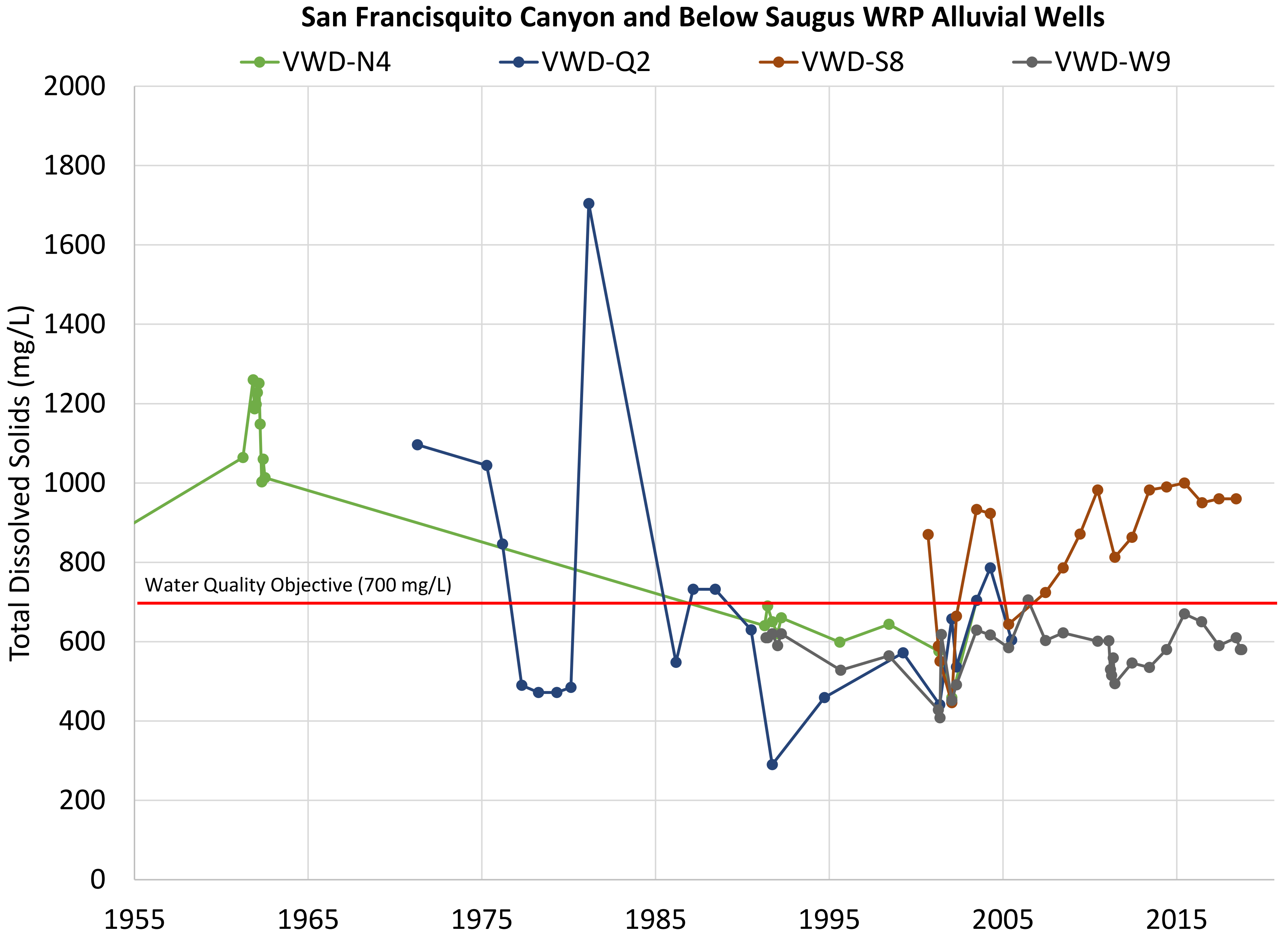
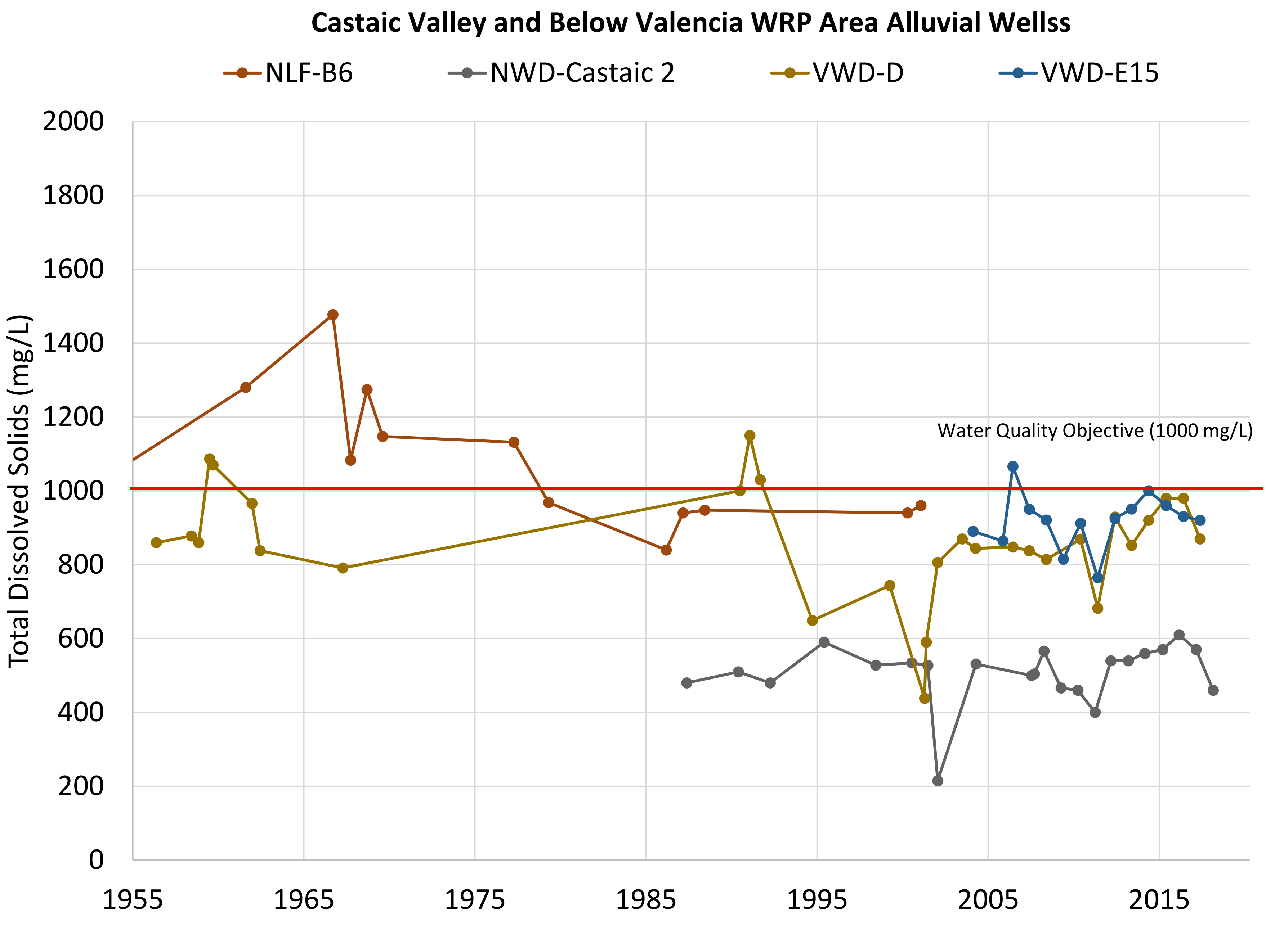
Groundwater Quality in Eastern Alluvial Wells

Santa Clara River East Subbasin Groundwater Sustainability Plan

Figure 5-18





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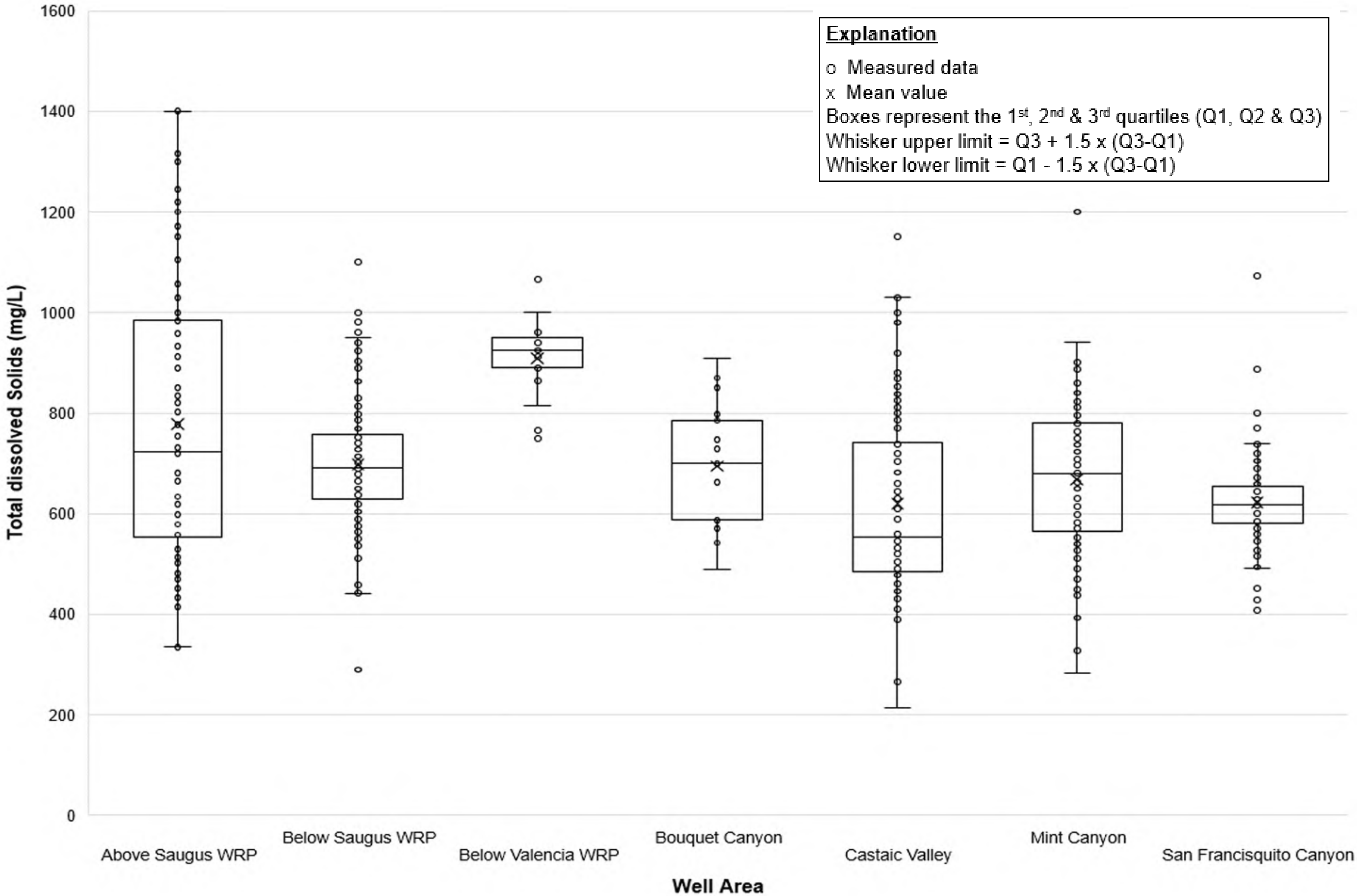
Groundwater Quality in Western Alluvial Wells

Santa Clara River East Subbasin
Groundwater Sustainability Plan

Figure 5-19



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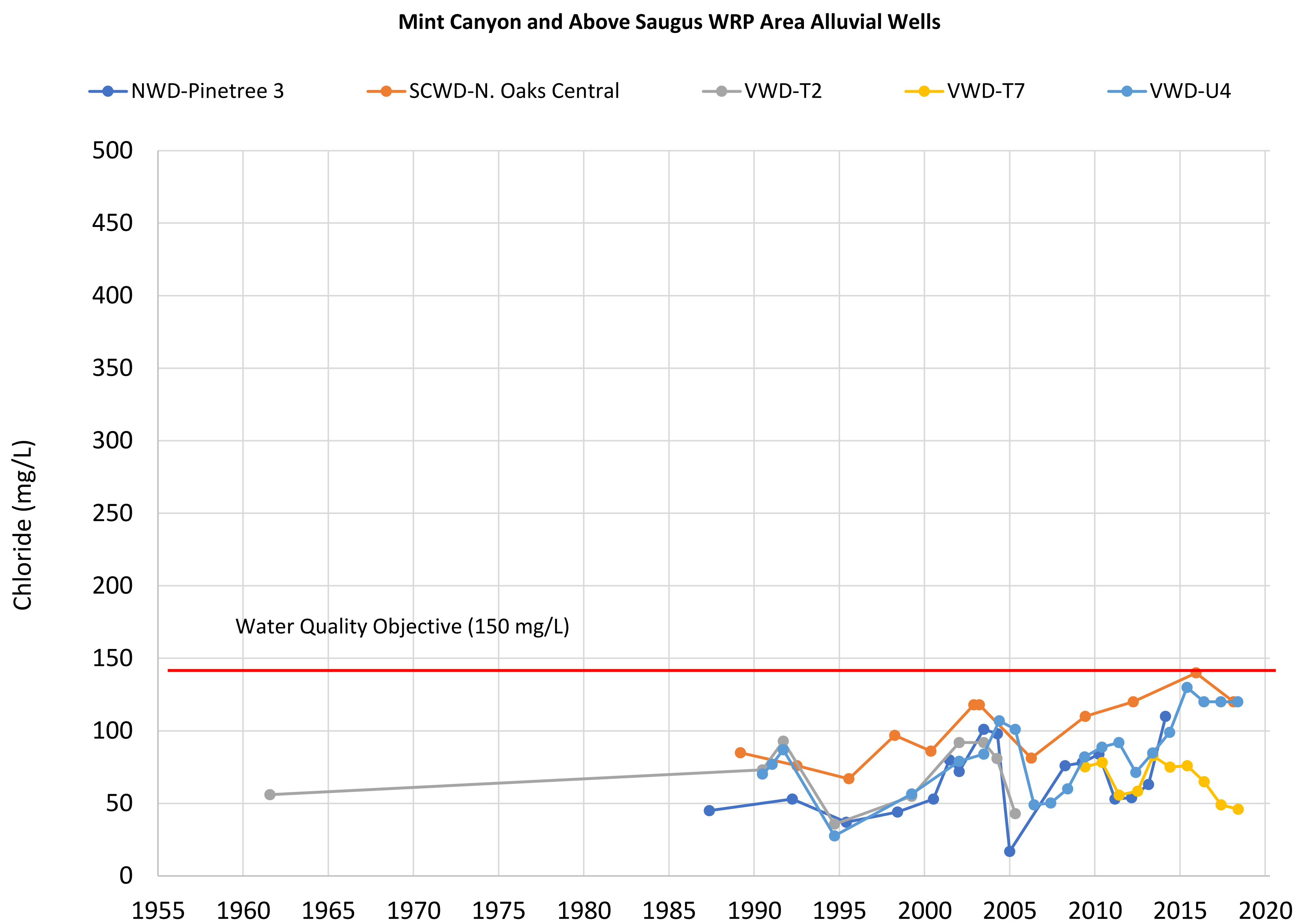
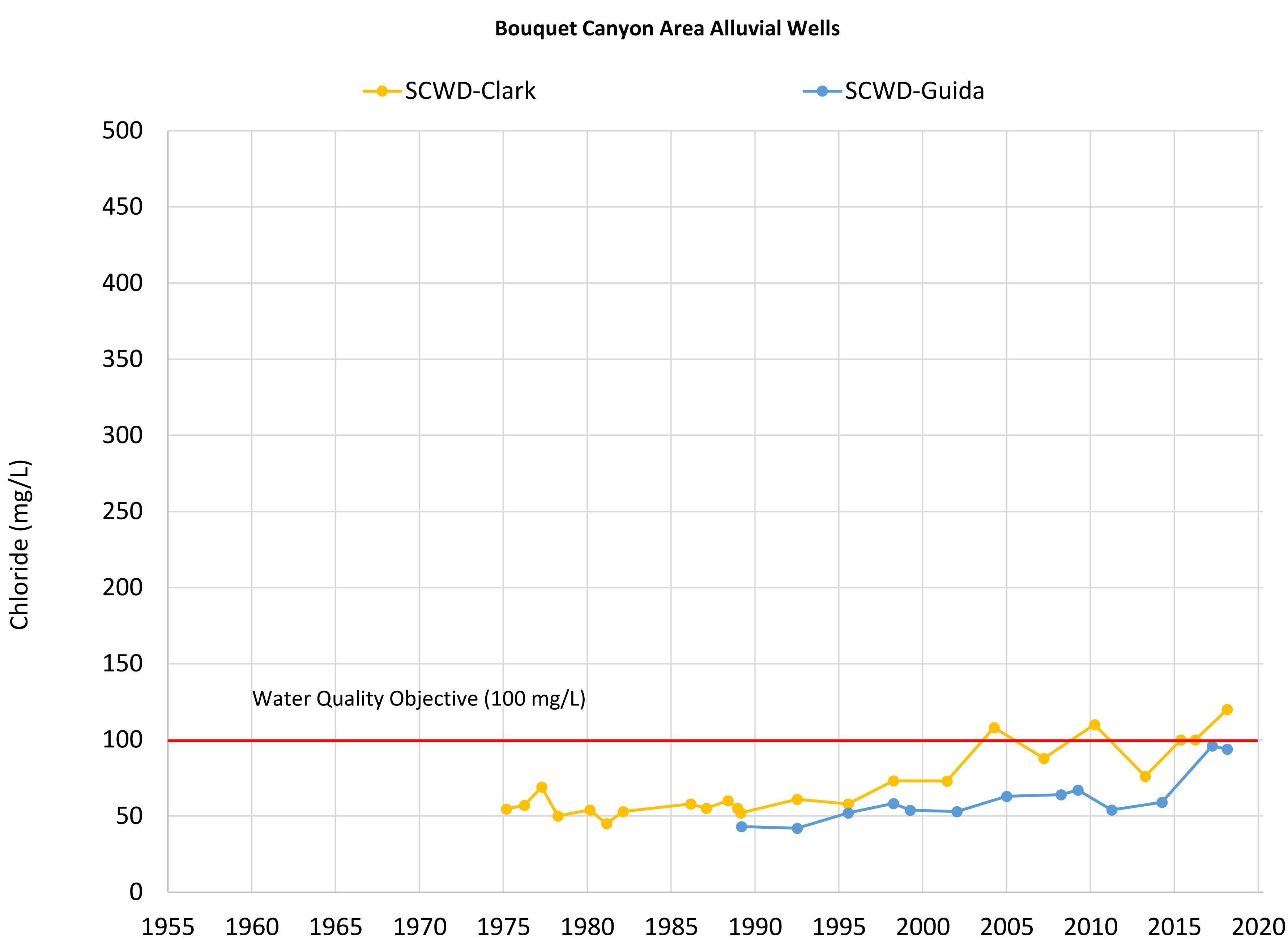
Alluvial Aquifer TDS Box and Whisker Plot

Santa Clara River East Subbasin
Groundwater Sustainability Plan

Figure 5-20





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Groundwater Quality in Eastern Alluvial Wells
Chloride

Santa Clara River East Subbasin
Groundwater Sustainability Plan

Figure 5-21

Chloride concentrations in the Bouquet Canyon have ranged between 40 and 120 mg/L (see Figure 5-21). Values in 2018 were between 94 and 120 mg/L. Historical data is available since the mid 1970's where chloride concentrations are generally stable and below the WQO of 100 mg/L. The SNMP found that the average concentration for this area is 77 mg/L.

Chloride concentrations in the San Francisquito Canyon and Below Saugus WRP areas range from 36 to 130 mg/L, with 2018 values between 62 and 130 mg/L (see Figure 5-22). Similar to other alluvial areas, chloride concentrations are stable but with a small increase in recent years. WQO for this area is 100 mg/L. The SNMP found that the average concentration for this area is 77 mg/L.

In the Castaic Valley and Below Valencia WRP Areas, chloride concentrations have ranged between 55 and 180 mg/L with a single 2018 measurement at 97 mg/L (see Figure 5-22). There has been a slight upward trend in chloride concentrations since the mid-1990s.

Chloride concentrations across the Alluvial Aquifer are presented statistically as Whisker plots in Figure 5-23. Chloride concentrations in the Above Saugus, Below Valencia, and Castaic Valley all have similar distributions. The highest median value occurred in the Below Valencia area and the lowest in the San Francisquito Canyon. The SNMP found that the average concentration for this area was 77 mg/L.

Nitrate

Nitrate is a compound that is associated with agricultural activities, septic systems, confined animal facilities, landscape fertilization, and water treatment facilities. Consumption of water with high concentrations of nitrate can have adverse health effects, specifically for infants under the age of six months who can develop methemoglobinemia or blue baby syndrome (SWRCB, 2017a). The MCL and the WQO objectives for each of the management areas for nitrate concentration is 45 mg/L (GSSI, 2016).

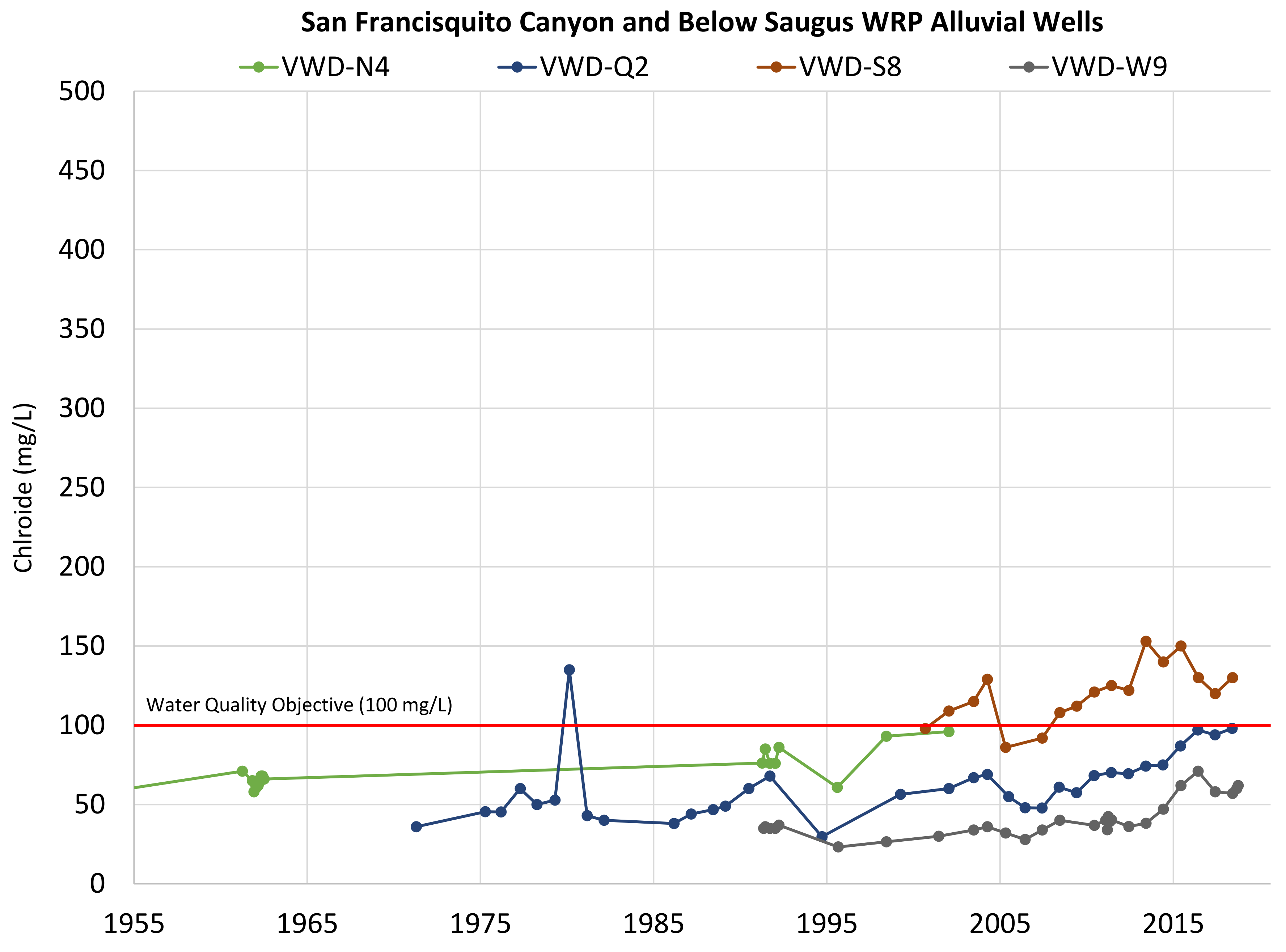
In the Mint Canyon and Above Saugus WRP areas, nitrate concentrations have ranged between non-detect (ND) and 38 mg/L. There is no apparent trend of increasing nitrate concentration in the Mint Canyon and Above Saugus WRP areas (see Figure 5-24). The average concentration identified in the SNMP for the Mint Canyon and Above Saugus WRP area were 20 and 21 mg/L, respectively.

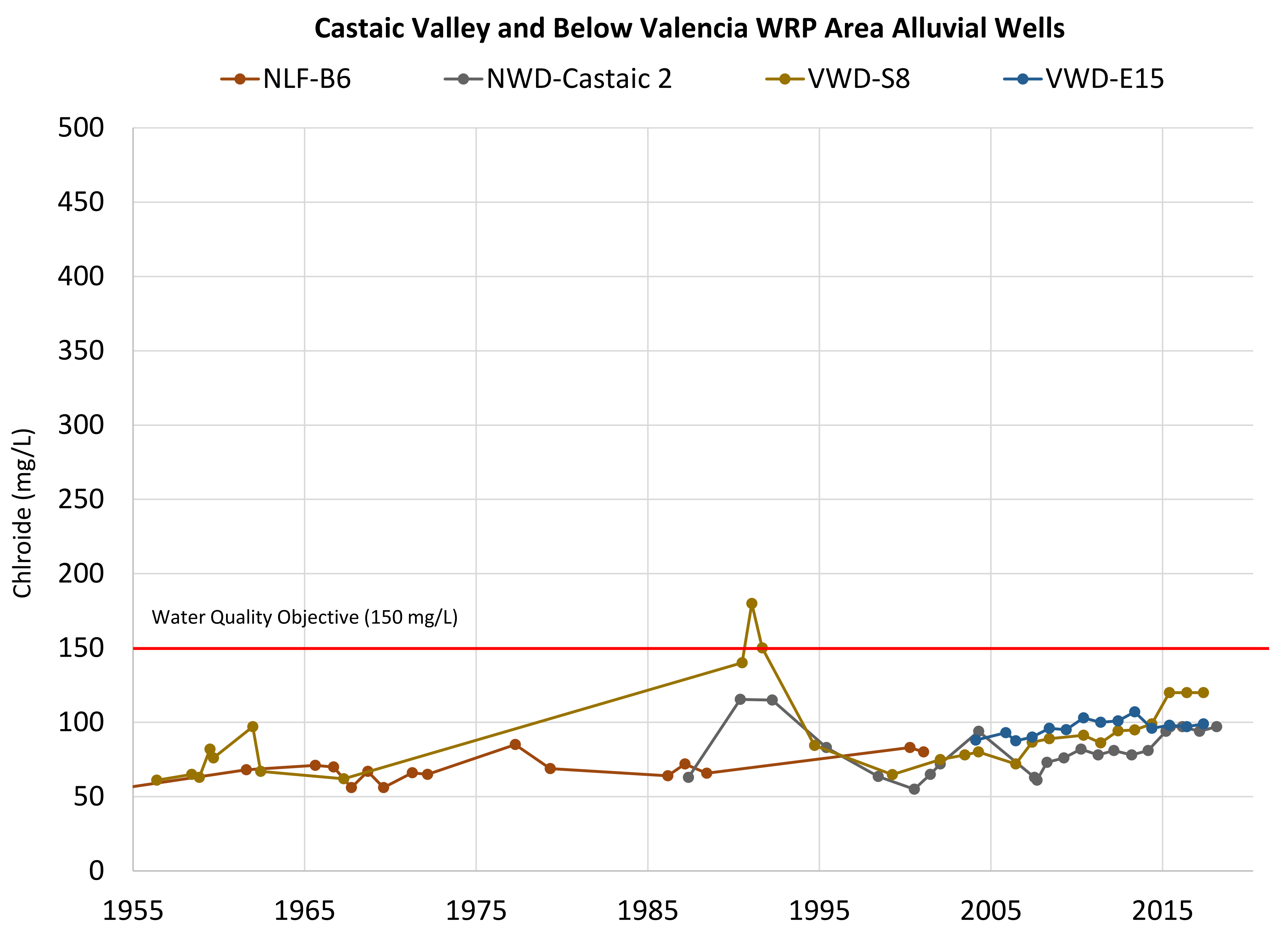
Nitrate concentrations in the Bouquet Canyon Area have ranged from 3 to 34 mg/L. Values have not shown any increasing trend over time (see Figure 5-24). Average concentration identified in the SNMP for this area was 16 mg/L.

Nitrate concentrations in the San Francisquito Canyon and the Below Saugus WRP area have ranged from ND to 50 mg/L. This area has exhibited a wide range of values dating back to the mid 1950's but has not shown any increasing trend over time (see Figure 5-25). Average concentration identified in the SNMP for this area was 16 mg/L.

In the Castaic Valley and Below Valencia WRP areas, nitrate concentrations have ranged from ND to 36 mg/L with the highest concentration occurring in the 1950's. There has not been an increasing trend in nitrate concentrations (see Figure 5-25). Average concentration identified in the SNMP for this area was 8 mg/L.

Figure 5-26 includes Box and Whisker plots representing the statistical distribution of nitrate concentrations across the Alluvial Aquifer that includes data from 1990 to present. Median concentrations are all well below the MCL and WQO of 45 mg/L. The lowest median value is in Castaic area while the highest is the Below Saugus WRP area.





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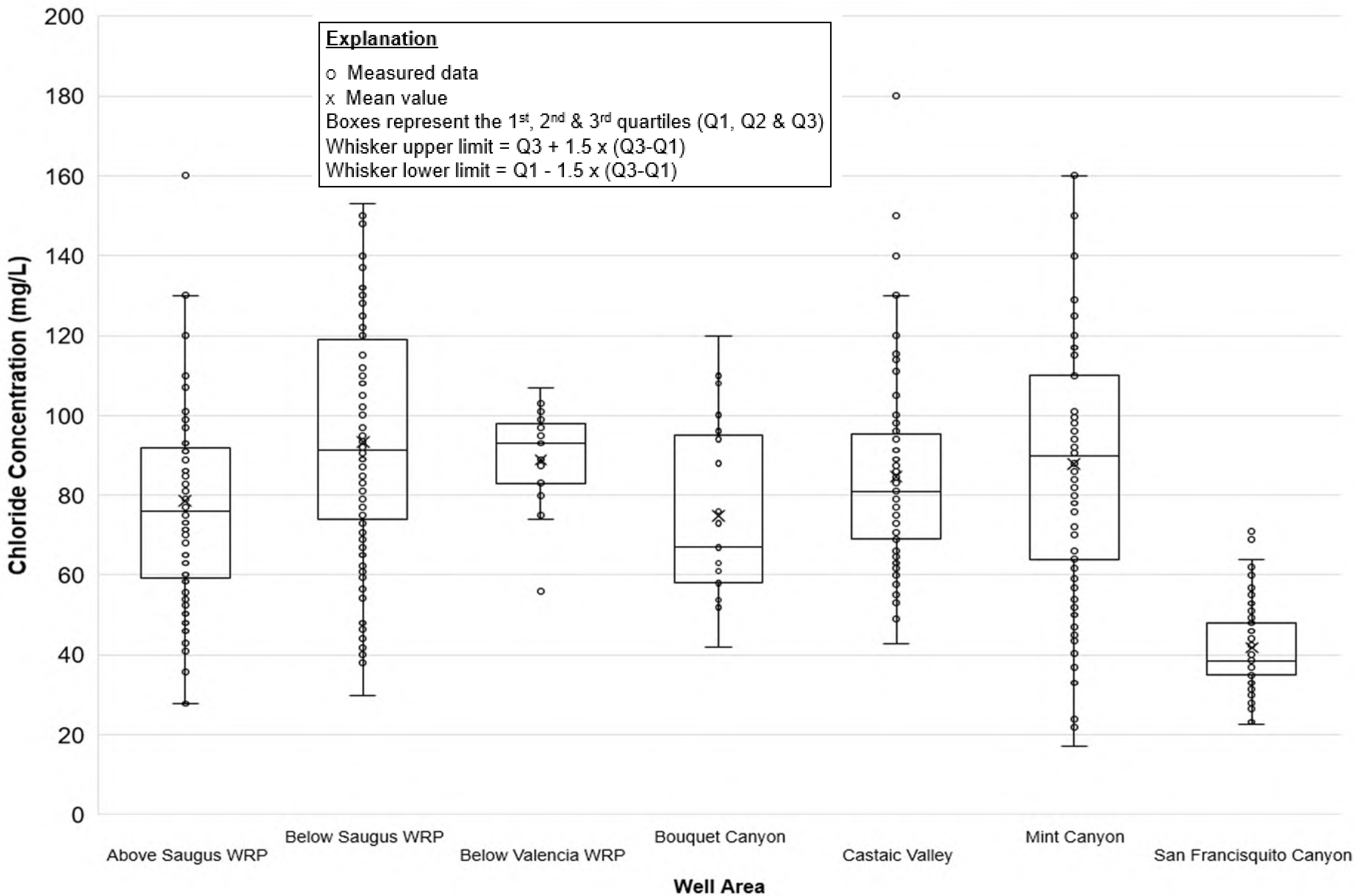
Groundwater Quality in Western Alluvial Wells
Chloride

Santa Clara River East Subbasin
Groundwater Sustainability Plan

Figure 5-22



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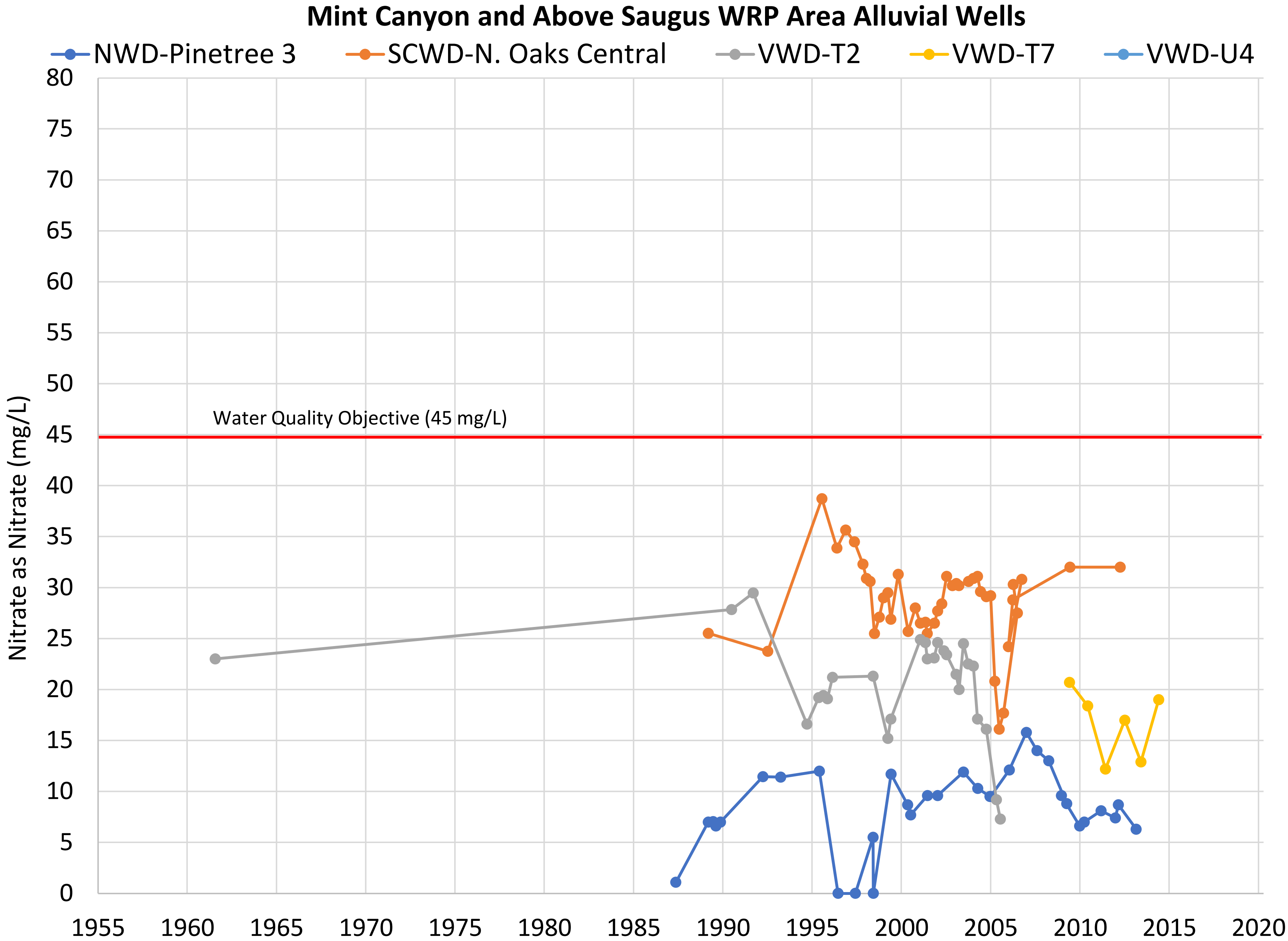
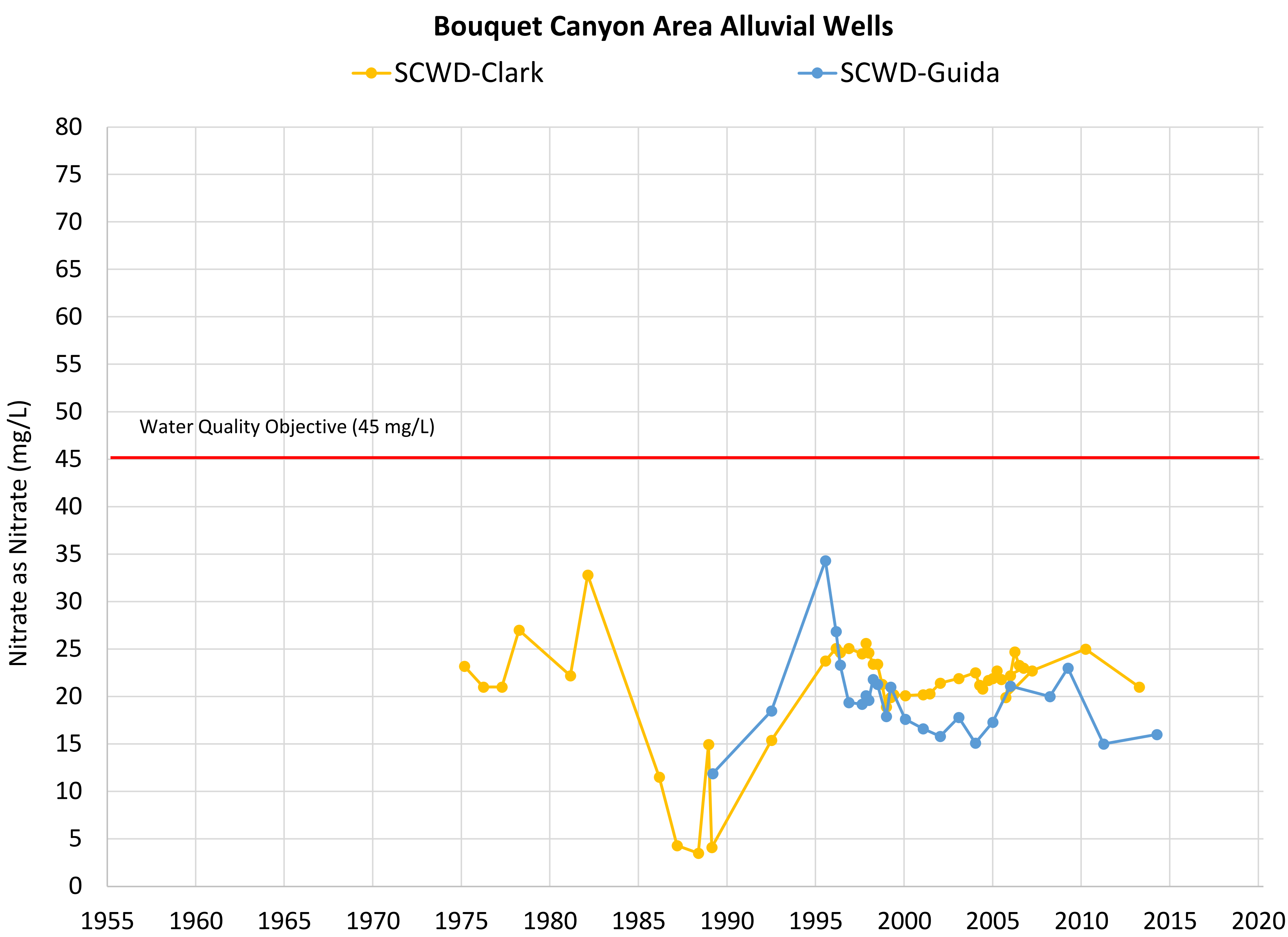
Alluvial Aquifer Chloride Box and Whisker Plot

Santa Clara River East Subbasin
Groundwater Sustainability Plan

Figure 5-23





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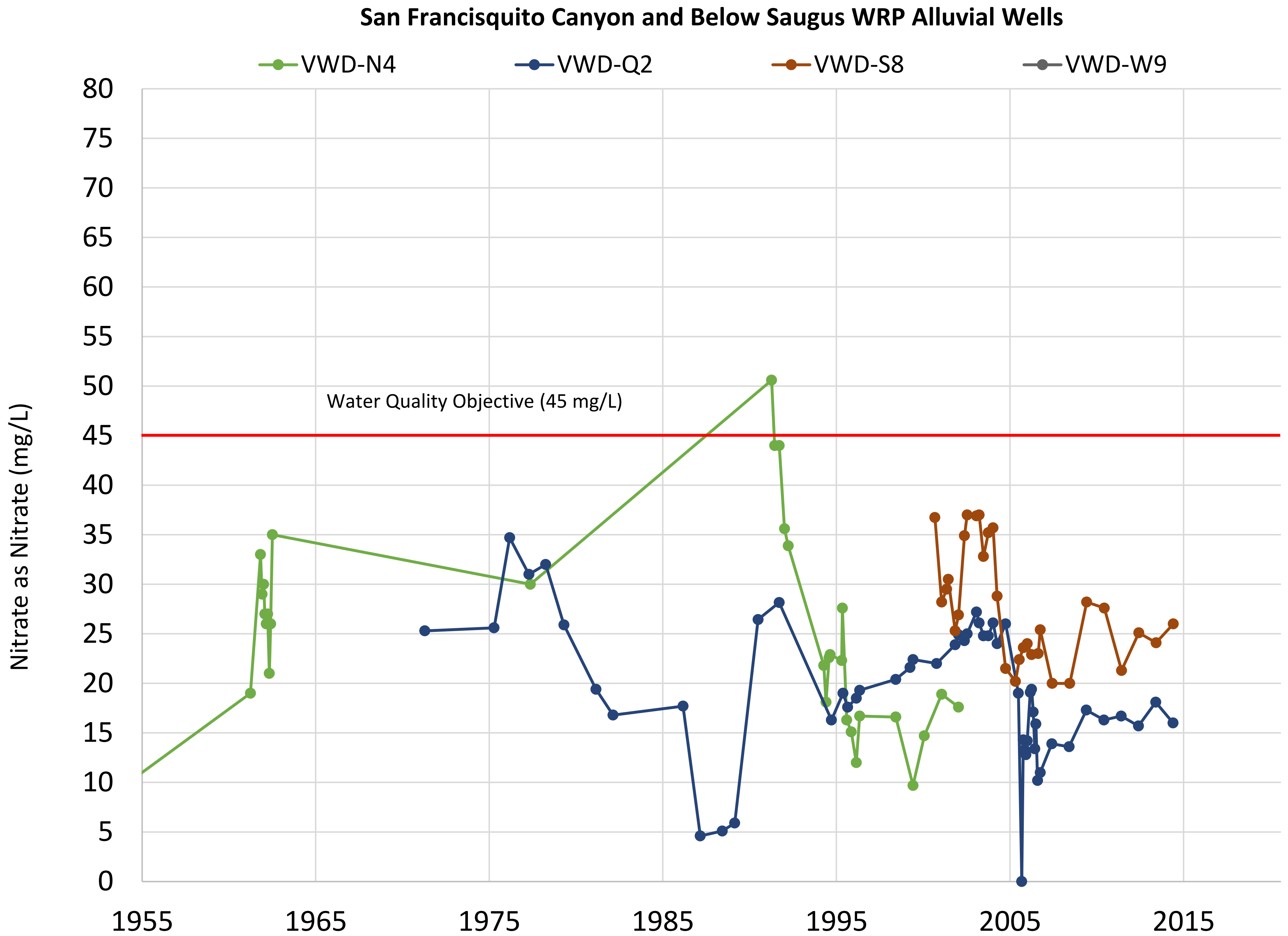
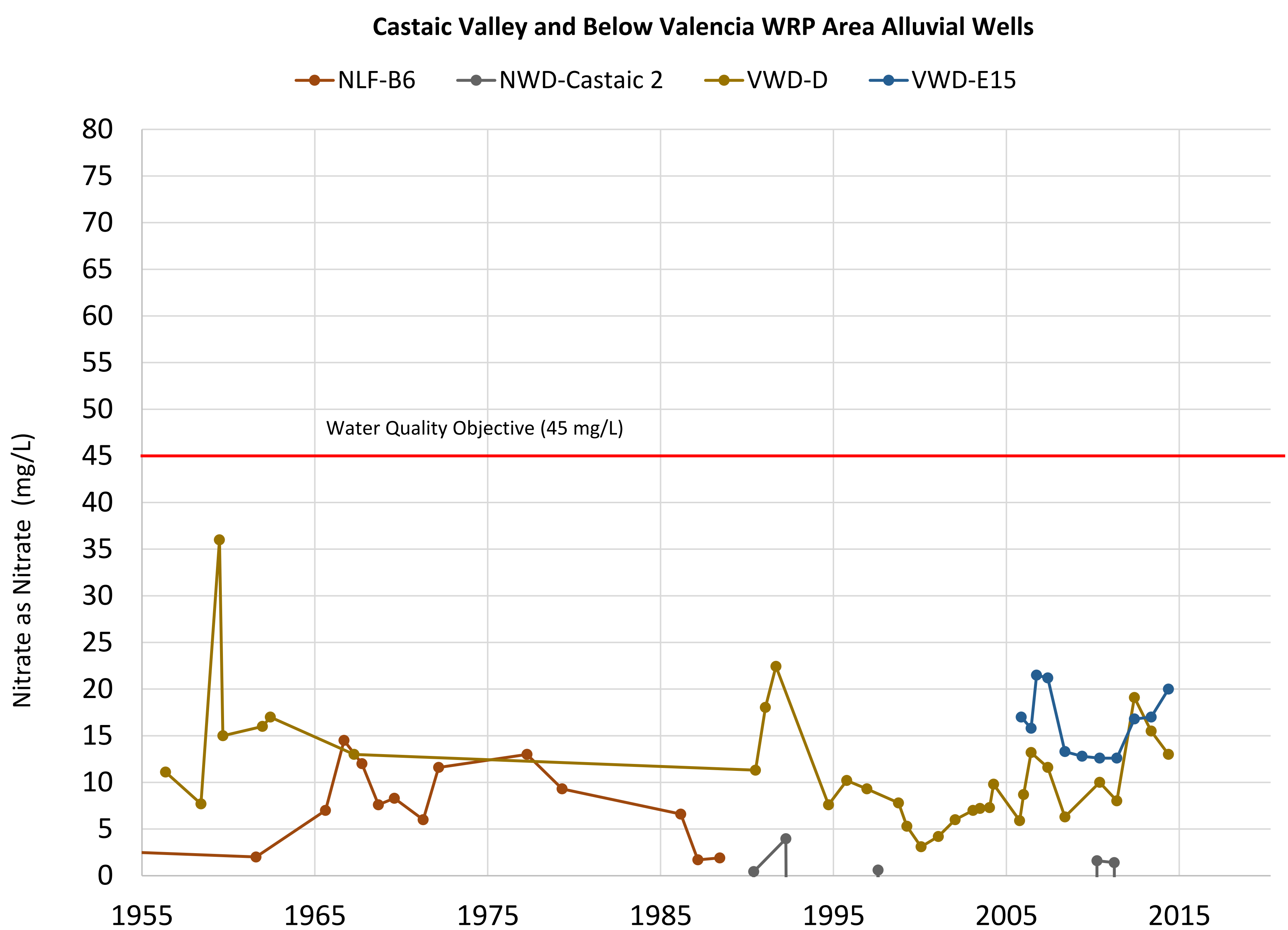
Groundwater Quality in Eastern Alluvial Wells
Nitrate

Santa Clara River East Subbasin
Groundwater Sustainability Plan

Figure 5-24





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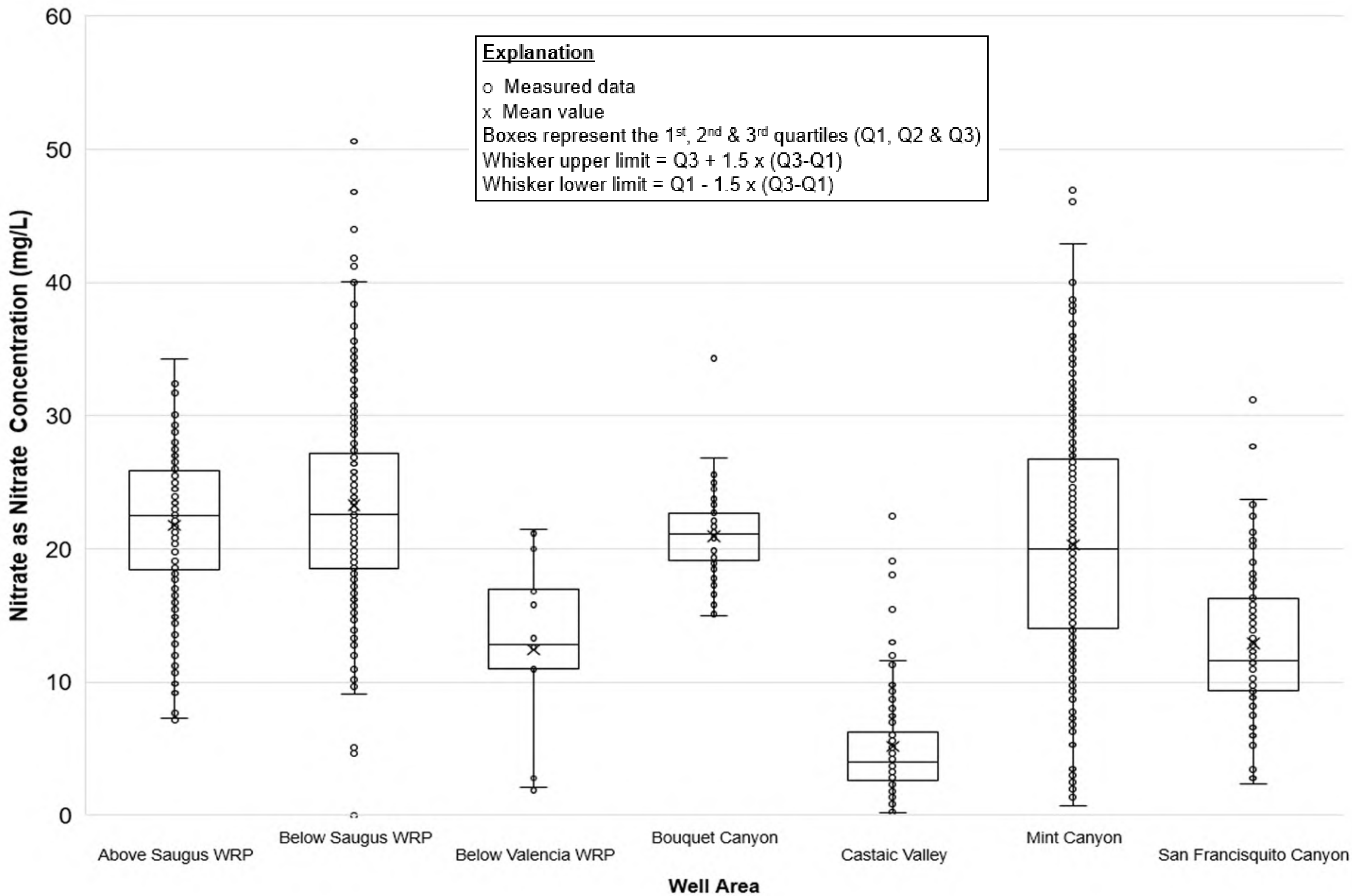
Groundwater Quality in Western Alluvial Wells
Nitrate

Santa Clara River East Subbasin
Groundwater Sustainability Plan

Figure 5-25



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Alluvial Aquifer Nitrate Box and Whisker Plot

Santa Clara River East Subbasin
Groundwater Sustainability Plan

Figure 5-26

Sulfate

Sulfate is naturally occurring in groundwater and can occur as a result as runoff from natural geological deposits and from industrial waste. Consumption of sulfate in high concentrations can have a laxative effect (WHO, 2004). The SMCL is 250 mg/L with an upper limit of 500 mg/L and a short-term limit of 600 mg/L. The WQOs for the Alluvial Aquifer range from 150 to 350 mg/L (GSSI, 2016).

In the Mint Canyon and Above Saugus WRP areas, sulfate concentrations have historically ranged between 34 and 538 mg/L (see Figure 5-27). In the set of wells shown on Figure 5-27, all wells except VWD-U4 exhibit a similar steady trend with values less than the WQO of 150 mg/L and no long-term increasing trend. VWD-U4 has shown a very wide range of sulfate concentrations with values exceeding the WQO and SMCL. The last available measurement for this well was in 2014 with a concentration of 440 mg/L. 2018 values were between 78 and 140 mg/L, which were measured at VWD-T7 and SCWD-N. Oaks Central, respectively (see Figure 5-27). VWD-U4 has had sulfate concentrations as high as 500 mg/L. The last measurement for this well was in 2014 with a concentration of 440 mg/L. The average concentration identified in the SNMP for the Mint Canyon and Above Saugus WRP area was 138 and 269 mg/L, respectively.

In the Bouquet Canyon area, sulfate concentrations have historically ranged from 89 and 260 mg/L. Values have shown little variation over time with a gradual increasing trend. 2018 values were 210 and 260 mg/L measured at SCWD-Clark and SCWD-Guida (see Figure 5-27). The WQO for this area is 250 mg/L. The average concentration identified in the SNMP for this area was 189 mg/L.

In the San Francisquito Canyon and Below Saugus WRP areas, sulfate concentrations have historically ranged between 46 and 506 mg/L. The highest value occurred in the early 1960s. Since the early 1990's values have been consistent in this area, showing a gradual increasing trend. In 2018, sulfate concentrations were between 160 and 300 mg/L (see Figure 5-28). The WQO for this area is 250 mg/L. The average concentration identified in the SNMP for this area was 189 mg/L.

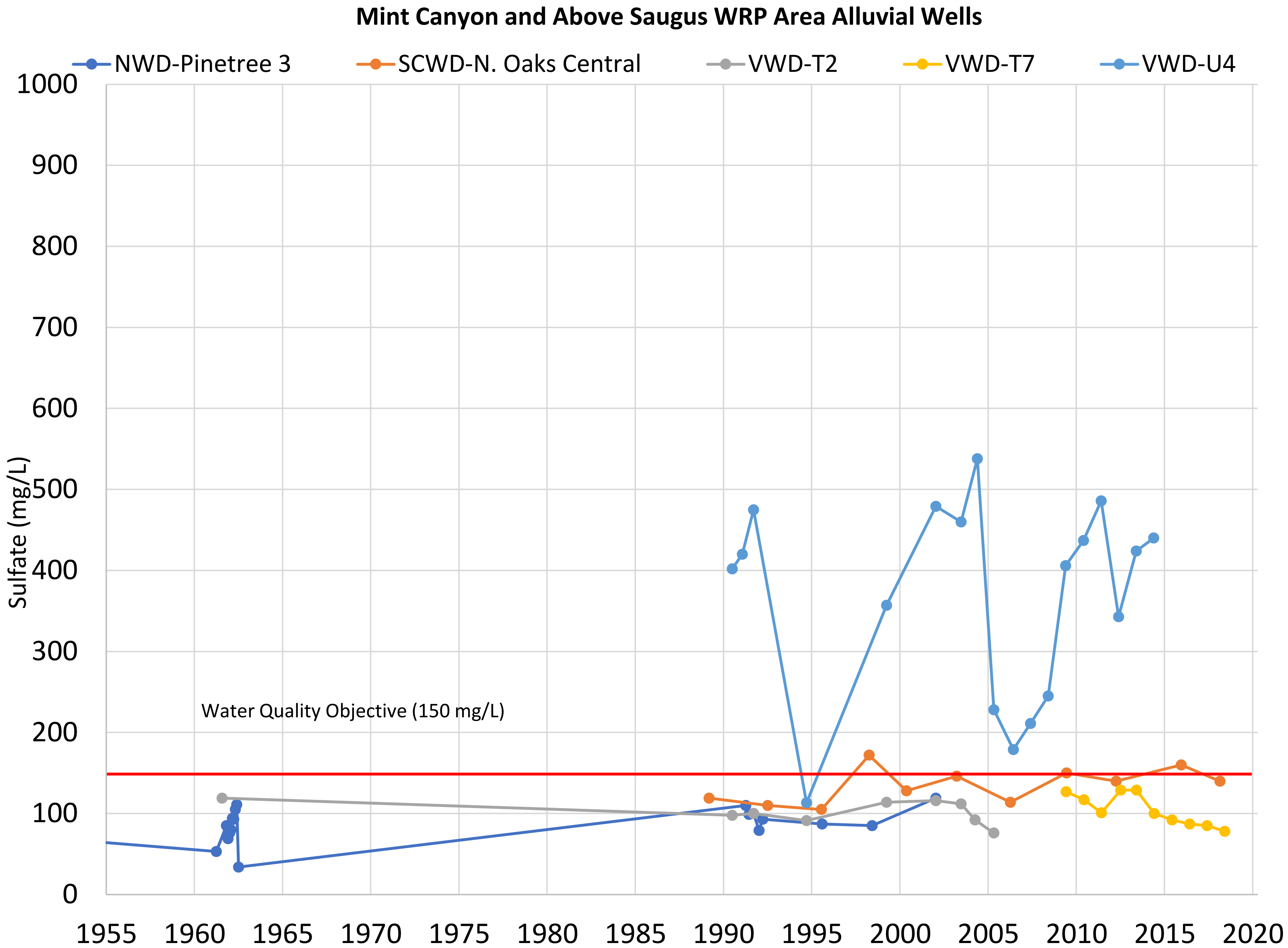
In the Castaic Valley and Below Valencia WRP areas, sulfate concentrations have historically ranged between 89 and 606 mg/L (see Figure 5-28). The historical high value occurred in the late 1960's with the historical low occurring in 2018. Wells in the area have exhibited a decreasing trend of sulfate concentration. The WQO for this area is 350 mg/L. The average concentration identified in the SNMP for this area was 246 mg/L.

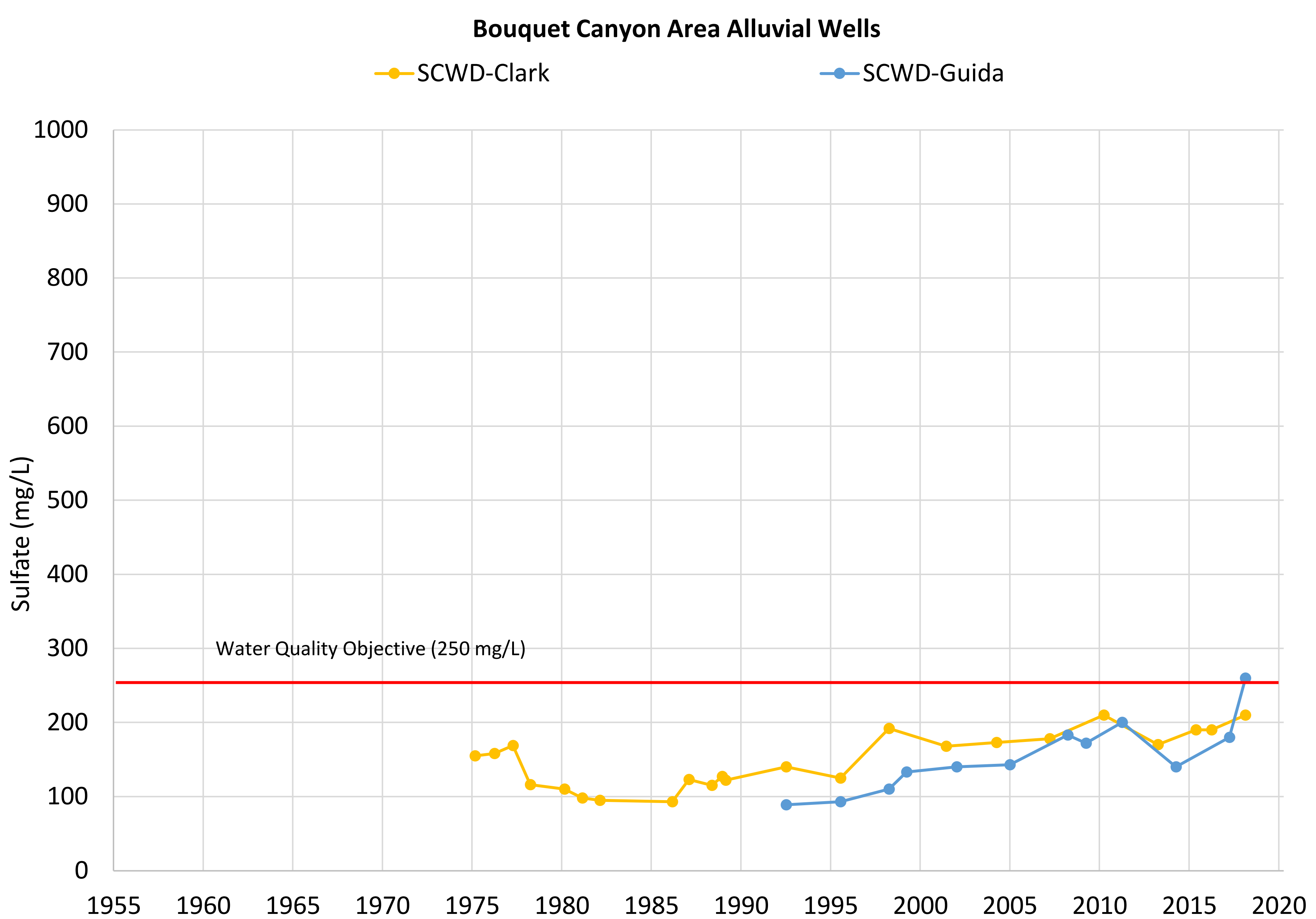
Figure 5-29 is a Box and Whisker plot that presents the distribution of sulfate concentrations across the Alluvial Aquifer with data from 1990 to present. The greatest variation occurs in the Above Saugus WRP area with the highest median value in the Below Valencia WRP area.

5.1.8.2 Groundwater Quality – Saugus Formation

Total Dissolved Solids

TDS concentrations for wells in the Saugus Formation are illustrated in Figure 5-30. Beginning in 2000, several wells within the Saugus Formation have exhibited an increase in TDS concentrations, similar to short-term changes in the Alluvial Aquifer, possibly as a result of decreased recharge to the Saugus Formation from the Alluvial Aquifer. From 2006 through about 2010, TDS concentrations had been steadily declining, followed by an increase through 2016 and a slight decrease in 2017/2018. TDS concentrations in the Saugus Formation remain within the range of historical concentrations and below the SMCL upper level. The WQO for the Saugus Formation is 700 mg/L. (GSSI, 2016). The average concentration identified in the SNMP was 636 mg/L. Groundwater quality within the Saugus Formation will continue to be monitored to ensure that the long-term viability of the Saugus Formation as a component of overall water supply is preserved.





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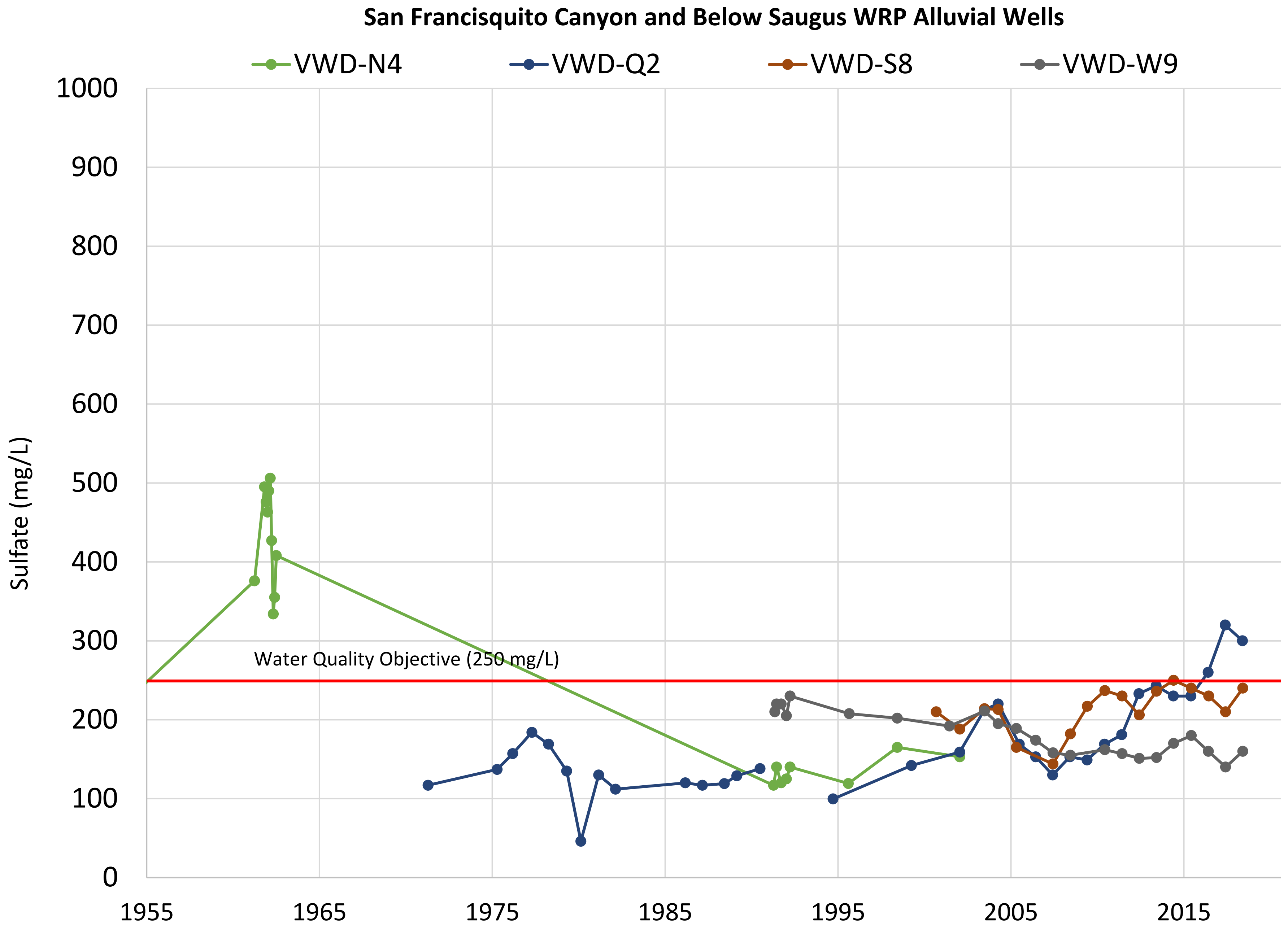
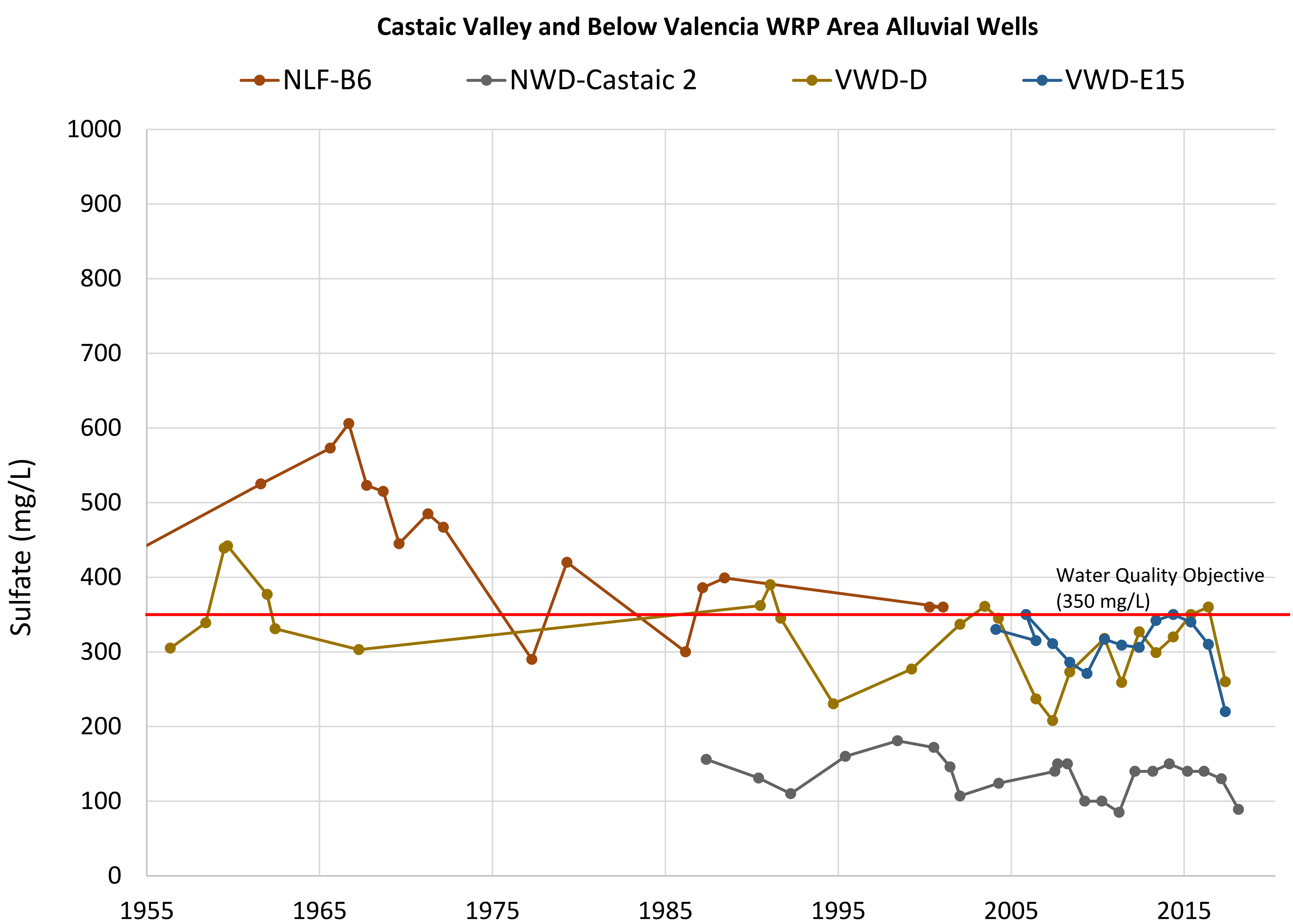
Groundwater Quality in Eastern Alluvial Wells
Sulfate

Santa Clara River East Subbasin
Groundwater Sustainability Plan

Figure 5-27





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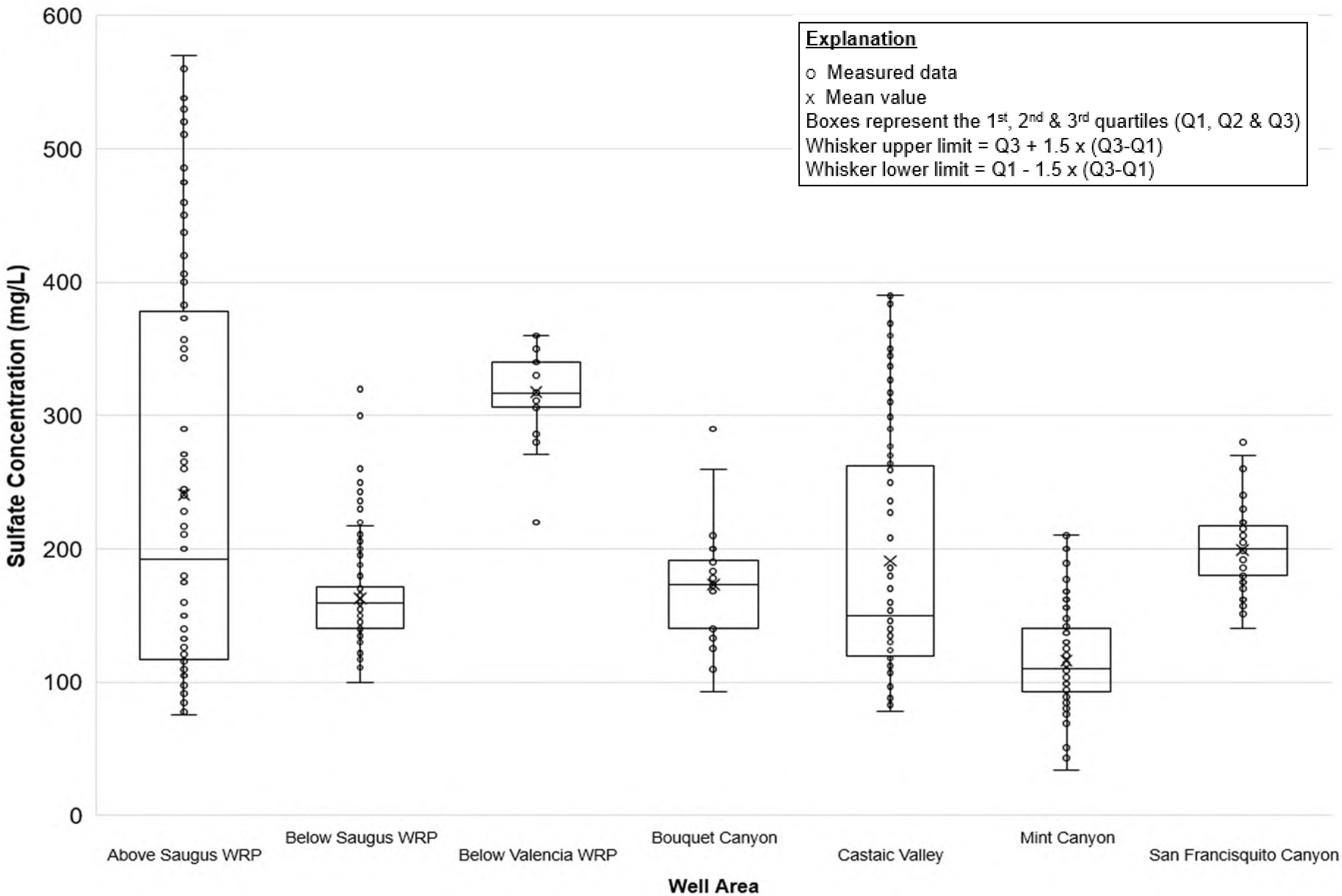
Groundwater Quality in Western Alluvial Wells
Sulfate

Santa Clara River East Subbasin
Groundwater Sustainability Plan

Figure 5-28



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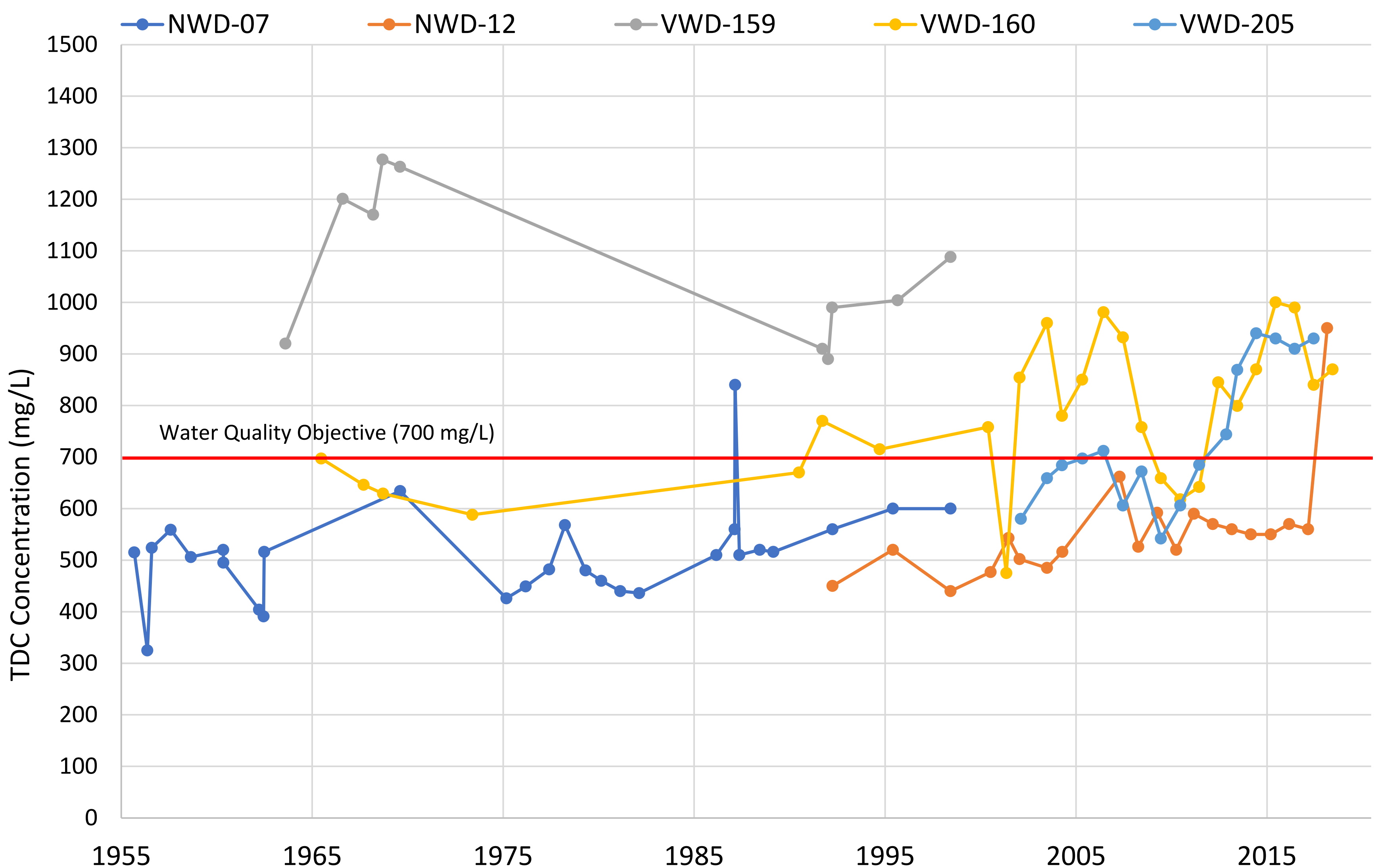
Alluvial Aquifer Sulfate Box and Whisker Plot

Santa Clara River East Subbasin
Groundwater Sustainability Plan

Figure 5-29



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Saugus Formation TDS Concentrations

Santa Clara River East Subbasin
Groundwater Sustainability Plan

Figure 5-30

Chloride

Chloride concentrations for representative wells are presented in Figure 5-31. Historical chloride concentrations have ranged between 17 and 420 mg/L. Chloride concentration in the Saugus Formation have been stable for the past 50 years. The WQO for chloride in the Saugus Formation is 100 mg/L. The average concentration identified in the SNMP was 28 mg/L.

Nitrate

Nitrate concentrations for representative wells are presented in Figure 5-32. Nitrate concentrations in the Saugus Formation have ranged from ND to 28 mg/L. Values have historically been stable but have shown higher concentrations in recent years, but are still well below the WQO of 45 mg/L. The average concentration identified in the SNMP was 14 mg/L.

Sulfate

Sulfate concentrations for representative wells are presented in Figure 5-33. Historical sulfate concentrations have ranged from 80 to 730 mg/L. The highest concentrations have been observed in VWD-159, which has not been sampled since 1998. Sulfate concentrations in some wells completed in the Saugus Formation exceed the federal SMCL of 250 mg/L. Overall, sulfate concentrations have exhibited an increasing trend in recent years. The high sulfate in the Saugus Formation is mostly likely due to naturally occurring minerals present in the rock. The average concentration identified in the SNMP was 235 mg/L. A WQO for sulfate in the Saugus Formation is not identified in the SNMP.

5.1.8.3 Groundwater Constituents of Concern (Anthropogenic) in the Alluvium and Saugus Formation

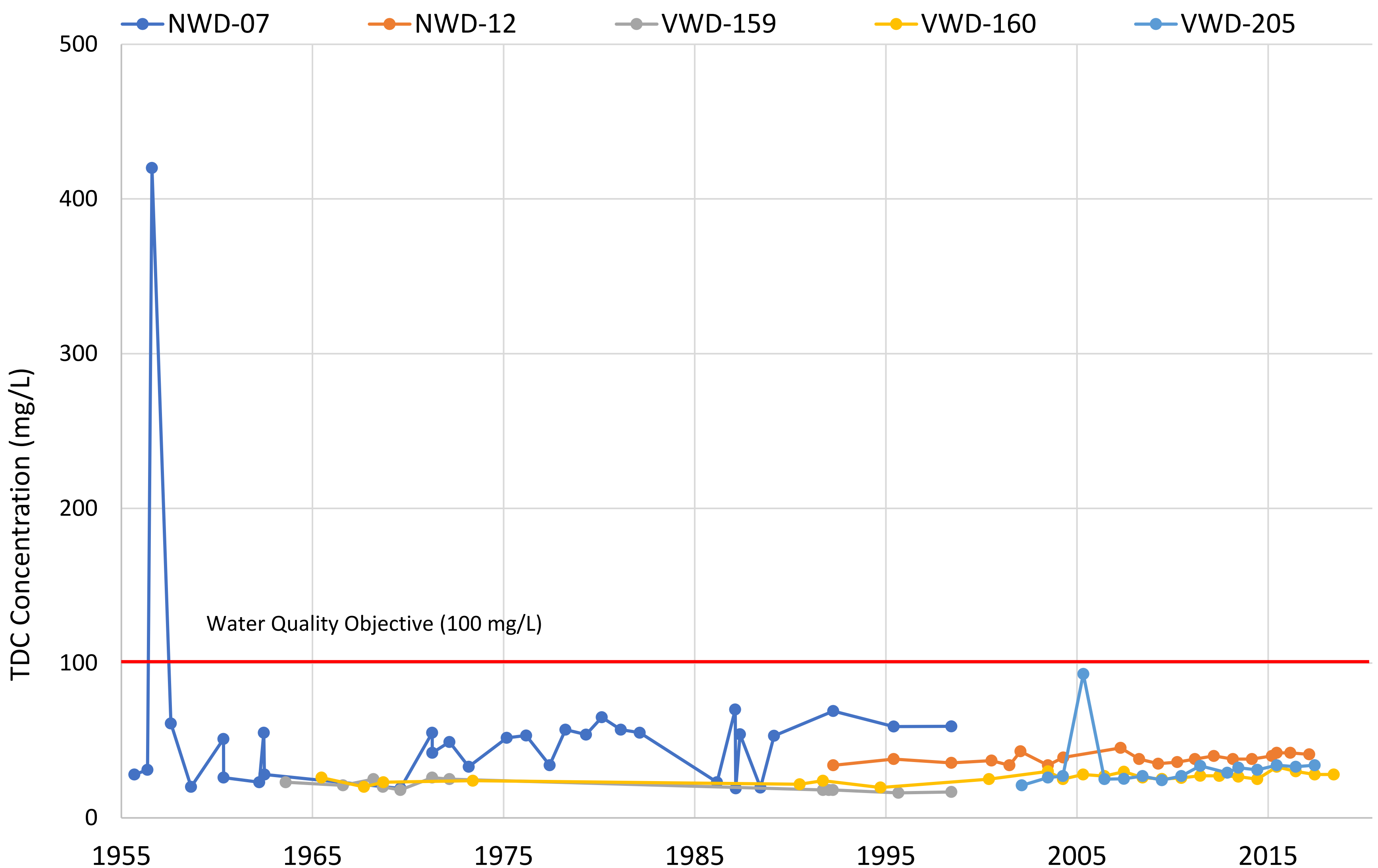
Groundwater COCs that have been measured in the Alluvial Aquifer and Saugus Formation include perchlorate, per- and PFAS, and VOCs such as TCE, and PCE. These contaminants have been identified in previous studies and are currently monitored under other state and federal regulatory programs (LSCE, 2019; GSSI, 2016).

Perchlorate and VOCs

Perchlorate is a regulated substance that is commonly used in propellants for rockets, missiles, and fireworks. Consumption of groundwater with high concentrations of perchlorate can result in issues with the thyroid gland (EPA, 2014). There have been several detections in the Basin, both in the Alluvial Aquifer and in the Saugus Formation. Perchlorate was first detected in the Basin in 1997 and since has been detected in a total of eight wells. Wellhead treatment systems have been built for four Saugus Formation production wells operated by SCV Water, with oversight from the California Department of Toxic Substances Control (LSCE, 2019). Details regarding ongoing and future monitoring of perchlorate concentrations in groundwater are provided in Section 7.2.6.1 of the GSP, along with a map (Figure 7-7) of the property that is the source of perchlorate detections in groundwater.

PCE is a VOC that is commonly associated with dry cleaning and metal degreasing processes. Long-term exposure at levels near the MCL can result in cancer. Other adverse effects include damage to the liver, kidneys, and central nervous system (SWRCB, 2017b). Detections of PCE have primarily occurred in the Alluvial Aquifer, however, the concentrations have been below the MCL.

TCE is a VOC that is primarily associated as a solvent to remove grease from metal parts. Long-term exposure could result in cancer. Exposure can also affect the central nervous system with symptoms such as light-headedness, drowsiness, and headache (SWRCB, 2017c). Detections of TCE have primarily occurred in the Alluvial Aquifer, however, the concentrations have been below the MCL. Table 5-3 presents the number of wells with detections above the reporting limit and MCL for perchlorate and each VOC of interest across the Basin.



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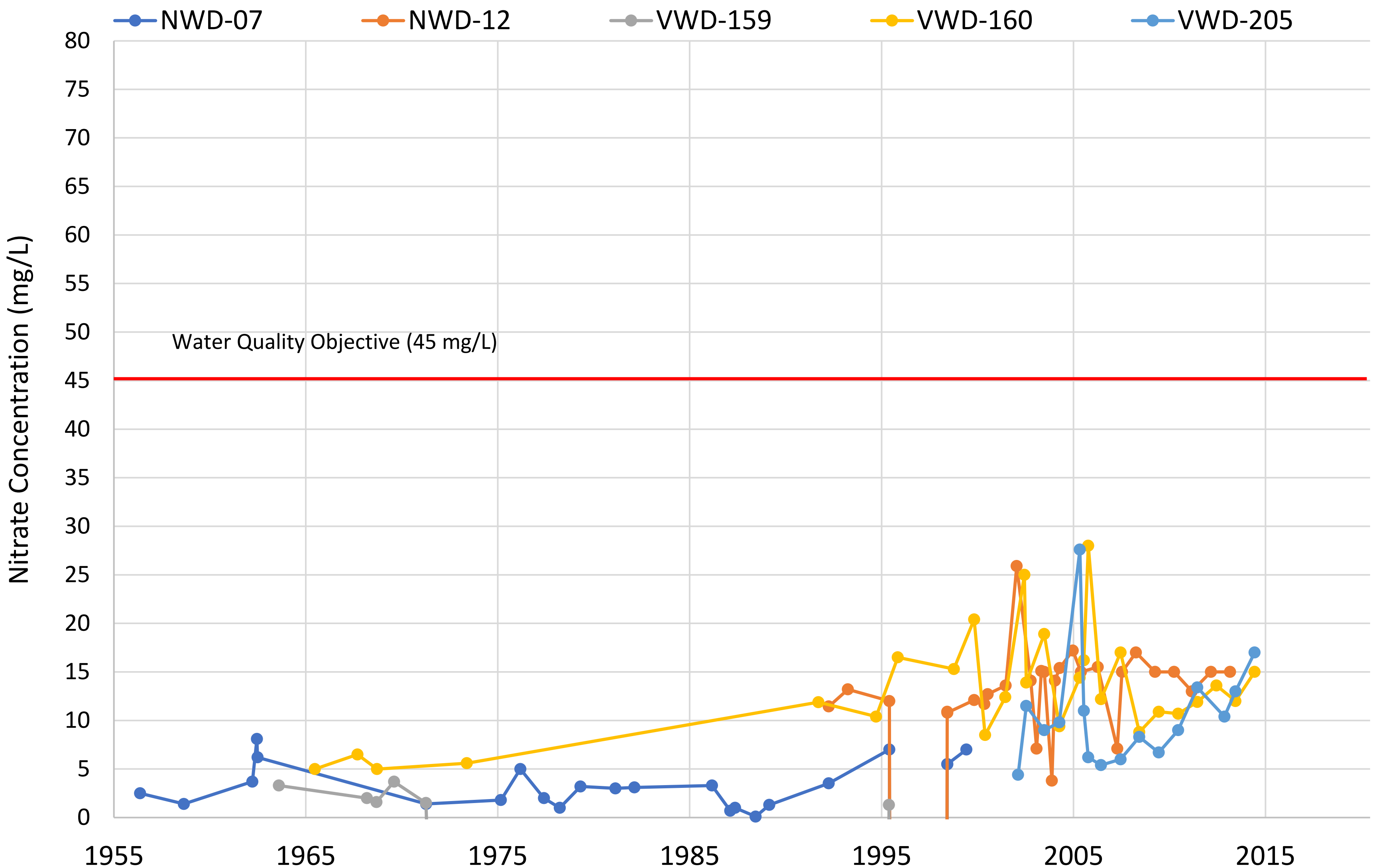
Saugus Formation Chloride Concentrations

Santa Clara River East Subbasin
Groundwater Sustainability Plan

Figure 5-31



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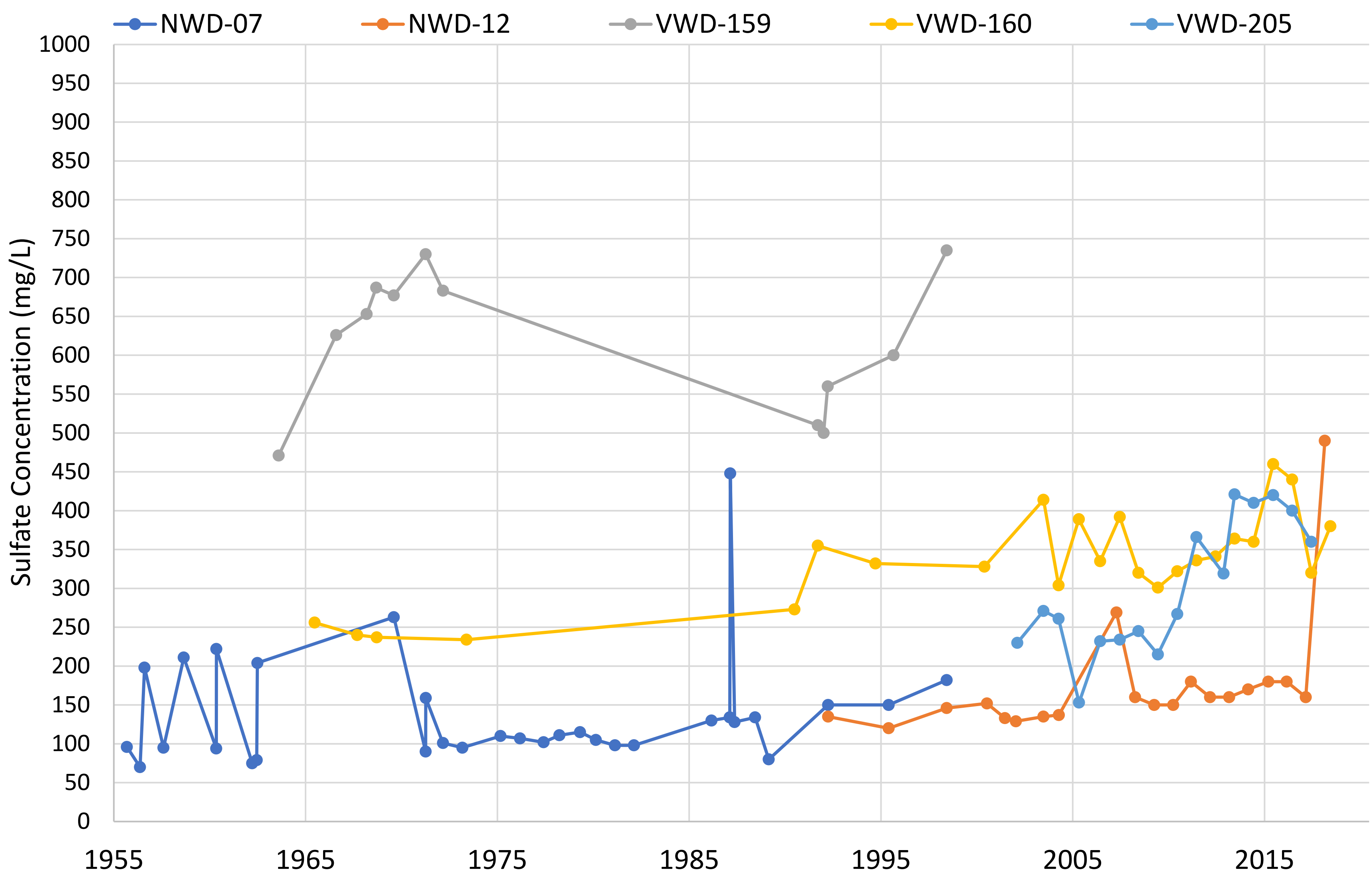
Saugus Formation Nitrate Concentrations

Santa Clara River East Subbasin
Groundwater Sustainability Plan

Figure 5-32



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Saugus Formation Sulfate Concentrations

Santa Clara River East Subbasin
Groundwater Sustainability Plan

Figure 5-33

Table 5-3. Wells with Perchlorate and VOC Detections

COC	Alluvial Wells with Detections > RL	Saugus Wells Detections > RL	RL	Max Concentration	MCL	Wells with Detections Above MCL	Units
Perchlorate	2	6	4	47	6	7	µg/L
Tetrachloroethylene (PCE)	14	1	0.5	2.6	5	0	µg/L
Trichloroethylene (TCE)	4	6	0.5	4.4	5	0	µg/L

Notes

COC = constituent of concern MCL = maximum contaminant level

RL = reporting limit VOC = volatile organic compound

PFAS

PFAS refers to the larger group of COCs of per- and polyfluoroalkyl substances. Formerly extensively used in firefighting foams, non-stick coatings, cookware, carpets, and furniture, these substances tend to accumulate in groundwater and long-term exposure could potentially affect the immune system, thyroid, liver, and can cause cancer. The most common types of PFAS are perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS). They are a contaminant of emerging concern that are not currently regulated. DDW has identified notification levels for PFAS concentrations that is a precautionary health-based measure for concentrations of chemicals in drinking water that warrant further monitoring and assessment (SWRCB, 2020).

The California Department of Toxic Substances Control and LARWQCB are overseeing the monitoring of and response to detections of constituents of concern exceeding the MCLs. SCV Water is actively addressing the issue with the regulatory agencies and has taken wells out of service that have detections above reporting limits until wellhead treatment systems are deployed.

The following is a SCV Water news release from March 13, 2020:

> *SANTA CLARITA –SCV Water has taken proactive steps to protect public health by voluntarily removing 13 of its groundwater wells from service. This move follows the State Water Resources Control Board – Division of Drinking Water (DDW) Feb. 6, 2020, decision to lower its response level guidelines for two chemicals found in low concentrations in drinking water across the state.*
>
> *Voluntary quarterly sampling of all active wells was done in February, and this action is based on those results for perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS). The Agency did not find more or higher levels of the chemicals, but instead is taking action based on the lowered response levels set by the DDW.*
>
> *The action this week is not related to the COVID-19 virus. The virus is not found in drinking water.*
>
> *Under the new levels, 14 of the 44 agency wells are impacted. This accounts for approximately 34 percent of the Agency's groundwater supply. In 2019, groundwater accounted for just 28% of the total water used in the SCV Water service area. SCV Water will continue to rely on its diverse water supply portfolio, including imported and banked water, to minimize supply impacts to customers.*
>
> *"SCV Water has a diverse and resilient water supply, so this action will not impact the availability of water to our customers," stated Matt Stone, general manager. "However, with some groundwater*

> *wells temporarily offline, it remains important that customers continue to use water efficiently in their homes and on their landscapes.*
>
> *Last month, the DDW lowered its response levels to 10 parts per trillion (ppt) for PFOA and 40 parts per trillion (ppt) for PFOS. The state's previous response level set a combined 70 ppt for PFOA and PFOS. These response levels are some of the most stringent guidelines in the nation, and lower than the Environmental Protection Agency's Lifetime Health Advisory level of 70 ppt. For perspective, one part per trillion would be equal to four grains of sugar in an Olympic-size swimming pool.*
>
> *The updated guidelines are part of DDW's statewide effort to assess the scope of water supply contamination by PFOS and PFOA.*
>
> *"We have three quarters of sampling data we can factor in now, giving us a head start in addressing the new guideline," stated Matt Stone, general manager of SCV Water. "Our top priority is providing clean and reliable water to our customers. We immediately removed one well from service last year when it exceeded the original response level, and we have taken the same actions for the 13 additional wells that exceeded the revised response level."*
>
> *SCV Water is also quickly moving forward with the construction of several water treatment plants to return affected wells back to service. The first PFAS treatment facility has started construction and is expected to be in operation by June of this year, restoring three key wells to service, which provides enough groundwater for 5,000 families. The fast-tracked project is estimated to cost $6 million to build and $600,000 annually to operate. Additional groundwater treatment facilities are in the planning and design phase.*
>
> *"We are committed to clear and timely communication with our customers about all water quality changes and how we plan to address them," said Stone. "Our customers are our top priority, and we are committed to rigorously testing our water thousands of times per year to ensure it meets or surpasses all water-quality standards and is safe for our customers to drink."*
>
> *Per- and polyfluoroalkyl substances (PFAS) are a group of manmade chemicals that are prevalent in the environment and were commonly used in industrial and consumer products to repel grease, moisture, oil, water and stains. Water agencies do not put these chemicals into the water, but over time very small amounts enter the water supplies through manufacturing, wastewater discharge and product use. Exposure to these chemicals may cause adverse health effects.*
>
> *For more information and resources on PFAS, visit yourSCVwater.com/pfas.*

5.2 Groundwater-Surface Water Interaction

This section examines the relationship between groundwater and surface water in the Basin. The goals of this evaluation are as follows:

- Evaluate the relationship between alluvial groundwater levels and surface water flows in the Santa Clara River downstream of the Saugus and Valencia WRPs.
- Understand the principal factors affecting groundwater levels downstream in comparison with other factors.
- Identify where groundwater levels lie relative to the bottom of the river channel (thalweg) as an indication of whether the river is gaining (groundwater discharging into the river) or losing (surface water infiltrating to groundwater) during different climatic conditions.

Section 5.2.1 describes the authors' conceptual understanding of the relationship between the surface water and groundwater in the Basin.

5.2.1 Conceptual Understanding of the Relationship between Groundwater and Surface Water and Effects of Urbanization

The Santa Clara River is the primary surface water drainage feature in the Basin, flowing generally from east to west (see Figure 5-34). The river is interconnected directly with the Alluvial Aquifer, primarily in the western and central portions of the Basin. The river also has an indirect connection with the Saugus Formation in the western portion of the Basin, which is an area where the Saugus Formation is discharging its water into the Alluvial Aquifer, and thereby providing an upwards driving force for groundwater to discharge into the Santa Clara River in certain localized reaches west of I-5 at certain times. Figure 5-35 is a conceptual diagram that illustrates the various components of the hydrologic cycle in the Basin and the relationship between the river, the Alluvial Aquifer, and the Saugus Formation. Rainfall falling in the upper elevations of the watershed infiltrates into the soil, where some of the water evaporates or is transpired by vegetation and the remainder becomes stormwater that can also infiltrate to groundwater. A portion of the rainfall runs off the land surface and flows into side canyons and tributaries to the river. In the urban areas, precipitation falling on impervious surfaces is directed to storm drains that flow to the river or the stormwater is directed to swales and allowed to percolate in some locations.

5.2.1.1 Groundwater Pumping

The history of groundwater pumping in the Basin dates back to at least the 1930s. Groundwater pumping peaked in the 1950s and 1960s, when groundwater was extracted almost exclusively for agricultural operations. Estimated groundwater extraction based on the number of acres of agriculture, typical crops, and growing practices during that period indicate annual demand of approximately 50,000 AFY.

In the late 1960s agricultural operations began to be replaced by urban land uses. Newly built urban uses were served by local water companies that provided only groundwater. As agricultural groundwater pumping was being reduced in the Basin, urban groundwater pumping became the largest groundwater demand, and between 2005 and 2014 pumping ranged from 27,000 AFY to 35,000 AFY for urban and 13,000 AFY to 17,000 AFY for agricultural purposes. Generally, over the past 70-year history, groundwater extraction transitioned from its highest volume serving primarily agriculture to a moderately lower volume serving urban uses and some agriculture.

Water demand for agricultural and municipal use varies seasonally, with the highest demand occurring in summer due to agricultural and urban irrigation demand. Locally, municipal water supply is made up by roughly a 50:50 blend of groundwater and imported water each year. Municipal pumping data indicate groundwater pumping in August, the period of highest demand, is almost twice the lowest-demand period in February. Groundwater extraction for agriculture is also higher during the summer months but is dependent on a variety of criteria that are highly dependent on cropping patterns.

Increased groundwater extraction in the summer months temporarily lowers the water table and, thus, can temporarily reduce the amount of shallow groundwater discharging to the river in some areas. Shallow groundwater levels and river flows in the summer are also affected by other important factors, principally water consumption from vegetation in and near the river corridor. It is believed that invasive species such as Arundo donax (Arundo) significantly contribute to this water consumption. Groundwater levels in the Alluvial Aquifer are also affected by discharges from the Saugus and Valencia wastewater reclamation plants that discharge into the river.

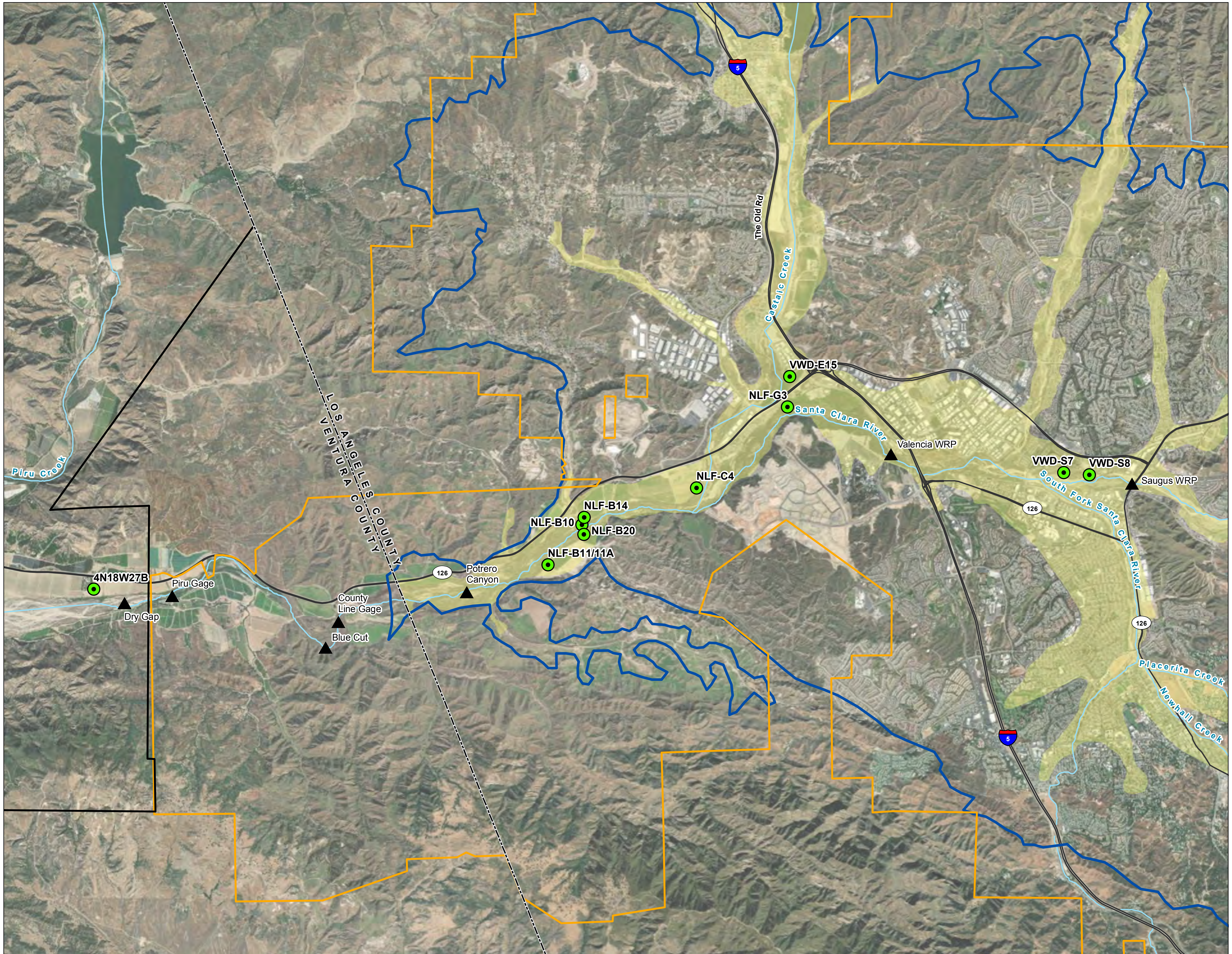

FIGURE 5-34

Wells Used for Evaluating Groundwater-Surface Water Interactions

Santa Clara River Valley
East Groundwater Subbasin
Groundwater Sustainability Plan

LEGEND

- Key Well
- Point of Interest
- Alluvial Aquifer
- Service Area Boundary for SCV Water
- UWCD Boundary
- Santa Clara River Valley Groundwater Basin, East Subbasin

All Other Features

- County Boundary
- Major Road
- Watercourse

NOTES

SCV Water: Santa Clarita Valley Water Agency
UWCD: United Water Conservation District

N

0 3,000 6,000 9,000
Feet

GSI Water Solutions, Inc.

Date: December 9, 2021
Data Sources: USGS, Maxar Imagery (2019), DWR Bulletin 118

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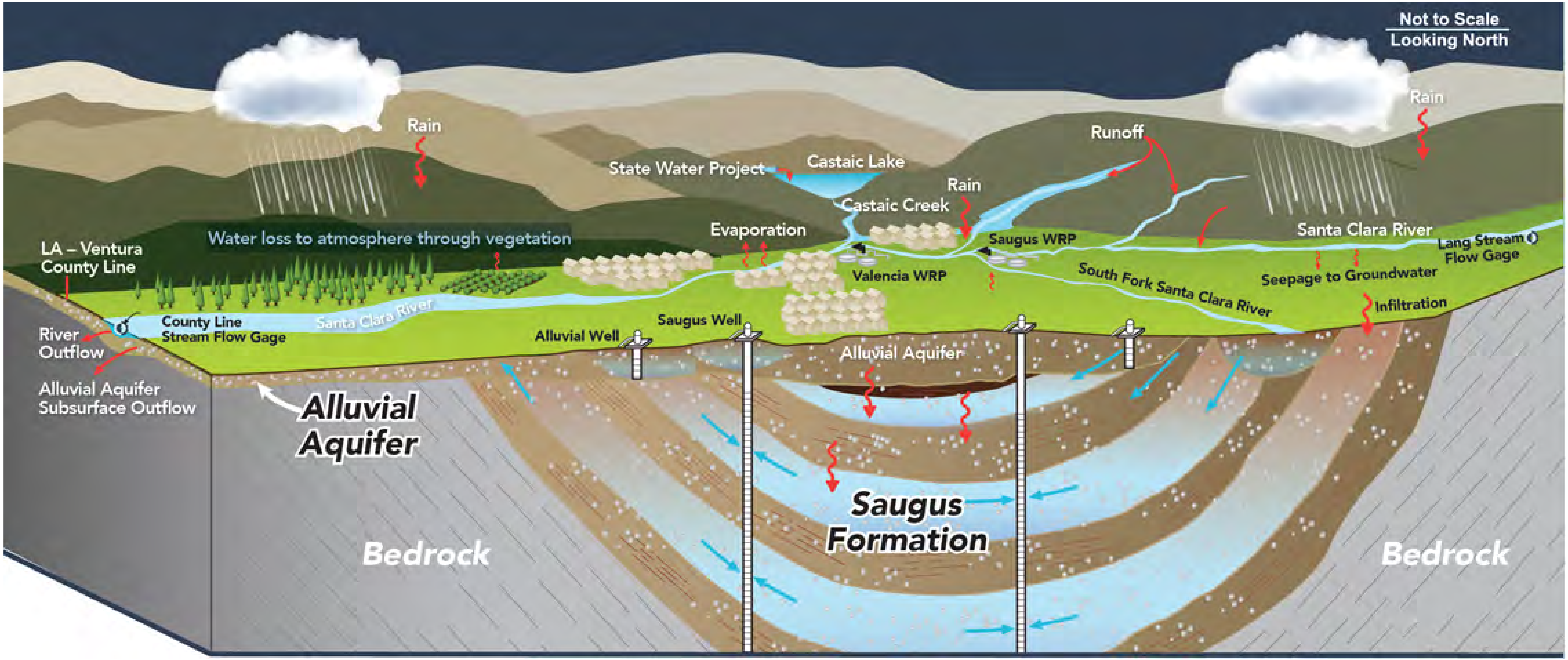

FIGURE 5-35

Conceptual Surface Water and Groundwater Flow Diagram

Santa Clara River Valley Groundwater Basin, East Subbasin

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5.2.1.2 Influences of Urbanization

As land use shifted from agricultural to urban use in the Basin, it also changed the groundwater and surface water interactions in some areas. While less water was pumped from the Basin for irrigation of crops, less recharge from deep percolation of irrigation water below the root zone was also occurring. Some of this reduction in groundwater recharge was offset by deep percolation from urban landscaping irrigation. Additionally, less infiltration from precipitation occurs because of the addition of impervious surfaces that accompany urbanization.

Importation of State Water Project water into the Basin began in the 1980s. These flows increased the recharge into the Basin from urban irrigation and discharges from the WRPs, resulting in a net increase in the amount of water in the groundwater/surface water system. The net effect of these factors has resulted in more water entering and leaving the Basin.

Water used indoors makes its way to either the Saugus or Valencia WRPs, and most of the water that is treated at these WRPs is discharged to the Santa Clara River or is redirected into a nonpotable recycled water system. A portion of the pumped groundwater and imported water also is used for outdoor irrigation of yards, parks, and landscaping; this irrigation water is transpired by vegetation and a lesser portion infiltrates to groundwater. In more rural areas that are unsewered, individual parcels are served by a combination of municipal and private wells, and a portion of the water recharges the groundwater system through septic tank drain fields. Some of this water that recharges the water table has the potential to make its way back to the Santa Clara River, though most of the septic systems are located away from the river in alluvial tributary valleys or on bedrock outcrops of the Saugus Formation and older rock units.

5.2.1.3 Groundwater-Surface Water Exchange

The amount and direction of the exchange between the Santa Clara River and the alluvial groundwater system in the Basin is dependent on a number of factors including cycles of wet/normal/dry rainfall conditions, WRP discharges to the river, releases from Castaic Reservoir, ET from riparian vegetation along the river corridor, stormwater flows, and groundwater pumping. As will be discussed in Section 5.2.4, there are areas where it is likely that the river is receiving groundwater flow and other areas where the river is recharging groundwater, depending on the time of year and the hydrologic factors mentioned here.

Because the river flows across the alluvium in the Basin, the river is an important source of recharge to the Alluvial Aquifer and the Saugus Formation, particularly east of I-5 and in the river's tributary valleys. Groundwater flows horizontally within the alluvium and, in some locations, percolates downward into the underlying Saugus Formation. As presented in a technical memorandum prepared by Luhdorff & Scalmanini Consulting Engineers (LSCE, 2021), most of this deep percolation recharge from the Alluvial Aquifer into the Saugus Formation occurs on the eastern end of the Basin from just west of the mouth of Mint Canyon downstream to roughly the location of the Saugus WRP. The river is generally losing in this portion of the Basin, meaning that river water is infiltrating to the groundwater table. Beginning roughly at the mouth of San Francisquito Canyon, significant reaches of the river appear to be gaining (meaning that groundwater is discharging to the river), particularly during normal and wet years. A significant reason for this is the addition of water into the river from WRP discharges. In addition, the reach from Castaic Creek to just upstream of Potrero Canyon appears to be gaining during most hydrologic periods as a result of Saugus Formation groundwater discharging to the Alluvial Aquifer and then to the river in this area. From this location downstream to the western basin boundary (which is near the LA/Ventura County line [county line]), the river flows on top of a thin layer of alluvium that is roughly 10 to 30 feet thick. Because only low-permeability Pico Formation mudstone and claystone underlies this area, flow across the western boundary of the Basin into the Piru Subbasin occurs in the alluvium and as surface water, but this river section is predominantly losing in this area because of the lack of an upwelling of deeper groundwater from the Pico Formation (in contrast to the upwelling that occurs further upstream where the Saugus Formation is present).

5.2.2 Data Evaluation Methodology

The area of interest for this study is the reach of the Santa Clara River extending from the Saugus WRP westward to the Piru Dry Gap, which is located in Ventura County, approximately 3 miles west of the western boundary of the Basin (see Figure 5-34). This study area was selected because it contains the portion of the Basin where there are exchanges between surface water and groundwater and because there are sensitive habitats in this section of the river. Upstream to the east, the river and tributaries are ephemeral, flowing only during high-flow storm events. GSI identified a number of alluvial wells located near the river channel and obtained historical water level data from SCV Water, FivePoint Holdings, LLC (the Newhall Land and Farming Company), and United Water Conservation District (UWCD). The following data sets were used in the hydrograph analysis:

- Depth to water data from various alluvial wells located within the study area
- Precipitation data, dating as far back as 1883, from the Newhall-Soledad FC32CE gage in Newhall (currently maintained by the LADPW) and (beginning in 1979) the Pine Street gage (currently maintained by SCV Water, and formerly established by its predecessor agency Newhall County Water District)
- Monthly discharge volume data from both the Saugus and Valencia WRPs, dating back to 1980
- Monthly release volume data from the Castaic Lagoon, dating back to 1980
- River bottom (thalweg) elevation data for the Santa Clara River, which was collected by Environmental Science Associates (ESA) in 2016 using Light Detection and Ranging (LiDAR) methods.

The observed fluctuation in groundwater levels observed in the hydrographs may be affected by a number of seasonal and annual factors including precipitation, seasonal climate, surface water flow, WRP discharges, and changes in pumping. In order to examine some of these effects, multiple hydrographs that had sufficient groundwater level data available during wet, dry, and normal hydrologic periods were created for each well. Each hydrograph has two data sets in common: groundwater elevation over time and channel bottom elevation (also referred to as the thalweg). Groundwater elevation data illustrate the historical trends and fluctuations in groundwater levels. GSI used reference point elevations at each wellhead estimated from Google Earth to convert depth-to-water measurements to groundwater elevations. The reference point elevation data are accurate to within approximately +/- 5 feet, which affects the amount of uncertainty that arises when comparing groundwater level elevations to the bottom of the river channel (thalweg) elevations which are obtained from the more accurate LiDAR data source.

The river thalweg is a single data point that represents the lowest point in the river channel nearest to the well. Using the LiDAR data in conjunction with ArcGIS, a cross section of the channel bottom was created perpendicular to the river and in line with the well. The lowest point in the cross section was used as the thalweg and it was assumed that this value has not changed significantly over the years.[22] This data point is portrayed as a horizontal line on each hydrograph. The significance of this line is that when the groundwater elevation is equal to or above the channel bottom elevation, groundwater has the potential to contribute to surface flow, assuming that the groundwater level is above the surface elevation of the river. Because information about the elevation of the river at each location (and how that has likely changed over time) is lacking, it is possible to say only that there is a potential for the river to be gaining at these locations. As

[22] LiDAR data are a snapshot in time, representing present conditions. The data include both the elevation of the channel invert and the location of the channel. However, the current channel conditions are not necessarily the same as they have been in the past. Channel characteristics change over time, particularly due to large flood events such as those that occurred in 1993, 1997–1998, and 2004–2005.

indicated by the hydrographs, water levels in several wells stop at the thalweg elevation, in which case GSI infers that groundwater must be flowing into the river. In contrast, when the groundwater elevation is below the channel bottom elevation, GSI infers that groundwater is not contributing to surface flow in the river (regardless of river elevation) because the water table is not high enough to reach the channel bottom—in which case, this area is identified as a losing reach, where a portion of the streamflow is seeping downward to the underlying water table in the alluvium.

For each well, the base hydrograph (showing groundwater elevation and thalweg) was duplicated and plotted with at least one other factor that may affect groundwater levels, such as WRP discharges and precipitation (the latter of which relates to stormwater flows). This enables a demonstration of how a certain factor correlates with groundwater levels, if at all. For example, if the hydrograph shows a trend of increasing precipitation and an increase in groundwater elevation during the same time frame, then it is likely that precipitation has a strong influence on groundwater levels in that area.

The raw form of precipitation data is daily and monthly rainfall in measurement units of inches. However, for evaluating longer-term correlations, precipitation data are better presented as a cumulative departure from the long-term average amount of rainfall on an annual basis. When plotted on a hydrograph, the slope of a cumulative departure curve is indicative of the climatic conditions during a given period of time. An increasing slope represents a period of above-average precipitation, and a decreasing slope represents a period of below-average precipitation.

Results from the calibrated groundwater flow model were used in some cases to examine certain reaches of the river where measured groundwater data at certain wells are suspect (e.g., not representative of static conditions) or inconclusive. In other cases, where water level data are lacking, the groundwater flow model was used to corroborate observations about where the Saugus Formation is discharging to the alluvium and then the river. Details of the model setup and calibration are presented in a separate document (GSI, 2021).

The data and results of this evaluation were synthesized to create three maps showing the elevation of groundwater relative to the thalweg at various locations along the river during wet, normal, and dry climatic conditions. Wet conditions are defined by periods of above-average precipitation during the past 40 years, normal conditions are defined by periods of average precipitation, and dry periods are defined by periods of drought, or below-average precipitation. The average annual precipitation at the Pine Street gage since its establishment in 1979 was 21.3 inches. For the purposes of evaluating groundwater/surface water exchanges, wet and dry conditions were defined as periods with approximately 50 percent differences in annual precipitation compared with the 1980–2019 average precipitation (i.e., 31.8 inches or more during wet years and 10.5 inches or less during dry years). The maps display locations where groundwater levels are as follows:

- Above the thalweg or no deeper than 1 foot below the thalweg (blue)
- 1 foot to 5 feet below the thalweg (green)
- 5 feet to 15 feet below the thalweg (yellow)
- 15 feet to 30 feet below the thalweg (orange)
- Greater than 30 feet below the thalweg (brown)

In addition to representing where the river has the potential to be gaining or losing, the maps provide an aid to assessing areas where groundwater levels are shallow and may be supporting GDEs.

5.2.3 Limitations

Interpretations made on the basis of the data presented in Section 5.2 have a number of important limitations. First, most of the alluvial wells used in this evaluation are relatively deep and have screens that are present over a depth interval ranging between 18 and 130 feet below ground surface. Shallow monitoring wells (not pumping wells) would be preferred for monitoring because they would be more sensitive to water level changes just beneath the river and are more representative of the shallow portions of the alluvium that are connected to the river. Some of the existing wells also are not located adjacent to the river channel, which means that the water level in the well may not be strongly connected to the river. In addition, there are long distances along the river where well data are lacking, which makes it necessary to infer and extrapolate an understanding of conditions between locations. Inspection of the water level data for all of the agricultural wells in the region suggests that a large number of measurements that are reported to be static water levels are not truly static, perhaps because the water levels were measured (1) while the well was still recovering from having been turned off prior to the measurement, or (2) while nearby wells were pumping, thereby lowering the water level in the measured well. For example, well NLF-B14 shows a reading in early 2015 that is 5 to 6 feet higher than most other static water level measurements in this well; nearby well NLF-B10 shows four readings that are 6 to 7 feet higher than other static water level readings; and well NLF-C10 shows a 10- to 20-foot decrease in its water levels after it was installed and began operating in 2008. Lastly, the reference point elevations on existing monitoring wells have been estimated using Google Earth, which limits the accuracy of the computed groundwater elevations at each well. The elevation of the river thalweg was estimated using LiDAR data from 2016 and not actual surveyed elevations. Each of these factors reduces the accuracy of the data and were considered when interpreting the data.

5.2.4 Results

5.2.4.1 Hydrograph Analysis

Hydrographs were created for wells completed within the Alluvial Aquifer and located near the river, from the vicinity of the Saugus WRP downstream to just past the western boundary of the Basin. Hydrographs for eight wells (see Figures 5-36 through 5-51) are embedded in the text of this section. These wells were selected based on the location and value of the data (e.g., a sufficiently long period of record over multiple climatic conditions). The following wells are listed in order by location, from the easternmost well (VWD-S7) to the westernmost well (4N18W27B). Refer to Figure 5-34 for well locations.

Groundwater elevations observed in Well VWD-S7 do not appear to be correlated with WRP discharges (see Figure 5-36) during early 2003 and early 2011. Rather, the abrupt increase in elevations during 2005 and the gradual decrease beginning in 2011 correspond well with precipitation data (see Figure 5-37). These results appear to indicate that groundwater in the alluvium along this reach of the river between the Saugus WRP and Valencia WRP is weakly influenced by WRP effluent and strongly influenced by precipitation. However, this alluvial well is located approximately 150 feet from the river and may not be sensitive to WRP discharges. Water levels measured during the last drought were more than 30 feet below the river thalweg but started to show moderate increases in 2019 as precipitation increased.

It is noteworthy that groundwater levels in VWD-S7 show a strong seasonal response to precipitation and perhaps a response to pumping at two nearby municipal production wells (VWD-S6 and VWD-S8). The high water levels in 2005 and 2006 are within a few feet of the thalweg, indicating that potentially gaining conditions only occur during the winter months, i.e., only seasonally. Large changes in groundwater levels have also been observed seasonally in other Alluvial Aquifer wells located on the east end of the Basin. As described later in this section, groundwater levels in wells located on the west end of the Basin show significantly less seasonal variation because they are affected by WRP discharges, Castaic Reservoir releases, and discharge of Saugus Formation groundwater into the Alluvial Aquifer.

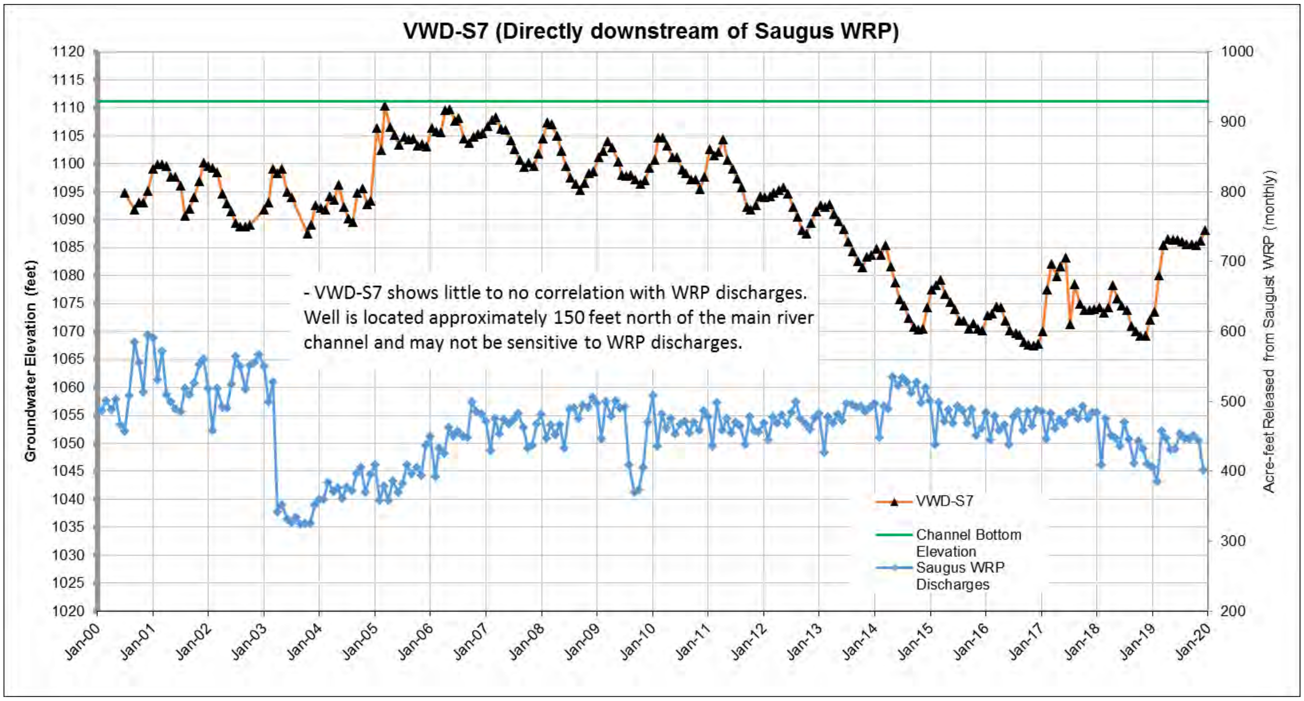

Figure 5-36. Well VWCD-S7 Groundwater Elevation and Saugus Water Reclamation Plant Discharges

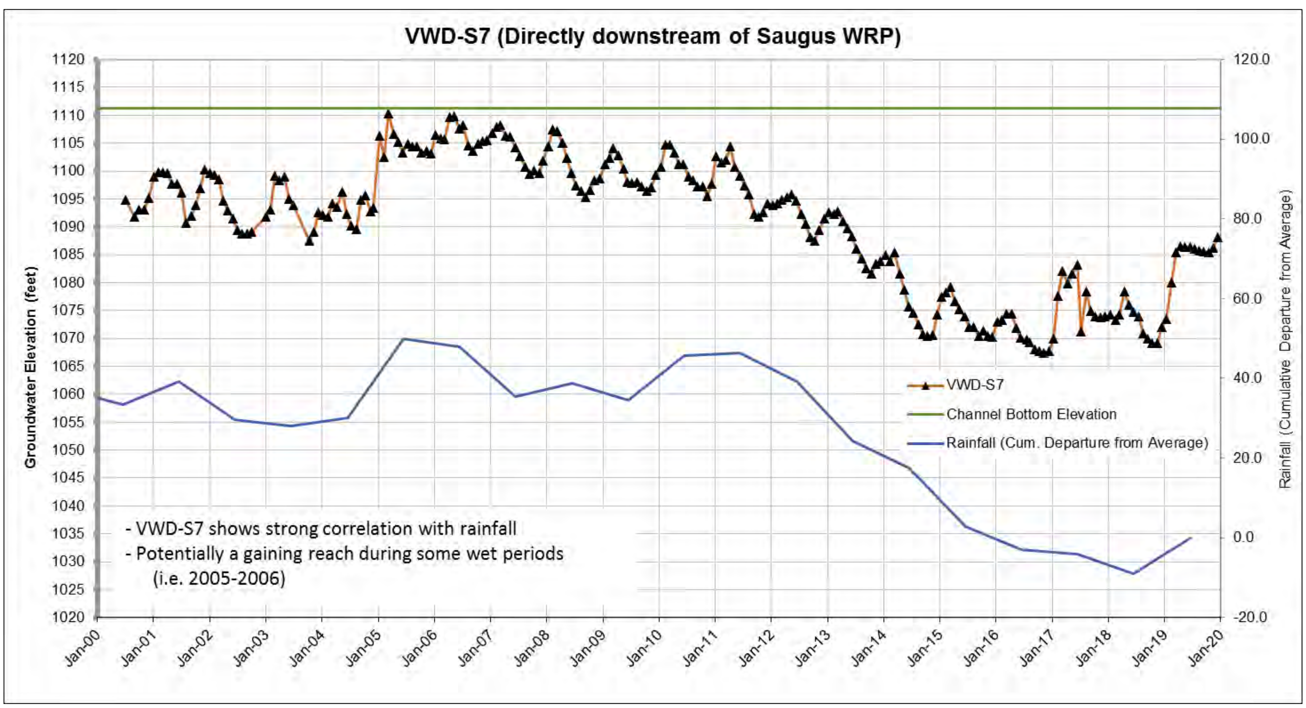

Figure 5-37. Well VWD-S7 Groundwater Elevation and Cumulative Departure from Average Rainfall

Groundwater elevations in Well NLF-G3 correlate well with Castaic Reservoir releases (see Figure 5-38) and with the precipitation trend (see Figure 5-39). The groundwater levels appear to be above the channel bottom (thalweg) in this area, indicative of potentially gaining conditions. The river appears to have been gaining in this area until the onset of drought conditions in 2013, when the groundwater levels dropped below the thalweg. Groundwater levels have nearly fully recovered in this well following the recent drought and the groundwater levels since 2017 are above the thalweg, indicating that the river may be gaining again at this location. The lowest measured historical groundwater level has been less than 5 feet below the thalweg.

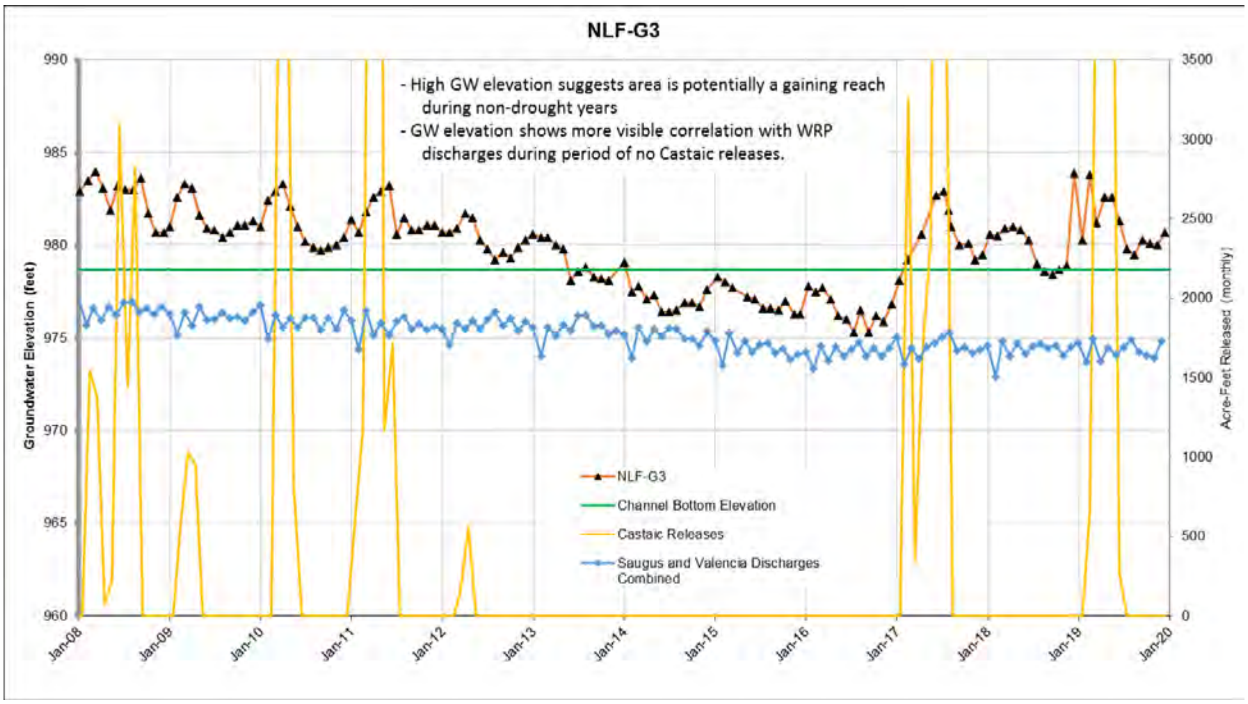

Figure 5-38. Well NLF-G3 Groundwater Elevation, Combined Water Reclamation Plant Discharges, and Castaic Reservoir Releases

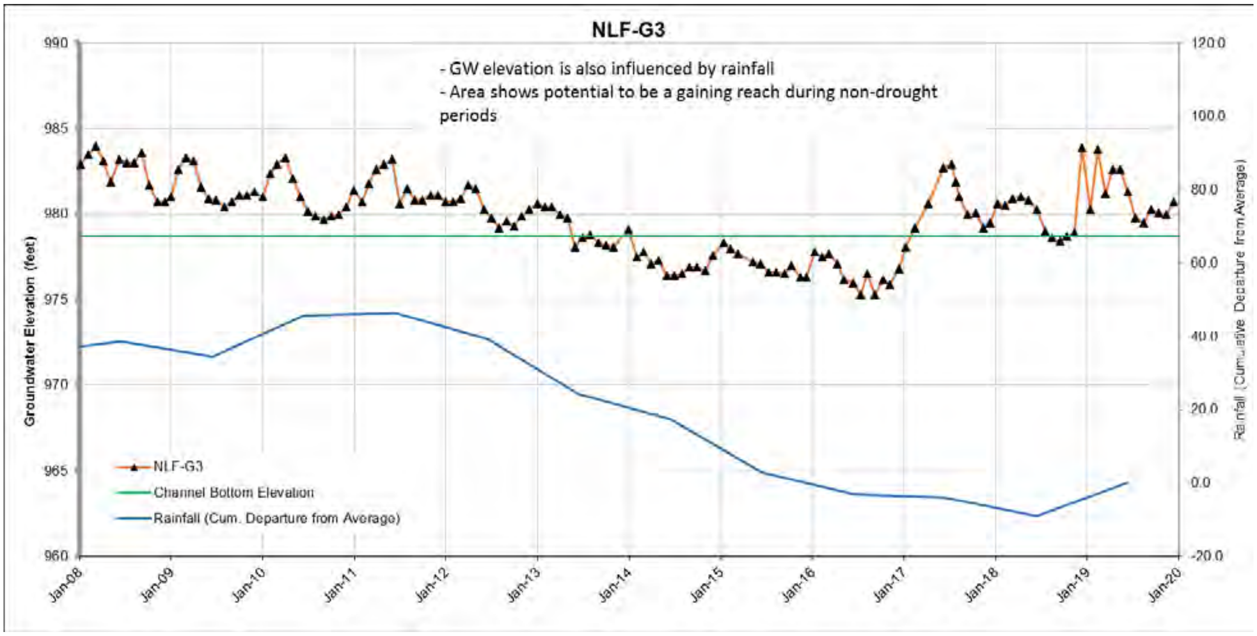

Figure 5-39. Well NLF-G3 Groundwater Elevation and Cumulative Departure from Average Rainfall

Groundwater elevations in Well NLF-C4, located along Castaic Creek just north of its confluence with the Santa Clara River, correlate strongly with Castaic releases as expected; however, it is not clear whether there is any correlation with WRP discharges (see Figure 5-40). Groundwater elevations appear to be less dependent on precipitation trends (see Figure 5-41), as demonstrated by the stable groundwater levels persisting through the drought conditions that occurred between 2011 and 2017. The available data at Well NLF-C4 suggest that this is a losing reach at all times; however, the authors believe that the reported water level elevations are too deep, based on (1) indications that another well in this wellfield (Well NLF-C10) has static water levels that are greatly affected by pumping in nearby wells and (2) simulation results from the groundwater model. Given that Castaic Creek receives a significant amount of recharge from reservoir releases, it seems likely that groundwater levels would be higher at Well NLF-C4 and the Santa Clara River would be gaining downstream of the confluence with Castaic Creek. The groundwater model shows a close correlation of the Well NLF-C4 groundwater levels with the northern-most well in the NLF-C wellfield (Well NLF-C6, which was not been pumped since 2004 and thereby is providing truly static water level data), but more difficulty matching the reportedly "static" water levels in the interior of this wellfield (e.g., Well NLF C-4), which is a further sign that the water levels in wells such as Well NLF-C4 (which is used each year to meet agricultural water demands) may not be truly static water levels, as discussed previously in Section 5.2.3. Based on this well's location along the Santa Clara River, water levels observed at other wells, observations of conditions along the river, and the conceptual understanding of the river at this location, the river is potentially gaining at this location, in contrast to what groundwater levels indicate at Well NLF-C4. The reference elevations and channel bottom (thalweg) elevations will need to be checked and a better understanding of the role of local pumping influences on groundwater levels must be developed before too many conclusions can be drawn at this location.

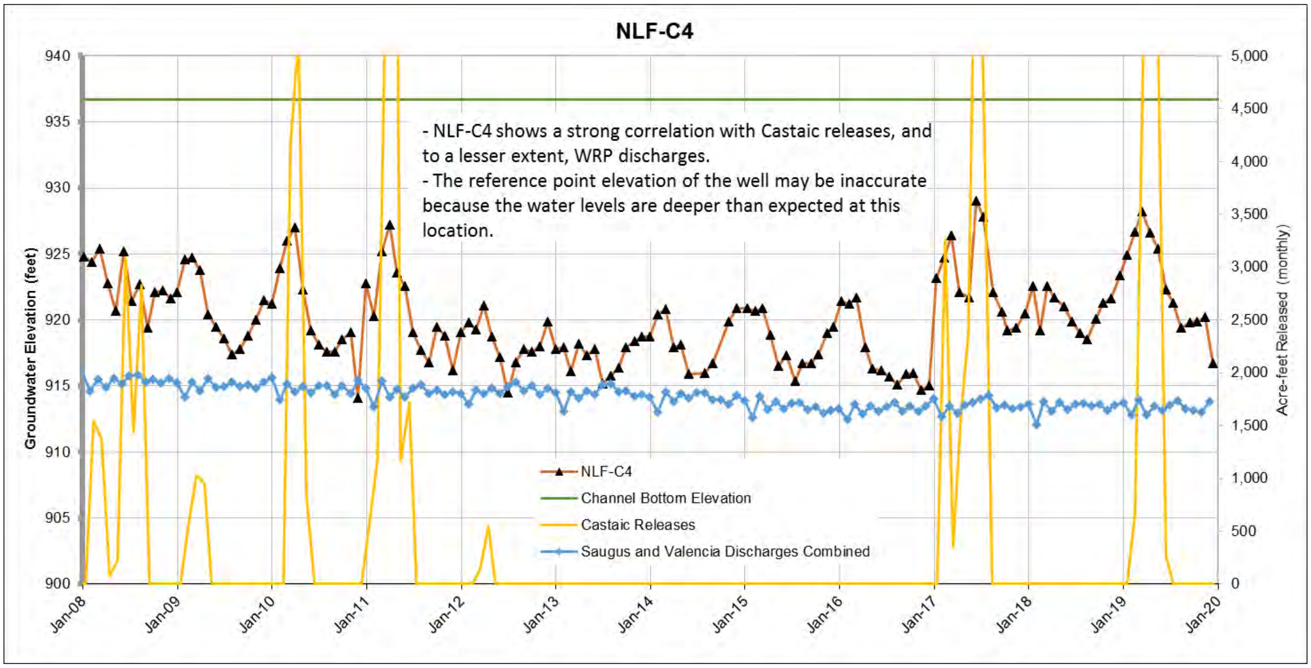

Figure 5-40. Well NLF-C4 Groundwater Elevation, Combined Water Reclamation Plant Discharges, and Castaic Reservoir Releases

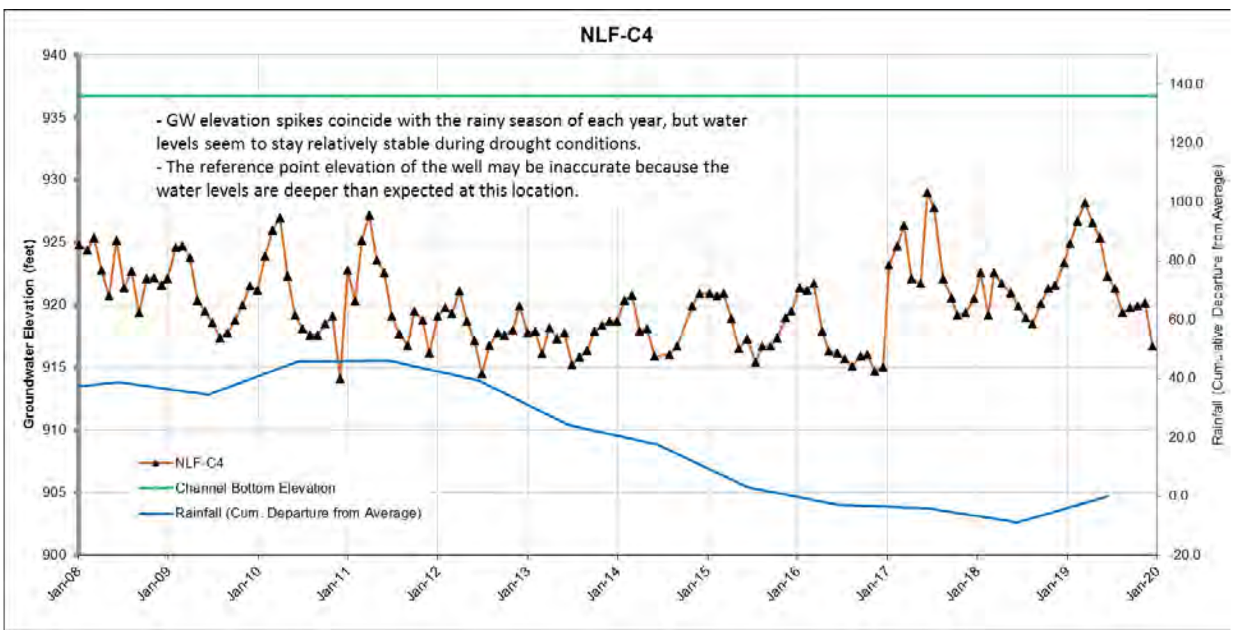

Figure 5-41. Well NLF-C4 GWE and Cumulative Departure from Average Rainfall

At Well NLF-B14, located 1.5 miles downstream from Well NLF-C4, the groundwater elevation data cannot be easily correlated with either (1) WRP discharges (due to the lack of variability in WRP discharges as shown in Figure 5-42) or (2) precipitation trends (as shown in Figure 5-43). This data-derived observation is consistent with observations that have been made during the process of calibrating the numerical groundwater flow model for the basin. Groundwater levels have remained constant through the drought (unlike wells located to the east). The hydrograph for Well NLF-B14 shows groundwater levels are relatively stable and are at or above the channel bottom (thalweg) elevation during most periods, and the groundwater model shows this part of the river is gaining. Accordingly, the authors infer this area to be primarily a gaining reach. However, other nearby wells with shallower screen depths (i.e., Wells NLF-B10 and NLF-B20; see Figures 5-44 through 5-47) show groundwater levels between 2 and 5 feet below the thalweg, indicating potentially losing conditions while the groundwater model shows that this part of the river is gaining. This inconsistency may be because the wells are screened at different depths or may be the result of uncertainties in the water level data set (such as elevation survey control and/or pumping influences on water level measurements). From extensive experience studying this area, the authors believe discharge from the Saugus Formation into the alluvium is the biggest reason for the observed stability. It is important to note too that the Saugus groundwater elevations tend to change more slowly than the groundwater elevations in the Alluvial Aquifer. That is, flow out of the Saugus Formation is only slightly affected (if at all) by hydrologic cycles and is virtually (if not completely) unaffected by WRP flow contributions into the river. Additionally, both the measured data sets and the groundwater model show long-term stability in groundwater levels (e.g., no apparent long-term trends). Based on the location of Well NLF-B14 along the river, the water levels observed at this well, the well's proximity to where the Saugus Formation pinches out against the low permeability Pico Formation, and the conceptual model understanding (which is supported by numerical modeling), the authors infer that the river in this area is primarily a gaining reach.

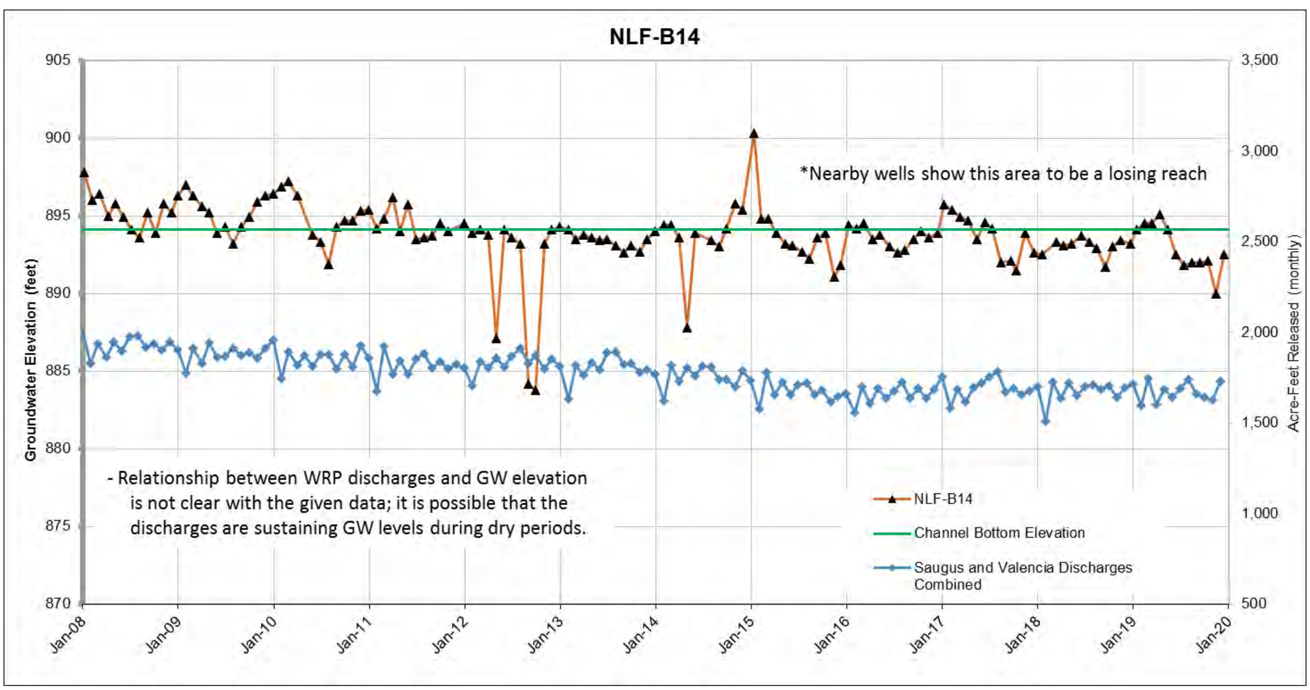

Figure 5-42. Well NLF-B14 Groundwater Elevation and Combined Water Reclamation Plant Discharges

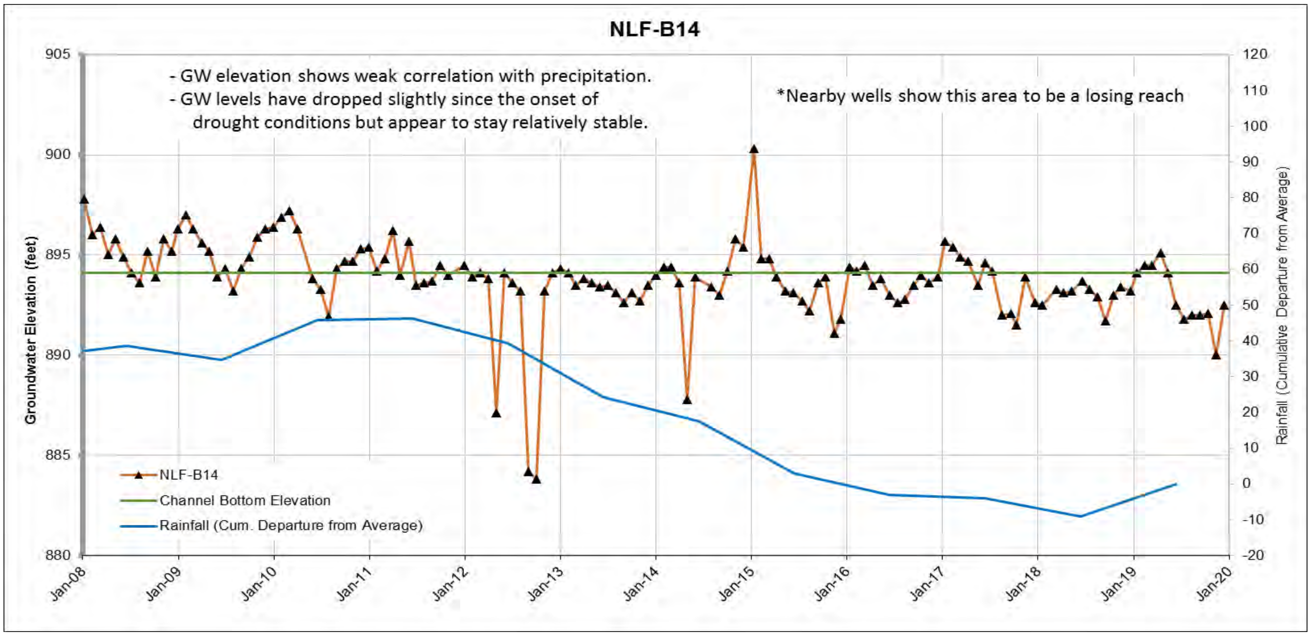

Figure 5-43. Well NLF-B14 Groundwater Elevation and Cumulative Departure from Average Rainfall

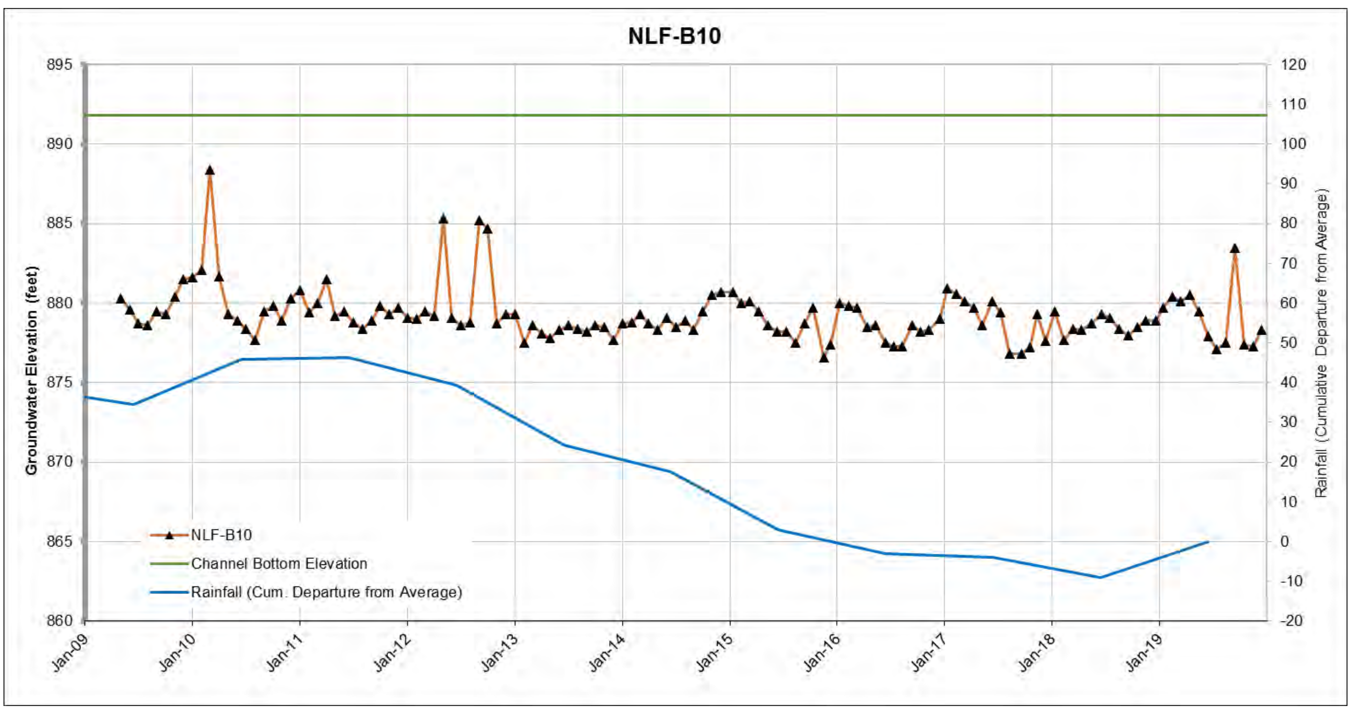

Figure 5-44. Well NLF-B10 Groundwater Elevation and Saugus Water Reclamation Plant Discharges

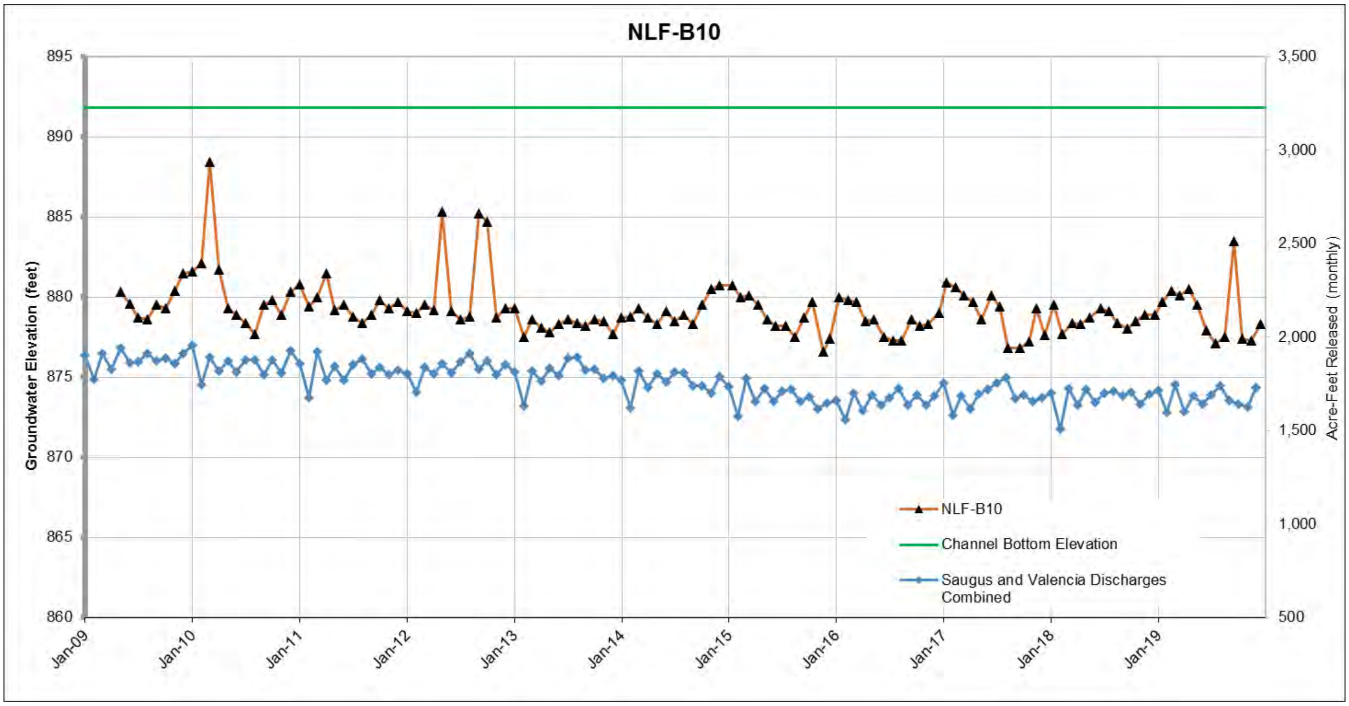

Figure 5-45. Well NLF-B10 Groundwater Elevation and Cumulative Departure from Average Rainfall

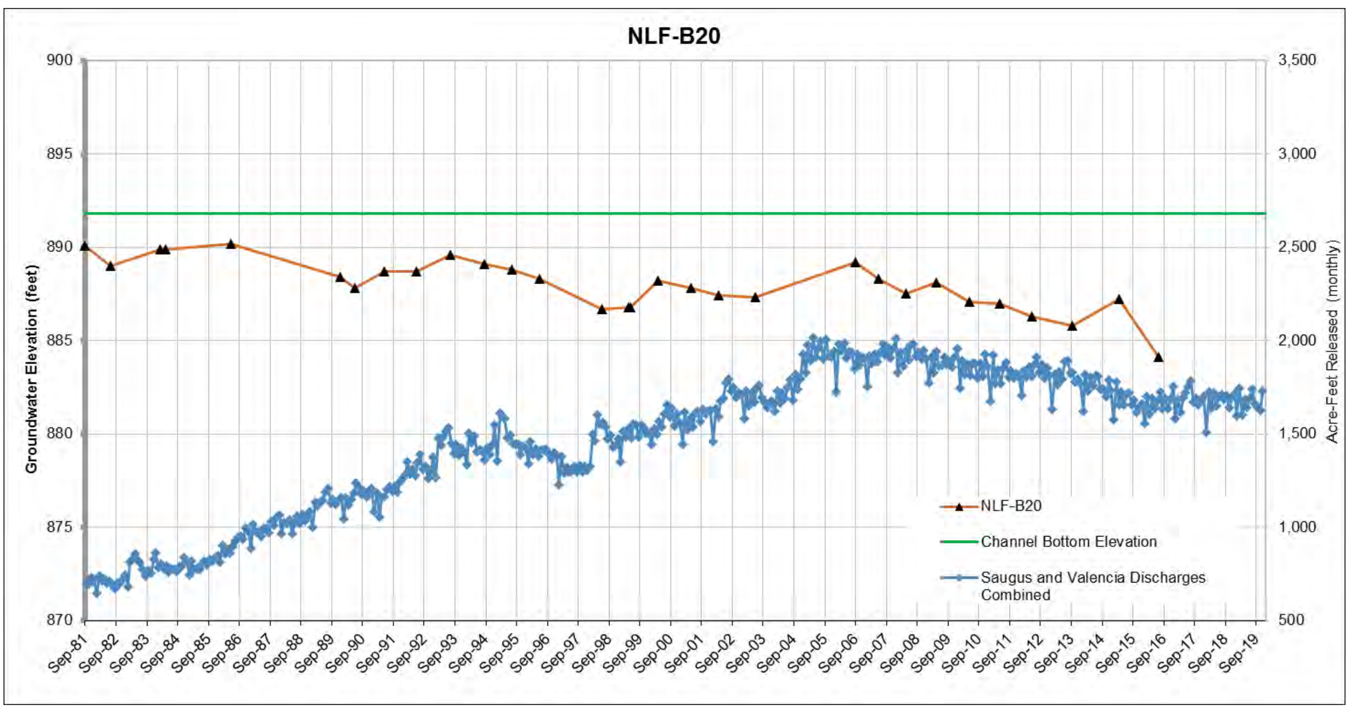

Figure 5-46. Well NLF-B20 Groundwater Elevation and Saugus Water Reclamation Plant Discharges

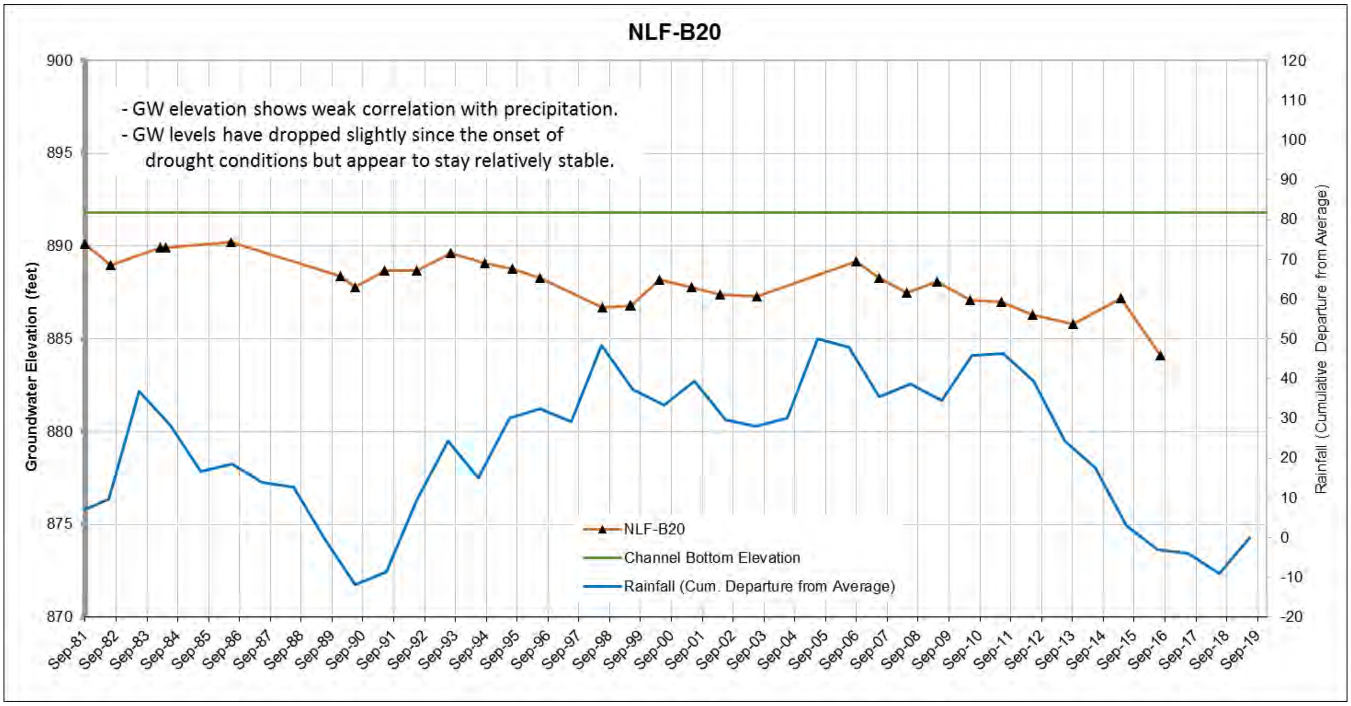

Figure 5-47. Well NLF-B20 Groundwater Elevation and Cumulative Departure from Average Rainfall

Groundwater elevations in Well NLF-B11/11A, located between the mouth of Potrero Canyon, and Well NLF-B14, do not correlate well with WRP discharges (see Figure 5-48) or precipitation (see Figure 5-49). There are indications that some readings are either affected by nearby pumping or that the water level measurement was not truly representing static conditions (see 1998 and 2005). The annual groundwater elevation readings do not show much detail, but it appears that groundwater levels have remained very stable during the period of record in this location. The authors believe this is because the Saugus Formation discharges significant quantities of groundwater to the alluvium upstream of Well NLF-B11/11A, thereby stabilizing groundwater levels in much of the western end of the groundwater basin. Downstream of this well, the alluvium is underlain by the low-permeability Pico Formation, which is considered to be non-water bearing for the purposes of agricultural and municipal water supply development. As a result, there is no additional upward flow coming from the Saugus Formation west of Well NLF-B11/B11A, and groundwater resides within the alluvium or discharges to the river depending upon whether climatic conditions are wet, dry, or normal. The deepest historically measured groundwater levels at Well NLF-B11/B11A were often no more than 5 feet below the channel bottom (thalweg) elevation, and often within 1 foot of the thalweg in this area. The authors believe that the river is transitioning from generally gaining to generally losing in this general area.

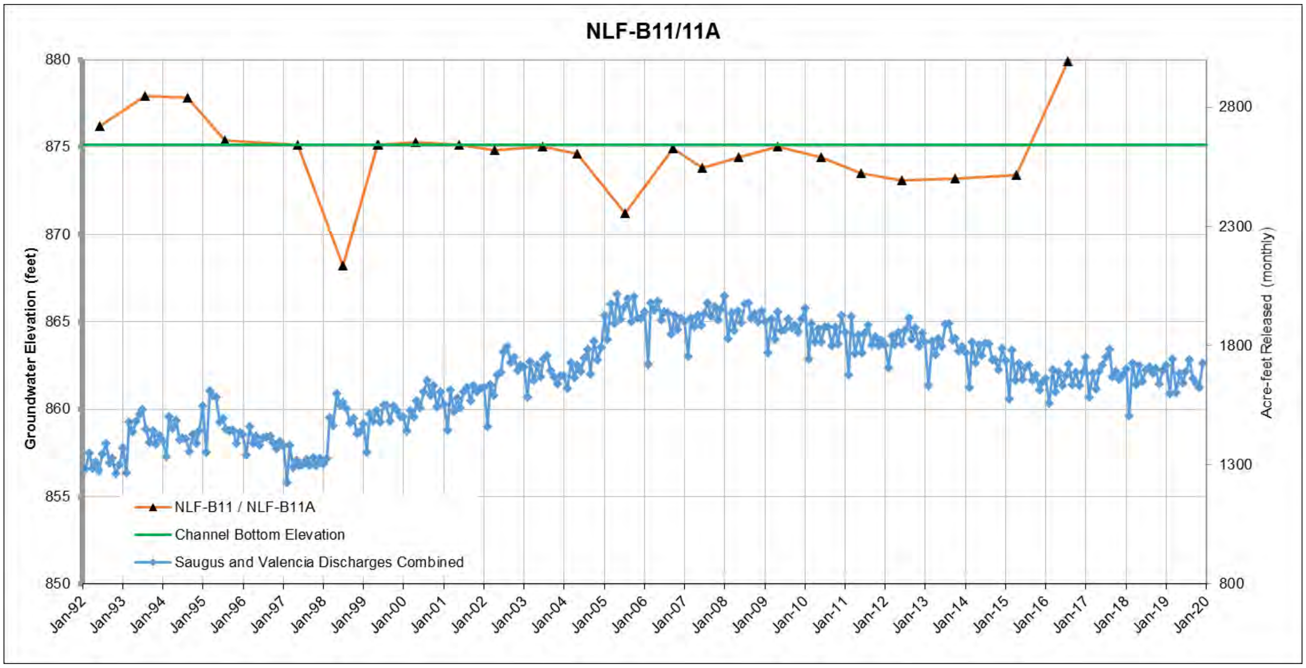

Figure 5-48. Well NLF-B11/11A Groundwater Elevation and Combined Water Reclamation Plant Discharges

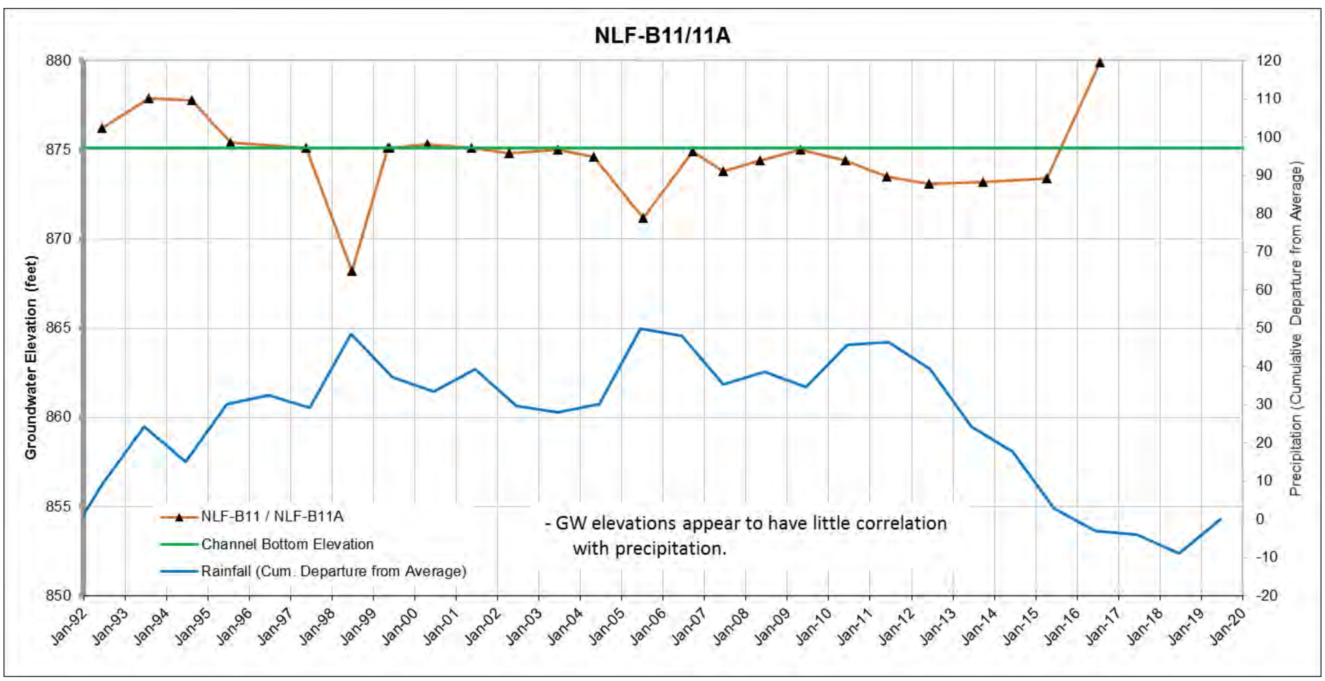

Figure 5-49. Well NLF-B11/11A Groundwater Elevation and Cumulative Departure from Average Rainfall

Well 4N18W27B, located west of the Basin and just west of the Piru Dry Gap, is the westernmost and furthest downstream well in the study area. Groundwater elevations at Well 4N18W27B correlate very well with precipitation trends since the late 1970s but appear to differ from precipitation trends from the mid-1960s through the mid to late 1970s (see Figure 5-51). Low groundwater levels observed in the Piru Subbasin during the 1960s (see Figure 5-50) are likely a result of a prolonged drought that began in the mid-1940s and continued through the mid-1960s. Water levels recover to near the channel bottom (thalweg) elevation beginning in the late 1960s as a result of (1) discharges from the Saugus and Valencia WRPs upstream and (2) the end of the drought period after the mid-1960s (as seen by the lack of a downward slope in the rainfall cumulative departure curve). Water levels in Well 4N18W27B declined significantly during the most recent drought beginning in 2011. Water levels have recovered substantially since the end of the drought in 2016, but not quite to pre-drought levels. As shown in Figure 5-51, it is likely that importation of water upstream and discharges from the WRPs have caused average groundwater elevations in this area to rise significantly since the late 1960s.

Well 4N18W27B appears to be located at a point that is likely where the alluvium has just started to thicken substantially (i.e., the well is just downstream of the transition from the narrow alluvial valley at Blue Cut to the wider alluvial valley that is present where the Piru Dry Gap begins). The river at this location appears to be losing during the summer and during drought conditions, partly because the alluvium is thickening as expected (which is why there is a dry gap).

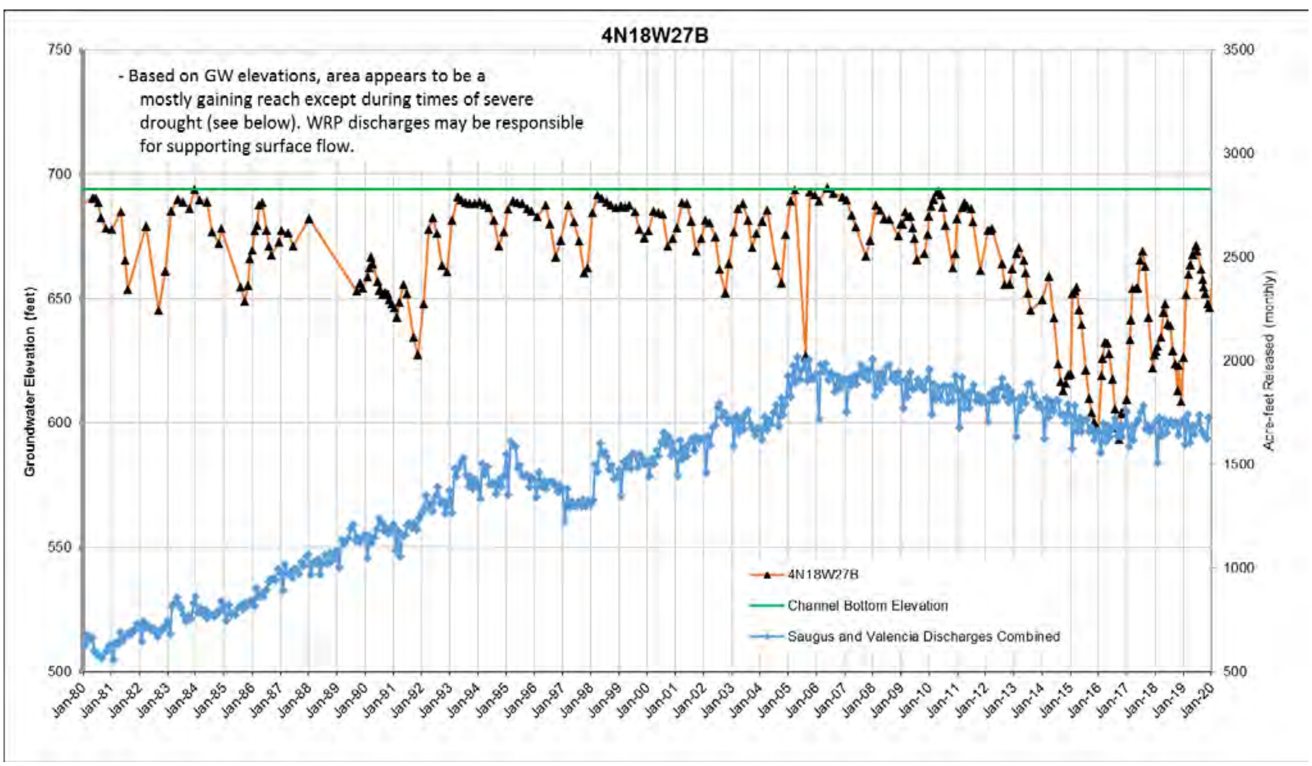

Figure 5-50. Well 4N18W27B Groundwater Elevation and Combined Water Reclamation Plant Effluent

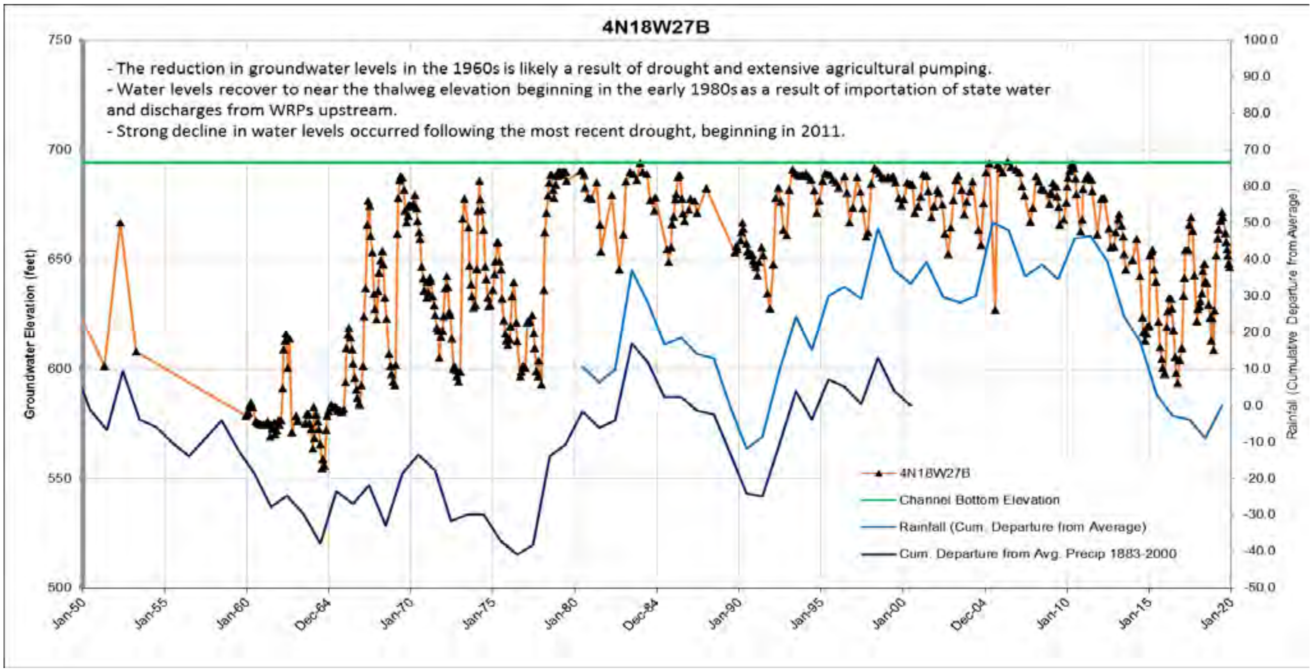

Figure 5-51. Well 4N18W27B Groundwater and Cumulative Departure from Average Rainfall

Effects of Precipitation, WRP Discharges, and Basin Pumping on River Flows

On the basis of available river gage data, it is believed that the WRP flows and the groundwater discharges from the Alluvial Aquifer to the river in the Basin are providing a base flow to the river as it moves through and out of the Basin and into the eastern portion of the Piru Subbasin. As shown on Figures 5-52, 5-53, and 5-54, surface water flow measurements at the former County Line gage and the existing Piru gage during non-storm events have steadily increased since the late 1970s. This increase appears to be unrelated to rainfall trends (see Figure 5-52) and more likely related to increased urbanization in the Basin that has resulted in importation of state water and discharge of treated water from the WRPs into the river (see Figure 5-53). As shown in Figure 5-54, pumping of the Alluvial and Saugus Aquifers in the Basin appears to have had little effect on river flows.

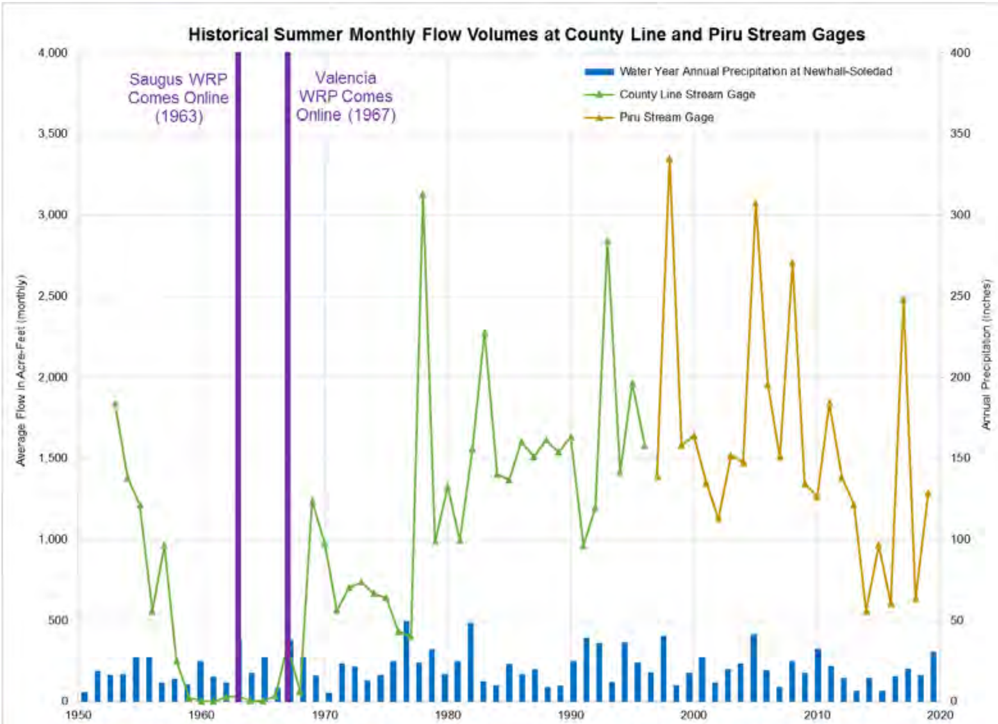

Figure 5-52. Santa Clara River Flow near the Western Basin Boundary County Line Gage and Precipitation in the Basin

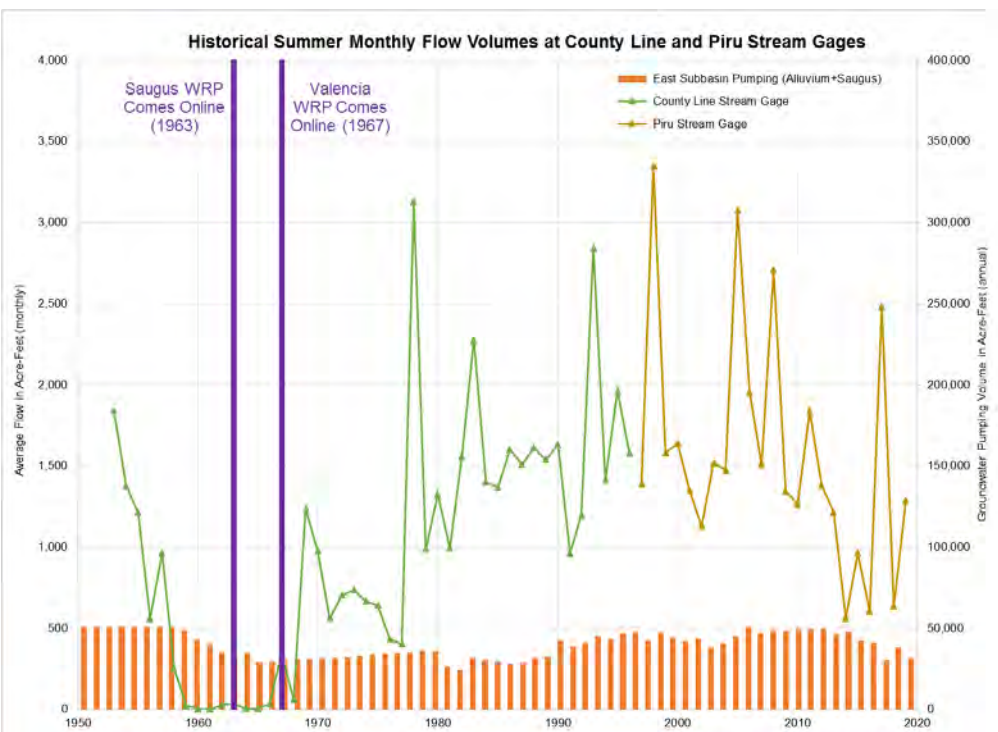

Figure 5-53. Santa Clara River Flow near the Western Basin Boundary and Water Reclamation Plant Discharges in the Basin

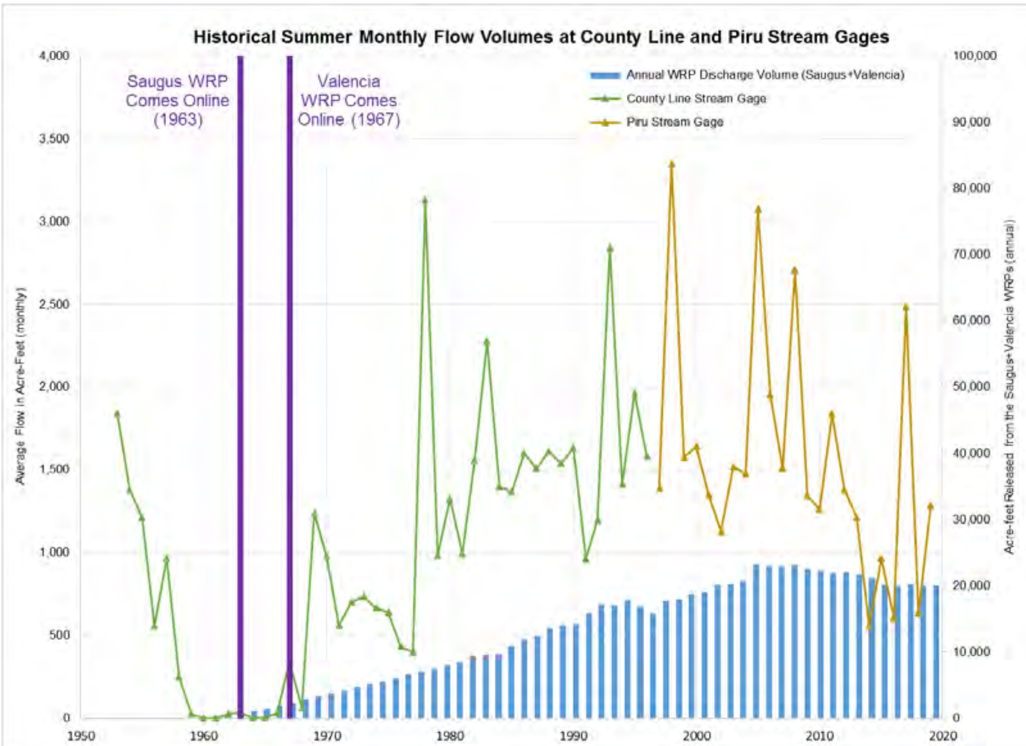

Figure 5-54. Santa Clara River Flow near the Western Basin Boundary and Total Groundwater Pumping in the Basin

The effect of increased urbanization and accordant discharges of treated water from WRPs into the Santa Clara River (see Figure 5-53) is consistent with the prior understanding of river flows before the onset of urbanization in the Basin. CH2M HILL (2004) inspected the summer-season flow records at the former County Line stream gage (located 0.75 miles west of the western boundary of the Basin) and found that prior to the activation of the Valencia WRP in 1967, the river flow volume during the lowest-flow month of any given year was (1) less than 100 AF per month and (2) being recorded as zero at the gage during the driest month in four different years (1960, 1961, 1964, and 1965). This observation is consistent with a report by Mann (1959), who provided water budgets for the adjoining downstream groundwater subbasins (Piru, Fillmore, and Santa Paula) for the period 1936–1957, which preceded urbanization and WRP discharges in the Basin. As discussed by UWCD (2020), Mann identified flood inflows to the Piru Subbasin separately from "rising water" inflows and did not quantify the latter, indicating that Mann considered the "rising water" inflows to the Piru Subbasin to be negligible. Mann quantified groundwater underflow into the Piru Subbasin as being small (averaging 240 AFY) compared to flood flows and imported water (averaging 75,180 AFY and 2,580 AFY, respectively). Mann's quantification of a small groundwater underflow term and the absence of an average value of dry-weather streamflow in his water budget for the Piru Subbasin suggests that dry-weather surface flows from the Basin into the Piru Subbasin were negligible during the summer season prior to the onset of urbanization in the Basin.

Extent of Gaining and Losing Reaches

Findings from the hydrograph analysis were used to create three separate maps that indicate the nature of surface water and groundwater exchanges along the Santa Clara River during wet, normal, and dry climatic conditions. Each map identifies six unique river reaches (stream segments) in the study area and shows where groundwater levels are vertically positioned relative to the nearby river channel bottom (thalweg) elevation during a given climatic condition. Reaches were defined by a combination of factors including the water level response in nearby wells, geological conditions such as thinning of the surficial alluvium, visual observations, and preliminary results from the groundwater model. This information can be used to provide an indication of where the river is potentially gaining or losing and how this might change over time depending on local rainfall cycles. It is important to note that there are limitations associated with the data sets used in this analysis (refer to Section 5.2.3); interpretation of the results considered those limitations.

Wet Conditions

Figure 5-55 illustrates the potentially gaining and losing reaches of the river during periods of increased precipitation (wet conditions), using data from 1991 to 1993, 2005, and 2017 to 2019. Though some wells do not have groundwater elevation data during these intervals, groundwater levels may be estimated based on the elevation trends during other periods.

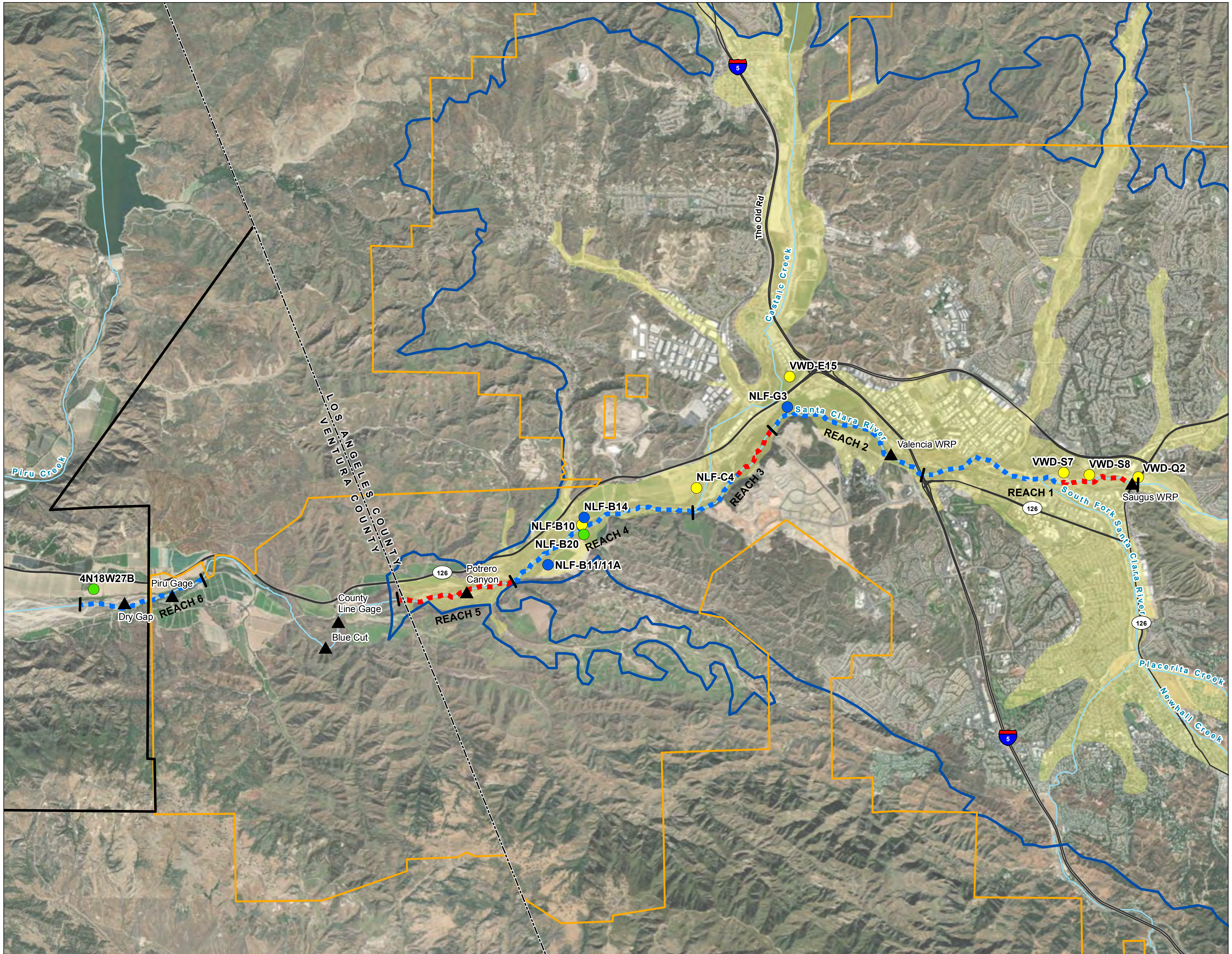

FIGURE 5-55

Gaining and Losing Reaches of the Santa Clara River During Wet Conditions

Santa Clara River Valley
East Groundwater Subbasin
Groundwater Sustainability Plan

LEGEND

- Potentially Gaining Reach
- Potentially Losing Reach

Key Well Depth to Water (ft)

- 0 - 1
- 1 - 5
- 5 - 15
- 15 - 30
- > 30

All Other Features

- Point of Interest
- Alluvial Aquifer
- Service Area Boundary for SCV Water
- UWCD Boundary
- Santa Clara River Valley Groundwater Basin, East Subbasin
- County Boundary
- Major Road
- Watercourse

NOTES

SCV Water: Santa Clarita Valley Water Agency
UWCD: United Water Conservation District

N

0 3,000 6,000 9,000
Feet

GSI Water Solutions, Inc.

Date: December 9, 2021
Data Sources: USGS, Maxar Imagery (2019), DWR Bulletin 118

Document Path: Y:\0420_CLWA\Source_Figures\019_EastSubbasinGSP\GSP\Section5\Figure5-55_Gaining_Losing_Reaches_Wet_Conditions.mxd, abarry

Reach 1 **Potentially Gaining** – Increased precipitation brought seasonal groundwater levels to near the thalweg during wet periods. Gaining conditions in this reach would likely only occur during the winter months of wet years, except for the short section of river east of the I-5 bridge, where groundwater upwelling has been observed even in drought conditions (see Section 5.2.1.4). This upwelling appears to be a result of thinning of the alluvium at this location. Groundwater elevation data also suggest that the far eastern end of this reach might be losing during wet years but transitioning to gaining conditions at or just upstream of the mouth of San Francisquito Canyon.

Reach 2 **Potentially Gaining** – Groundwater levels were consistently above the thalweg until 2 years after the onset of the drought in 2011, as indicated by groundwater level data at Well NLF-G3.

Reach 3 **Potentially Gaining** – Groundwater levels downstream of the confluence with Castaic Creek are likely close to the thalweg; however, there is a lack of reliable data in this reach. Groundwater modeling analyses suggest the eastern portion of this reach may be losing.

Reach 4 **Potentially Gaining** – The water level data in this reach are too uncertain to provide a clear indication of gaining or losing conditions. However, each well in this area (including Wells NFL-B11 and NLF-B14) shows relatively steady groundwater levels throughout the decades, with little difference in wet to normal to dry years. This stability is unlike what is observed east of I-5 or in the Castaic Valley north of the river corridor. The groundwater flow model indicates this remarkable stability in river flow rates is likely reflective of WRP flow contributions to the river from upstream plus the discharge of groundwater from the underlying Saugus Formation into the alluvium (which then discharges this water into the river throughout this reach).

Reach 5 **Potentially Losing** – There is a lack of long-term groundwater elevation data in this reach; however, in 2007, geophysical surveys and exploratory borings at the mouth of Potrero Canyon and at the county line indicated that the water table is near ground surface at the mouth of Potrero Canyon but approximately 20 feet deep at the county line, suggesting that the river could be gaining upstream of Potrero Canyon and likely losing downstream of Potrero Canyon (in the lower half of Reach 5). Results from the groundwater model (which includes thinning of the alluvium and streamflow records at the former County Line stream gage) also support this interpretation. In this reach, the alluvium overlies the low-permeability Pico Formation, which does not contain a significant groundwater resource and therefore does not substantially recharge the alluvium or the river, as occurs further upstream where the Saugus Formation is present beneath the alluvium.

Reach 6 **Potentially Gaining** – Beginning in the late 1960s, periods of heavy precipitation coupled with WRP discharges to the river upstream have raised the groundwater elevation in Well 4N18W27B nearly to the thalweg during wet periods. On occasion, the data suggest that groundwater levels might even briefly rise above the thalweg elevation. The river corridor widens and becomes devoid of riparian vegetation just downstream of Well 4N18W27B; therefore, it is highly likely that a much more prevalent losing reach begins just west of this well.

Normal Conditions

Figure 5-56 illustrates the gaining and losing reaches of the river during periods of average precipitation (normal conditions), using data from 2008 to 2011.

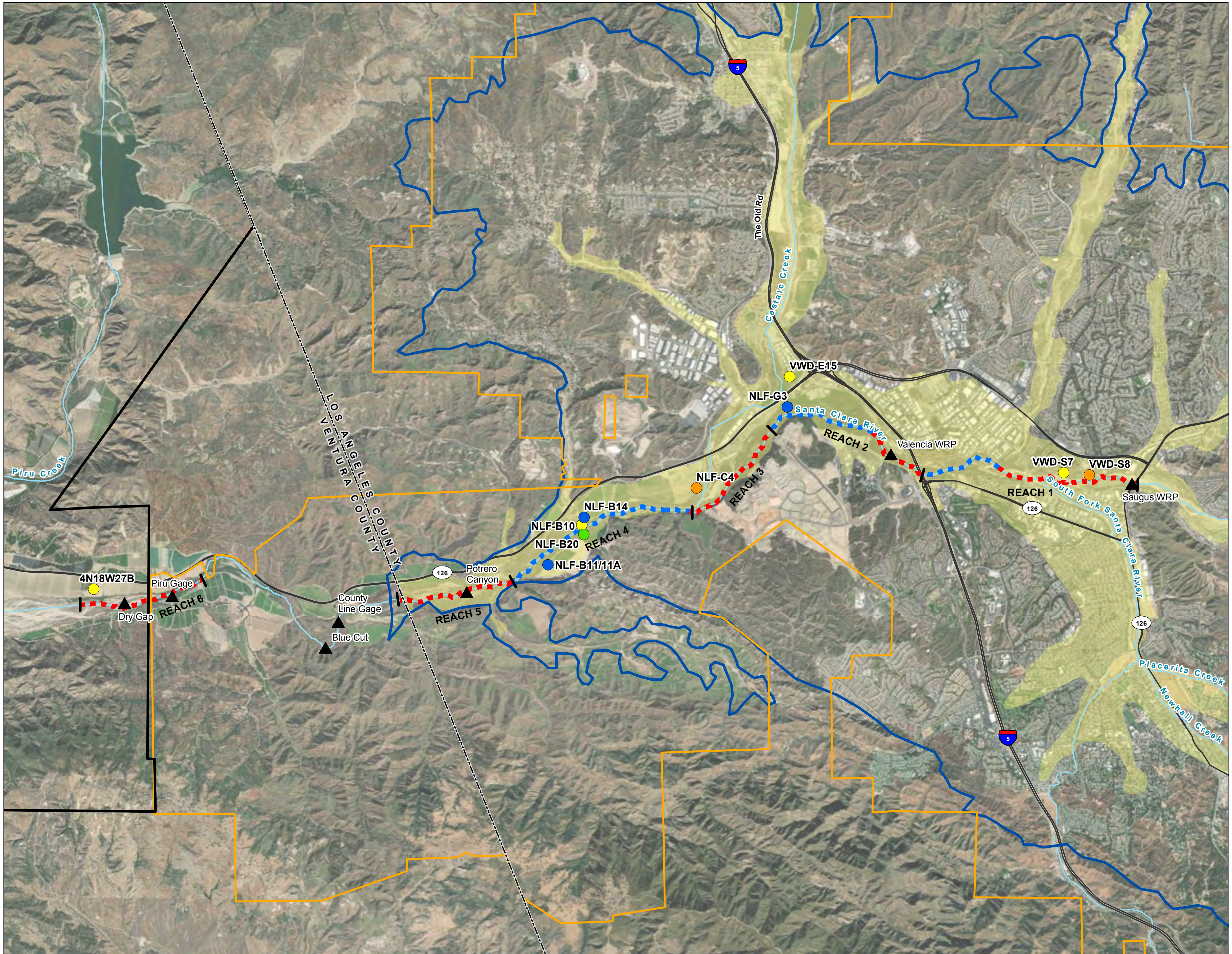

FIGURE 5-56

Gaining and Losing Reaches of the Santa Clara River During Normal Conditions

Santa Clara River Valley
East Groundwater Subbasin
Groundwater Sustainability Plan

LEGEND

- Potentially Gaining Reach
- Potentially Losing Reach

Key Well Depth to Water (ft)

- 0 - 1
- 1 - 5
- 5 - 15
- 15 - 30
- > 30

All Other Features

- Point of Interest
- Alluvial Aquifer
- Service Area Boundary for SCV Water
- UWCD Boundary
- Santa Clara River Valley Groundwater Basin, East Subbasin
- County Boundary
- Major Road
- Watercourse

NOTES

SCV Water: Santa Clarita Valley Water Agency
UWCD: United Water Conservation District

N

0 3,000 6,000 9,000
Feet

Date: December 9, 2021
Data Sources: USGS, Maxar Imagery (2019), DWR Bulletin 118

GSI Water Solutions, Inc.

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Reach 1 **Potentially Losing / Potentially Gaining** – Groundwater levels are consistently below the channel bottom, except in the section of river just east of the I-5 bridge, where groundwater upwelling has been visually observed even in drought conditions.

Reach 2 **Potentially Losing / Potentially Gaining** – Groundwater levels in Well NLF-G3 are consistently above the bottom if the river channel until 2 years after the onset of the drought in 2011, indicating potentially gaining conditions in the western portion of Reach 2. Preliminary groundwater modeling results indicate that the eastern portion of Reach 2 is potentially losing, until a point downstream of the Valencia WRP where the river turns westward. This may be a result of changing aquifer thickness. Groundwater levels in Well NLF-G3 are consistently above the channel bottom until 2 years after the onset of the drought in 2011, indicating potentially gaining conditions in the western portion of Reach 2.

Reach 3 **Potentially Losing** – Groundwater levels in Well NLF-C4 are well below the nearby thalweg elevation in the river; however, the authors believe that the reference level elevation is not accurate at this location. The river is assumed to be potentially losing upstream of the confluence with Castaic Creek.

Reach 4 **Potentially Gaining** – The portion of the river directly downstream of the confluence with Castaic Creek would likely be gaining. Further downstream, the hydrographs for multiple wells in this area do not consistently show this reach to be gaining; however, Well NLF-B14 shows groundwater levels are at or above the thalweg. The wells in this area have differing screen depths and the thickness of the alluvium in this area may vary, causing local highs or lows in groundwater levels. The reference point elevations of the wellheads may also be erroneous. Well NLF-B14 shows relatively steady groundwater levels at or above the channel bottom elevation at all times that likely reflect discharge of Saugus groundwater into the alluvium in this reach.

Reach 5 **Potentially Losing**– See the discussion in Section 5.2.4.1.2 (Wet Conditions) for wet years, which identifies that the river is likely losing in the lower half of Reach 5 but may be either gaining or losing in the upper half of Reach 5. Groundwater modeling results and the field-observed stability of groundwater elevations at the well furthest downstream (Well NLF-B11) suggest that the gaining/losing characteristics of the river during wet years are likely also occurring during years of normal rainfall. The river resides in a relatively thin layer of alluvium that overlies the low-permeability Pico Formation; therefore, it is likely that this region is losing.

Reach 6 **Potentially Losing** – Beginning in the late 1960s, periods of heavy precipitation coupled with WRP discharges to the river upstream of Reach 6 have raised the groundwater elevation in Well 4N18W27B nearly to the river's thalweg elevation for prolonged periods of time. On occasion, the data suggest that groundwater levels might even briefly rise above the thalweg elevation. The river corridor widens and becomes devoid of riparian vegetation just downstream of Well 4N18W27B, so it is highly likely that a much more prevalent losing reach begins just west of this well.

Dry Conditions

Figure 5-57 illustrates the gaining and losing reaches of the river during periods of below-average precipitation (dry conditions), using data from 2012 to 2016.

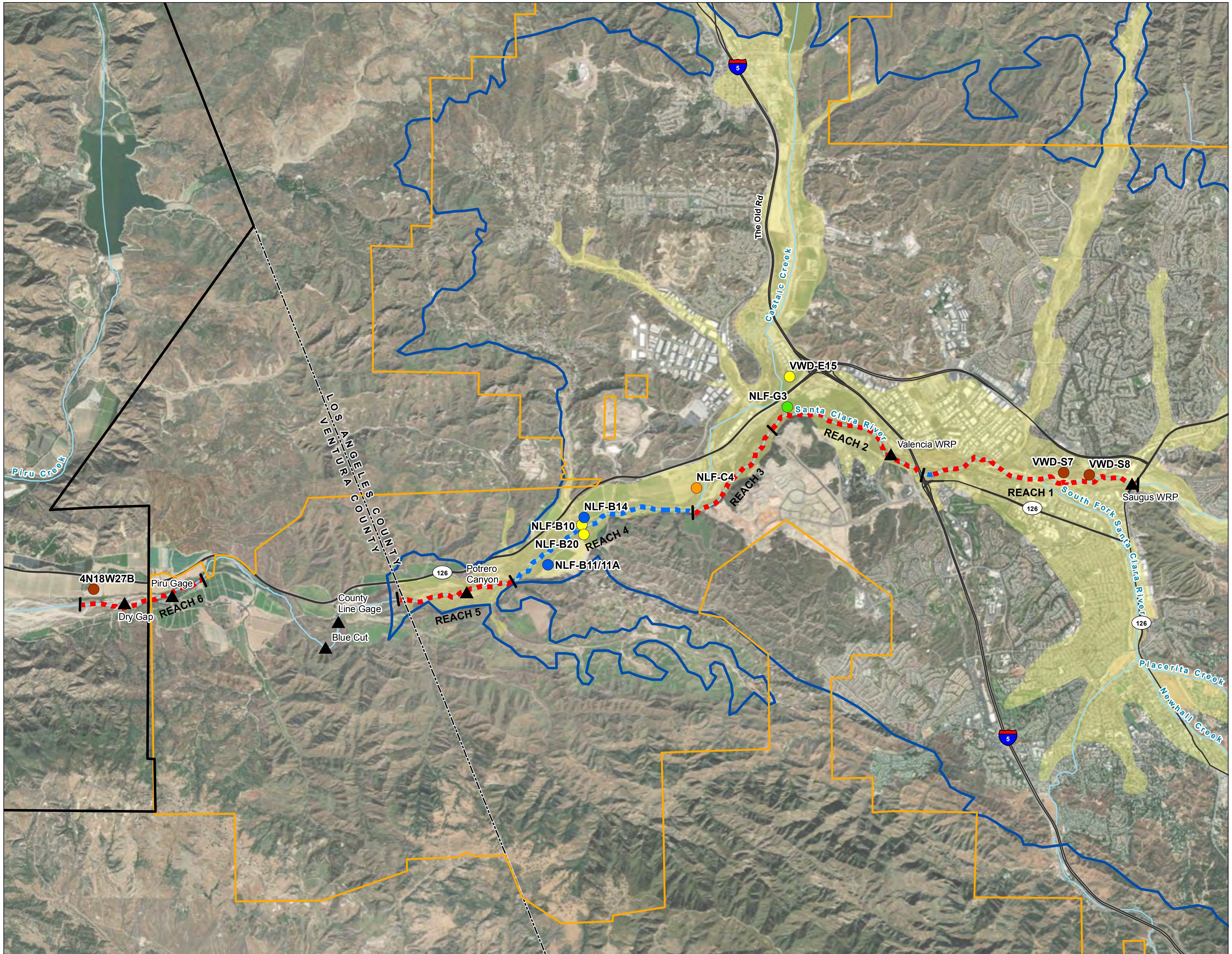

FIGURE 5-57

Gaining and Losing Reaches of the Santa Clara River During Dry Conditions

Santa Clara River Valley East Groundwater Subbasin Groundwater Sustainability Plan

LEGEND

- Potentially Gaining Reach
- Potentially Losing Reach

Key Well Depth to Water (ft)

- 0 - 1
- 1 - 5
- 5 - 15
- 15 - 30
- > 30

All Other Features

- Point of Interest
- Alluvial Aquifer
- Service Area Boundary for SCV Water
- UWCD Boundary
- Santa Clara River Valley Groundwater Basin, East Subbasin
- County Boundary
- Major Road
- Watercourse

NOTES

SCV Water: Santa Clarita Valley Water Agency
UWCD: United Water Conservation District

N

0 3,000 6,000 9,000
Feet

Date: December 9, 2021
Data Sources: USGS, Maxar Imagery (2019), DWR Bulletin 118

GSI Water Solutions, Inc.

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Reach 1 **Potentially Losing** – Groundwater levels are consistently below the channel bottom. However, in 2016, during the recent drought, lateral seepage of alluvial groundwater (springs) were observed to still be present beneath the I-5 bridge in the western portion of this reach, creating small pools at the base of steeply sloping ground surface topography and coinciding with an area where the alluvium is very thin (along the south side of Round Mountain). These pools were observed to transition into a small, distinct flowing channel starting at the nearby Old Road Bridge.

Reach 2 **Potentially Losing** – Groundwater levels slowly declined as the drought conditions which began in 2011 progressed, causing the groundwater levels to eventually fall below the channel bottom elevation in the summer of 2013. Prolonged drought is likely to render this length of river a losing reach, even with regular discharges from the WRPs.

Reach 3 **Potentially Losing**– The river appears to be losing throughout this reach. During the last drought, there were fewer releases from Castaic Reservoir and as a result, groundwater levels declined in Well NLF-C4 by 5 feet to 10 feet.

Reach 4 **Potentially Gaining** – The hydrographs for multiple wells in this area do not consistently show this reach to be gaining; however, Well NLF-B14 shows groundwater levels at or above the thalweg during the last drought from 2011 to 2016. The wells in this area have differing screen depths and the thickness of the alluvium in this area may vary, causing local highs or lows in groundwater level. The estimated reference point elevations of the wellheads may also be erroneous. Well NLF-B14 shows relatively steady groundwater levels at or above the channel bottom elevation during drought conditions that likely reflects discharge of Saugus groundwater into the alluvium in this reach.

Reach 5 **Potentially Losing** –Because of a lack of data in this reach, it is not known whether the river is gaining or losing; however, the river resides in a relatively thin layer of alluvium that overlies the low-permeability Pico Formation; therefore, it is likely that during low rainfall periods, this region of the river is losing.

Reach 6 **Potentially Losing** – Water levels in Well 4N18W27B have fallen steadily and dramatically below the thalweg since the onset of the drought in 2011, to depths of as much as 100 feet below ground surface during 2015. Other below-average rainfall periods also show this reach to be potentially losing.

5.2.5 Field Data Collection Work Plan

Based on the results of the evaluation of groundwater-surface water interaction presented previously, a number of data gaps and uncertainties were identified that should be further investigated in order to gain a better understanding of the interaction between groundwater and surface water. A field data collection work plan has been prepared that identifies possible locations for installing piezometers and temperature probes (see Appendix F). The piezometers and temperature probes will be used to measure water levels and temperature in the alluvium near the river. Temperature sensors placed within or above the water table will be able to detect the temperature signature of the underlying groundwater; thus, temperature will be used as a tracer for surface water influence. Because temperature probes will be installed to a depth of 10 feet bgs, they will be located below the effects of diurnal air temperature fluctuations and so they will reflect groundwater temperatures, even though they may not be submerged below the water table. Temperature will also be measured directly in the river. Temperature monitoring will allow identification of locations and time periods where warmer river water (heated by the sun and discharge from wastewater treatment plants) is recharging shallow groundwater and places where cooler groundwater is discharging to the river. The timing and direction of this exchange (gaining or losing stream) may change depending on the time of year and whether it is a dry versus wet year. Changes in temperature in the river, shallow temperature probes, and shallow groundwater will be correlated with river flow and groundwater levels to assess groundwater and surface water interactions over time. Access for installation of the piezometers and temperature probes is still being negotiated with property owners and so the locations for the installations are subject to change.

5.3 Groundwater Dependent Ecosystems (GDEs)

SGMA requires Groundwater Sustainability Agencies (GSAs) to identify and consider GDEs within their GSPs. GDEs are defined under SGMA as “ecological communities of species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface” (23 California Code of Regulations § 351(m)). GDE types include seeps and springs; wetlands and lakes; terrestrial vegetation connected to shallow groundwater; and rivers, streams and estuaries.

To assist in the identification of GDEs, The Nature Conservancy (TNC) has developed a methodology and guidance document to assist in a structured and uniform process for defining and identifying GDEs that may be applied throughout the State. Section 5.3.2 describes the full TNC methodology. This section of the GSP accomplishes a portion of the TNC methodology to identify and map potential GDEs within the Basin.

Although the TNC guidance recommends using depth to groundwater as a means of identifying GDEs. Groundwater depths vary substantially seasonally and year-over-year in this watershed. This analysis identifies and maps habitats within the natural watershed that require intermittent or perennial water and characterizes these areas as “potential GDEs.” This provides for an initial conservative accounting of all areas that may or may not be groundwater dependent. Subsequent analysis using depth to groundwater data is discussed later in this document eliminates some areas identified as potential GDEs.

5.3.1 Environmental Setting

DWR maintains and updates Bulletin 118 that identifies the occurrence and nature of groundwater within the state (DWR, 2016), including the establishment and naming of groundwater basin boundaries, the status of pumping and overdraft for each basin, and the identification of priority basins experiencing critical overdraft.

California’s 515 groundwater basins are classified into one of four categories: high, medium, low, or very low priority based on components identified in the California Water Code Section 10933(b). Basin priority determines which provisions of California Statewide Groundwater Elevation Monitoring (CASGEM) Program and the SGMA apply in a basin. DWR prioritized groundwater basins through the CASGEM Program in 2014. In 2015, SGMA went into effect and required DWR to prioritize basins. Consequently, DWR used the 2014 CASGEM Basin Prioritization as the initial SGMA basin prioritization, which identified the Santa Clara River Valley East Groundwater Subbasin as a high priority basin (DWR, 2019a).

5.3.1.1 Santa Clara River Watershed

The Santa Clara River is the largest river system in Southern California remaining in a relatively natural state. The Santa Clara River originates in the northern slope of the San Gabriel Mountains in LA County and flows in a westerly direction for approximately 84 miles through Tie Canyon, Aliso Canyon, Soledad Canyon, the Santa Clarita Valley, the Santa Clara River Valley, and the Oxnard Plain before discharging to the Pacific Ocean near the Ventura Harbor (see Figure 5-58).

The Santa Clara River and tributary system covers about 1,634 square miles. Major tributaries include Castaic Creek, Bouquet Canyon Creek, and San Francisquito Creek in LA County, and the Sespe, Piru, and

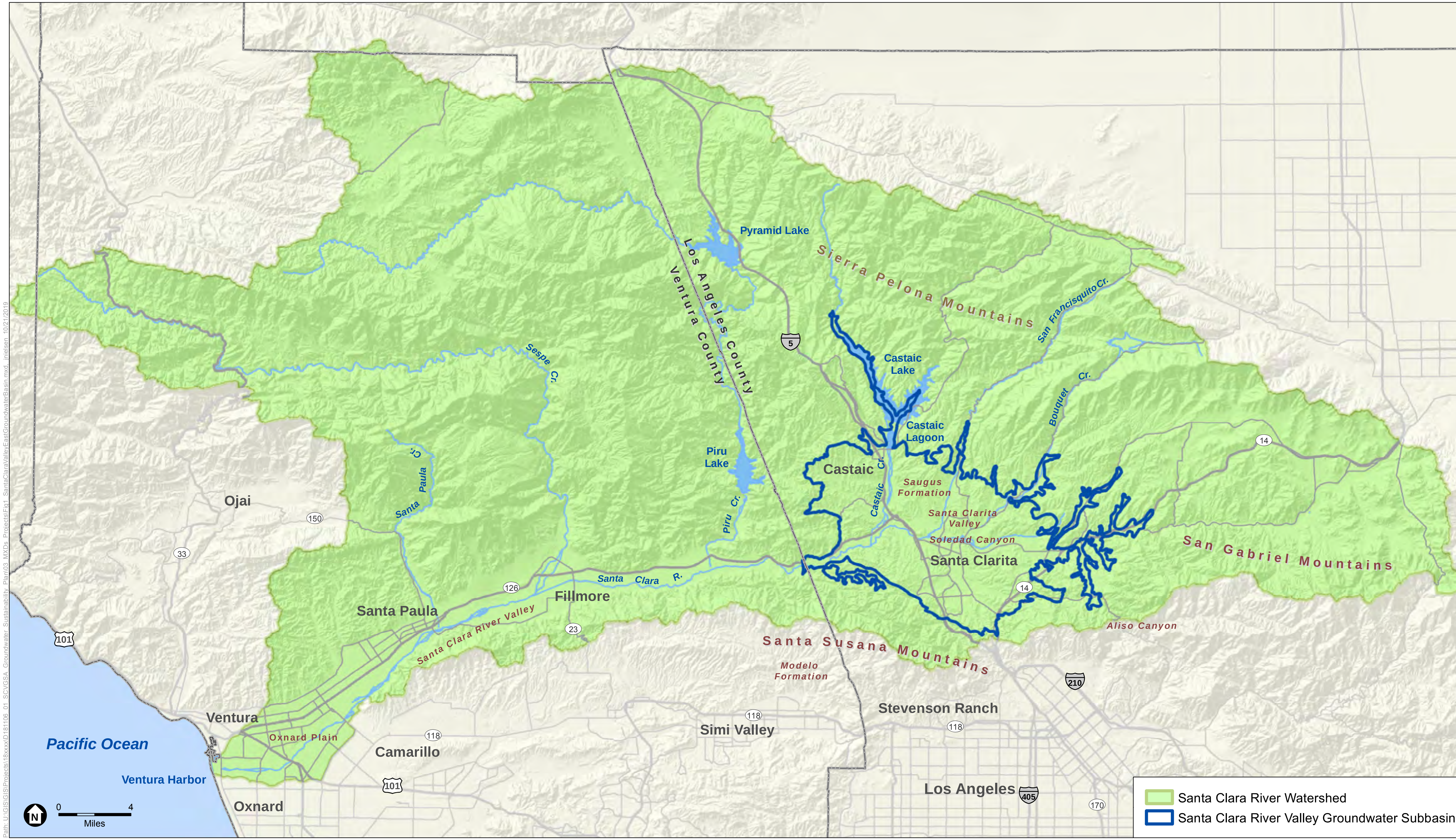
Santa Paula Creeks in Ventura County. Approximately 40 percent of the watershed is located in LA County and 60 percent is in Ventura County (Watersheds Coalition of Ventura County, 2017). Land use within the watershed is predominately open space, with primarily residential, agriculture, and some industrial uses along the mainstem of the river. High quality riparian patches occur along the river and its tributaries (Water Boards, 2019).

5.3.1.2 Santa Clara River Valley East Groundwater Subbasin

The Basin is located in the central- western portion of LA County. The Basin is bound on the north by the Sierra Pelona Mountains, on the east and southeast by the San Gabriel Mountains, and on the south by the Santa Susana Mountains (see Figure 5-58). It is bound on the west by the Modelo Formation, the Saugus Formation, and a thinning of the alluvium near the Piru Subbasin (DWR, 2018). This includes nearly the entirety of the City of Santa Clarita as well as unincorporated LA County communities and census-designated areas such as Castaic and Stevenson Ranch.

5.3.1.3 Riparian Habitat

In general, riparian habitat in the Upper Santa Clara River Basin support several special status avian species including the least Bell's vireo and southwestern willow flycatcher. These species are found in the willow and riparian mixed hardwood forests along the length of the river. Riparian habitat requires a reliable water source. Willow forests occur in areas where groundwater is available year-round. Willow root zones occur most prominently within 1 to 5 feet below the surface but may reach depths of up to 8 feet (TNC, 2018a). Root depths of mature cottonwood trees may reach over 16 feet (Taylor, 2000). The TNC Guidelines suggest that habitats where underlying groundwater depths are 30 feet or more can be assumed to be disconnected from groundwater (TNC, 2018b). Table 5-4 characterizes GDEs in the watershed, focusing on discrete segments of the Santa Clara River below Bouquet Canyon. The GDE resources sustained in these reaches rely on a combination of surface flow and groundwater upwelling.



SOURCE: ESRI, 2019; ESA, 2019.

SCVGSA Groundwater Sustainability Plan

Figure 5-58
Santa Clara Valley East Groundwater Subbasin and Santa Clara River Watershed

ESA

Table 5-4. Characteristics of GDEs along Santa Clara River Corridor

Segment Description	Dry Year Gaining/Losing	GDE Resource
Upper Reaches and Interim Reaches of Santa Clara River	Mostly dry in dry season, Losing	GDEs are present in certain areas of the watershed outside of the Santa Clara River mainstem. These areas include oak woodlands that are supported from hillside seepage and riparian habitat where groundwater is shallow or at the surface intermittently.
Santa Clara River from Bouquet Canyon to I-5 Bridge	Losing/Gaining	This reach stretches from the confluence of the Bouquet Canyon to the I-5 Bridge. Much of the reach is perennially dry, exhibiting Riversidean scrub. The Saugus WRP discharges an average of 5 MGD to the river in this reach that supports a ribbon of riparian vegetation that dissipates as the surface flow infiltrates. Riparian vegetation begins to reemerge below this area that is otherwise a sandy dry wash. Riparian vegetation becomes more established at the confluence of the San Francisquito Creek to the I-5 Bridge. Beginning at the I-5 Bridge for a few 100 feet downstream, perennial surface flows have been recorded resulting from rising groundwater. This perennial flow represents an essential aquatic habitat for sensitive native aquatic species.
Santa Clara River from I-5 Bridge to one mile downstream of the VWRP point of discharge	Losing/Gaining	This reach stretches from just below the I-5 bridge to approximately 1 mile below the Valencia WRP discharge. A few 100 feet downstream of the I-5 bridge, the river narrows and becomes a losing reach. However, at this point the Valencia WRP discharges an average of approximately 15 MGD to the river. The river corridor from the I-5 bridge to one mile downstream of the Valencia WRP exhibits a dense cottonwood and willow forest. The river widens in places and vegetation covers the entire flood plain. The dense riparian forest and perennial aquatic habitat exists in this reach supported in part by Valencia WRP surface flow discharges.
Santa Clara River from one mile to Castaic Creek	Losing	This reach stretches from approximately 1 mile downstream from the Valencia WRP to just above the confluence with Castaic Creek. This is a losing reach with groundwater levels dropping below 25 feet during the driest months. The riparian forest becomes less dense and wide dry sand bars with scrub habitat are evident. Surface water flows are perennial in this reach supporting a ribbon of riparian habitat on one side of the floodplain.
Santa Clara River from Castaic Creek for two miles	Gaining	This reach stretches from just above Castaic Creek for approximately 2 miles downstream. Groundwater upwelling contributes surface flow to this segment even in the driest months of the driest years. The channel begins to narrow, and the riparian forest becomes denser, covering the entire floodplain in many places. Surface water flows are perennial.

Segment Description	Dry Year Gaining/Losing	GDE Resource
Santa Clara River from approximately two miles below Castaic Creek to Ventura County border	Losing/Gaining	This reach stretches for another mile to the end of the Upper Santa Clara Basin near the Ventura County border. The channel narrows and the riparian forest is dense in this segment although groundwater levels may drop below 25 feet during the driest months of dry years. Surface water flows are perennial.

Notes

GDE = groundwater dependent ecosystem

MGD = million gallons per day

I-5 = Interstate 5

WRP= water reclamation plan

5.3.1.4 Aquatic Habitat

Aquatic habitat in the Basin may support several special status species including the arroyo toad, native fishes, and unarmored three-spined stickleback (UTS). The UTS have been found in only a few locations within the watershed upstream of the Valencia WRP. Recently, the UTS has not been located below the Valencia WRP discharges, making the short upstream segment near the I-5 bridge a particularly important location. The Valencia WRP discharges of approximately 15 million gallons per day (MGD) create perennial surface flows. The aquatic habitat is also supported by groundwater upwelling. The cooler groundwater may cool the WRP discharges presenting preferable water quality conditions for special status species such as UTS. As a result, groundwater upwelling in areas that historically have been gaining reaches improves aquatic habitat quality.

5.3.2 The Nature Conservancy Guidance for Identifying GDEs

TNC developed a guidance document based on best available science to assist agencies, consultants, and stakeholders to efficiently incorporate GDEs into GSPs. In the guidance, five steps were outlined to inform the GSP process (TNC, 2018b):

Step 1: Identify GDEs

- **Step 1.1:** Map GDEs
- **Step 1.2:** Characterize GDE Condition

Step 2: Determine Potential Effects of Groundwater Management on GDEs

Step 3: Consider GDEs when Establishing Sustainable Management Criteria

Step 4: Incorporate GDEs into the Monitoring Network; and

Step 5: Identify Projects and Management Actions to Maintain or Improve GDEs.

There are two objectives within Step 1 which are to map (Step 1.1) and characterize (Step 1.2) GDEs in the Basin. Step 1.1 is the focus of this section.

5.3.2.1 Step 1.1: Map GDEs

The mapping process in Step 1.1 begins with the publicly available statewide GDE indicators (iGDE) database that was developed by the TNC in partnership with the California Department of Fish and Wildlife (CDFW) and the DWR using the best available statewide data on vegetation, springs and seeps, wetlands, and riparian mapping. This statewide database identifies areas (polygons) where GDEs may be potentially present. These polygons may be refined further using local information and site-specific data to ensure the map accurately reflects local conditions.

Aerial photos and local knowledge may be used to refine the data specific to local regions, resulting in addition, removal, and modifications to polygons. To confirm whether the GDE polygons are connected to groundwater, local hydrologic information may be used to confirm a groundwater connection to the potential GDE. For hydrologic data that is missing or insufficient, TNC guidance provides a list of questions to assess whether iGDE polygons are connected to groundwater. These questions include the following from Worksheet 1 of the guidance:

1. Is the iGDE underlain by a shallow unconfined or perched aquifer that has been delineated as being part of a Bulletin 118 principal aquifer in the basin?
2. Is the depth to groundwater under the iGDE less than 30 feet?
3. Is the iGDE located in an area known to discharge groundwater (e.g., springs/seeps)?

If the answer is yes to any of these three questions, per TNC guidance, it is likely a GDE.

Once a hydrologic connection between each iGDE polygon and groundwater is confirmed, the polygons can be designated as actual GDEs (TNC, 2018b). As a part of the process, some GDE polygons are removed and other GDE polygons added, where appropriate. TNC recommends that iGDEs with insufficient hydrologic data also be considered GDEs but should be flagged for further investigation.

TNC further recommends grouping and consolidating GDE polygons based on their proximity to each other, GDE type (seeps and springs; wetlands and lakes; terrestrial vegetation; and rivers, streams, and estuaries), and association to the same aquifer. Based on DWR's Bulletin 118 and local geologic information, it is recommended to group proximate GDE polygons in the Basin by aquifer.

5.3.2.2 Step 1.2: Characterize GDE Condition

Once GDEs are mapped, they are then characterized in Step 1.2 by their hydrologic and ecological conditions. Although mapping of potential GDEs is the focus of this section, additional characterization of potential GDEs is an anticipated next step (see Section 5.3.5).

To assess the ecological condition of each GDE, the TNC guidance recommends that data sets be reviewed including the iGDE database, U.S. Fish and Wildlife Service's Environmental Conservation Online System, CDFW's California Natural Diversity Database, California Protected Areas Data Portal, Areas of Conservation Emphasis, Regional Water Quality Control Board's beneficial use designations, and local plans or studies such as habitat conservation plans and natural resource management plans.

The TNC guidance recommends that the condition of each GDE unit be inventoried and documented by describing the species composition, habitat condition, and other relevant information reflected in Worksheet 2 of the guidance (TNC, 2018b). Then the ecological condition of the GDE unit should be characterized as having a high, moderate, or low ecological value based on criteria provided in the TNC guidance.

This step has not been conducted for all the potential GDEs, although field data sheets have been prepared for a representative sampling of the GDE polygons. The identification of riparian habitat in this watershed is considered to represent high ecological values that could potentially support sensitive species. Any further refinement of habitat condition could result in a reduction of assessed ecological values associated with specific GDE polygons (see Section 5.3.5).

5.3.3 Methods Used to Identify Potential GDEs

5.3.3.1 Data Compilation and Aerial Imagery Analysis Methods

Both vegetation and wetland layers of the Natural Communities Commonly Associated with Groundwater (NCCAG) data set (DWR, 2019a) were used as the baseline mapping for the locations of potential GDEs. The NCCAG data set is the same data set as the statewide GDE indicators (iGDE) database referred to in the TNC guidance (TNC 2018b). The publicly available data compiled into the iGDE database includes several large-scale vegetation and wetland mapping efforts that conform to established State or federal mapping standards. The NCCAG (i.e., iGDE) can be accessed using the NC Data set Viewer which is a web-based mapping program that allows for the viewing and download of vegetation and wetland layers contained in the NCCAG data set (DWR, 2019b). As further detailed in Appendix D, the *Mapping of Potential Groundwater Dependent Ecosystems within the Santa Clara River Valley East Groundwater Basin* (Appendix A of that report), the data sources used to compile the iGDE database include the following:

1. VEGCAMP – The Vegetation Classification and Mapping Program, CDFW
2. CALVEG – Classification and Assessment with Landsat of Visible Ecological Groupings, USDA Forest Service
3. NWI V 2.0. – National Wetlands Inventory (Version 2.0.), U.S. Fish and Wildlife Service
4. FVEG – California Department of Forestry and Fire Protection, Fire and Resources Assessment Program (CALFIRE FRAP).
5. United States Geologic Survey (USGS) National Hydrography Data set (NHD)
6. Mojave Desert Springs and Waterholes (Mojave Desert Spring Survey)

Although the iGDE database lists the National Wetland Inventory (NWI) as one of its data sources, it was noted that the entirety of the NWI data was not accurately depicted. Therefore, NWI data were taken from its original U.S. Fish and Wildlife source to identify areas not included in the iGDE database but which contained riverine channels, riparian, or wetland vegetation. Spatial data were assembled in Keyhole Markup Language (KML) files, that were zipped (i.e., saved as KMZs). The KMZs were prepared using the most current aerial imagery available. The original iGDE database was used to create KMZ 1 (Original iGDE Database).

The Basin boundary defined in Bulletin 118, as viewed on the NC Data set Viewer (DWR, 2019b), was used as the area within which potential GDEs are to be identified (DWR, 2016).

Using aerial imagery (Google, 2019), the next step was to keep, add, or remove potential GDE polygons in accordance with Step 1.1 of the TNC guidance based on an assessment and interpretation of vegetative cover and/or land use. Added polygons included vegetation communities that were already mapped as potential GDE polygons in the original iGDE database but needed to be revised or added based on the vegetative cover shown on the aerial imagery (i.e., unmapped sections of river channels). These added polygons were assigned one of the vegetation or wetland classifications of an adjacent polygon or an existing classification as used in the iGDE data set, for consistency (KMZ 2). The added potential GDE polygons were included with the original iGDE database to create a working iGDE database [(KMZ 2 (iGDE Database + Added GDEs)]. Areas that were difficult to assess using aerial imagery were noted as needing a field assessment to confirm the vegetation present, as discussed below.

5.3.3.2 Field Assessment Methods

To verify polygons of the working iGDE database reflected in KMZ 2, and to gather species and habitat information, representative potential GDE polygons were selected for a field assessment. These areas included the following:

1. At least one of each habitat type reflected in the original iGDE database
2. Areas where vegetation type or hydrology was unclear based on the aerial imagery analysis (i.e., isolated tree clusters with no obvious connection to a water source)

Prior to the field assessment, a field data sheet was developed that incorporated species and habitat information, and environmental beneficial uses established by the LARWQCB (LARWQCB, 2016), consistent with TNC guidance for determining the ecological condition of a potential GDE. Additional information on the field data sheet included, but was not limited to, dominant plant species observed within the tree, shrub, and herbaceous layers; wildlife species observed; hydrology information such as the presence of surface flows or ponded water and the source of water; and soil type. The data sheet was completed for each of the potential GDE polygons selected for a field assessment that were accessible.

The field assessment was conducted by ESA biologists on September 5 and 6, 2019. The survey was conducted on foot within accessible portions of the representative potential GDE polygons, which comprised 335 acres. Aerial photography and tablets using ArcGIS Collector were used to accurately locate each polygon. Vegetation communities were characterized and mapped in the field in accordance with the vegetation classifications from the original iGDE database. In areas that were not accessible at the time of the survey, visual observations were made from the nearest accessible locations. Inaccessible locations typically occurred on private or gated property, and trespassing was avoided. Areas where the polygon could not be visually assessed from a distance or with binoculars were not analyzed and were noted as being inaccessible. Inaccessible polygons accounted for a total of 12 distinct polygons totaling 30 acres (or an estimated 8 percent of the total survey area). Inaccessible polygons were kept as potential GDE polygons with the original vegetation classification. Datasheets prepared during the field assessment are included in Appendix D, the *Mapping of Potential Groundwater Dependent Ecosystems within the Santa Clara River Valley East Groundwater Basin* (Appendix B of that report).

5.3.3.3 Refinement of GDE Mapping

Removal of Potential GDE Polygons

After the field assessment, it became evident that some habitat types do not meet the definition of GDEs as defined under SGMA. These areas include the following:

1. Upland habitats that were planted or landscaped, and/or are currently supported by irrigation
2. Human-made features[23] maintained by management of surface flows (i.e., intakes/outlets) such as golf course ponds, detention basins, concrete-lined channels, open water reservoir/lakes and associated riparian/wetland vegetation (i.e., Castaic Lake)
3. Barren[24] segments of river channels
4. Riversidean scrub habitats. Vegetation classified within the original iGDE database as Riversidean Alluvial Scrub, Riverwash Scrub, or Scalebroom were removed from the potential GDEs, as these

[23] Human-made features exclude historical drainage features that were later surrounded by development.

[24] Barren habitat is defined by the absence of vegetation. Any habitat with <2% total vegetation cover by herbaceous,desert, or nonwildland species and <10% cover by tree or shrub species is defined this way (CDFG 1988).

habitats are established in river floodplains where they are dependent on (limited) flood events (Beller et al., 2011), and are generally not known to be groundwater dependent

The remaining potential GDE polygons were compiled into KMZ 3 (iGDE Database + Added GDEs - Removed GDEs).

Remapping and Reclassification of Potential GDE Polygons

A review of all confirmations or modifications of the field assessed potential GDEs made during the field assessment was conducted in coordination with ESA's Geospatial Services' staff. Based on the field assessment, a handful of polygons originally classified as Coast Live Oak, Riparian Mixed Hardwood, Riversidean Alluvial Scrub, Scalebroom or Willow (Shrub) were reclassified and remapped from KMZ 3 as necessary and kept as potential GDEs.

The vegetation communities of the potential GDEs from KMZ 3 were then reclassified according to *A Manual of California Vegetation, Second Edition* (Sawyer et al., 2009) based on the dominant plant species observed during the field assessment. In addition, in accordance with TNC guidance, the potential GDE polygons were also grouped by potential GDE type (seeps and springs; wetlands and lakes; terrestrial vegetation; and rivers, streams and estuaries). The potential GDE polygons reflective of this step were compiled into KMZ 4 (Final Potential GDE Mapping).

5.3.4 Results of Potential GDE Identification

5.3.4.1 Data Compilation and Aerial Imagery Analysis Methods

The iGDE database source data includes an estimated 6,926 acres of potential GDEs (KMZ 1) categorized by the NCCAG as wetlands and vegetation. These two categories are a combination of a number of different vegetation classifications systems. As such, the vegetation types within the NCCAG data set associated with these two categories included: Baccharis (Riparian), California Sycamore (*Platanus racemosa*), Coast Live Oak (*Quercus agrifolia*), Fremont Cottonwood (*Populus fremontii*), Arrowweed (*Pluchea sericea*), Riparian Mixed Hardwood, Riparian Mixed Shrub, Riversidean Alluvial Scrub, Riverwash Scrub, Narrowleaf Willow (*Salix exigua*), Scalebroom (*Lepidospartum squamatum*), Tule – Cattail (*Schoenoplectus* sp. – *Typha* sp.), Valley Oak (*Quercus lobata*), Wet Meadows, Willow, and Willow (Shrub). NWI data within the Basin contained the following classifications: Freshwater Emergent Wetland, Freshwater Forested/Shrub Wetland, Freshwater Pond, Lake, and Riverine.

After review of aerial imagery, a total of 1,533 acres of potential GDEs were added to the original iGDE database, totaling 8,459 acres of potential GDEs as reflected in KMZ 2. These added potential GDE polygons included the following vegetation communities: Coast Live Oak, Riparian Mixed Hardwood, Riparian Mixed Scrub, and Willow (Shrub). Several of the less common communities that occurred within the NCCAG data set were consolidated into the surrounding communities if the analysis of aerial imagery was not conclusive to that specific type of community. This included Baccharis, California Sycamore, Riverwash Scrub, Narrowleaf Willow, Tule-Cattail, and Valley oak. One detention basin and four ponds were also noted as potential GDEs based on the data compilation and aerial imagery analysis, as they are features located along natural drainages.

5.3.4.2 Field Assessment

During the field assessment, some areas originally mapped in the iGDE database as Riversidean Alluvial Scrub or Willow (Shrub) were confirmed to be riparian woodland communities (Riparian Mixed Hardwood or Coast Live Oak) along the Santa Clara River mainstem, Castaic Creek, and Bouquet Canyon. Several willow species including Goodding's willow (*Salix gooddingii*), red willow (*Salix laevigata*), arroyo willow (*Salix* *lasiolepis*) and narrowleaf willow occurred within much of the Riparian Mixed Hardwood community. Upland habitats surveyed in the field that were planted or landscaped, and/or are currently supported by irrigation, included pine and eucalyptus trees.

It should be noted that not all polygons identified as potential GDEs were visited during the field assessment. Several areas identified for field assessment (such as Potrero Canyon, detention basins, and four ponds) were not accessible due to a number of factors including the presence of private property, locked gates, fences or other factors which prevented entry. Inaccessible areas totaled 30 acres, and vegetation communities or land uses within these inaccessible areas were classified solely based on the aerial imagery analysis.

5.3.4.3 Refinement of Potential GDE Mapping

Further refinement of the potential GDEs was conducted to remove habitat types identified in aerial imagery and confirmed in the field visit that do not meet the definition of GDEs as defined under SGMA. Riversidean Alluvial Scrub, Riverwash Scrub, and Scalebroom habitats were removed from the potential GDE database. In addition, habitat types associated with man-made features such as wet meadows on the shores of Castaic Lake, planted/irrigated areas, detention basins, golf course ponds, ponds, barren channels, and other man-made features were also removed from the potential GDE database. A total of 6,567 acres were removed from the potential GDE database (KMZ 3).

The remaining potential GDEs were then reclassified in accordance with *A Manual of California Vegetation, Second Edition* (Sawyer et al., 2009) where applicable, based on observations from the field assessment. Table 5-5 lists and Figure 5-59 displays the potential GDEs reflected in KMZ 4, totaling an estimated 1,890 acres. The primary vegetation types include Fremont cottonwood forest and coast live oak woodland along the Santa Clara River and its tributaries.

Table 5-5. Summary of Potential Groundwater Dependent Ecosystems within the Santa Clara River Valley East Groundwater Subbasin

Waterway/Tributary	Tributary ID Number	Vegetation Classification Based on Aerial Imagery Analysis[1]	Revised Vegetation Classification[2]	Area (acres)
Santa Clara River	SCR	Riparian mixed hardwood	Fremont cottonwood forest	698.33
Unnamed tributary to Santa Clara River (Fairfield Way)	SCRTRIB3	Riparian mixed hardwood	Fremont cottonwood forest	1.65
Unnamed tributary to Santa Clara River (Turn Leaf Court)	SCRTRIB2b	Riparian mixed hardwood	Fremont cottonwood forest	1.10
Unnamed tributary to Santa Clara River (Golden Valley Road)	SCRTRIB2a	Coast live oak	Coast live oak woodland	2.33
Unnamed tributary to Santa Clara River (Keaton Street)	SCRTRIB1	Riparian mixed hardwood	Fremont cottonwood forest	5.29

Waterway/Tributary	Tributary ID Number	Vegetation Classification Based on Aerial Imagery Analysis[1]	Revised Vegetation Classification[2]	Area (acres)
Unnamed tributary to Santa Clara River (Sierra Highway, south of Soledad Canyon Road)	SCRTRIB4	Riparian mixed hardwood	Fremont cottonwood forest	1.01
Unnamed tributaries to Santa Clara River (Sierra Highway, north of Soledad Canyon Road)	SCRTRIB5	Coast live oak	Coast live oak woodland	2.34
		Riparian mixed hardwood	Fremont cottonwood forest	1.84
		Pond	Open water	0.50
Unnamed tributary to Santa Clara River (Sand Canyon Road)	SCRTRIB6	*Coast live oak	Coast live oak woodland	41.95
		*Pond	Open water	1.12
Unnamed tributary to Santa Clara River (west of I-5, South of Santa Clara River)	SCRTRIB7	Coast live oak	Coast live oak woodland	12.64
Unnamed tributary to Santa Clara River (west of I-5, Borton Street, Val Verde)	SCRTRIB8	*Coast live oak	Coast live oak woodland	7.69
		*Riparian mixed hardwood	Fremont cottonwood forest	1.66
Unnamed tributaries of Santa Clara River (far western GWB, Del Valle)	SCRTRIB9	Riparian mixed hardwood	Fremont cottonwood forest	0.9
		*Riparian mixed scrub	Mulefat thickets	3.57
South Fork Santa Clara River	SCRTRIB10	Riparian mixed hardwood	Fremont cottonwood forest	67.37
		Riparian mixed scrub	Mulefat thickets	2.33
Unnamed tributary to South Fork Santa Clara River (La Salle Canyon Road)	SCRTRIB11	*Coast live oak	Coast live oak woodland	5.19
		Riparian mixed hardwood	Fremont's cottonwood forest	0.65
		*Detention basin	Detention basin	0.59
Unnamed tributary to South Fork Santa Clara River (The Old Road)	SCRTRIB12	Coast live oak	Coast live oak woodland	44.93
Bouquet Creek	SCRTRIB13	Riparian mixed hardwood	Fremont cottonwood forest	13.07

Waterway/Tributary	Tributary ID Number	Vegetation Classification Based on Aerial Imagery Analysis[1]	Revised Vegetation Classification[2]	Area (acres)
Unnamed tributary to Bouquet Creek (Forest Route 6N18)	SCRTRIB14	Coast live oak	Coast live oak woodland	1.35
		Riparian mixed scrub	Mulefat thickets	1.29
Castaic Creek	SCRTRIB15	Riparian mixed hardwood	Fremont cottonwood forest	201.10
Unnamed tributary to Castaic Creek (Tapia Canyon Road)	SCRTRIB16	Coast live oak	Coast live oak woodland	24.09
Unnamed tributaries to tributary of Castaic Creek (Hasley Canyon Road)	SCRTRIB17	Coast live oak	Coast live oak woodland	4.25
		Riparian mixed hardwood	Fremont cottonwood forest	2.77
San Francisquito Creek	SCRTRIB18	Riparian mixed hardwood	Fremont cottonwood forest	91.22
Placerita Creek	SCRTRIB19	Riparian mixed hardwood	Fremont cottonwood forest	17.58
		Coast live oak	Coast live oak woodland	2.77
Unnamed tributary to Placerita Creek (Oro Fino Mountainway)	SCRTRIB20	Coast live oak	Coast live oak woodland	25.74
Newhall Creek	SCRTRIB21	Riparian mixed hardwood	Fremont cottonwood forest	15.47
Unnamed tributary to Newhall Creek (Pine Street)	SCRTRIB22	Coast live oak	Coast live oak woodland	43.75
Potrero Canyon	SCRTRIB23	*Coast live oak	Coast live oak woodland	3.43
		*Riparian mixed hardwood	Fremont cottonwood forest	35.95

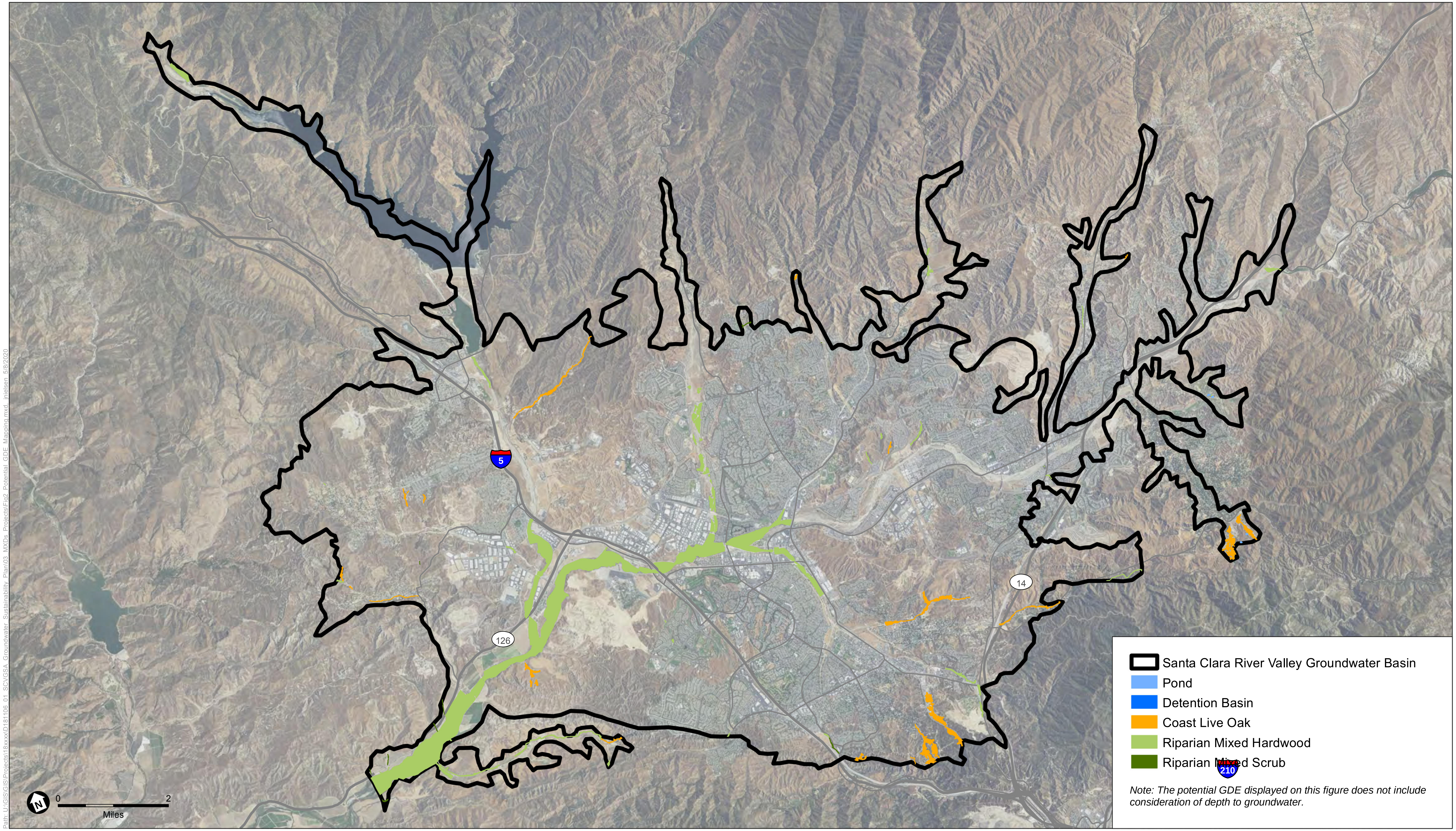
Waterway/Tributary	Tributary ID Number	Vegetation Classification Based on Aerial Imagery Analysis[1]	Revised Vegetation Classification[2]	Area (acres)
Features Associated with Sand Canyon Golf Course	SCRTRIB24	*Pond	Open water	1.13
		*Riparian mixed hardwood	Fremont cottonwood forest	1.14
		*Riparian mixed scrub	Mulefat thickets	0.12
Total				1,889.96

Notes

[1] Based on KMZ 2.

[2] Vegetation communities classified using *A Manual of California Vegetation, Second Edition* (Sawyer et al., 2009).

* Inaccessible during the field assessment.



SOURCE: ESA, 2020; NWI, 2019; NCCAG, 2019.

SCVGSA Groundwater Sustainability Plan

Figure 5-59
Potential GDE Mapping

ESA

5.3.4.4 Discussion of Potential GDE Mapping

Following the TNC suggested methodology, an estimated 1,890 acres of potential GDE have been documented within the Basin boundaries. The KMZ 4 database provides the geographic location for each distinct potential GDE. The potential GDEs are comprised primarily of riparian corridors. Much of the acreage associated with the potential GDEs occurs in the main stem of the Santa Clara River. However, many smaller potential GDEs are identified within the tributaries reaching into the higher elevations. Some potential GDEs in the higher elevations may be fed from higher elevation seepage disconnected from the shallow groundwater basin.

In accordance with Step 1.1 of the TNC guidance, potential GDEs with a depth to groundwater of greater than 30 feet may indicate that no connection to groundwater is possible to support vegetation. Groundwater levels vary with seasons, hydrologic year types, and alluvial aquifer pumping. The analysis of potential GDEs presented herein inventories all habitats observed within the semi-arid watershed that require intermittent or perennial access to water, subtracting only the man-made water features and irrigated landscapes (including agricultural land). Section 5.4 discusses further refinement of the distribution of GDEs using a 30-foot depth to groundwater criterion.

Step 1.2 of the TNC guidance that recommends characterizing the ecological value of each GDE unit to assist with GDE prioritization was not conducted. Rather than refine the relative value of each GDE polygon, documentation is provided regarding the existence of habitat that may be suitable to support sensitive species. Relative quality of the habitat in each stretch of the river may depend on occupation by sensitive species, the season, consistency of water availability, invasive species, nuisance surface flows, urban runoff water quality including trash, and in stream human use including homeless encampments. Additional field verification and/or other study is needed to fully implement Step 1.2 of the TNC guidance for the potential GDE polygons. However, in this semi-arid environment, the current existence of riparian, aquatic, and woodland habitats represent important ecological values that have the potential to support sensitive species; therefore, additional characterization of ecological value is not recommended. A discussion of riparian and aquatic habitats is presented below.

5.3.5 Refinement of GDE Distribution Based Upon Groundwater Levels

The TNC guidelines suggest that when groundwater is consistently greater than 30 feet bgs, it can be concluded that the vegetation is not reliant on a groundwater aquifer. Figure 5-60 presents a revised map of GDEs within the Upper Santa Clara River Basin considering this 30-foot depth to groundwater criterion. Since groundwater fluctuates over the year and between years, the 30-foot criterion data is taken conservatively from modeled groundwater depths throughout the Basin in the late dry season (September) during a wet year (2011). As illustrated in Figure 5-60, some of the vegetated areas in the eastern portion of the basin and in the upper canyons have been removed from the GDE category. However, the majority of potential GDEs identified in Section 5.3.3 are confirmed, particularly the areas within the Santa Clara River corridor extending from the confluence with San Francisquito Creek to the western Basin boundary.

SOURCE: ESA, 2020; NWI, 2019; NCCAG, 2019.

Figure 5-60
Wet Year - September, 2011, GDE Mapping

ESA

5.3.6 Historical Range in Groundwater Levels

Groundwater levels tend to decline in the late summer and recover in the winter responding to natural recharge and reduced pumping in the winter months, and groundwater levels also reflect multi-year drought with progressively lower levels each year, followed by recovery in wetter periods. The existing GDEs have been sustained through a recent drought (2012–2016) that resulted in historically low groundwater levels. Table 5-6 summarizes the historical lows recorded in several representative locations along the river corridor. Figure 5-61 identifies these locations. When groundwater levels are above these recorded temporary historical lows, it can be inferred that GDEs are not significantly and unreasonably affected. As a result, these existing wells may be used to monitor future groundwater elevations to ensure that GDEs are sufficiently maintained throughout the upper Santa Clara River.

Table 5-6. GDE Monitoring Locations and Historical Low Groundwater Levels

Location Description	Well Name	Historical Low Depth to Groundwater below River Thalweg (feet bgs)[1]	Historical Low Groundwater Elevation (feet NAVD 88)[2]
San Francisquito Canyon	NLF-W5[3]	42	1,108
Santa Clara River Below Mouth of Bouquet Canyon	GDE-A[3]	42	1,087
Santa Clara River at I-5 Bridge	GDE-B	-5	1,060
Santa Clara River Near Valencia WRP	GDE-C	8	1,027
Santa Clara River 1 Mile Downstream of Valencia WRP	NLF-G3	5	975
Castaic Creek in Lower Castaic Valley	NLF-E	40	981
Santa Clara River Below Mouth of Castaic Creek	GDE-D	3	932
Santa Clara River at Mouth of Potrero Canyon	GDE-E	0	860

Notes:

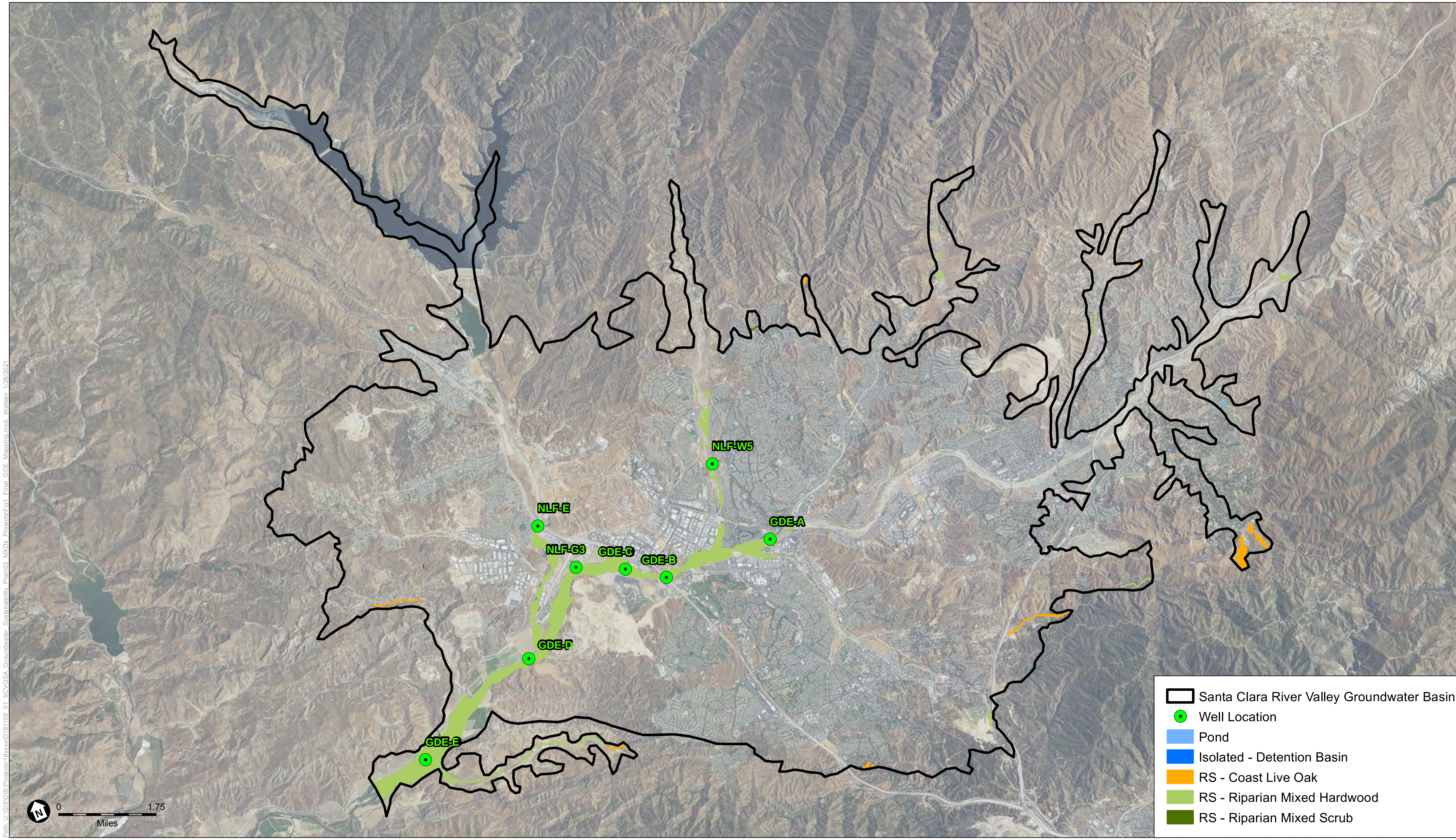
[1] Subject to change in monitoring plan

[2] Historical groundwater elevations are from simulations conducted using the calibrated groundwater flow model.

[3] Might not be within an actual GDE area.

bgs = below ground surface GDE = groundwater-dependent ecosystem

NAVD88 = North American Vertical Datum of 1988 WRP = water reclamation plant



SOURCE: ESA, 2020; NWI, 2019; NCCAG, 2019.

GDE Considerations Assessment

Figure 5-61
Potential Monitoring Locations

ESA

Groundwater levels in the alluvium respond to higher rates of pumping in the summer generally reaching their deepest levels around September (early fall) and recovering entirely in the winter. During prolonged periods of drought, the recovery may not be complete, and a lowering of groundwater levels occurs year-over-year until a single or multiple wet seasons completely recover levels, maintaining an historical average baseline level. Figure 5-62 depicts this pattern based on a conceptual hydrograph provided in the TNC guidelines. As shown in the figure, the historical annual cycle has created conditions that support habitat over time.

The historical hydrographs of older wells show that groundwater was pumped in large amounts for a short period in the 1950s. Alluvial groundwater levels dropped over 30 feet in some areas for a period of one or 2 years and then immediately recovered back to previous levels. This sudden major temporary decline has not occurred since the 1950s because urbanization has reduced the amount of agricultural pumping and because importation of state water and discharges of treated wastewater to the river from the WRPs has increased the flow in the river overall. The hydrographs illustrate that alluvial groundwater levels can recover from significant declines in a matter of one or 2 wet years.

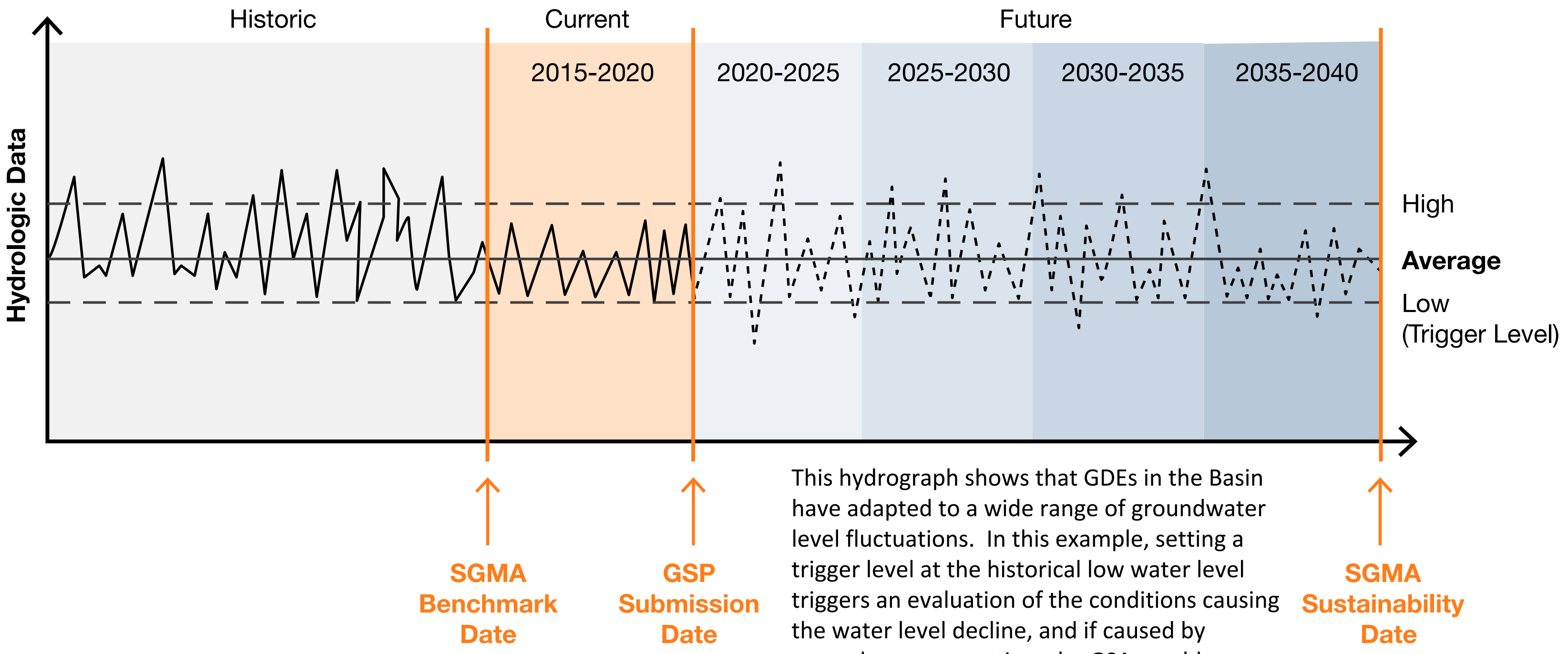
5.3.7 Resilience of Existing Habitat

The existing vegetation within the GDE area has survived a pattern of annually lowering levels with even greater declines in drought years. This pattern affects different parts of the river channel differently. Figures 5-63, 5-64, and 5-65 schematically depict this seasonal variability within different river segments. The river channel widens and narrows providing varying density of riparian habitat corresponding to river width, proximity to surface water, and groundwater depth.

Discharges from the Valencia WRP provide approximately 15 MGD of surface water just downstream from the I-5 bridge. This surface water supports riparian habitat. A green ribbon of vegetation can be seen following surface water where shallow groundwater may not be reliably present. In some of these areas, the remaining channel is a dry sand bank. In other areas, riparian vegetation occurs sporadically across the channel, supported either by high soil moisture from lateral movement of perennial surface water or from shallow groundwater. The more sparsely vegetated areas may represent areas where groundwater drops sufficiently often to stress vegetation during normal and dry years.

In these losing reaches and particularly in the eastern portion of the watershed where depth to groundwater is already below the thalweg (bottom of the river channel), groundwater becomes progressively lower as the summer progresses. Vegetation that relies on moisture within the first 1 to 5 feet exclusively may not survive or even exist in areas where groundwater routinely declines by 10 feet. Rather, vegetation that exists in this condition is likely seasonal in nature. However, some vegetation such as larger trees may develop root systems that can accommodate this variability. In some areas, riparian habitat may experience high degrees of stress during prolonged drought conditions. If the drought lasts long enough, vegetation may be temporarily impacted. However, when wet conditions return, these areas may re-establish themselves with emergent riparian vegetation. Furthermore, high flows change the channel morphology periodically, transporting sediment and altering the low flow channel location that may result in vegetation conversions or habitat value fluctuations in these areas.

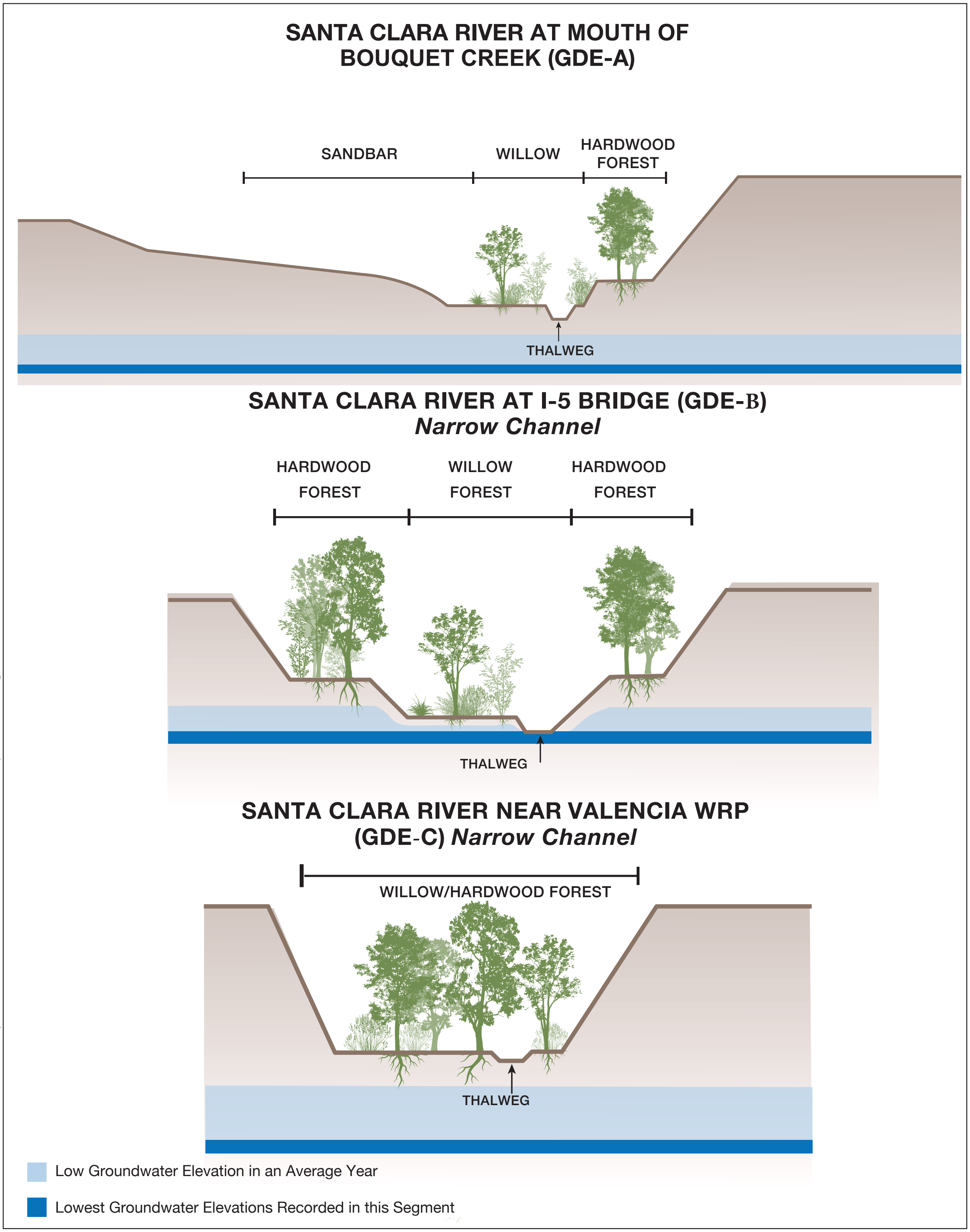
Figure 5-66 presents an aerial photograph of the Santa Clara River in 1947 showing river segments with thick vegetation and other drier segments corresponding to reliable groundwater availability prior to surface discharges from the WRPs. The historical aerial photograph illustrates that vegetation has persisted in the river channel since the last mid-century similar to the existing condition.



This hydrograph shows that GDEs in the Basin have adapted to a wide range of groundwater level fluctuations. In this example, setting a trigger level at the historical low water level triggers an evaluation of the conditions causing the water level decline, and if caused by groundwater extraction, the GSA would implement management actions intended to avoid impacts to GDEs.

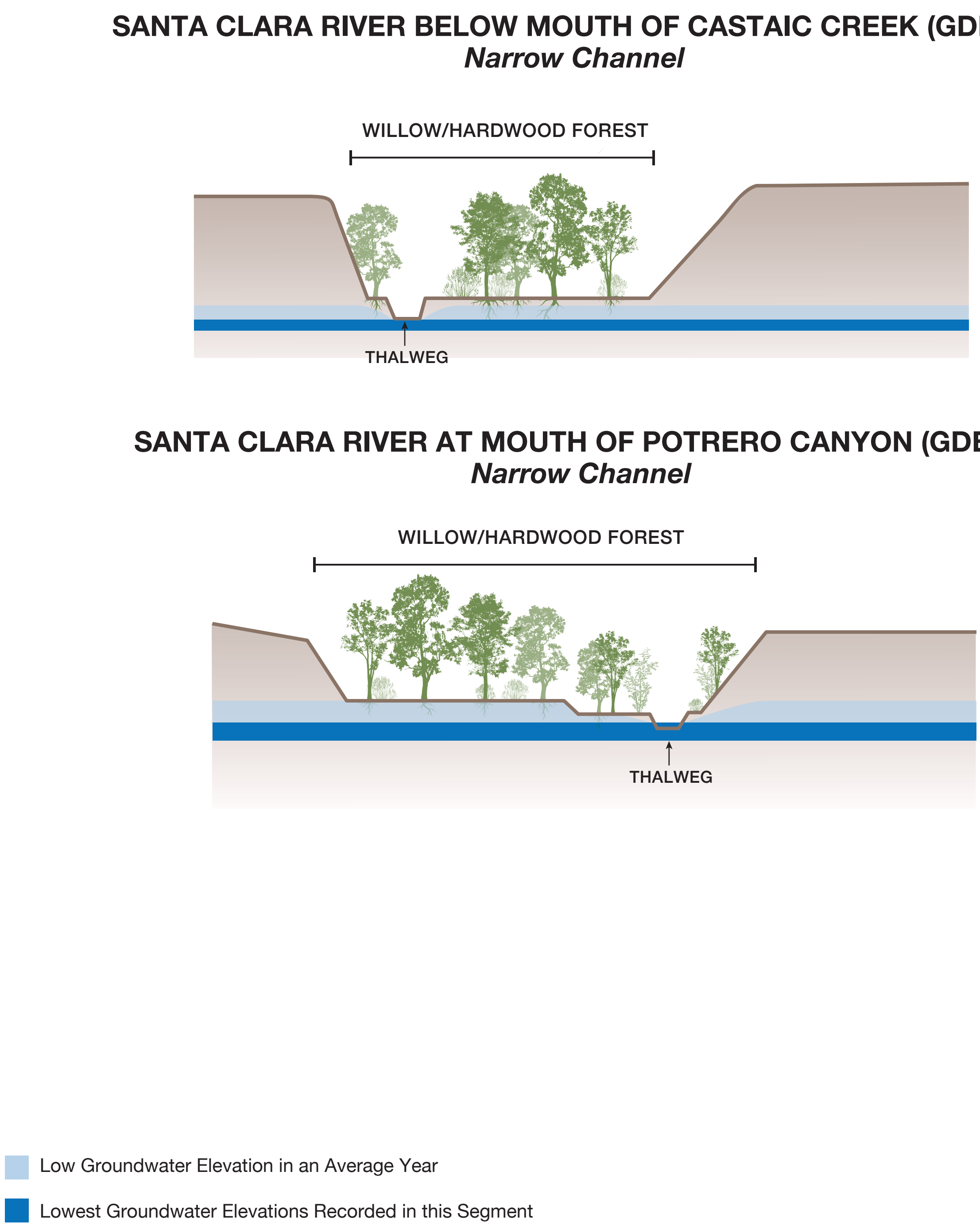
SOURCE: ESA, 2021

Figure 5-62
Conceptual Groundwater Hydrograph



SOURCE: ESA, 2020

Figure 5-63
Schematic Cross Sections at Sites GDE-A, GDE-B, and GDE-C

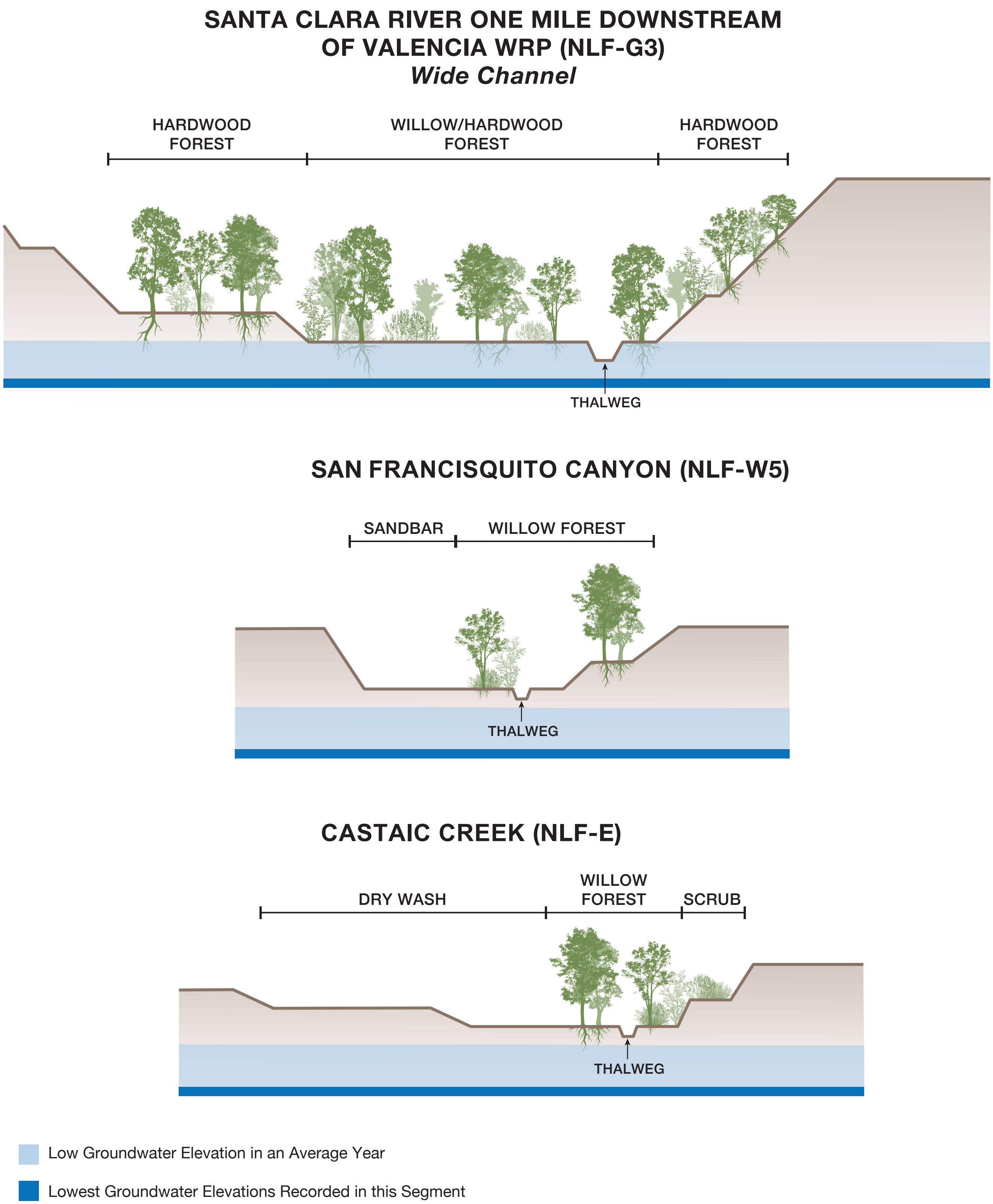


LAX/19xxx/D201900670.00 - SCVA Future Recycled Water Environmental Considerations Assessment/05 Graphics-GIS-Modeling/Illustrator

SOURCE: ESA, 2020

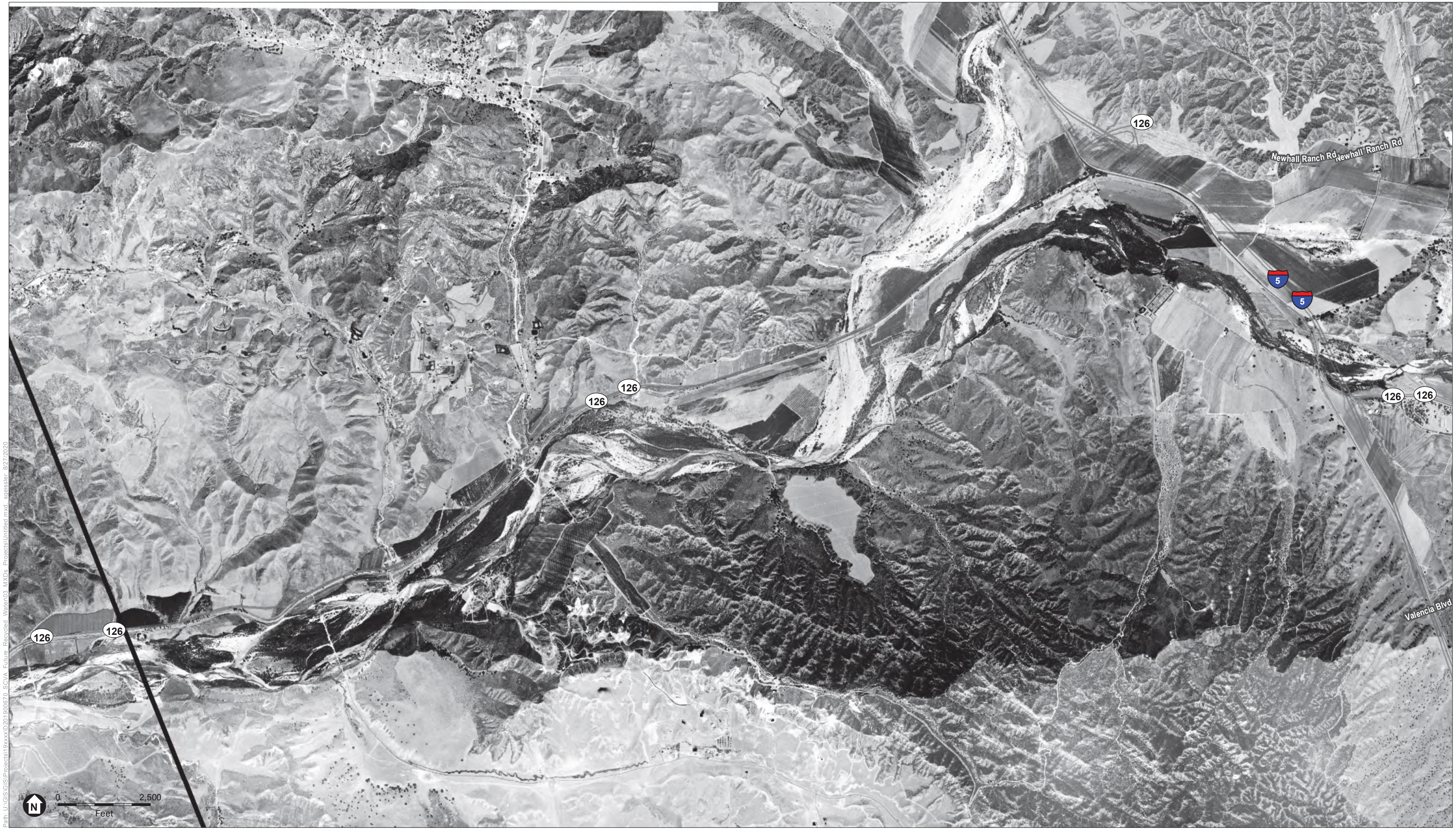
Figure 5-64
Schematic Cross Sections
at Sites GDE-D and GDE-E

ESA



SOURCE: ESA, 2020

Figure 5-65
Schematic Cross Sections at Sites NLF-G3, NLF-W5, and NLF-E



SOURCE: HistoricAerials.com (1947-2016).

GDE Considerations Assessment

Figure 5-66
Historical Aerial
1947

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6. Water Budgets

6.1 Summary of Basin Conditions and Water Budget

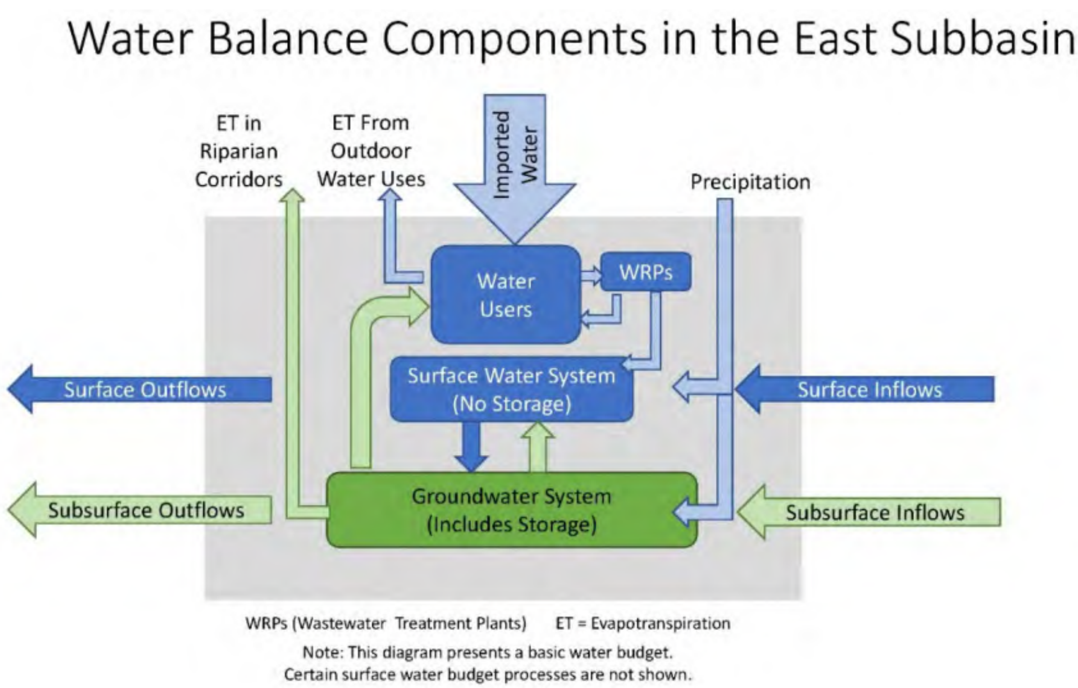
This section describes the historical, current, and projected water budgets for the groundwater basin that is located in the Santa Clarita Valley (the valley), in the northwestern part of the County of Los Angeles (LA County). The local groundwater basin is designated by the California Department of Water Resources (DWR) as the Santa Clara River Valley East Groundwater Subbasin, which is herein referred to in this section as the Basin. The water budgets have been developed as part of the ongoing process of developing a Groundwater Sustainability Plan (GSP) for the groundwater basin under the requirements of California's Sustainable Groundwater Management Act (SGMA).

6.1.1 Background

6.1.1.1 Introduction

A water budget defines the sources and uses of water in an area. The budget, like a financial budget, is intended to quantify the sources and uses of water and ensure they are in long-term balance. With variable water supplies, groundwater storage can be used to balance water supply and demand in the short term, while ensuring that supplies meet or exceed demand to provide a balanced water budget over the longer term. The water budget is thus closely related to the water balance, which tracks water supplies, human and environmental demands for water, and changes in water storage within the Basin (primarily in groundwater).

The water budget for the groundwater basin is a regional basinwide water budget that accounts not just for groundwater, but also for surface water and imported water supplies and uses. The regional water budget provides an accounting of all surface water and groundwater flowing into and out of the Basin over a specified period. A generalized depiction of the water budget processes (inflows and outflows) for surface water and groundwater in the local groundwater basin is shown below.



In the groundwater budget, basin inflows include imported water recharge, surface water, and subsurface flows into the groundwater system; basin outflows include groundwater extraction (pumping), plant uptake of groundwater, groundwater flows to surface waters, and subsurface outflows. The difference between inflows and outflows results in a change in the volume of water stored within the basin.

In the Basin, imported water primarily enters the groundwater system through percolation of applied water and leachate from septic systems. However, imported water is occasionally released to the river system from Castaic Lake, and a portion of these releases percolates into the groundwater basin from the river system. Outputs from the Basin include subsurface and surface flows at the western boundary of the groundwater basin (located near the LA/Ventura County line); evapotranspiration from plants along the river and its tributaries; and consumptive uses including agricultural, municipal, institutional, and industrial uses of pumped groundwater. Changes in regional storage occur almost exclusively in the groundwater basin because surface storage in the area is dedicated to storage in Castaic Lake of imported water, not local water.

Recharge of the Basin from surface waters occurs from percolation of stormflows from the Santa Clara River and its tributaries and from precipitation percolating into the groundwater system. Subsurface groundwater originating from outside of the Basin is a fairly minor source of inflow.

The interactions between surface water and groundwater can be quite complex and subtle and are discussed in greater detail below. This section prepares surface water and groundwater budgets that incorporate these interactions. This assessment, or water budget analysis, provides an understanding of historical conditions, current conditions, and how future changes to supply, demand, hydrology, population, land use, and climatic conditions may affect the water budget in the Basin.

6.1.1.2 Basin Definition

The Basin is the eastern-most and furthest upstream subbasin in the group of six subbasins that comprise the Santa Clara River Valley Groundwater Basin (Figure 6.1-1). Located in the Santa Clarita Valley in northwestern LA County, California, this local groundwater subbasin is identified in DWR Bulletin 118 as the Santa Clara River Valley East Subbasin (DWR Basin 4-4.07). The Basin sits in the Eastern Hydrologic Subarea of the Upper Santa Clara River Hydrologic Area (Figure 6.1-2). Some tributaries to the Santa Clara River are outside of the Bulletin 118 Basin boundary (e.g., Towsley, East, and Rice creeks) because they were mapped by DWR as either non-water bearing or containing geologic materials that are not recognized as part of the Basin. Because they are outside of the Bulletin 118 Basin boundary, they are not subject to groundwater management activities pursuant to this GSP. They are, however, included in the overall Basin water budget because the surface water flow originating in these tributaries that recharges the Basin must be accounted for.

6.1.1.3 Development of Imported Supplies and the Basin Operating Plan

Analysis of the current and future management of the local groundwater basin depends upon a number of parameters, including the criteria used to manage water demands, imported supplies, recycled water, and groundwater pumping. Further, future management of the local groundwater basin must consider the influences of future growth and possible climate change. In particular, the current and future uses of groundwater in this water budget are based on the existing Basin Operating Plan for the Basin, which was incorporated into the Groundwater Monitoring Plan required by the Groundwater Management Act (AB 3030)[25] and adopted in 2003 by Castaic Lake Water Agency (CLWA), the predecessor agency to today's Santa Clarita Valley Water Agency (SCV Water). The Basin Operating Plan was updated in 2009 and is based

[25] The Groundwater Management Act (California Assembly Bill [AB] 3030), which took effect in 1993, permitted certain local agencies to develop groundwater management plans.

upon the principle of ensuring that the Basin is operated without causing an overdraft condition (LSCE and GSI, 2009). By design, the Basin Operating Plan draws upon the groundwater storage reserves of the Basin (primarily in the Saugus Formation) to augment imported supplies during drought years in the State Water Project (SWP) system, then reduces pumping at other times to facilitate the natural replenishment of those reserves. This operating plan and the water budget described herein are consistent with the water resources plan for SCV described in its Urban Water Management Plans (UWMPs).[26]

Imported Water

In 1963, the Upper Santa Clara River Valley Water Agency, the predecessor and legacy agency to CLWA and now SCV Water, entered into a contract with DWR for SWP supply. Of the 79,000 acres then encompassed by the legacy agency boundary, 10,600 acres were in agricultural production and 3,700 acres were residential, with 12,400 residents. Also, the Wayside Honor Rancho (now the Pitchess Detention Center) and other LA County correctional facilities housed an additional population of 3,200 inmates. At that time, planners estimated that, by 1990, agricultural activities would end and developable land covering 51,500 acres would be urbanized and support a population of 180,000. Accordingly, the legacy agency contracted for SWP water supply of 23,000 acre-feet per year (AFY) to keep the Basin in balance. Annexations and new land development practices made more land developable. In response, the legacy agency increased its contract amount to 41,500 AFY by 1966. Once the importation of SWP water began, the local population rapidly increased along with the volume of water being imported from year to year. The legacy agency purchased SWP contract rights from other water purveyors in 1991 and 1992, which increased the legacy agency's current contract amount to 95,200 AFY. These purchases were made because of the need for additional imported water supplies to meet growth projections, as well as with the recognition that the percentage of contracted water that could be delivered to SWP contractors might decrease over time because of increasingly stringent regulatory constraints on the SWP system.

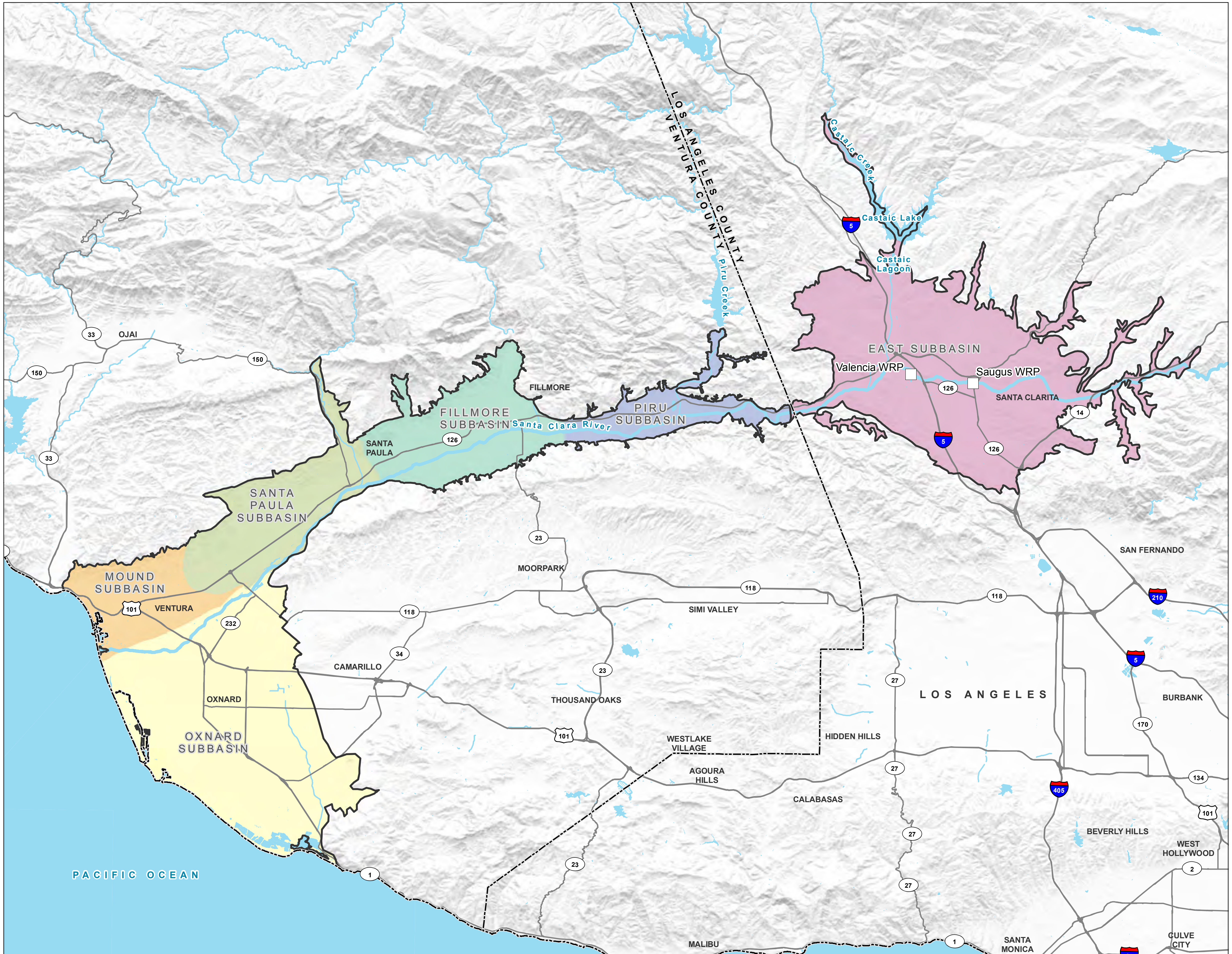
In addition, CLWA acquired a firm 11,000 AFY of groundwater from the Buena Vista and Rosedale Rio-Bravo Water Storage Districts (BVRRB). Further, CLWA/SCV Water placed 140,000 acre-feet of water into long-term groundwater banks in Kern County to provide imported water when SWP supplies are curtailed because of dry conditions. The operation of these water banks during wet/normal year and dry years is illustrated in the diagram on page 6-6.

[26] The *Santa Clarita Valley Water Agency 2020 Urban Water Management Plan*, dated June 28, 2021, is the current version of the UWMP (KJ, 2021).

FIGURE 6.1-1

Santa Clara River Valley Groundwater Basin and Subbasins

Santa Clara River Valley East Groundwater Subbasin Groundwater Sustainability Plan



LEGEND

- Water Reclamation Plant (WRP)
- Santa Clara River Valley Groundwater Basin

Santa Clara River Valley Subbasins

- Santa Clara River Valley East
- Piru
- Fillmore
- Santa Paula
- Mound
- Oxnard

All Other Features

- County Boundary
- Major Road
- Watercourse
- Waterbody

N

0 12,500 25,000 37,500
Feet

Date: December 9, 2021
Data Sources: USGS, DWR Bulletin 118

GSI Water Solutions, Inc.

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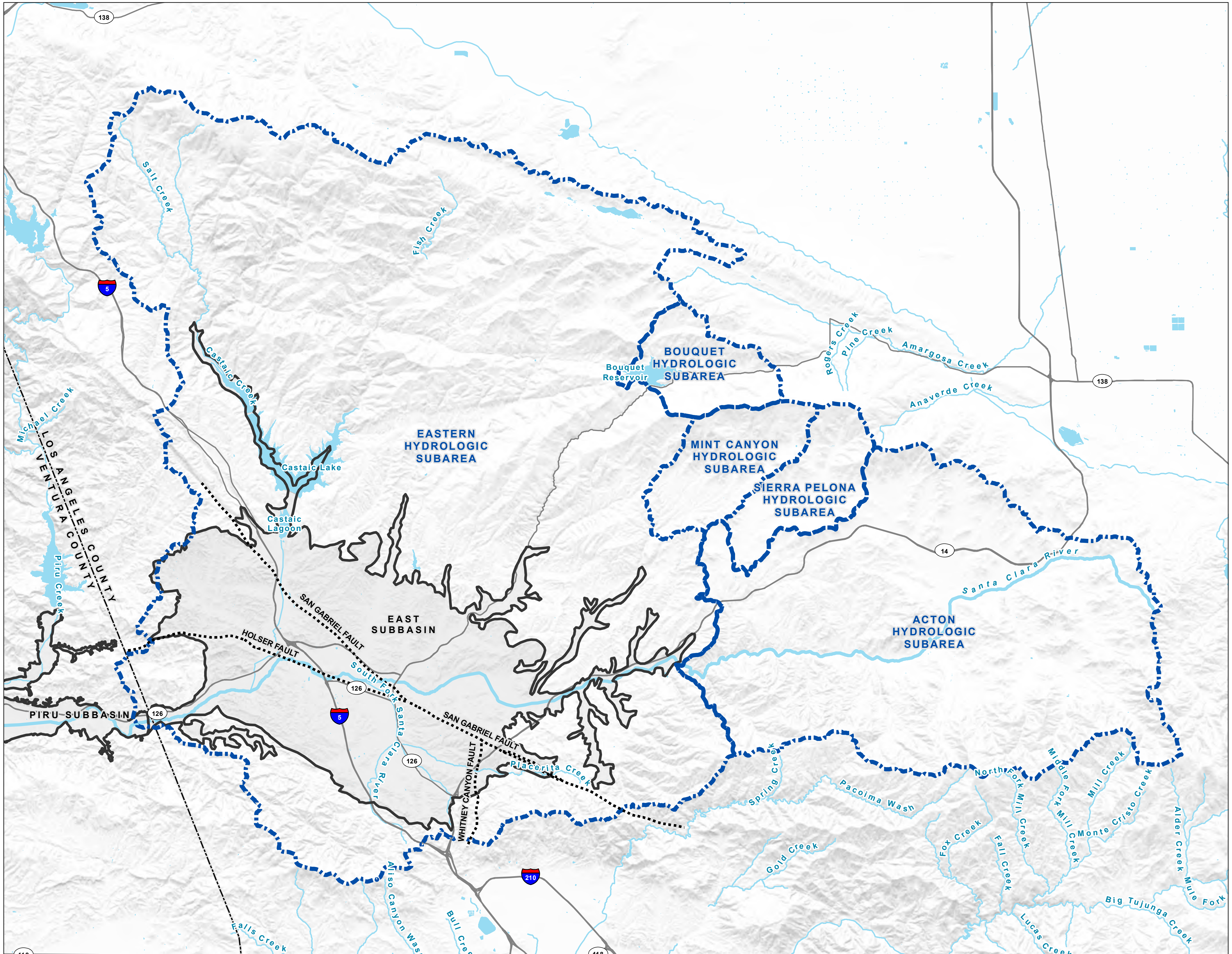
FIGURE 6.1-2

Watershed Boundaries for Upper Santa Clara River Hydrologic Area and Subareas

Santa Clara River Valley East Groundwater Subbasin Groundwater Sustainability Plan



LEGEND

- Fault
- Santa Clara River Valley Groundwater Basin
- Upper Santa Clara River Hydrologic Subbarea

All Other Features

- Major Road
- Watercourse
- Waterbody

N

0 9,000 18,000 27,000
Feet

Date: December 9, 2021
Data Sources: USGS, DWR Bulletin 118

GSI Water Solutions, Inc.

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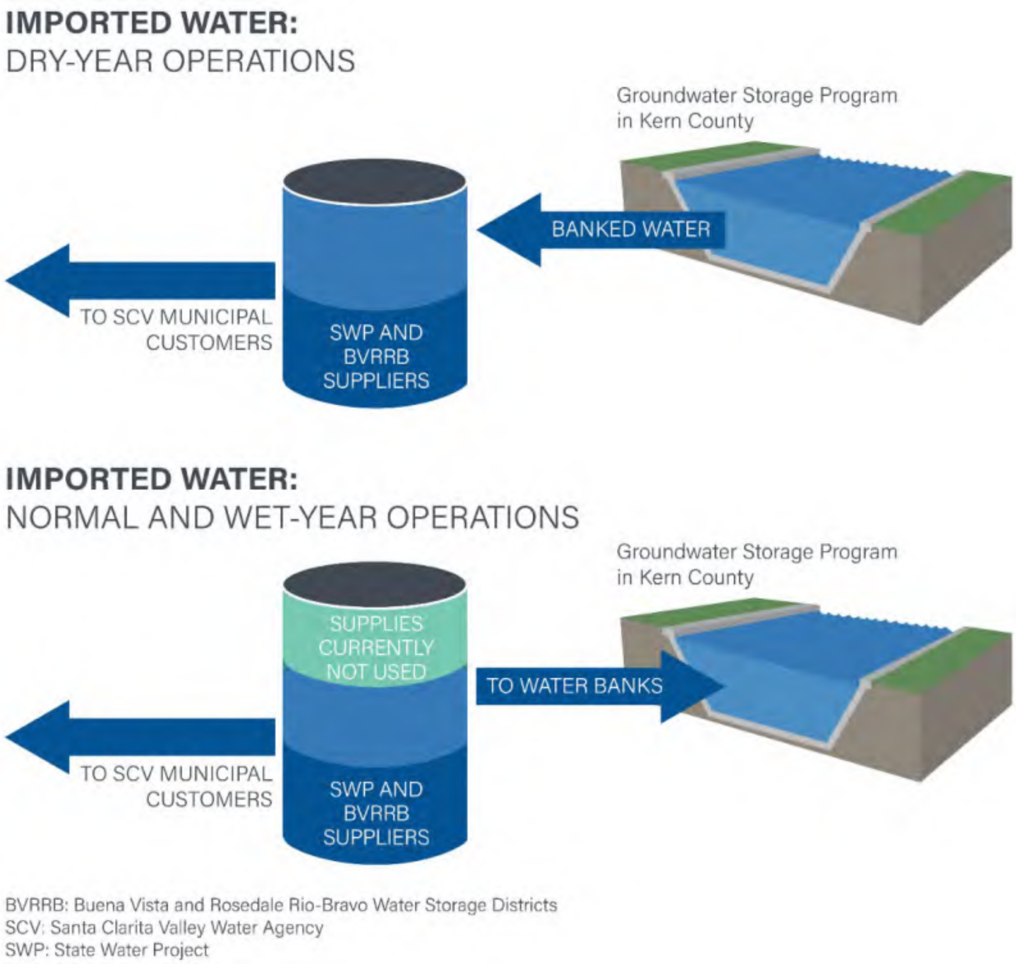


The cylinders in these diagrams show the total imported supplies available to the Basin. In normal and wet years, water in excess of annual need within the SCV Water service area is delivered to one of SCV's banking partners and stored in a groundwater basin through spreading or by in lieu replenishment. Under wetter circumstances, excess water may exceed the ability to bank supplies, in which case, excess water may be turned back to the SWP system. Conversely, during dry years, water is taken out of the bank (physically delivered to the California Aqueduct or exchanged for the banking partners' SWP water supplies) to make up for SWP shortfalls.

Basin Operating Plan

As described above, prior to the formation of SCV Water, the retail water purveyors and CLWA undertook preparation of an AB 3030 Groundwater Management Plan (AB 3030 plan) that was adopted in 2003 (LCSE, 2003). That plan was updated in 2009 and built upon extensive work already conducted in the Basin, including introducing the application of a three-dimensional numerical groundwater model to ensure that the proposed operations under this plan would not result in overdraft. The AB 3030 plan and later updates describe a Basin Operating Plan with the following annual groundwater production schedule:[27]

[27] See the discussion of Primary Element 4 of the AB 3030 Plan (on page 30 of LSCE, 2003).

	Groundwater Production (AFY)			
	Normal Years	**Dry Year 1**	**Dry Year 2**	**Dry Year 3**
Alluvial Aquifer	30,000 to 40,000	30,000 to 35,000	30,000 to 35,000	30,000 to 35,000
Saugus Formation	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**

AFY: acre-feet per year

Although a number of factors have prevented full use of the Saugus Formation as described in the Basin Operating Plan, the Basin Operating Plan remains the best available description of future operation of the Basin and thus is used to estimate water balances under the future land use and water use conditions described in this section. The Basin Operating Plan is similarly used to describe groundwater operations in the 2020 Urban Water Management Plan (KJ, 2021) and the 2021 *Draft Water Supply Reliability Plan Update* (Geosyntec, 2021).[28] The Basin Operating Plan has similarly been used in the 2010 and 2015 Urban Water Management Plans (KJC et al., 2011 and 2016), and the 2017 Water Supply Reliability Plan Update (Clemm and KJC, 2017). The combination of imported water management in conjunction with the Basin Operating Plan forms the basis for current and future water planning in the Santa Clarita Valley. These plans consistently demonstrate that operation of the basin under the existing Basin Operating Plan (and in combination with the imported water resources portfolio) allows SCV Water to reliably meet water demands within its service area under current conditions and through 2050 build-out of land and water uses under varying hydrologic conditions consistent with those that have been recorded for nearly a century in the region. The recent 2021 *Draft Water Supply Reliability Plan Update* (Geosyntec, 2021) has reached the same conclusions—specifically, that there would be a supply surplus that would greatly exceed any projected shortfalls, as long as the remaining supply capacity in the Saugus Formation and/or in specific water banks is fully developed.

6.1.2 Water Budget Analysis and Presentation of Data

The water budgets presented in this section have been developed using a three-dimensional numerical computer model that simulates the natural interactions that take place between surface and groundwater components. This numerical computer model conducts its calculations three times a month over multiple decades to estimate these interactions.

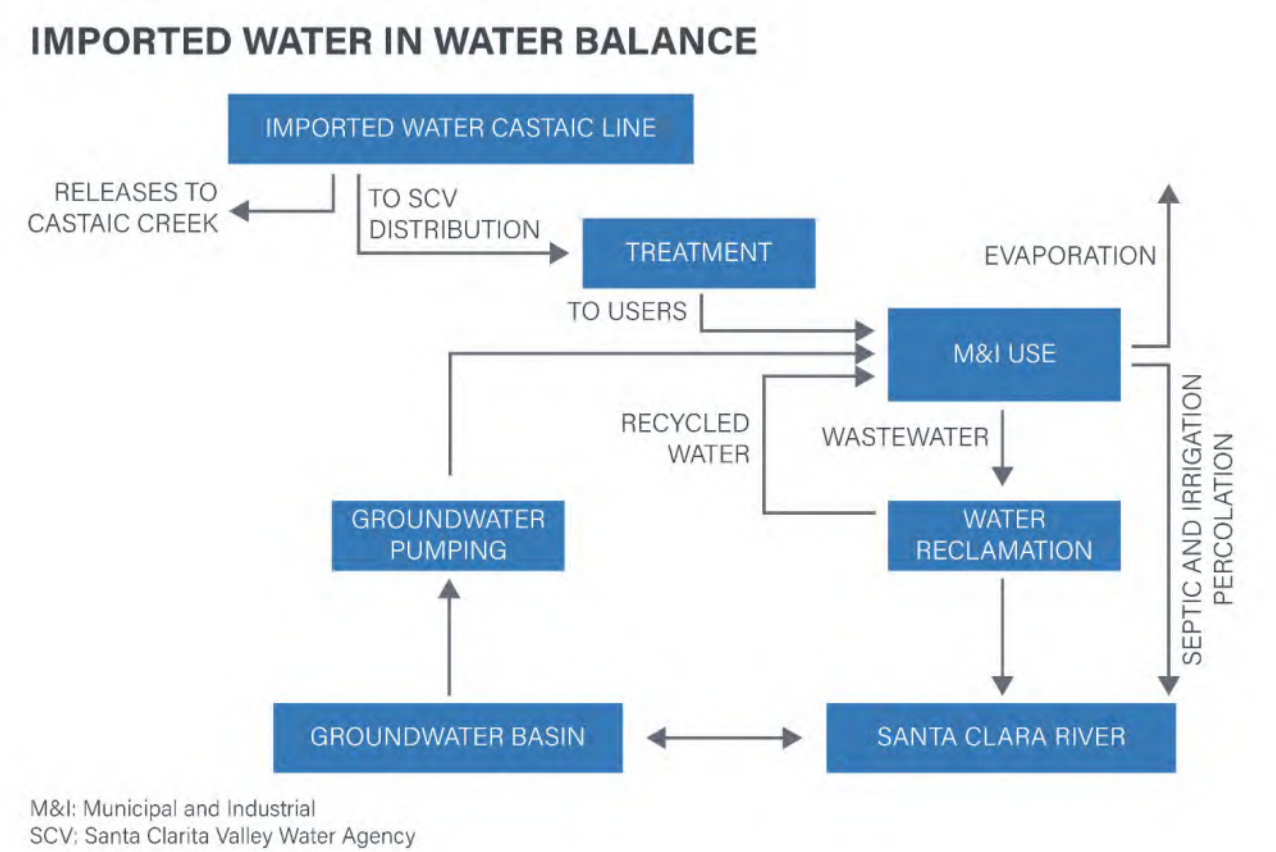
Figure 6.1-3 depicts the general characteristics of the surface and groundwater processes occurring in the Basin, along with its geologic structure.

6.1.2.1 The Role of Imported Water in the Water Budget Analysis

Imported water is an important part of the regional water budget. The adequacy of imported water is essential to meeting the needs of the region and its water balance. Imported water comes from various water supply sources that are transported through the SWP system to Castaic Lake, where SCV Water takes

[28] It is conceivable that SCV Water may find it more feasible to operate the Saugus Formation differently in certain circumstances. In particular, if the first year of increased Saugus pumping during a dry period is a year of an especially significant curtailment in SWP water deliveries (as occurred in 1977), then SCV Water may elect to pump as much as 33,825 AFY from the Saugus Formation during the first year of SWP curtailments (resulting in 35,000 AFY of total pumping from the Saugus Formation) and reduce its Saugus Formation pumping below 33,825 AFY in one or more subsequent years, if the curtailment persists.

delivery of these supplies then pumps the water via pipeline for treatment at either the Earl Schmitt Filtration Plant or the Rio Vista Water Treatment Plant. Water is then distributed to municipal water users. Imported water enters the natural surface water system as return flow from municipal sewerage system discharges and releases from Castaic Lake to downstream agencies in Ventura County (a portion of which recharges the groundwater system in the Basin). Imported water also recharges the groundwater system as percolation from land-applied water (outdoor irrigation) and from septic systems. The use of imported water in the regional water balance is depicted in the graphic below.



In this section, imported water releases to Castaic Creek are included in the historical water budget analysis, but are not included in the current or projected water budget analyses. Future releases of imported water to Castaic Creek are presumed to be for the benefit of downstream parties only, and therefore any incidental recharge is excluded from the projected water budget for the upstream area.

In the water budget analyses, the return flows of imported water (from deep percolation of applied irrigation water, septic tank percolation, and water reclamation plant [WRP] discharges to the Santa Clara River) are not tracked separately from the return flows from local groundwater supplies because these two supply sources are blended in the distribution system. Accordingly, imported water is reported only in tables showing the sources of water for delivery to customers in any year. In these tables, imported water is shown as an amount of water delivered by SCV Water from Castaic Lake through its municipal delivery system to its customers.

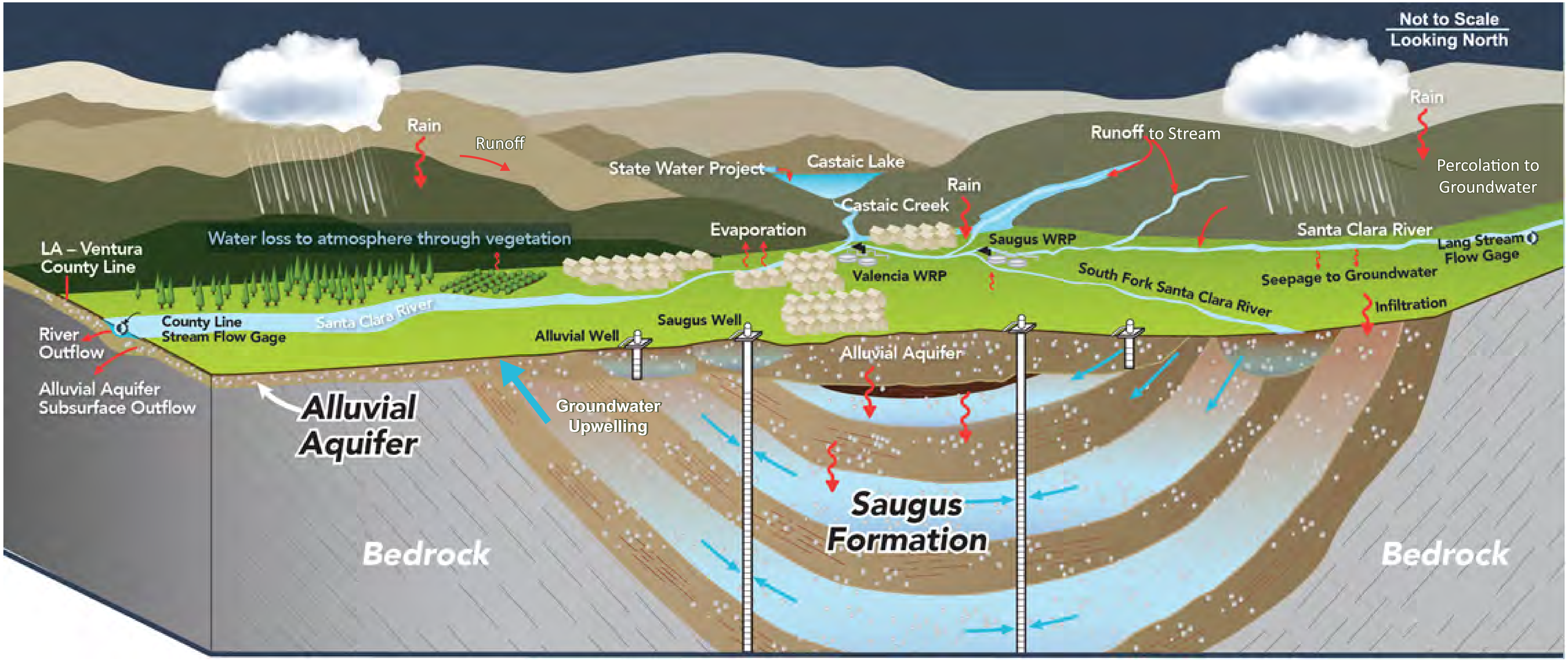


FIGURE 6.1-3

Conceptual Groundwater and Surface Water Flow Diagram
Santa Clara River Valley Groundwater Basin

Santa Clara River Valley East Groundwater Subbasin Groundwater Sustainability Plan

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6.1.2.2 Terms Used in Water Budget Tables and Graphics

In this section, tabular data present the water budgets for the surface water system (generally the Santa Clara River and its tributaries), and the groundwater system (the Basin, which is the local groundwater system in the valley). Because of the interconnections between these systems, the tables may show that an interconnected process that exchanges water between the surface and groundwater systems has a negative numerical value in one system and an equal but positive numerical value in the other system, to provide balancing of the water budgets in both systems. For example, streamflow losses that represent an outflow term for surface water also represent inflow (recharge) values for groundwater, while upwelling of groundwater into a stream represents an outflow (loss) of water from the groundwater system and an inflow (gain) of water in the surface water system.

In order to discern important watershed components such as surface water flows compared with groundwater flows leaving the Basin and groundwater storage changes over time, separate surface water and groundwater budgets were developed. These budgets reflect the results of using the three-dimensional numerical groundwater flow model of the Basin to simulate the interaction between the surface water and groundwater systems. These exchanges of water and the complete group of processes that are components of the surface water and groundwater budgets (and that are used in the graphics and tables) are summarized below.

- **Precipitation**, primarily in the form of rainfall, typically occurs from fall through spring. While averaging slightly over 17 inches per year (in/yr), it is highly variable as shown below in Figure 6.1-4. The general pattern is a period of below-normal precipitation followed by shorter periods of higher precipitation. Rainfall provides surface flows in the form of runoff and directly recharges the groundwater basin through percolation through the soil column. Quantities of precipitation are impacted by climate change as discussed in the projected water budget discussion (Section 5).
- **Surface Water Recharge to the Groundwater Basin** constitutes an addition to the groundwater system in the groundwater budget and is a surface water loss in surface water budget. Surface water flow originates from precipitation in canyons and tributaries of the upper Santa Clara River watershed, which drain into the Santa Clara River. Conversely, groundwater upwelling that flows into the surface water systems is depicted as an outflow from the groundwater system but a source of water to the surface water system. The watersheds that are tributary to the Basin are shown on Figure 6.1-5. Surface water inflows also include controlled releases of local water and (infrequently) SWP water impounded in Castaic Lake. The impounded local water consists of precipitation runoff from the watershed areas upstream of the reservoir. These releases into Castaic Creek occur near the northern boundary of the Basin. Controlled releases of local water also occur from Bouquet Reservoir, which is located at the boundary between the Eastern and Bouquet Hydrologic Subareas (Figure 6.1-2). A large portion of these releases infiltrates the alluvial material underlying each creek, while the remainder continues as streamflow out of the Basin.
- **Evapotranspiration** (ET) is the uptake of groundwater by phreatophyte plant communities. These include the riparian mixed hardwood forests and coast live oak woodlands shown in Figure 6.1-6.

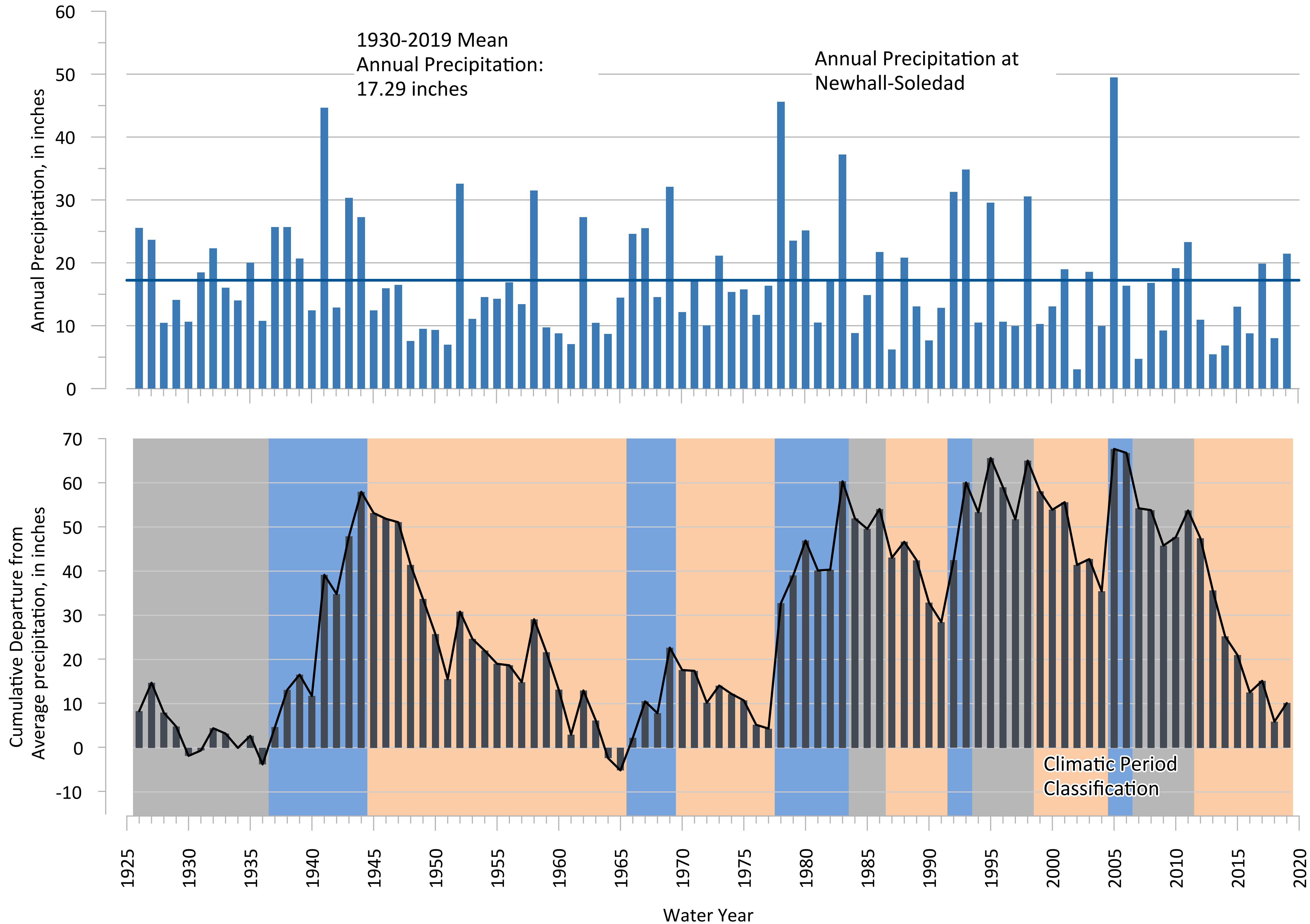

FIGURE 6.1-4

Annual Precipitation at the Newhall-Soledad (Newhall Fire Station #73) Rain Gage and Water Year Types for the Santa Clara River Valley East Groundwater Subbasin

Santa Clara River Valley
East Groundwater Subbasin
Groundwater Sustainability Plan

LEGEND

- Wet
- Dry
- Normal
- Cumulative Departure From Mean
- Mean Precipitation

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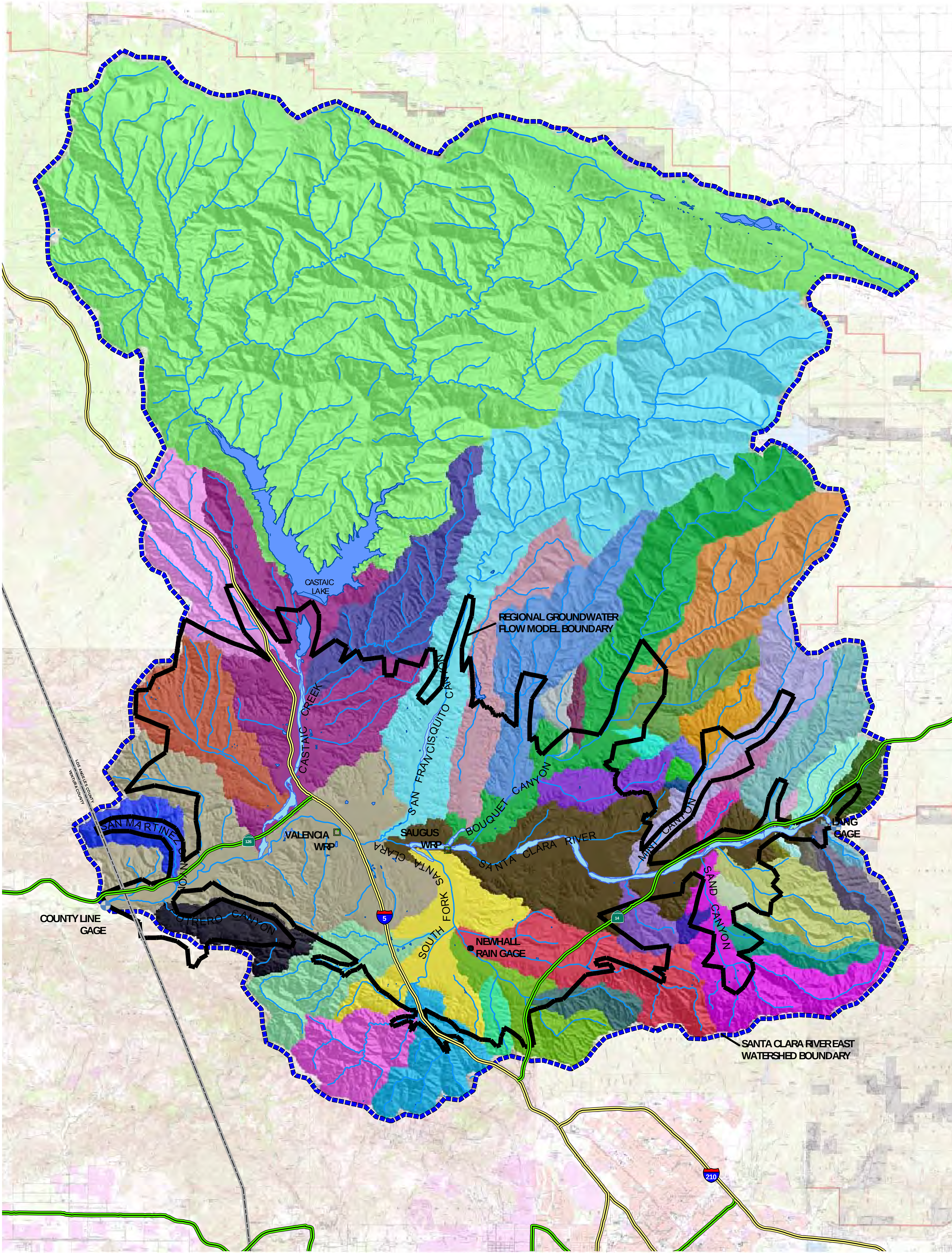

LEGEND

Hydrography

- Lake
- Stream
- Stream Gage
- Water Reclamation Plant (WRP)

Major Road

- Interstate
- State Highway

Data Sources: CH2MHILL, 2004

FIGURE 6.1-5

Contributing Watersheds to the Santa Clara River Valley East Groundwater Subbasin

Santa Clara River Valley
East Groundwater Subbasin
Groundwater Sustainability Plan

N

0 2.5 5
Miles

GSI Water Solutions, Inc.

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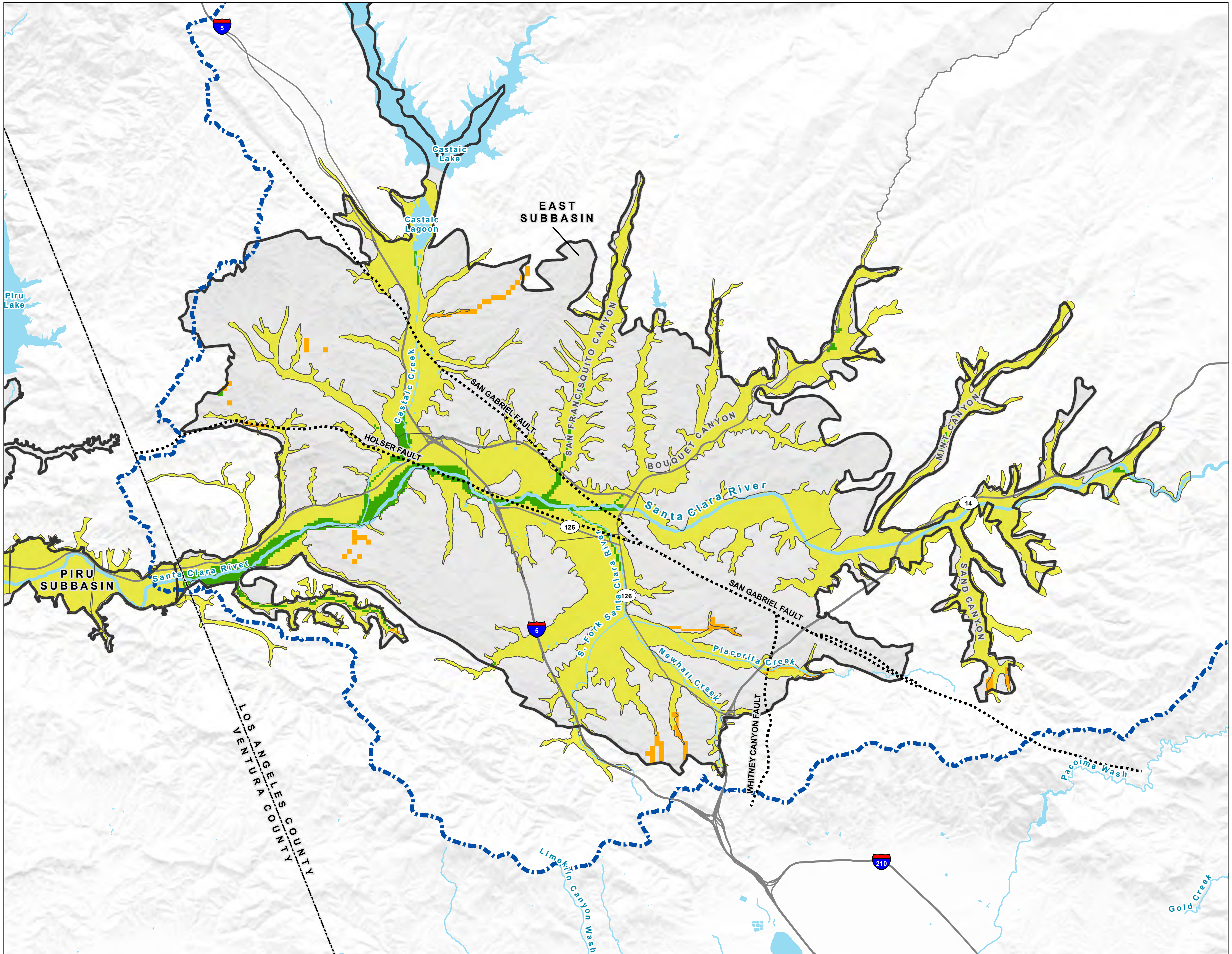
FIGURE 6.1-6

Phreatophyte Locations in the Model Grid

Santa Clara River Valley
East Groundwater Subbasin
Groundwater Sustainability Plan



LEGEND

Alluvial Aquifer
Santa Clara River Valley Groundwater Basin
Watershed Boundary

Phreatophyte Locations

Riparian Mixed Hardwood
Coast Live Oak Woodland

All Other Features

Major Road
Watercourse
Waterbody

N

0 5,000 10,000 15,000
Feet

Date: December 9, 2021
Data Sources: USGS, DWR Bulletin 118, ESA (2020)

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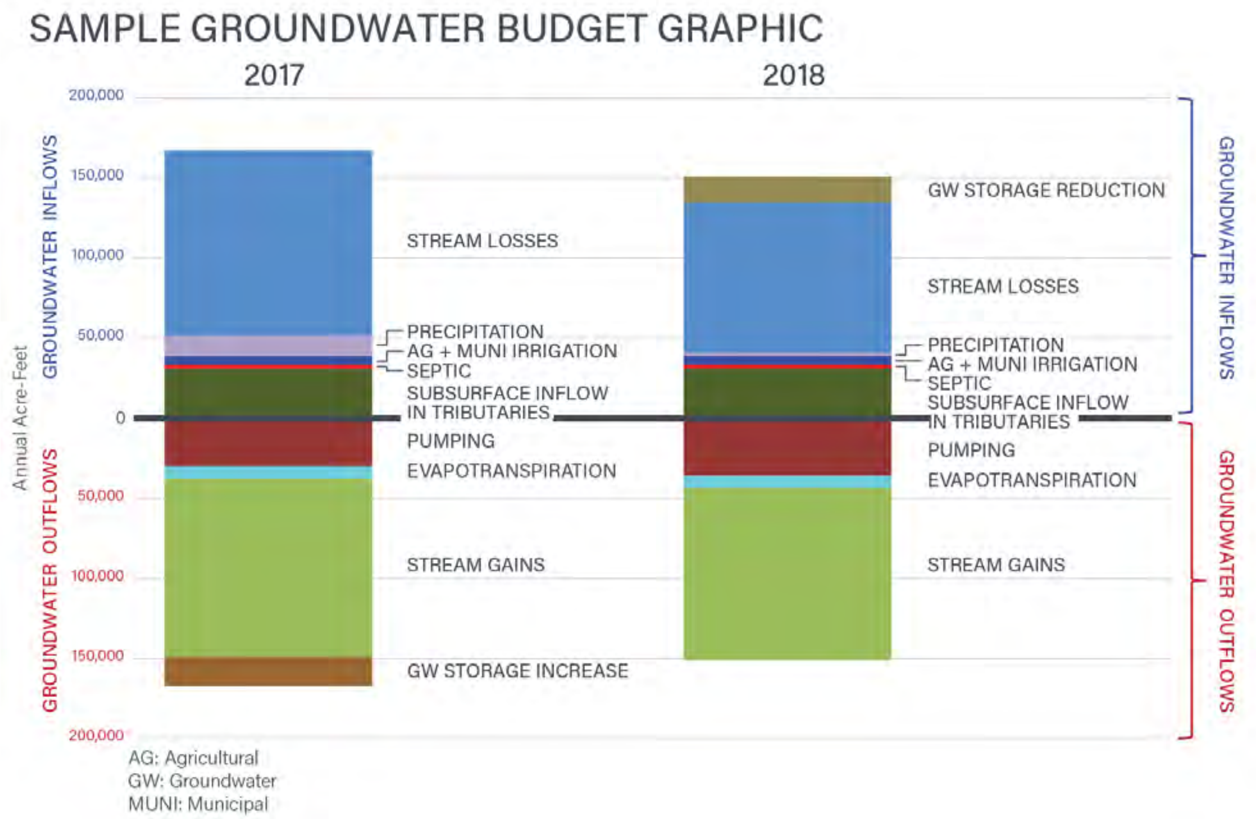
- **Other Consumptive Uses** represent the portion of agricultural and urban water uses that are not returned to the surface or groundwater systems and hence are "consumptive" uses of water. This is almost exclusively in the form of ET of land-applied water (water that is used for irrigation of agricultural crops and urban landscapes). Consumptive use does not include water that percolates into the ground when irrigation of agricultural lands and municipal lawns and gardens occur; this percolation of irrigation water is accounted for as inflows into the groundwater system. Indoor water use is a very small consumptive use. Most of the water used inside homes and nonresidential facilities is returned to the system via wastewater systems that consist of WRPs discharging treated water into the Santa Clara River and septic systems that percolate treated water into the groundwater system.
- **Surface and Subsurface Outflows** represent surface or groundwater flowing out of the Basin at its western boundary (near the LA/Ventura county line).
- **Point Discharges to the Santa Clara River** also occur from local WRPs and from groundwater treatment systems that pump groundwater to contain and treat perchlorate contamination on and near the former Whittaker-Bermite Corporation (Whittaker-Bermite) property.
- **Stream Losses** are surface water outflows that occur when streamflows seep into the underlying groundwater system (see Surface Water Inflows above) and when surface water in the Santa Clara River flows out of the Basin at the western basin boundary.
- **Stream Gains** occur when groundwater upwells into surface streams. These flows, beginning at the mouth of the San Francisquito Canyon and continuing beyond the western basin boundary, contribute to the perennial streamflow that occurs in most periods in the Santa Clara River.
- **Agricultural and Municipal and Industrial Irrigation** water that is not taken up by plants (through ET) percolates into the groundwater basin. This is also referred to as irrigation return flow.
- **Septic Systems** also provide a small amount of groundwater recharge to the groundwater basin.
- **Pumping** from the groundwater basin removes water from the groundwater system. The largest pumper in the Basin is SCV Water, which accesses groundwater from both the Alluvial Aquifer and the Saugus Formation. SCV Water and the Los Angeles County Waterworks District No. 36, Val Verde (LACWD) are the sole municipal water providers in the Santa Clarita Valley. Other pumpers include FivePoint Holdings, LLC (FivePoint), which is the successor of interest to The Newhall Land and Farming Company and extracts water for agricultural uses; the Pitchess Detention Center, which extracts water for municipal purposes; the Disney Corporation, which pumps localized Saugus Formation groundwater along the basin boundary for irrigation purposes; golf courses; and small domestic pumpers. Historical pumping levels are documented in annual reports, including the *2019 Santa Clarita Valley Water Report* (LSCE, 2020).

The water budget analyses for the Basin combine these hydrologic and water use components to arrive at annual surface water and groundwater budgets. These budgets are presented in graphical form and in tables. A sample of the terms used in the groundwater budget is shown in the diagram below for two years.

In the Sample Groundwater Budget graphic, the area below the zero line of the graphic shows pumping, ET, and stream gains are all leaving the groundwater system (as groundwater outflows), while stream losses, precipitation, irrigation return flows, septic systems, and subsurface tributary inflows, are all recharging the groundwater basin (i.e., as groundwater inflows), as shown above the zero line. Using DWR's guidance for displaying storage changes, the net impact of stored groundwater on the water budget and the balancing of the water budget terms is shown in a brown or tan color each year.



For the second year, the positive value of this storage change (as represented by the tan bar) is called a groundwater storage reduction because the aquifer naturally releases stored water that is then available as a source of water to support the various groundwater discharge mechanisms that are operating in the Basin. This occurs when the volumes of those groundwater outflow terms are higher than the amount of recharge into the aquifer system. Conversely, for the first year, the negative value of this storage change (as represented by the black bar) is called a groundwater storage increase because the aquifer naturally stores water during high precipitation/recharge periods (when the groundwater discharge mechanisms do not need to withdraw stored water because of the high amount of groundwater recharge). This method of representing the storage terms is based on the principle of conservation of mass, which states that the difference between inflows and outflows must equal the change in storage at any given time. Accordingly, under this principle, in any given year, the size of the group of bars lying above the zero line is the same as the size of the group of bars lying below the zero line.

6.1.3 The Process for Building the Projected Water Budget

The water budget analyses that are described and developed in this section provide the basis for identifying the projected water budget that are used in subsequent steps of GSP development to evaluate basin sustainability, develop sustainable management criteria under SGMA, and identify and evaluate implementation measures for obtaining and/or maintaining long-term sustainability of the Basin's groundwater resources in the next 20 years (the time frame required by SGMA for achieving sustainability). In the sections below, the estimated future water budget (which is described by DWR as the "projected" water budget) for the Basin is derived. The projected basin water budget is fundamental to evaluating the sustainability of the Basin because it depicts how the basin operates in highly variable hydrologic conditions, how the basin interacts with the surface water system, and how the Basin Operating Plan for the groundwater resources in the Basin interrelates to the overall water resources supply plan for the region.

The development of the projected water budget is presented in several parts.

- First, the historical water budget for the groundwater system is presented. The historical water budget shows how water use has grown over time as the area developed and how the groundwater basin water interacted with the surface water system and imported water system over time (from 1925 through 2019), including during periods of abundant precipitation and periods of drought conditions.
- Next, the current water budget is presented. In this water budget, the performance of the Basin is simulated over a repeat of the historical hydrologic record (1925 through 2019), but with a static level of pumping and overlying human water demands that are representative of recent land uses and water uses in the Basin. This differs from the historical water budget in that it takes out the factors associated with continual changes in the overlying land and water uses during the historical record, thereby allowing an analysis of how the basin would perform under a repeat of historical droughts and wet cycles at the current level of overlying development and human water demand. The current water budget depicts how the groundwater basin currently interacts with the surface water system and how the region depends upon imported water to maintain a long-term balance between supplies and human demands for water.
- Finally, the projected water budget is presented, with a preceding discussion of how the Basin Operating Plan was developed and how this plan interrelates to the region's dependence upon imported water supplies (based on the conjunctive-use management approach for the Basin). The projected water budget also accounts for the effects of climate change on the local groundwater system.

6.1.4 Historical Water Budget

This section provides a look back at the Basin's historical water budget from 1925 through 2019. This historical water budget includes historical wet and dry periods, which are later used to represent water supply variability in current and projected water budget evaluations. The historical water budget also depicts the actual history of past changes in regional water use over time.

6.1.4.1 Historical Water Supplies and Demands

Water use changes were dramatic during this period. The table below shows the overlying human water demands and the sources of water used to meet those demands.

		Municipal Users				Other Users	Total	
Years	**Statistic**	**Local Groundwater**	**Imported Water**	**Recycled Water**	**Total**	**Local Groundwater**	**Local Groundwater**	**Demand**
1936–1949	Min	0	0	0	0	5,000	5,000	5,000
	Average	0	0	0	0	33,500	33,500	33,500
	Max	0	0	0	0	50,000	50,000	50,000
1950–1959	Min	500	0	0	500	50,000	50,500	50,500
	Average	1,000	0	0	1,000	51,000	51,000	51,000
	Max	1,000	0	0	1,000	51,000	51,000	51,000
1960–1979	Min	500	0	0	500	14,000	29,000	29,000
	Average	11,500	0	0	11,500	23,500	35,000	35,000
	Max	20,000	7	0	20,000	50,000	50,500	50,500
1980–2019	Min	12,201	1,126	0	21,386	9,975	24,138	33,323
	Average	25,820	26,486	167	52,473	13,990	39,810	66,463
	Max	34,612	47,205	507	77,311	17,312	50,373	92,079

Notes

All units are in acre-feet. Values prior to 1980 are estimates and are rounded to the nearest 500 or 1,000 acre-feet due to limited records. Totals do not equal the sum of the individual uses because the minimum, average, and maximum values occur in different years for each water use and water source.

Min = minimum Max = maximum

Water use during the region's history can be logically divided into four periods: predevelopment (before 1936), agricultural (1936 through 1959), transition to urbanization (1960 through 1979), and the modern period of record (1980 through 2019).

- **Predevelopment Period (Before 1936).** During the 1800s and early 1900s, the Basin was largely rural, with ranches, rural populations, and small villages present. This early development included an outpost of Mission San Fernando that was established at Castaic Junction in 1802. See Lopez, 1974 for an ethnographic and archaeological study of these early years, including discussions of precipitation and temperature patterns during this period. Shallow hand-dug wells and direct diversions of water from perennial reaches of the Santa Clara River are thought to be the primary sources of the low-volume water needs in those days.[29]
- **Agricultural Development Period (1936 through 1959).** The first large-scale use of groundwater is thought to have occurred with the construction of agricultural supply wells along the Santa Clara River in the western and central portions of the Basin beginning in the mid-1930s. Inspection of aerial photos from 1947 and a U.S. Geological Survey (USGS) study of the Basin's agricultural and early urban years (Robson, 1972) indicate that groundwater pumping for agricultural uses supported irrigated crop cultivation on as much as 6,100 acres (approximately) of land lying along the alluvial corridors that contain the Santa Clara River and certain tributaries. See Appendix I, Water Budget Details, for the

[29] See https://scvhistory.com/scvhistory/lopezrobert1974rainfall.htm for details.

locations of these lands and the wells that are estimated (based on construction dates) to have provided the irrigation water supply. Calculations by Robson (1972), CH2M HILL (2004), and GSI (2020) for the mixture of crops farmed in those days and more recently indicate that (1) crop irrigation demands range from about 4 to 10 acre-feet (AF) per acre per year, and (2) crops consume approximately 50 to 70 percent of the land-applied irrigation water pumped from the Alluvial Aquifer, with the remainder lost to evaporation from soils and seepage back to the underlying water table. Accordingly, annual groundwater pumping to support agricultural irrigation is thought to have averaged approximately 50,000 AFY by the mid-1940s and continuing through much, if not all, of the 1950s. The Saugus Formation was not a source of groundwater supply until the early 1950s, when the newly formed Newhall County Water District drilled wells along the South Fork Santa Clara River in the town of Newhall.

- **Transition Period (1960 through 1979).** Beginning in the 1960s, certain parcels of agricultural land, located primarily east of the modern-day Interstate 5 (I-5) freeway, were retired and gradually urbanized. As this transition began, the region began planning water importation to meet future growth. In 1963, the Upper Santa Clara River Valley Water Agency, the predecessor to CLWA, and now SCV Water, contracted with DWR for SWP supply. Urbanization continued during the 1960s and 1970s, with the first deliveries of SWP water occurring in 1979.
- **Modern Record (1980 through 2019).** Over these years, the Basin has continued to urbanize. By 2019 the region's population was approximately 286,000. During this period, the region invested in increased supplies of imported water and began operating the local groundwater basin in conjunction with imported water. This was formalized in a Basin Operating Plan near the turn of this century (LSCE, 2003; LSCE and GSI, 2009).

6.1.4.2 Historical Groundwater Budget Analysis Results

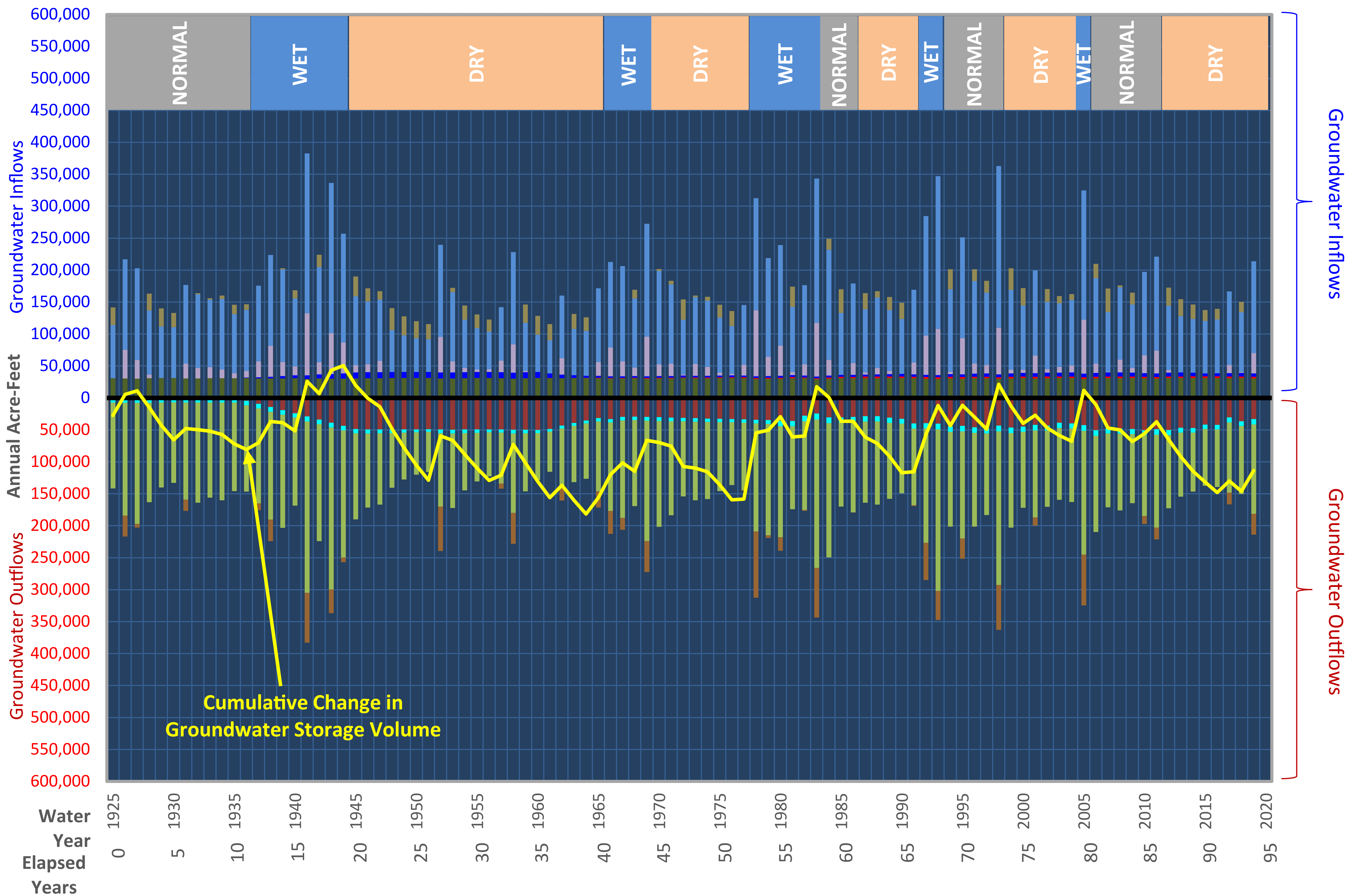
Figure 6.1-7, shown below, depicts the historical water budget. The figure presents a histogram plot showing the multiple groundwater inflows and outflows, with the inflows stacked as bars above the zero line and the outflows stacked as bars below the zero line. A yellow line shows the cumulative change over time in the volume of groundwater in storage in the Basin. Like the cumulative departure curve for precipitation, the cumulative change curve for groundwater storage indicates whether the basin is experiencing long-term changes in groundwater storage, and, in particular, whether an overdraft condition might exist (as would be shown by a curve that is declining over a long period—i.e., sloping down and to the right over multiple decades). As shown in this plot, the historical water budget shows the effects of periodic low precipitation periods but does not show long-term sustained downward trends in the cumulative change curve over the entire period. The absence of long-term sustained downward trends in the cumulative change curve indicates that the Basin has not been in an overdraft condition. This observation is corroborated by observed groundwater levels.

As a companion to Figure 6.1-7, the table that follows it shows the sources of water delivered to end users in the historical water budget, beginning with the first delivery of imported water in 1979. Prior to 1979, all water use in the area was derived from groundwater pumping.

FIGURE 6.1-7

Historical Groundwater Budget (Water Years 1925-2019)

Santa Clara River Valley
East Groundwater Subbasin
Groundwater Sustainability Plan



LEGEND

- Stream Gains
- Stream Losses
- Precipitation
- Ag+Muni Irrigation
- Subsurface Inflow in Tributaries
- Septic
- Pumping
- ET
- Groundwater Storage Increase
- Groundwater Storage Reduction

NOTES

This projected water budget is developed by projecting the 1925-2019 historical hydrology forward in time.
Ag: agriculture
Muni: municipal
ET: evapotranspiration

GSI Water Solutions, Inc.

	Municipal Users				Other Users	Total	
Calendar Year	Local Groundwater	Imported Water	Recycled Water	Total	Local Groundwater	Local Groundwater	Demand
1979	19,500	7	0	19,507	15,223	34,723	34,730
1980	20,639	1,126	0	21,765	15,413	36,052	37,178
1981	18,482	5,817	0	24,299	17,278	35,760	41,577
1982	12,253	9,659	0	21,912	13,705	25,958	35,617
1983	12,201	9,185	0	21,386	11,937	24,138	33,323
1984	16,390	10,996	0	27,386	15,377	31,767	42,763
1985	16,659	11,823	0	28,482	13,403	30,062	41,885
1986	17,393	13,759	0	31,152	12,297	29,690	43,449
1987	17,592	16,285	0	33,877	10,611	28,203	44,488
1988	18,601	19,033	0	37,634	9,975	28,576	47,609
1989	21,195	21,618	0	42,813	10,285	31,480	53,098
1990	21,453	21,613	0	43,066	11,284	32,737	54,350
1991	31,825	7,968	0	39,793	10,279	42,104	50,072
1992	27,355	13,911	0	41,266	11,160	38,515	52,426
1993	29,959	13,393	0	43,352	10,777	40,736	54,129
1994	31,599	14,389	0	45,988	13,559	45,158	59,547
1995	28,677	16,996	0	45,673	14,347	43,024	60,020
1996	32,054	18,093	0	50,147	14,570	46,624	64,717
1997	32,025	22,148	0	54,173	15,319	47,344	69,492
1998	28,604	20,254	0	48,858	13,599	42,203	62,457
1999	29,968	27,282	0	57,250	17,154	47,122	74,404
2000	28,409	32,579	0	60,988	15,608	44,017	76,596
2001	25,367	35,369	0	60,736	16,362	41,729	77,098
2002	26,457	41,763	0	68,220	16,979	43,436	85,199
2003	22,978	44,416	50	67,444	14,829	37,807	82,273
2004	24,671	47,205	420	72,296	15,590	40,261	87,886
2005	32,316	37,997	418	70,731	12,785	45,101	83,516
2006	33,061	40,048	419	73,528	17,312	50,373	90,840
2007	31,690	45,151	470	77,311	14,768	46,458	92,079
2008	33,884	41,705	311	75,900	14,750	48,634	90,650
2009	31,100	38,546	328	69,974	16,564	47,664	86,538
2010	33,152	30,578	336	64,066	16,098	49,250	80,164
2011	33,624	30,808	373	64,805	15,439	49,063	80,244
2012	33,726	35,558	428	69,712	15,694	49,420	85,406
2013	29,779	43,281	400	73,460	16,151	45,930	89,611
2014	34,612	33,092	474	68,178	12,885	47,497	81,063
2015	29,893	24,148	450	54,491	12,079	41,972	66,570
2016	26,329	31,130	507	57,966	14,360	40,689	72,326
2017	16,403	46,651	501	63,555	13,438	29,841	76,993
2018	22,869	41,999	352	65,220	13,071	35,940	78,291
2019	17,547	42,072	458	60,077	12,510	30,057	72,587

Notes
All values are in units of acre-feet. Data are for calendar years, to be consistent with water usage information presented in annual reports. See Table I-2 in Appendix I for water-year values of groundwater usage. Other users are FivePoint (The Newhall Land and Farming Company), the Pitchess Detention Center, Sand Canyon Country Club, Valencia Country Club, Vista Valencia Golf Course, small private domestic well owners, and the groundwater pumping/treatment system on the Whittaker-Bermite property.

6.1.5 Current Water Budget

The approach that was used to develop the current water budget involved taking the historical pattern of natural hydrologic conditions (i.e., precipitation, basin inflows, ET, etc.) from 1925 through 2019 and using current pumping and development patterns to demonstrate how the current operation of the groundwater basin interacts with the surface water system under historical droughts and wet periods. Analysis of the current water budget allows for evaluating whether overdraft conditions would possibly occur if the current levels of groundwater pumping and overlying water uses were to continue for many decades.

6.1.5.1 Water Supplies and Demands for the Current Water Budget

While the historical water budget extends through 2019, the pumping patterns that have occurred beginning in 2015 have been abnormally depressed during these years—well below the annual volumes specified in the AB 3030 Groundwater Management Plan (LSCE, 2003). To avoid this anomaly, this current water budget uses SCV Water's actual 2014 pumping distribution and the overlying land uses that were present that year. The 2014 land uses are believed to be within 1 percent of those found in 2019, based on the number of water accounts served by SCV Water. For other pumpers (i.e., non-municipal pumpers), the current water balance uses those well owners' average pumping during the last 10 years, which is consistent with estimation procedures used in past Urban Water Management Plan analyses.

The table below shows how human water demands would be satisfied at the current level of development and the associated current level of water demands and groundwater pumping.

Municipal Users				Other Users	Total	
Local Groundwater	Imported Water	Recycled Water	Total	Local Groundwater	Local Groundwater	Demand
34,612	33,092	474	68,178	14,623	49,235	82,801

Notes

All values are in units of acre-feet and are for 365-day years. Values will be higher in leap years.
Groundwater pumping consists of actual 2014 municipal water use, 2010–2019 average pumping for other pumpers, and 500 AFY for the groundwater pumping/treatment system on the Whittaker-Bermite property.
Other users are FivePoint (The Newhall Land and Farming Company), the Pitchess Detention Center, Sand Canyon Country Club, Valencia Country Club, Vista Valencia Golf Course, small private domestic well owners, and the groundwater pumping/treatment system on the Whittaker-Bermite property.

6.1.5.2 Current Groundwater Budget Analysis Results

The current groundwater budget is depicted in Figure 6.1-8, below. This plot shows the effects of periodic low precipitation periods but does not show long-term sustained downward trends in the cumulative change curve for groundwater storage over the entire period. The absence of long-term sustained downward trends in the cumulative change curve indicates that the Basin would not be in an overdraft condition if current land use and water use conditions persisted over multiple decades of fluctuating precipitation in the basin.

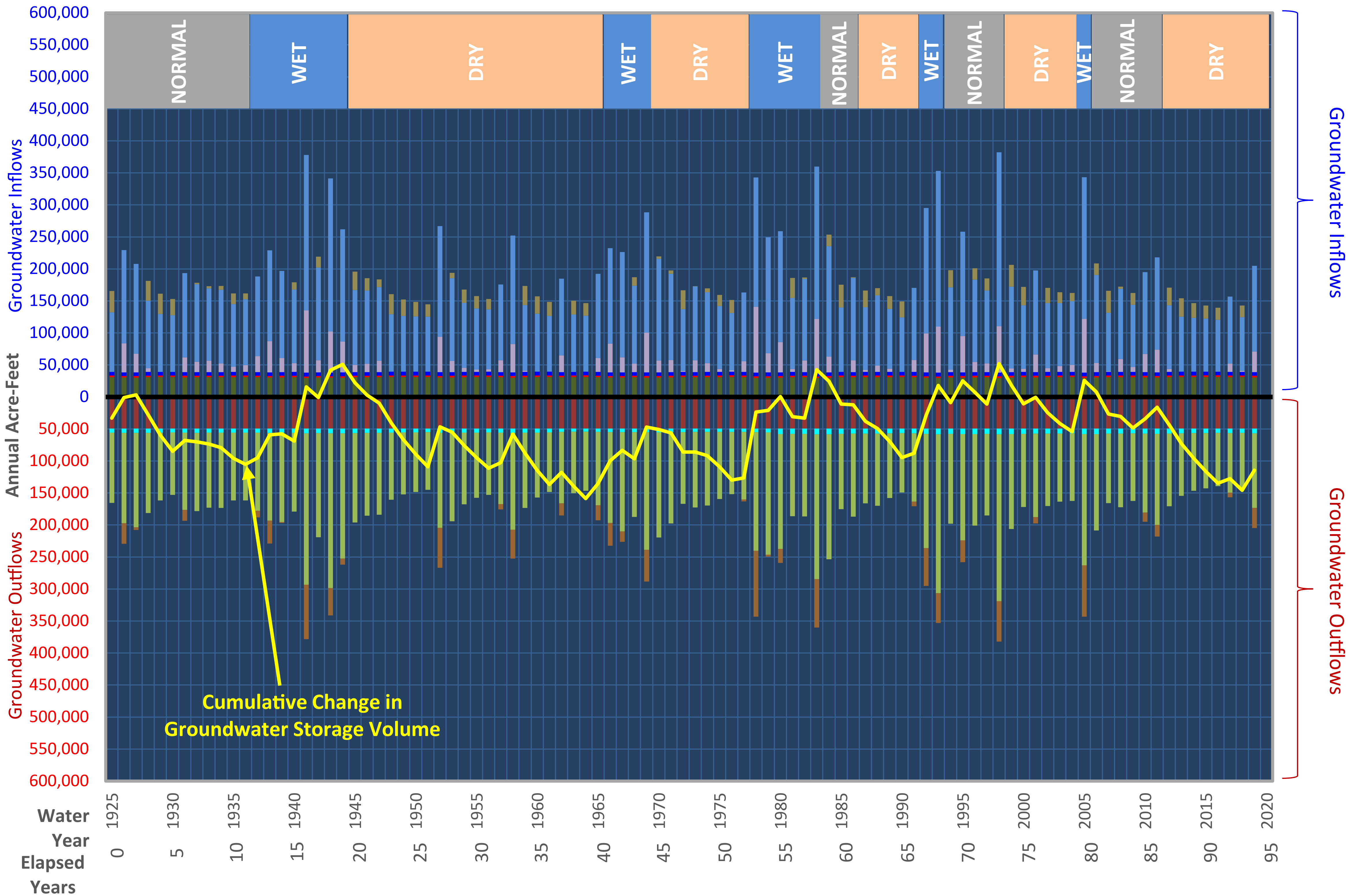


FIGURE 6.1-8

Current Groundwater Budget Under the 2014 Level of Development

Santa Clara River Valley
East Groundwater Subbasin
Groundwater Sustainability Plan

LEGEND

- Stream Gains
- Stream Losses
- Precipitation
- Ag+Muni Irrigation
- Subsurface Inflow in Tributaries
- Septic
- Pumping
- ET
- Groundwater Storage Increase
- Groundwater Storage Reduction

NOTES

This projected water budget is developed by projecting the 1925-2019 historical hydrology forward in time.
Ag: agriculture
Muni: municipal
ET: evapotranspiration

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6.1.6 Projected Water Budget

This section presents the projected water budget under three alternative sets of climate assumptions and derives the future water budget that will be carried forward into later evaluations of basin sustainability.

6.1.6.1 Water Supplies and Demands for the Projected Water Budget

Simulations of the projected water budget under a variety of future conditions are described below. In all of those scenarios, future human demands for water are projected under full build-out of the Basin's land uses, and hence full build-out of future water demands. Full build-out is expected to occur by the year 2050 (KJ, 2021), and future basin pumping is in accordance with the Basin Operating Plan.

	Municipal Users				Other Users	Total	
Year Type	Local Groundwater	Imported Water	Recycled Water	Total	Local Groundwater	Local Groundwater	Demand
Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
Dry Year 1	44,915	53,224	8,961	107,100	7,585	52,500	114,685
Dry Year 2	49,915	43,994	8,961	102,870	7,585	57,500	110,455
Dry Year 3+	59,915	33,994	8,961	102,870	7,585	67,500	110,455
Average (1925–2019)	**44,649**	**48,365**	**8,966**	**101,980**	**7,588**	**52,237**	**109,568**

Notes

Normal-year and dry-year values are in units of acre-feet per year (AFY) and are for 365-day years. Values will be higher in leap years. Average values for 1925–2019 include leap years. Hence, the average values for recycled water and local groundwater are slightly higher than those shown for normal and dry years.

Other users are FivePoint (The Newhall Land and Farming Company), the Pitchess Detention Center, Sand Canyon Country Club, Valencia Country Club, Vista Valencia Golf Course, small private domestic well owners, and the groundwater pumping/treatment system on the Whittaker-Bermite property.

Total demand by municipal users in normal years (101,000 AFY), single-dry years (107,100 AFY), and multiple-dry years (102,870 AFY) is for Year 2050, as shown in Tables 7-2, 7-3, and 7-4 of the 2020 UWMP (KJ., 2021), and is the demand with the plumbing code and active conservation.

As described above, the projected water budget is based on simulating the effects of full build-out of land uses and human demands for water. Three alternative projected water budgets (no climate change, 2030 climate change, and 2070 climate change) are presented for consideration as the projected water budget to use for evaluating basin sustainability under SGMA. The projected water budget is examined to see how changes in climate could affect precipitation and ET rates locally in the Basin, as defined by DWR for the years 2030 and 2070. The analysis of the projected water budget also includes a numerical groundwater flow model simulation that uses the historical climate without climate change, to help quantify the climate-change influence separately from the changes in land and water uses. All three of these projected water budgets are developed for the same historical climatic regime (1925 through 2019) as is used in the historical and current water budgets, with DWR's local climate-change factors being applied to the historical climatic regime to describe the potential future effects of climate change on precipitation and ET in 2030 and 2070. Based on this analysis, the projected water budget that was for further SGMA sustainability evaluations and groundwater management planning reflects full build-out conditions in the Basin plus precipitation and ET changes that are estimated by DWR to occur in 2030.

6.1.6.2 Evaluating the Influences of Climate Change

One of the dominant uncertainties in water resource planning in California is climate change. Hydrology in California is highly variable, and forecasts of the effects of climate change suggest even greater variability could occur in the coming years. Moreover, the available global climate models suggest that a general warming trend is likely to occur in California, which is likely to reduce SWP water deliveries and have other profound implications for management of water supplies in the state.

When evaluating sustainable management of the Basin 50 years into the future, it is prudent to consider the potential impacts that climate change could have on the state's future management of water supplies and the change in hydrology within the local groundwater system. SGMA issues guidance to local GSAs for consideration of how to factor these forecasts and uncertainties into planning for local sustainability. Sustainable groundwater management provides a buffer against drought and climate change and contributes to reliable water supplies regardless of weather patterns. The Santa Clarita Valley depends on groundwater for a portion of its annual water supply, and sustainable groundwater management is essential to a reliable and resilient water system.

The 2020 Urban Water Management Plan (KJ, 2021) provides future water supply and human water demand values and incorporates DWR's most current estimates of future SWP delivery capability (DWR, 2020). The projected water budgets are based on the current operating plan for the Basin (the Basin Operating Plan) which is applicable to all three of the projected water budget scenarios described in this Water Budgets section (no climate change, 2030 climate change, and 2070 climate change).

DWR provides GSAs with one climate scenario for 2030 and three climate scenarios for 2070. The climate scenario for 2030 provides the best estimate of the variability in local hydrology (precipitation and ET) that the Basin might experience during the next 20 years as the GSA works to obtain and/or maintain sustainability of local groundwater resources. The three climate scenarios for 2070 demonstrate the uncertainty of climate when considering a 50-year planning horizon under SGMA. The forecasts result in a fairly minor change in local hydrology compared with the effects of climate uncertainty and future climate change on future statewide policy-making and water resource management. When considering sustainability 50 years out, SCV Water anticipates there will be a need to consider and adjust to the influences of climate change in its water demand and supply management programs. Thus, it is prudent to focus on the 2030 climate scenario for addressing sustainability within the 20-year time frame required by SGMA, while also using the results of the 2070 water budget analysis to inform water managers about conditions that may be possible afterward.

6.1.6.3 Projected Groundwater Budget Analysis Results

The projected water budgets, in Figures 6.1-9 through 6.1-11 below, show that the cumulative change curve for groundwater storage may shift slightly downward with the onset of slightly reduced precipitation and greater ET in the Basin. However, chronic declines in groundwater levels are not projected to occur over long periods, which indicates that SCV Water's operating plan for the Basin is unlikely to cause an overdraft condition in the local groundwater system (i.e., it is unlikely to exceed the basin yield) in the future under the assumed climatic conditions, as discussed in Section 6.1.7.

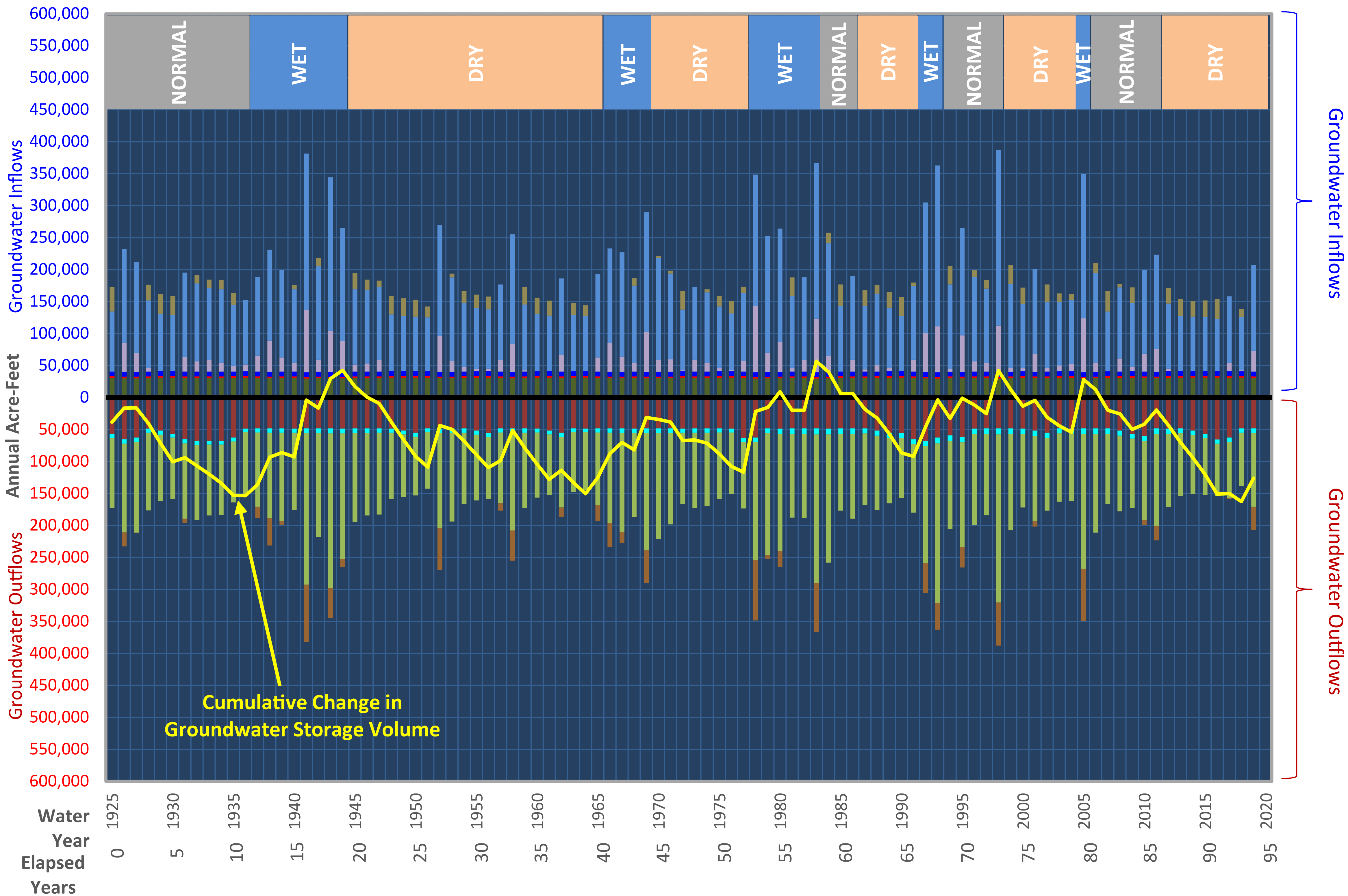

FIGURE 6.1-9

Projected Groundwater Budget Under Full Build-out Conditions Without Climate Change

Santa Clara River Valley
East Groundwater Subbasin
Groundwater Sustainability Plan

LEGEND

- Stream Gains
- Stream Losses
- Precipitation
- Ag+Muni Irrigation
- Subsurface Inflow in Tributaries
- Septic
- Pumping
- ET
- Groundwater Storage Increase
- Groundwater Storage Reduction

NOTES

This projected water budget is developed by projecting the 1925-2019 historical hydrology forward in time.
Ag: agriculture
Muni: municipal
ET: evapotranspiration

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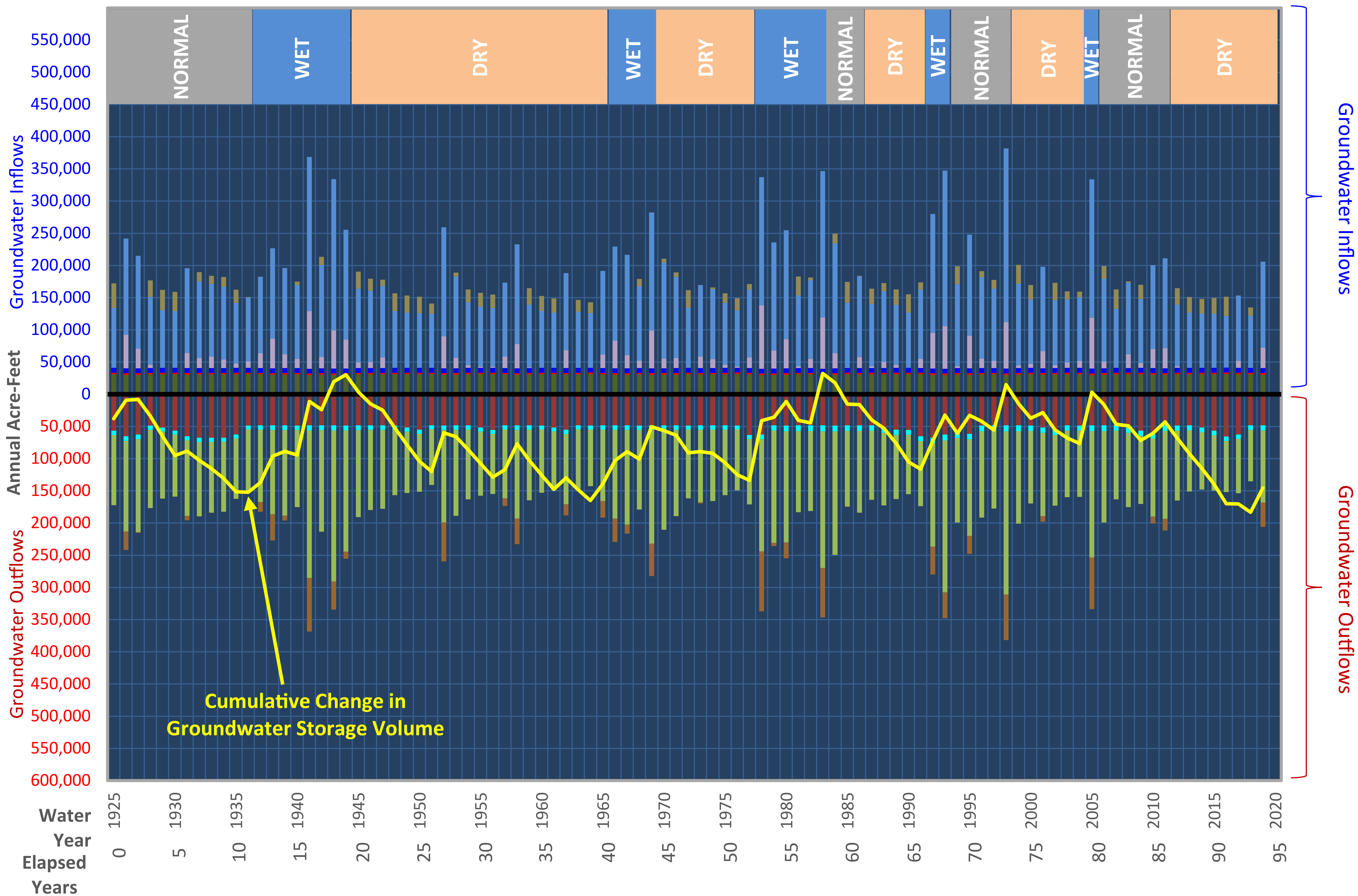
FIGURE 6.1-10

Projected Groundwater Budget For Year 2042 Conditions (Full Build-out Conditions With 2030 Average Climate Change)

Santa Clara River Valley
East Groundwater Subbasin
Groundwater Sustainability Plan



LEGEND

- Stream Gains
- Stream Losses
- Precipitation
- Ag+Muni Irrigation
- Subsurface Inflow in Tributaries
- Septic
- Pumping
- ET
- Groundwater Storage Increase
- Groundwater Storage Reduction

NOTES

This projected water budget is developed by projecting the 1925-2019 historical hydrology forward in time.
Ag: agriculture
Muni: municipal
ET: evapotranspiration

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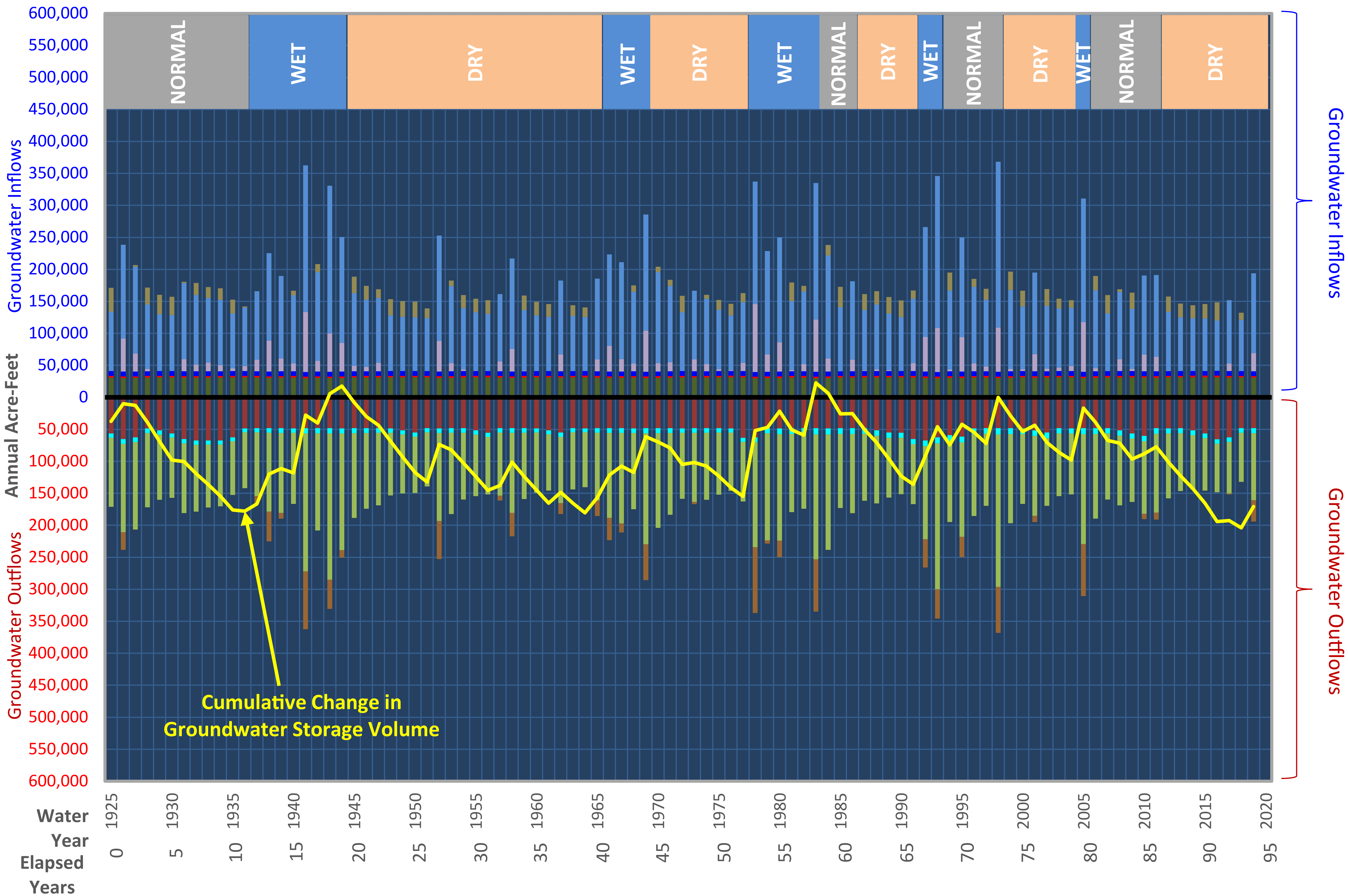

FIGURE 6.1-11

Projected Groundwater Budget For Year 2072 Conditions (Full Build-out Conditions With 2070 Average Climate Change)

Santa Clara River Valley
East Groundwater Subbasin
Groundwater Sustainability Plan

LEGEND

- Stream Gains
- Stream Losses
- Precipitation
- Ag+Muni Irrigation
- Subsurface Inflow in Tributaries
- Septic
- Pumping
- ET
- Groundwater Storage Increase
- Groundwater Storage Reduction

NOTES

This projected water budget is developed by projecting the 1925-2019 historical hydrology forward in time.
Ag: agriculture
Muni: municipal
ET: evapotranspiration

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6.1.7 Basin Yield

SGMA requires that basins be brought into balance within 20 years so as to avoid undesirable results and depletion of groundwater resources. A basin that is out of balance is characterized by a continual lowering of groundwater levels over time, a condition known as overdraft. Overdraft occurs when the average annual amount of groundwater extraction exceeds the long-term average annual supply of water to the basin. Effects of overdraft can include seawater intrusion, land subsidence, and groundwater depletion (which refers to chronic lowering of groundwater levels), eventually making a basin unusable. This is not to say that a basin must be in balance each year. It is normal for groundwater basins to experience increases and decreases in storage in response to the normal dry and wet hydrologic cycles. What is generally required is for a basin to be operated at or below its "basin yield" production volume, which is a long-term (multi-decadal) average annual production volume that does not create a long-term chronic overdraft condition.

The basin yield volume for a groundwater basin is the average amount of pumping that can occur on a long-term basis without creating a chronic (i.e., continual) lowering of groundwater levels and a chronic reduction in groundwater storage volumes. The basin yield volume is generally considered equal to the long-term average replenishment rate of the aquifer from natural and artificial recharge sources. ET and basin outflow are also factored into calculating groundwater replenishment rates. The volume of groundwater pumped in a given year can be less than, or greater than, the long-term average volume that is used to define basin yield.

The table below compares the annual groundwater pumping volumes that were modeled for the projected water budget with the annual pumping volumes specified in the operating plan for the Basin.

Year Type	Modeled Groundwater Pumping for the Projected Water Budgets	Pumping Ranges Specified in the Basin Operating Plan
Normal	48,300	37,500 to 55,000
Dry Year 1	52,500	45,000 to 60,000
Dry Year 2	57,500	51,000 to 60,000
Dry Year 3+	67,500	51,000 to 70,000
Modeled Average for Projected Water Budgets	**52,200**	

Note

Normal-year and dry-year values are in units of acre-feet per year (AFY) and are for 365-day years. Values will be higher in leap years. The modeled average of 52,200 AFY is for the 95-year time period that is simulated in the numerical groundwater flow model, and is rounded from values presented in other tables and in Appendix I.

As shown in the table, annual pumping volumes increase during dry years, which are defined as years when SWP water deliveries are significantly curtailed. The increase in groundwater pumping during these years (compared with normal years) occurs in the Saugus Formation. The projected water budgets for the Basin indicate the Basin Operating Plan does not produce chronic declines in groundwater storage volumes or groundwater levels in the aquifer system on a long-term basis, including under the two different climate change scenarios that were evaluated. This means the basin yield volume for the Basin is likely higher than the average annual production volume of 52,200 AFY that was simulated for the projected water budget under full build-out of the land and water uses in the Basin.

The results of the projected water budget also indicate that, pursuant to the Basin Operating Plan, the Basin can be pumped at an annual rate of at least 67,500 AFY for multiple dry years without causing chronic water-level declines. The number of consecutive dry years that the basin can be pumped at or above 67,500 AFY without causing chronic water level declines has not been tested or determined. Thus, it is prudent to consider the basin yield volume for the Basin to be at least 52,200 AFY, based on the long-term average amount of pumping. However, as indicated by the projected water budget analyses presented in this section, pumping at rates of 67,500 AFY (and potentially higher) can occur for multiple dry years without causing chronic groundwater level declines and hence exceeding the long-term basin yield for the Basin groundwater system.

The basin yield volume is not the same as the sustainable yield of the basin according to SGMA, because the GSP development process must consider not only chronic lowering of groundwater levels and chronic reduction in groundwater storage, but also whether there are other undesirable results with respect to other sustainability indicators (including degradation of water quality, subsidence, surface water depletion, and seawater intrusion). The GSP development process also must consider whether groundwater-dependent ecosystems (GDEs) have been, or will be, impacted. As discussed in Sections 8 and 9 of the GSP, undesirable results arising from pumping in the groundwater basin have not been identified to date and are not expected to occur under the Basin Operating Plan, given that this operating plan is expected to not create a chronic decline in groundwater levels, a reduction of groundwater in storage, or significant and unreasonable depletion of surface water. These conditions will be monitored and evaluated under the monitoring program described in Section 7 of the GSP, along with monitoring of the two other sustainability indicators that are pertinent in the Basin (degraded groundwater quality and land subsidence). If undesirable results are identified in the future, then the GSP will include projects and management actions to return the Basin to a sustainable condition. Because undesirable results are not expected to occur, the basin yield volume of at least 52,200 AFY is numerically equivalent to the sustainable yield of the Basin (though it potentially might be higher, as described above).

6.2 Data Sources, Time Periods, and Methods

The SGMA regulations (herein referred to as the GSP regulations) contain specific requirements for developing and presenting the water budgets, as described in 23 California Code of Regulations (CCR) §354.18 and listed below:

§ 354.18 Water Budget.

(a) Each Plan shall include a water budget for the basin that provides an accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the basin, including historical, current and projected water budget conditions, and the change in the volume of water stored. Water budget information shall be reported in tabular and graphical form.

(b)The water budget shall quantify the following, either through direct measurements or estimates based on data:

(1) Total surface water entering and leaving a basin by water source type.

(2) Inflow to the groundwater system by water source type, including subsurface groundwater inflow and infiltration of precipitation, applied water, and surface water systems, such as lakes, streams, rivers, canals, springs and conveyance systems.

(3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow.

(4) The change in the annual volume of groundwater in storage between seasonal high conditions.

(5) If overdraft conditions occur, as defined in Bulletin 118, the water budget shall include a quantification of overdraft over a period of years during which water year and water supply conditions approximate average conditions.

(6) The water year type associated with the annual supply, demand, and change in groundwater stored.

(7) An estimate of sustainable yield for the basin.

In accordance with these requirements, for each of the three periods that must be evaluated (historical, current, and projected) an integrated water budget is developed for the basin's surface water and groundwater systems. Each integrated water budget describes the total inflows and outflows for surface water and the two principal aquifers (the Alluvial Aquifer and the Saugus Formation) combined. The water budgets present the magnitudes of individual inflow and outflow terms for each water year (October 1 through September 30)[30] evaluated. Additionally, for each water year, the water budget consists of distinct surface water and groundwater budgets. These water budgets quantify inflows and outflows on a basinwide basis in the Basin. Tables 6.2-1 and 6.2-2 provide inventories of the inflow and outflow terms for the surface water system and the groundwater system, respectively. Figure 6.2-1 shows the inflows and outflows from these systems, the linkages between these systems, and the sources and uses of water supplies in the Basin.

[30] Water year 2019, for example, begins on October 1, 2018, and continues through September 30, 2019.

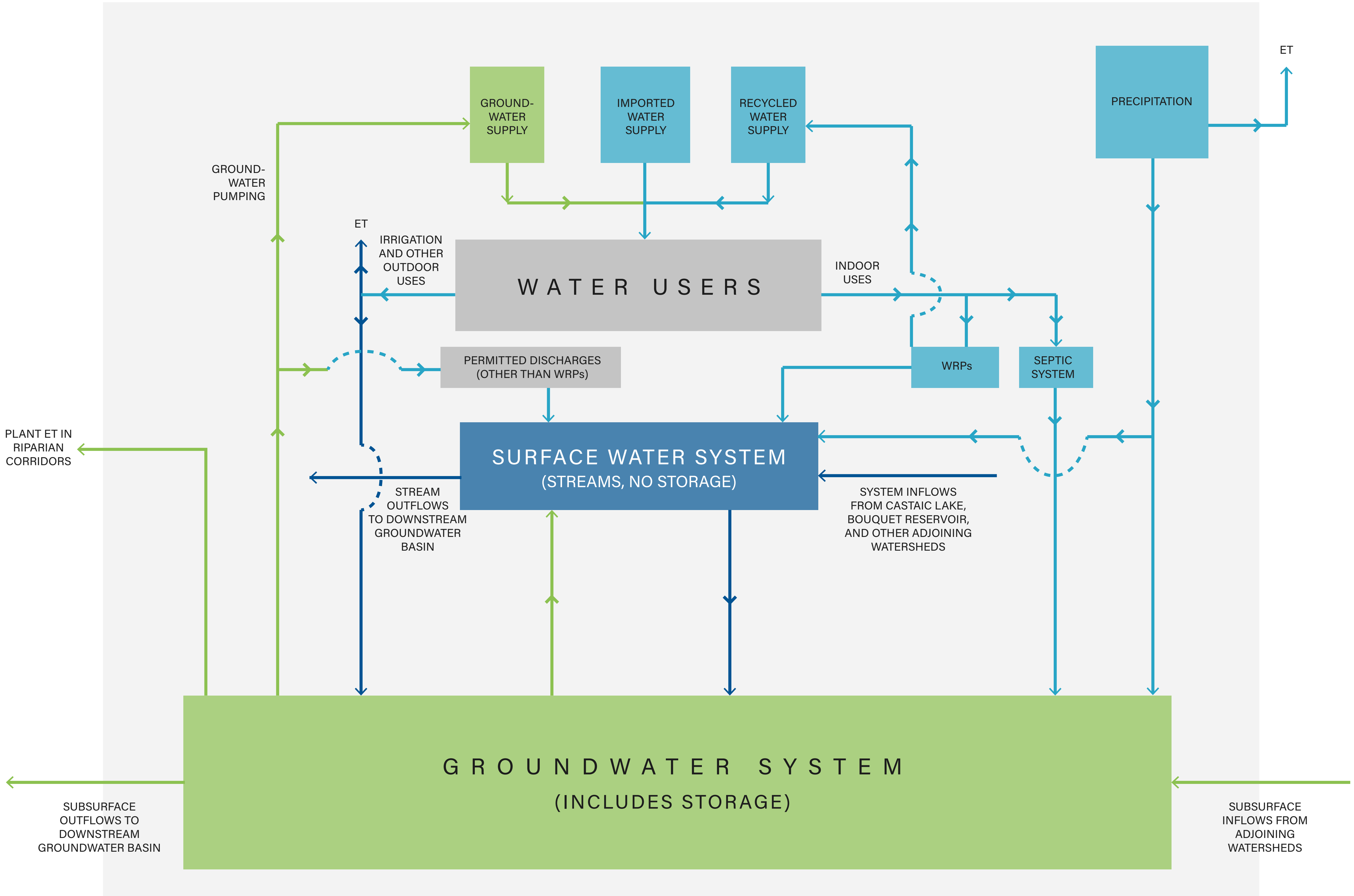

FIGURE 6.2-1

Water Budget Process Diagram for the East Subbasin

Santa Clara River Valley
East Groundwater Subbasin
Groundwater Sustainability Plan

NOTES
ET: evapotranspiration
WRP: Water Reclamation Plant

GSI Water Solutions, Inc.

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Table 6.2-1. Inventory of Surface Water Inflows and Outflows for the Basin

Blue = Surface Water System Process
Green = Exchange with Groundwater
Purple = Internal Flow Process Within the Surface Water System

Surface Water Process	Information Source
INFLOWS	
In-Basin Precipitation	Rain Gage Data and Isohyetes
Stormwater Generated from In-Basin Precipitation	Rainfall Data and Modeling
Stream Inflow (Santa Clara River)	Stream Gaging Data
Stream Inflow (Releases from Castaic Lake/Lagoon)	Data and Projections
Stream Inflow (Releases from Bouquet Reservoir)	Data and Projections
Stream Inflow (Other Santa Clara River Tributaries)	Modeling
Discharges to Santa Clara River from WRPs	Data and Projections
Discharges to Santa Clara River from Groundwater Treatment Systems	Data and Projections
Groundwater Discharge to Streams	Modeling
OUTFLOWS	
Santa Clara River Non-Storm Outflow at the Western Basin Boundary	Data and Modeling
Groundwater Recharge from Precipitation	Modeling
Groundwater Recharge from Streams	Modeling
ET and Stormwater Outflow	Modeling
CHANGE IN STORAGE	
Change in Surface Water Storage (None)	---

Notes

Inflows to - and storage in - Castaic Lake and Bouquet Reservoir are not included in the surface water budgets because these water bodies lie at or upstream of the margins of the groundwater basin.

Subsurface outflow through the thin alluvial material beneath the Santa Clara River at the western boundary of the Basin is accounted for in the "Santa Clara River Non-Storm Outflow at the Western Basin Boundary" term because the historical and current stream gages are located further downstream where bedrock is thought to be at or just beneath the river channel, which causes most if not all subsurface water at the western basin boundary to appear in the river upstream of those gages.

Table 6.2-2. Inventory of Groundwater Inflows and Outflows for the Basin

Blue = Exchange with Surface Water
Green = Groundwater System Process
Purple = Internal Flow Process Within the Groundwater System

Groundwater Process	Information Source
INFLOWS	
Recharge from Precipitation	Rainfall Data and Modeling
Recharge from Streams	Rainfall Data and Modeling
Subsurface Inflow	Modeling
Septic System Percolation	Data and Modeling
Recharge of Applied Water	Data and Modeling
OUTFLOWS	
Groundwater Pumping	Data and Projections
Riparian Evapotranspiration	Modeling
Groundwater Discharge to Streams	Modeling
CHANGE IN STORAGE	
Change in Groundwater Storage	Modeling

Notes

Subsurface outflow through the thin alluvial material beneath the river at the western boundary of the Basin is accounted for as outflow in the surface water budget because the historical and current stream gages are located further downstream where bedrock is thought to be at or just beneath the river channel, which causes most if not all subsurface water at the western basin boundary to appear in the river upstream of those gages.

Recharge of applied water consists of deep percolation of irrigation water and conveyance system losses.

Changes in the volume of groundwater in storage are accounted for separately from the inflow and outflow terms in the groundwater budget.

The historical and current water budgets have been developed from prior and current studies of the hydrogeologic, land use, and water use characteristics of the Basin, including the development and calibration of a three-dimensional numerical groundwater flow model (GSI, 2021). The projected water budgets have been developed by building upon the methodology for the historical and current water budgets, using future estimates of land use build-out and associated human water demands and discharges, as well as incorporating climate-change scenarios provided by DWR for two future time horizons (the years 2030 and 2070). Details regarding the data sources, the time periods associated with each water budget, and the technical methods that are used to construct each water budget (including technical details about the numerical groundwater flow model) are provided below.

6.2.1 Data Sources and Key Basin Studies

The primary data sources for the historical water budget analyses are described in detail in the *Development of a Numerical Groundwater Flow Model for the Santa Clara River Valley East Groundwater Subbasin* (GSI, 2021) (model development report) (Appendix G) and are available as monthly and often daily records as follows:

- Precipitation data from the Newhall-Soledad rain gage (Station FC32CE), now located at Newhall Fire Station #73. Annual precipitation records extend back to the late 1880s and early 1900s, with monthly records available beginning in water year 1928.
- Streamflow gaging data where the Santa Clara River enters the Basin at Lang Station/Capra Railroad Crossing; this gage has been operated intermittently by LA County (including currently as Stations F93B-R and F93C-R) and the USGS (in the past as USGS Station 11107745) and has been relocated at least twice.
- Streamflow gaging data at a former gage (USGS Station 11108500, named "Santa Clara River at LA/Ventura County Line") that was located 0.75 miles downstream of the western basin boundary and operated from water years 1953 through 1996.
- Streamflow gaging data at the existing replacement gage (USGS Station 11109000, named "Santa Clara River Near Piru"), which is located 3.5 miles downstream of the western basin boundary and has operated since October 1996.
- Gaged and ungaged inflows to Castaic Lake and releases of water from Castaic Lake/Castaic Lagoon into Castaic Creek, as reported by DWR.
- Releases of water from Bouquet Reservoir into Bouquet Creek, as reported by the Los Angeles Department of Water and Power (LADWP).
- Discharges of treated water from the Saugus and Valencia WRPs, as reported by the Los Angeles County Sanitation District.
- Reported and estimated discharges of water from groundwater treatment systems on and near the Whittaker-Bermite property.
- Municipal groundwater pumping, which includes all commercial and industrial water use needs in the Santa Clarita Valley.
- Groundwater pumping by agricultural and private wells (in some cases available only annually).

Key studies and reports used to construct the historical, current, and projected water budgets are as follows:

- Annual reports presenting pumping by water use sector since 1980 (LSCE, 2020)

- A USGS study (Robson, 1972) showing the locations of irrigated and non-irrigated agricultural lands prior to urbanization and including estimates of effective groundwater pumpage for 1945 through 1967[31]
- A report presenting the mapping of potential GDEs (ESA, 2020)
- The 2015 and 2020 UWMPs for the Santa Clarita Valley (KJC et al., 2016; KJ, 2021)
- A 2019 study of estimated future indoor water demands and inflows to WRPs from 2020 through 2050, which is the year that full build-out of development in the Santa Clarita Valley is expected to occur (Maddaus, 2019)
- Land use mapping for recent periods (Figure 6.2-2) and for the future full build-out of the Santa Clarita Valley's land uses (see Figure 6.2-3), as derived from the Southern California Association of Governments (SCAG) 2008 land use survey[32] and the One Valley One Vision (OVOV) land use planning process (Los Angeles County Department of Regional Planning and City of Santa Clarita, 2012)

6.2.2 Time Periods

As discussed below, a three-dimensional numerical groundwater model is used to quantify the water budget terms that cannot be directly measured in the field. The numerical groundwater flow model varies the natural hydrology and the water uses in the Basin on a monthly basis, to provide a more accurate quantification than would be achieved by varying these processes on an annual basis. The monthly results from the groundwater flow modeling evaluations are combined into the annual values presented in this section for each water year that is evaluated for historical, current, and projected future periods. This approach is consistent with recommendations provided in the *Water Budget Best Management Practices for the Sustainable Management of Groundwater (BMP)* guidance document (DWR, 2016) regarding the time intervals for quantifying and reporting the water budgets. Details regarding the definitions of the time periods for the historical, current, and projected water budgets follow.

6.2.2.1 Period for Historical Water Budget

The annual reports for the groundwater basin provide a thorough compilation of water use volumes by calendar year, beginning in 1980. Annual water use records are less readily available prior to 1980 and are particularly limited prior to the 1960s, when little municipal use occurred, and most groundwater pumped from the Basin was for agricultural irrigation. Aquifer conditions and groundwater uses prior to the 1970s are understood primarily from historical accounts and reconstruction efforts by prior researchers (Robson, 1972; RCS, 1986 and 1988), as well as from well construction records and aerial photos.

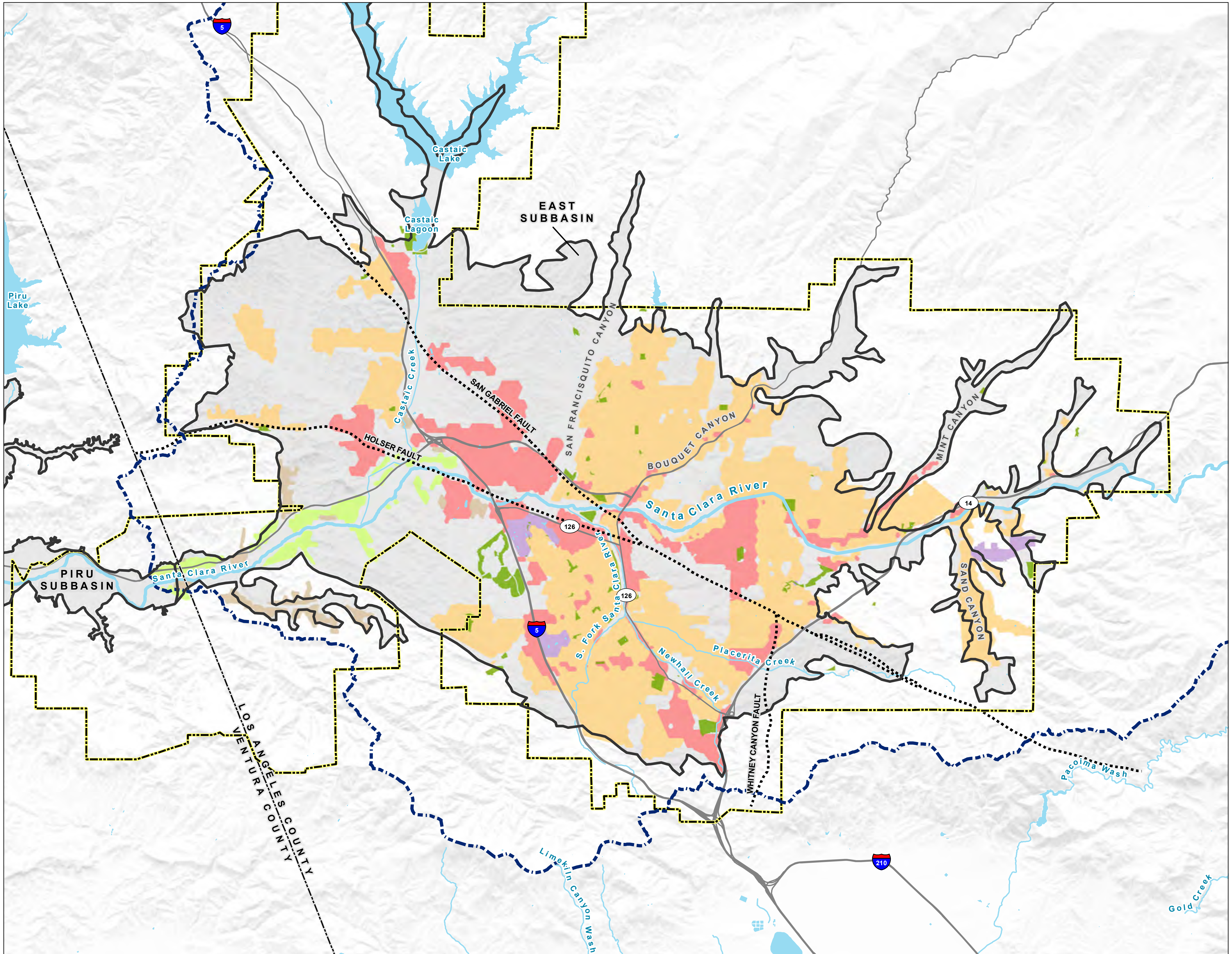
Consideration was given to beginning the historical water budget in the early to mid-1960s, to focus on the period of modern records (since 1980) while extending far enough back in time to approximately characterize the early period of urbanization, including the first years of operations by the two existing WRPs. Using water year 1965 (as the first year in the historical water budget) would have provided a 50-year duration when extending the historical period through water year 2014. Ending the historical analysis in water year 2014 would provide an accounting of conditions leading up to January 1, 2015, which is the reference date identified in the SGMA regulations for evaluating how basin conditions pertain to the establishment of measurable objectives, minimum thresholds, and sustainability criteria for the GSP.

[31] This USGS study described "effective pumpage" as the total pumping volume minus the portion of the total pumping volume that returns to the water table as deep percolation beneath irrigated lands. The study estimated that crops consume approximately 50 percent of the applied water on most of these lands, except along the South Fork Santa Clara River and in Castaic Valley, where soils are less permeable, and crops are likely to consume about 65 percent of the applied water.
[32] Available at https://scag.ca.gov/data-tools-geographic-information-systems. Accessed June 3, 2021.

FIGURE 6.2-2

2014 Land Use

Santa Clara River Valley
East Groundwater Subbasin
Groundwater Sustainability Plan



LEGEND

- Santa Clara River Valley Groundwater Basin
- Watershed Boundary
- Service Boundary Area for SCV Water

Land Use

- Agriculture (Dryland)
- Agriculture (Irrigated)
- Park
- Golf Course
- Commercial/Industrial
- Residential

All Other Features

- Major Road
- Watercourse
- Waterbody

NOTE

SCV Water: Santa Clarita Valley Water Agency

N

0 5,000 10,000 15,000
Feet

Date: December 9, 2021
Data Sources: USGS, Southern California Association of Governments (2008), LA County and City of Santa Clarita (2012), DWR Bulletin 118

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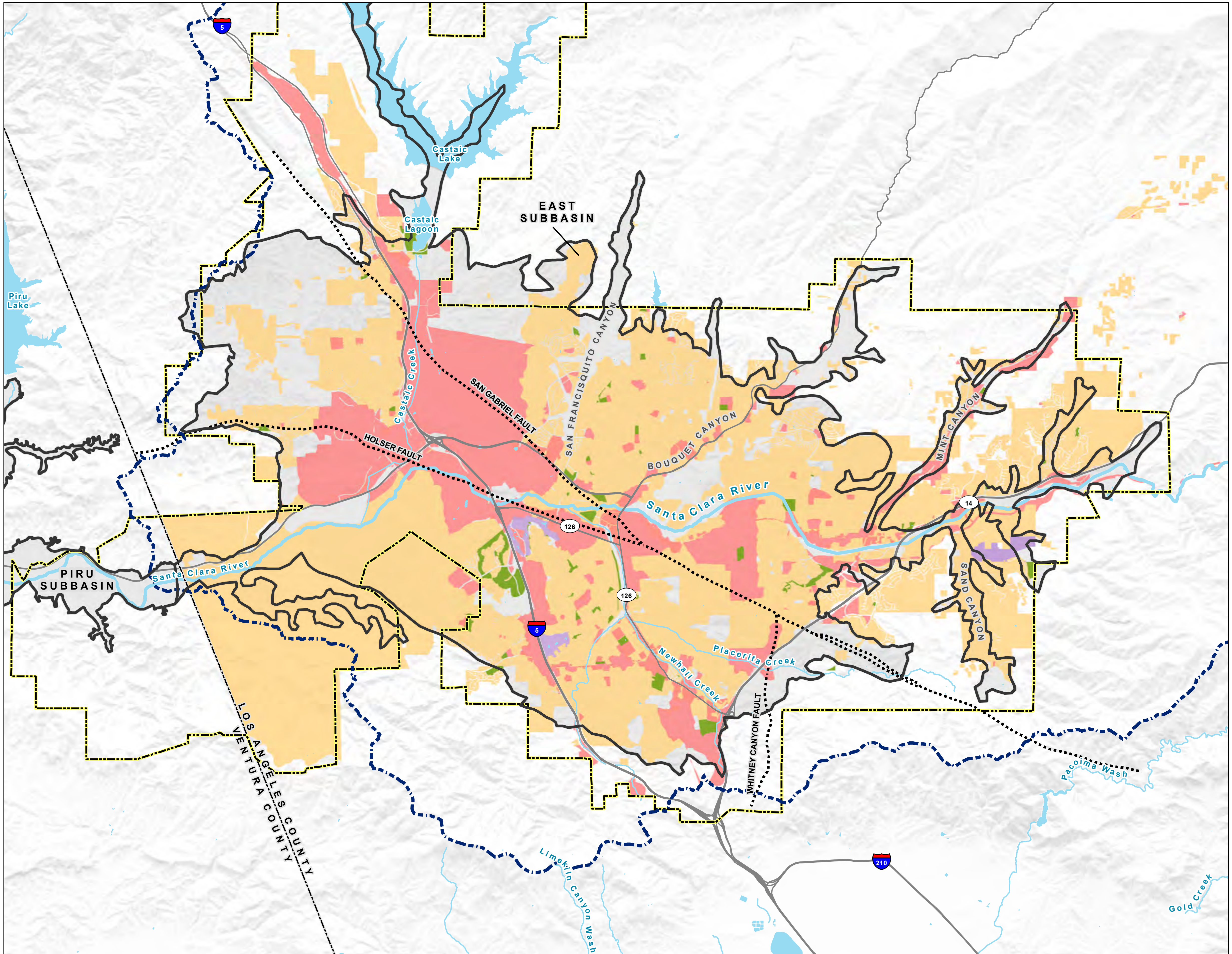


FIGURE 6.2-3

Future Land Use Under Full Build-out Conditions

Santa Clara River Valley East Groundwater Subbasin Groundwater Sustainability Plan

LEGEND

- Santa Clara River Valley Groundwater Basin
- Watershed Boundary
- Service Boundary Area for SCV Water

Land Use

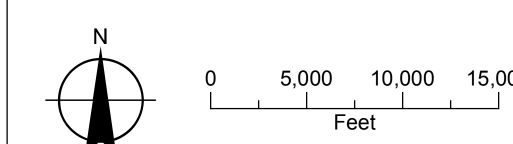
- Park
- Golf Course
- Commerical
- Residential

All Other Features

- Major Road
- Watercourse
- Waterbody

NOTE

SCV Water: Santa Clarita Valley Water Agency



Date: December 13, 2021
Data Sources: USGS, Los Angeles County (2010), DWR Bulletin 118

Water Solutions, Inc.

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However, such a 50-year water budget would have left the region's longest drought period out of the historical analysis—a drought that was considered by the GSP development team to be important for evaluating the projected water budget. The precipitation cumulative departure curve (Figure 6.2-4) shows that a 20-year dry period began in water year 1946 and continued through water year 1965, as indicated by the prolonged period of decreasing cumulative departure values (albeit with periodic interruptions for normal or modestly wet years). Additionally, as described in a prior study of the Basin Operating Plan for the Basin (LSCE and GSI, 2009), the region (and much of California) experienced an intense drought from about 1928 through 1935. The GSP development team therefore decided to construct the projected water budget by simulating future land use and water use conditions on the historical hydrology that occurred beginning in water year 1925 and continuing through water year 2019 (with and without DWR's climate change factors applied to the hydrology of that historical period). As shown in Figure 6.2-4, the 95-year historical period contains 14 sequences for local basin hydrology, consisting of 5 wet periods, 4 normal periods, and 5 dry periods (droughts). Note that, in some individual water years, the classification system may produce a different year type than would be suggested by the precipitation data for that particular year alone; in these cases, the historical classification is still useful because it is developed by considering the prevailing conditions during the years before and after any individual year. For example, even though precipitation during water year 1958 was 31.48 inches at the Newhall-Soledad rain gage (approximately 14 inches greater than the historical average), water year 1958 is nonetheless included in a dry-year period because of the dry years that occurred for several years before and after water year 1958.

6.2.2.2 Period for Current Water Budget

As stated in §354.18(c)(1) of the GSP regulations, the current water budget must quantify basin inflows and outflows for "the most recent hydrology, water supply, water demand, and land use information." In its water budget BMP, DWR (2016) states "The GSP is required to provide an accounting of current water budget conditions to inform local resource managers and help the Department *(*DWR*)* understand the existing supply, demand, and change in storage under the most recent population, land use, and hydrologic conditions." In considering the time period to use to meet this objective, the technical team arrived at the conclusion that pumping conditions in the Basin should be consistent with a number of parameters, including the AB 3030 plan adopted by CLWA in 2003 and the version of the Basin Operating Plan described in a 2009 study of that plan (LSCE and GSI, 2009). Together, these documents have guided basin operations for nearly 2 decades and are indicative of what operators would consider current normal operations. The use of pumping data from 2015 through 2020, when pumping levels were extraordinarily depressed, would lead to erroneous conclusions regarding the basin's water balance. For these reasons, 2014 water use and groundwater pumping volumes were selected for the current water budget.

The current water budget examines how the land and water uses in 2014 would have affected the Basin on a long-term basis if the 2014 land and water uses were to be repeated throughout the historical precipitation sequence (i.e., for the historical precipitation and streamflow conditions that occurred during the period 1925 through 2019). This allows the 2014 water demand and supply usage condition to be evaluated against the same 95-year period for which the historical and projected water budgets are constructed, including during the prevailing dry conditions that occurred from 1945 through 1965 and the more intense drought period that began in 2012 and continued through 2016, as shown in Figure 6.2-4.

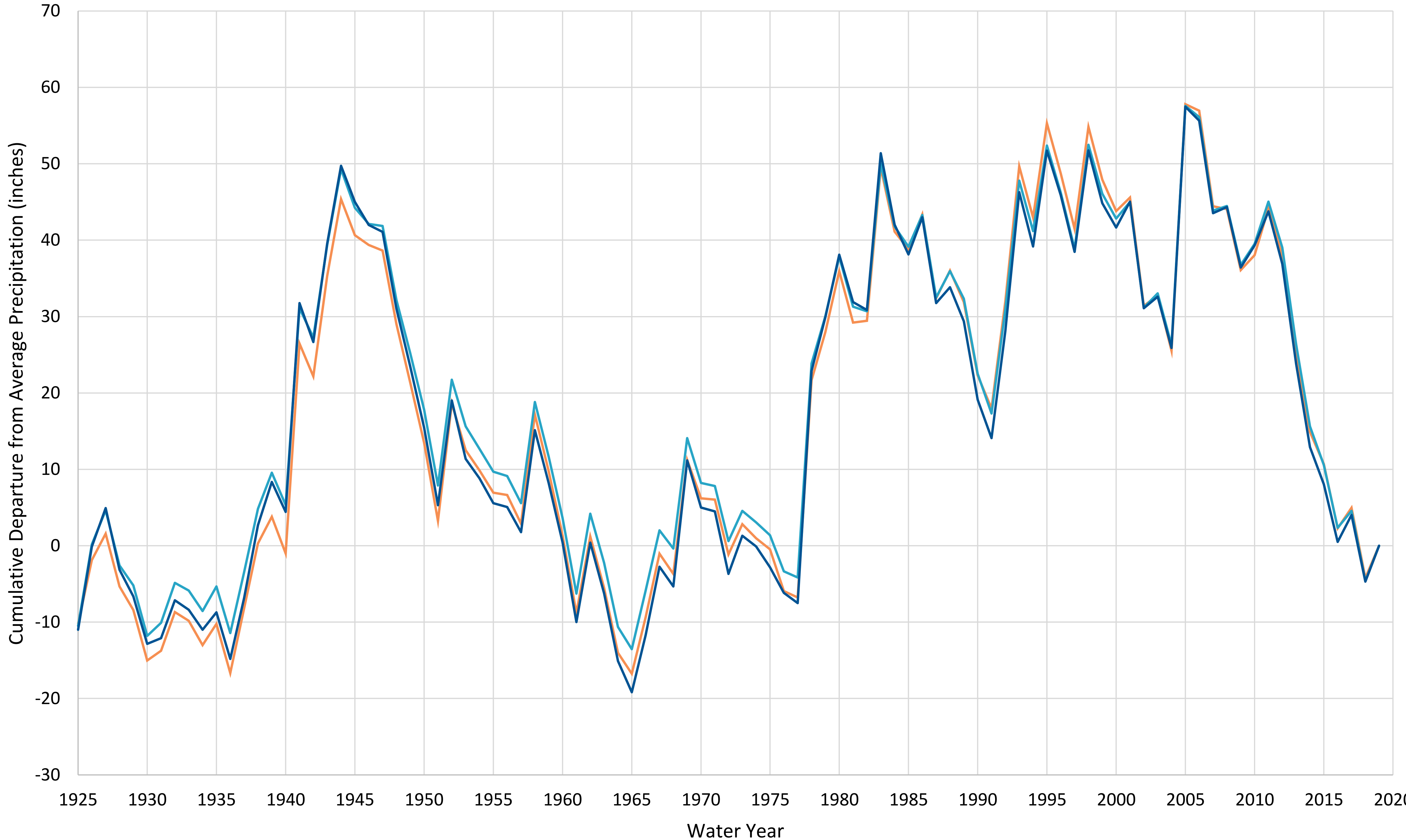

FIGURE 6.2-4

Precipitation Cumulative-Departure Curves at the Newhall-Soledad (Newhall Fire Station #73) Rain Gage With and WIthout Climate Change

Santa Clara River Valley
East Groundwater Subbasin
Groundwater Sustainability Plan

LEGEND

- Historical Precipitation
- Historical Precipitation with 2030 Climate Change
- Historical Precipitation with 2070 Climate Change

GSI Water Solutions, Inc.

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6.2.2.3 Period for Projected Water Budget

The projected water budget represents full build-out conditions for the Basin, which are expected to occur by approximately the year 2050, as described in the 2020 UWMP (KJ, 2021) and other recent planning studies (e.g., Maddaus, 2019). Three projected water budgets have been developed that are distinguished by the following climate and land use/water use characteristics:

- A **full build-out water budget** without climate change provides insights on the effects of estimated future land and water uses on local groundwater conditions and provides a direct comparison with the historical and current water budgets without introducing the added factor of climate change.
- The **2042 water budget** uses the same full build-out condition for land and water uses as the prior water budget and adds a 2030 level of climate change. This water budget corresponds to the 20-year implementation time frame for groundwater sustainability measures to be implemented under the GSP.
- The **2072 water budget** uses the same full build-out conditions for land and water uses and adds a 2070 level of climate change. This water budget describes conditions for the 50-year planning and implementation horizon under SGMA.

Based on the current status of future development plans and the growth in water demands that is forecasted in the 2020 UWMP (KJ, 2021), it is anticipated that approximately 95 percent of the future growth in the Basin will have occurred by the year 2042, which will be the end of the 20-year period for implementing the GSP. Full build-out is expected to occur by the year 2050, as discussed in the 2020 UWMP (KJ, 2021). Given the uncertainties associated with the rate of development and given the desire to understand any potential consequences of full build-out of the Basin's land uses and water demands on groundwater sustainability, the GSP development team concluded that a conservative approach to developing the projected water budget should be used—specifically, to examine full build-out conditions for the year 2042 to account for all future anticipated human water demands, rather than estimating the actual level of human water demand in that year.

As a result, the distinction between the three projected water budgets lies in the representation of potential future changes in climate. The 2042 and 2072 projected water budgets use the 1925 through 2019 historical precipitation record, but with climate-change adjustment factors that are applied to the monthly historical record to account for future potential changes in precipitation and ET. The climate-change factors consist of multipliers for precipitation and reference ET that are the averages calculated by DWR from 20 global climate models. These precipitation and reference ET climate-change factors have been provided by DWR on a monthly basis for the period from January 1915 through December 2011 and are available at a 6-kilometer (3.75-mile) spatial resolution throughout California, including at the location of the Newhall-Soledad rain gage in the town of Newhall. Because it is impossible to know what precipitation and air temperatures will actually be in the years 2042 and 2072 (and in the preceding years), this approach of applying the climate-change factors to the historical climate allows the full build-out land-use and water-use conditions to be evaluated against the observed long-term record of historical year-to-year variability in climate while adjusting the magnitude of that variability to account for future potential changes in climate.

In addition to evaluating climate-change influences on the local hydrology and groundwater conditions in the Basin, the projected water budgets also account for potential climate-change influences on the availability of SWP supplies, as presented in future delivery capability assessments provided by DWR. DWR's most recent State Water Project Delivery Capability Report (DCR; DWR, 2020) has been used to develop a pattern of normal-year and dry-year (SWP curtailment-year) pumping from the Saugus Formation, as described in Section 6.5.1.1.

6.2.3 Model Description and Use for Water Budget Development

The historical water budget has been developed using a combination of historical data and groundwater modeling, while the current and projected water budgets use groundwater modeling to examine the effects of current and future land and water use scenarios. A three-dimensional numerical groundwater flow model has been developed for the Basin and is documented by GSI (2021). The numerical groundwater flow model has been used to quantify the terms that cannot be directly measured in the field, such as groundwater recharge volumes, groundwater withdrawals by phreatophytes, and year-to-year changes in the volume of groundwater in storage. Numerical groundwater models provide the most robust state-of-the-art method for quantifying these terms, especially when the model has been calibrated to historically measured groundwater levels and streamflows, as has occurred for this model.

The numerical groundwater flow model of the Basin simulates the occurrence and movement of groundwater flow in the two principal aquifer systems: the surficial Alluvial Aquifer and the underlying Saugus Formation. The model simulates groundwater flow processes and groundwater budgets in both aquifers, as well as the connection of the local groundwater resources to the Santa Clara River and its tributaries. The model uses multiple layers to provide a three-dimensional representation of groundwater movement horizontally within individual model layers and vertically between layers. The model is called the Santa Clarita Valley Groundwater Flow Model and is referred to as the SCVGWFM or the regional groundwater flow model. The model uses the USGS software MODFLOW-USG (Panday et al., 2013; Panday, 2021) and replaces a model that was first developed in 2004 (CH2M HILL, 2004) using the European MicroFEM® finite-element software (Hemker and de Boer, 2003 and 2017). The regional model has been developed by GSI for SCV Water to use as its primary tool for developing water budgets and analyzing groundwater management options in the context of projected (future) hydrology, human and environmental water demands, and water supply conditions in the valley.

In addition to using MODFLOW-USG, the new regional groundwater flow model relies on two other key companion codes for its successful operation: (1) a graphical user interface (Groundwater Vistas) (ESI, 2020) and (2) a customized tool specific to the Basin (and named the SCV Recharge Compiler) that compiles and translates all recharge terms into the form needed by the Recharge (RCH) Package for MODFLOW-USG. As described in Appendix G, the model development report (GSI, 2021), the SCV Recharge Compiler is a Microsoft Visual Basic program developed in Microsoft Excel® that was written by GSI to specify the total amount of recharge occurring (1) at each grid node in the uppermost model layer and (2) for each time period during a given model simulation. This tool also estimates the surface flow entering the model in ungaged tributary streams from the upper reaches of their watersheds (i.e., the portion of the watershed upstream of the Basin), and it provides mechanisms for tracking and infiltrating this flow as a given ephemeral stream enters the groundwater basin, thereby facilitating the development of the surface water inflow terms that are required to be reported in the historical, current, and projected surface water budgets.

Tables 6.2-3 and 6.2-4 identify the components of the groundwater model and the SCV Recharge Compiler that address each inflow and outflow term for the surface water and groundwater budgets, respectively. The methods for accounting for these terms in the groundwater flow model and the SCV Recharge Compiler, along with underlying assumptions regarding certain terms, are described in Section 6.2.4 below.

Table 6.2-3. Quantification Methods for Surface Water Inflows and Outflows in the Basin

Blue = Surface Water System Process
Green = Exchange with Groundwater
Purple = Internal Flow Process Within the Surface Water System

Surface Water Process	Quantification Method	How Used
INFLOWS		
In-Basin Precipitation	Rain Gage Data and Isohyetes	Volumetric Control on Stormwater Recharge
Stormwater Generated from In-Basin Precipitation	SCV Recharge Compiler	Volumetric Control on Stormwater Recharge
Stream Inflow (Santa Clara River)	Stream Gaging Data, Including Regression Analysis	Volumetric Control on Stormwater Recharge
Stream Inflow (Releases from Castaic Lake/Lagoon)	Flood Flow Data	Volumetric Control on Stormwater Recharge
Stream Inflow (Releases from Bouquet Reservoir)	Historical Data and Release Agreements	Volumetric Control on Stormwater Recharge
Stream Inflow (Other Santa Clara River Tributaries)	SCV Recharge Compiler	Volumetric Control on Stormwater Recharge
Discharges to Santa Clara River from WRPs	Data and Projections	Input to SFR Package in MODFLOW-USG
Discharges to Santa Clara River from Groundwater Treatment Systems	Data and Projections	Input to SFR Package in MODFLOW-USG
Groundwater Discharge to Streams	Numerical Flow Model (MODFLOW-USG)	Output from SFR Package in MODFLOW-USG
OUTFLOWS		
Santa Clara River Non-Storm Outflow at the Western Basin Boundary	Data and Numerical Flow Model (MODFLOW-USG)	Control data for MODFLOW-USG calibration
Groundwater Recharge from Precipitation	SCV Recharge Compiler	RCH Package in MODFLOW-USG
Groundwater Recharge from Streams	SCV Recharge Compiler for Stormwater Recharge in Ephemeral Streams and Numerical Flow Model (MODFLOW-USG) for Recharge of Other Streamflows	Input to RCH Package in MODFLOW-USG Plus Output from SFR Package in MODFLOW-USG
ET and Stormwater Outflow	Balancing the Water Budget	—
CHANGE IN STORAGE		
Change in Surface Water Storage (None)	—	—

Notes

Inflows to - and storage in - Castaic Lake and Bouquet Reservoir are not included in the surface water budgets because these water bodies lie at or upstream of the margins of the groundwater basin.

Subsurface outflow through the thin alluvial material beneath the Santa Clara River at the western boundary of the Basin is accounted for in the "Santa Clara River Outflow at the Western Basin Boundary" term because the historical and current stream gages are located further downstream where bedrock is thought to be at or just beneath the river channel, which causes most if not all subsurface water at the western basin boundary to appear in the river upstream of those gages.

RCH = Recharge Package
SFR = Streamflow Routing Package
SCV = Santa Clarita Valley
WRP = water reclamation plant

Table 6.2-4. Quantification Methods for Groundwater Inflows and Outflows in the Basin

Blue = Exchange with Surface Water
Green = Groundwater System Process
Purple = Internal Flow Process Within the Groundwater System

Groundwater Process	Quantification Method	How Used
INFLOWS		
Recharge from Precipitation	SCV Recharge Compiler	Input to RCH Package in MODFLOW-USG
Recharge from Streams	SCV Recharge Compiler	Input to RCH Package in MODFLOW-USG
Subsurface Inflow Beneath Santa Clara River	Modeling	Computed by GHB Package in MODFLOW-USG
Subsurface Inflow Beneath Castaic Dam	Modeling	Input to WEL Package in MODFLOW-USG
Subsurface Inflow Beneath Other Tributaries	Modeling	Computed by GHB Package in MODFLOW-USG
Septic System Percolation	Data and SCV Recharge Compiler	Input to RCH Package in MODFLOW-USG
Recharge of Applied Water from Agricultural Water Uses	Data and SCV Recharge Compiler	Input to RCH Package in MODFLOW-USG
Recharge of Applied Water from Municipal Water Uses	Data and SCV Recharge Compiler	Input to RCH Package in MODFLOW-USG
OUTFLOWS		
Groundwater Pumping	Data and Projections	Input to CLN and WEL Packages in MODFLOW-USG
Riparian Evapotranspiration	Modeling	Computed by EVT Package in MODFLOW-USG
Groundwater Discharge to Streams	Modeling	Computed by SFR Package in MODFLOW-USG
OUTFLOWS		
Change in Groundwater Storage	Modeling	Computed by MODFLOW-USG

Notes

Subsurface outflow through the thin alluvial material beneath the river at the western boundary of the Basin is accounted for as outflow in the surface water budget because the historical and current stream gages are located further downstream where bedrock is thought to be at or just beneath the river channel, which causes most if not all subsurface water at the western basin boundary to appear in the river upstream of those gages.

Changes in the volume of groundwater in storage are accounted for separately from the inflow and outflow terms in the groundwater budget.

CLN = Connected Linear Network Process
EVT = Evapotranspiration Package
GHB = General Head Boundary Package
RCH = Recharge Package
SCV = Santa Clarita Valley
SFR = Streamflow Routing Package
WEL = Well Package

6.2.4 Methods and Assumptions for Developing Specific Input Terms for the Water Budget Analyses

The methods, data, and assumptions that are used to simulate various water budget processes are described in detail in Appendix G, the model development report (GSI, 2021; see Section 3 and Appendix B of that report). The methods, data, and assumptions are summarized below for the following water budget processes that require estimation and/or data analysis methods to generate input to the numerical groundwater flow model:

- Deep percolation of precipitation falling within the groundwater basin boundary
- Streamflows entering the Basin in the Santa Clara River and its ungaged tributaries, and the subsequent infiltration of water from these ephemeral streams to the underlying water table
- Subsurface groundwater inflows
- Deep percolation of irrigation water from agricultural lands
- Deep percolation of irrigation water from urbanized lands
- Deep percolation from septic systems in areas served by municipal water supplies
- Point discharges of water into the Santa Clara River
- ET demands by phreatophytes in and outside of riparian habitat corridors

6.2.4.1 Deep Percolation of Precipitation Falling Within the Basin

Annual precipitation volumes arising from precipitation within the boundaries of the groundwater basin are estimated from annual precipitation data using a variation of a method described by Turner (1986). Turner empirically derived a power-function equation that describes the average statewide relationship between annual precipitation and ET rates, based on the measured yields from 68 different watersheds throughout California. Precipitation not taken up by ET is available for surface water runoff and infiltration to groundwater. During large storm events, some of this water leaves the Basin before it has a chance to infiltrate to groundwater. However, during smaller storm events, precipitation that is not consumed by ET eventually infiltrates to groundwater. Using the equation provided by Turner, the calibration process for the numerical groundwater flow model resulted in the following equation for the historical relationship between annual precipitation and annual infiltration in the Basin:

For historical conditions: $\text{Infiltration} = \text{Precipitation} - 5.00*(\text{Precipitation})^{0.41}$ **(Equation 6.2-1)**

In Equation 6.2-1, the annual infiltration and precipitation values are in units of inches. DWR has published climate-change factors across California, including at the locations of the Newhall-Soledad rain gage (operated by the Los Angeles County Department of Public Works) and the nearby Pine Street rain gage (operated by SCV Water and formerly by its predecessor agency Newhall County Water District). The factors apply to precipitation and reference ET during the years 2030 and 2070. Each climate-change factor represents the average change[33] computed by DWR from the simulation results of 20 global climate models that have been downscaled throughout the state to grid blocks that are 6 kilometers (3.75 miles) on a side. Each climate-change factor is provided by DWR as a multiplier to apply to the local historical records of

[33] In its BMP documents for water budgets and climate change analysis under SGMA, DWR (2016 and 2018) refers to the average change as the central-tendency evaluation. In some locations, DWR also provides precipitation and ET factors for two other scenarios named “drier with extreme warming (DEW)” and “wetter with moderate warming (WMW).” However, precipitation and ET factors for these two scenarios are not available for the Basin.

precipitation and reference ET; these multipliers are available on a monthly basis for the period 1915 through 2011.

GSI downloaded DWR's published climate-change factors for two adjoining grid blocks (denoted as blocks 10052 and 10134 on the SGMA web portal) that contain the two stations where long-term rainfall data are available (the Newhall-Soledad rain gage and the Pine Street rain gage). See Table 6.2-5 for a summary of the average climate change factors each month during the period 1925 through 2011 (which is an 87-year period containing 1,044 months of climate change factors). Table 6.2-5 shows that the average rainfall change factors are very close to 1.0 (ranging from 0.979 in 2030 to 0.933 in 2070), while the change factors for reference ET are notably higher than 1.0 (with average values, ranging from 1.048 in 2030 to 1.108 in 2070).

GSI applied the 1,044 monthly climate change factors for precipitation and the 1,044 monthly climate change factors for reference ET directly to the period of water years 1925 through 2011, then used the precipitation records during that period to select climate-change factors that are likely to be representative of climate change for the 8-year period of water years 2012 through 2019. As shown in Table 6.2-6, the 2030 and 2070 climate-change factors produce 0.94 percent and 1.29 percent less annual precipitation, respectively, on a water-year basis than was observed during the 95-year historical period (1925 through 2019). Figure 6.2-4 includes curves showing that the cumulative departures from average rainfall for the 2030 and 2070 climate-change scenarios are similar in their sequence of normal, wet, and dry years to the curve for historical rainfall. As shown in Table 6.2-7, DWR's change factors for reference ET result in future ET demands in the riparian hardwood forest that, on an annual basis, are 1.044 and 1.052 times the present-day demands in 2030 and 2070, respectively.

Future increases in ET will affect soil moisture levels in the Basin by reducing the amount of deep percolation to groundwater that results from precipitation. This phenomenon will increase the amount of precipitation needed to overcome soil moisture deficits and produce deep percolation to groundwater. As shown in Figure 6.2-5, the mathematical relationship shown in Equation 6.2-1 for historical conditions results in no deep percolation occurring until annual precipitation exceeds 15 inches. Examination of this relationship and the climate-change factors for reference ET indicates that future ET increases of 4.8 percent in 2030 and 10.8 percent in 2070 would increase the threshold annual precipitation amounts necessary to generate deep percolation from 15 inches (under historical conditions) to about 16 inches in 2030 and 18 inches in 2070. The equations for 2030 and 2070 that are used in the numerical groundwater flow model to simulate the effect of reduced annual precipitation and increased annual ET on deep percolation are as follows (in units of inches):

For 2030 climate change: Infiltration = Precipitation – 5.08*(Precipitation)$^{0.41}$ (Equation 6.2-2)

For 2070 climate change: Infiltration = Precipitation – 6.00*(Precipitation)$^{0.37}$ (Equation 6.2-3)

Through the use of these equations, the combination of slightly lower precipitation and higher ET is estimated to result in decreases in the amount of deep percolation to groundwater by about 5 percent under the 2030 average climate-change scenario and 14 percent under the 2070 average climate-change scenario.

Table 6.2-5. DWR's Local Climate-Change Factors for the Basin

	DWR Climate-Change Factors for Rainfall (1925-2011 Averages)		DWR Climate-Change Factors for Reference ET (1925-2011 Averages)	
Month	**Year 2030**	**Year 2070**	**Year 2030**	**Year 2070**
January	0.966	0.903	1.066	1.145
February	0.964	0.905	1.040	1.105
March	0.978	0.946	1.037	1.098
April	0.975	0.923	1.043	1.109
May	0.988	0.923	1.057	1.110
June	0.987	0.970	1.037	1.095
July	0.973	0.915	1.033	1.078
August	0.983	0.997	1.039	1.079
September	0.992	0.964	1.038	1.078
October	0.984	0.921	1.046	1.088
November	0.982	0.933	1.061	1.135
December	0.975	0.890	1.076	1.176
Minimum	**0.964**	**0.890**	**1.033**	**1.078**
Average	**0.979**	**0.933**	**1.048**	**1.108**
Maximum	**0.992**	**0.997**	**1.076**	**1.176**

Notes

All values are unitless and represent the average factors for DWR's grid blocks 10052 and 10134. Values are DWR's computed averages from 20 downscaled global climate models.

Table 6.2-6. Historical Water Year Rainfall
With and Without DWR's Local Climate-Change Factors

	Without Climate Change	With Climate Change	
Water Year	Historical	Year 2030	Year 2070
1925	6.95	6.54	5.96
1926	25.53	27.67	27.84
1927	20.66	21.50	22.04
1928	10.28	9.80	8.87
1929	14.08	14.42	13.46
1930	10.60	10.41	10.79
1931	18.44	18.74	17.69
1932	22.27	22.24	21.92
1933	16.03	16.03	15.74
1934	13.99	14.34	14.35
1935	19.97	20.24	19.22
1936	10.75	10.93	10.87
1937	25.67	25.01	24.95
1938	25.68	25.32	26.49
1939	20.66	21.75	22.64
1940	12.41	12.79	13.04
1941	44.65	42.80	44.28
1942	12.88	13.18	11.86
1943	30.33	29.15	29.86
1944	27.27	26.94	27.15
1945	12.43	11.96	12.23
1946	15.92	14.92	13.95
1947	16.46	16.76	16.07
1948	7.57	7.33	6.91
1949	9.50	10.06	9.36
1950	9.32	9.64	9.01
1951	6.97	7.08	6.79
1952	32.56	30.89	30.67
1953	11.06	10.93	9.32
1954	14.55	14.08	14.42
1955	14.26	14.03	13.74
1956	16.88	16.44	16.46
1957	13.42	13.49	13.66
1958	31.48	30.28	30.31
1959	9.73	9.83	10.03
1960	8.78	9.01	9.21
1961	7.05	7.12	6.53
1962	27.24	27.50	27.37
1963	10.44	10.59	10.32
1964	8.68	8.64	8.13
1965	14.46	14.11	12.86
1966	24.59	24.70	24.44
1967	25.50	24.92	25.91
1968	14.54	14.63	14.39
1969	32.09	31.49	33.45
1970	12.16	11.13	10.80
1971	17.04	16.64	16.47
1972	10.01	9.81	8.77
1973	21.12	21.00	21.97
1974	15.34	15.51	15.56
1975	15.75	15.33	14.26
1976	11.72	12.32	13.61
1977	16.36	16.20	15.60
1978	45.61	45.04	47.34

Table 6.2-6. Historical Water Year Rainfall
With and Without DWR's Local Climate-Change Factors

	Without Climate Change	With Climate Change	
Water Year	**Historical**	**Year 2030**	**Year 2070**
1979	23.51	23.23	24.03
1980	25.15	24.81	25.12
1981	10.46	10.49	10.79
1982	17.41	16.41	15.91
1983	37.23	36.34	37.50
1984	8.83	8.80	7.61
1985	14.87	14.39	13.05
1986	21.72	21.19	21.84
1987	6.22	6.21	5.72
1988	20.82	20.48	19.05
1989	13.05	13.40	12.51
1990	7.62	7.22	6.71
1991	12.83	11.80	11.92
1992	31.26	30.68	31.04
1993	34.81	33.89	35.10
1994	10.48	10.41	9.86
1995	29.54	28.22	29.49
1996	10.60	10.87	11.15
1997	9.95	9.68	9.52
1998	30.54	30.62	30.26
1999	10.27	10.62	10.04
2000	13.06	13.78	13.80
2001	18.95	19.21	20.34
2002	3.03	3.17	3.03
2003	18.54	18.90	18.46
2004	9.96	10.28	10.26
2005	49.45	48.33	48.53
2006	16.33	15.54	15.15
2007	4.69	4.79	4.83
2008	16.80	17.62	17.80
2009	9.21	9.34	9.04
2010	19.12	19.76	19.84
2011	23.30	22.58	21.44
2012	10.94	11.00	10.06
2013	4.56	4.35	3.89
2014	6.81	6.32	6.09
2015	13.00	11.96	12.08
2016	8.77	8.80	9.43
2017	19.85	19.24	20.48
2018	8.00	7.86	8.25
2019	21.42	21.62	21.66
Total	**1,632.66**	**1,617.38**	**1,611.65**
Average	**17.19**	**17.03**	**16.96**
Percent Change from Historical		**-0.94%**	**-1.29%**

Notes

All values are in units of inches.

Data are for calendar years, to be consistent with 1980-2019 water use information presented in annual reports.

Table 6.2-7. Influence of DWR's Local Climate-Change Factors on ET Demands in the Mixed Hardwood Forest Riparian Corridor

	DWR ET Change Factors (1925-2011 Averages)		Potential Riparian ET (feet per month)		
Month	**Year 2030**	**Year 2070**	**Historical**	**Year 2030**	**Year 2070**
January	1.066	1.145	0.22	0.23	0.25
February	1.040	1.105	0.22	0.23	0.25
March	1.037	1.098	0.32	0.33	0.35
April	1.043	1.109	0.45	0.47	0.50
May	1.057	1.110	0.59	0.63	0.66
June	1.037	1.095	0.77	0.80	0.84
July	1.033	1.078	0.87	0.89	0.93
August	1.039	1.079	0.84	0.88	0.91
September	1.038	1.078	0.64	0.67	0.69
October	1.046	1.088	0.51	0.53	0.56
November	1.061	1.135	0.31	0.32	0.35
December	1.076	1.176	0.21	0.23	0.25
Total			**5.96**	**6.22**	**6.54**
Ratio (Future/Historical)				**1.044**	**1.052**

Notes

ET change factors are unitless and represent the average factors for DWR's grid blocks 10052 and 10134.
Values are DWR's computed averages from 20 downscaled global climate models.

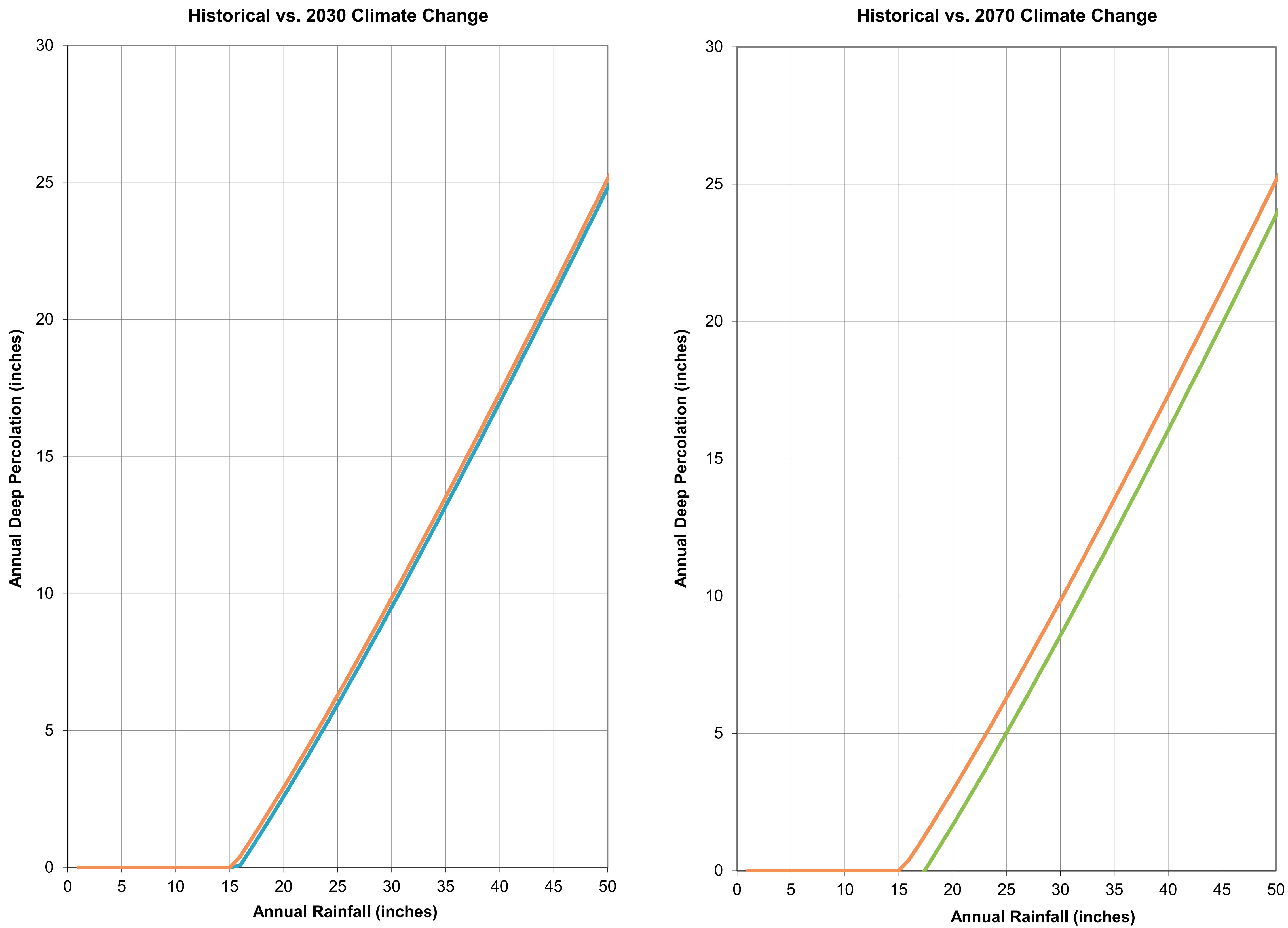

FIGURE 6.2-5

Rainfall-Recharge Relationship Under Historical Conditions and the 2030 and 2070 Average Climate Change Scenarios

Santa Clara River Valley
East Groundwater Subbasin
Groundwater Sustainability Plan

LEGEND

- 2030 Climate Change
- 2070 Climate Change
- Historical Conditions

NOTES

For historical conditions, the rainfall-recharge relationships are derived from model calibration.
For 2030 and 2070 climate change, the rainfall-recharge relationship is developed using factors for rainfall and ET that are provided by DWR for the East Subbasin on its SGMA web portal https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#waterbudget
DWR: California Department of Water Resources
ET: evapotranspiration
SGMA: Sustainable Groundwater Management Act

GSI Water Solutions, Inc.

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6.2.4.2 Stream Inflows and Subsequent Infiltration

For each month of a given model simulation, the SCV Recharge Compiler calculates the amounts of stormwater flow and groundwater recharge in streams, plus the amount of surface water inflow and subsequent groundwater recharge arising from controlled releases to Castaic Creek and Bouquet Creek from impoundments on those streams. Details regarding these methods are presented in Appendix G, the model development report. A summary is as follows:

- For the Santa Clara River, historical volumes of streamflow entering the Basin are defined from measured and estimated streamflow data at the Lang Station/Capra Railroad Crossing stream gage. These historical streamflows are reduced by 4.8 percent and 10.8 percent for the 2030 and 2070 climate change simulations, respectively.
- For ungaged tributaries of the Santa Clara River, the natural inflows of stormwater generated in the watershed areas lying outside the groundwater basin boundary are generated by the SCV Recharge Compiler using precipitation data, rainfall isohyets,[34] and the watershed area as described in Appendix G, the model development report (Section 4.2.1 of Appendix B of that report) (GSI, 2021). For historical conditions, Equation 6.2-1 is then used to define the amount of the water generated in the upstream watershed that enters into the basin and is available to infiltrate to groundwater. Equations 6.2-2 and 6.2-3 are used to estimate these inflow volumes for the 2030 and 2070 climate-change scenarios, respectively.
- Historical stormwater flows generated in the contributing watershed to Castaic Lake are derived from inflow and outflow records reported by DWR's Southern Field Division Water Operations office in its monthly operations tables for the complex comprising Pyramid Lake, the Elderberry Forebay, Castaic Lake, and Castaic Lagoon. These reports date back to 1974 and account for releases of stormwater impounded behind Castaic Dam and periodic releases of SWP water to downstream users in Ventura County. Additional details regarding how these flows are treated in the modeling analyses for the historical, current, and projected water budgets are as follows:
  - For years prior to 1974, precipitation records at the Newhall-Soledad rain gage are used to identify individual years during the period of historical record (1974 through 2019) that provide reasonable prototypes for estimating the stormwater flows that occurred prior to 1974. The historical, current, and projected water budgets use these estimated stormwater flows prior to 1974, while the historical water budget uses the actual historical monthly and annual releases that occurred during the period 1974 through 2019.
  - In the current and projected water budgets, the releases from Castaic Lake from 1974 through 2019 consist solely of stormwater as defined from gaged and ungaged flows reported by DWR during this period. Accordingly, the releases from Castaic Lake for the entire period of 1925 through 2019 consist solely of storm flows and do not include releases of SWP water. This method is used to avoid including SWP deliveries to downstream users, because the timing and magnitude of future releases of SWP water are unknown.
  - In the projected water budget, the stormwater flows are reduced by 4.8 percent and 10.8 percent for the 2030 and 2070 climate change simulations, respectively. No such adjustments are made, however, for the version of the projected water budget that does not include climate change.

[34] Isohyets are contour maps showing the spatial distribution of rainfall on a long-term basis.

- Releases from Bouquet Reservoir are based on LADWP's recorded values for the historical water budget and the 1978 release agreement between LADWP and the United Water Conservation District[35] for the current and projected water budgets. Based on the results of the groundwater flow model calibration process, it is estimated that only a small fraction of these releases enters the basin as surface flow (assumed to be 5 percent for modeling purposes) and that a portion of these releases may also enter as subsurface flow that is implicitly accounted for via the use of the General-Head Boundary (GHB) condition that allows subsurface flow from outside the basin boundary to enter the basin in the thin alluvial veneer present in this area.
- The infiltration of stormwater and controlled flow releases is computed by the SCV Recharge Compiler, using a streamflow accounting method from one groundwater flow model grid cell to another, coupled with streambed permeability terms that were developed during calibration of the groundwater flow model. See Appendix G, the model development report (GSI, 2021) (Section 4.2.5 of Appendix B of that report) for further details. Where groundwater elevations rise above the elevation of the riverbed intermittently or perennially, the Streamflow Routing (SFR) Package in MODFLOW-USG computes the rate of groundwater discharge to the stream and routes the water downstream to allow for possible re-infiltration of this water.

6.2.4.3 Subsurface Inflows to the Alluvial Aquifer in Tributary Valleys

GHBs are used in MODFLOW-USG to simulate the subsurface inflows of water that are likely to occur from the thin surficial alluvium underlying the Santa Clara River and its 48 tributaries that provides subterranean flow into the model (groundwater basin) boundary from these 49 upstream watersheds. The GHBs are also used to help guide the model on groundwater elevations in the upper ends of these tributaries and were checked during construction and calibration of the model to ensure that flow is predominantly (if not exclusively) into the model domain (i.e., inflow to the model) rather than flowing out of (discharge from) the model. A total of 149 grid cells use GHBs in the model, and the application of a GHB in any given model cell is identical for each of the water budget periods.

6.2.4.4 Deep Percolation of Irrigation Water from Agricultural Lands

As discussed previously, there has been a long history of agricultural development and irrigation in the Basin, including by the Newhall Land and Farming Company (Newhall Land), the former Wayside Honor Rancho, and the Disney Corporation. The largest amount of agricultural irrigation occurs on lands owned by Newhall Land, a subsidiary of FivePoint.

Due to a wide variety of factors, irrigation use has varied substantially over the historical period of record. Further, a portion of Newhall Land's agricultural operations are downstream of the Basin and cropping patterns and usage between lands overlying the Basin and those downstream also varies year to year. Appendix G Table 3-11 depicts estimated groundwater pumping by agricultural water users from 1980 through 2019.

To deal with this complexity, as further described in Appendix G (see Appendix B, SCV Recharge Compiler, of that appendix), a detailed assessment of deep percolation from Newhall Land properties was performed for agricultural use during the period 1996 through 2000. Deep percolation factors from that assessment were applied to historical water use proportional to pumping. Those amounts are depicted in Table B-6 of Appendix B of Appendix G.

[35] Agreement No. 10162 between Department of Water and Power of the City of Los Angeles and United Water Conservation District, dated March 9, 1978.

For the current conditions, agricultural water use and deep percolation estimates are the average of estimates from 2010 through 2019. For future conditions, it is forecast that no agricultural use by Newhall Land will occur overlying the basin and thus no deep percolation from Newhall Land pumping would occur in these scenarios.

6.2.4.5 Deep Percolation of Irrigation Water from Urbanized Lands

As derived by CH2M HILL (2004), the long-term infiltration rates of applied irrigation water in urban areas as defined in the SCV Recharge Compiler is calculated to be 1.0 in/yr for industrial and retail lands, 2.2 in/yr for residential developments and parks, and 4.6 in/yr for golf courses. An additional separate infiltration rate has been defined for schools and recreational facilities (ranging from 3.4 in/yr to 4.6 in/yr). These rates are applied during each year (and each month) of the simulation period but are varied in the historical water budget to reflect changes in urban water use volumes from year to year. In the current water budget, these rates are unchanged from year to year, reflecting conditions in 2014. See Appendix G, the model development report (GSI, 2021) (Section 4.4 of Appendix B of that report) for further details.

The areas over which these rates are applied are as follows:

- Land uses in the historical and current water budgets are defined from land use data provided to the local water purveyors by the City of Santa Clarita in 2013 when an update was occurring to the original finite-element groundwater flow model of the Basin (GSI and LSCE, 2013).
- For the projected water budget, the locations and categories of land use are defined from geographic information system (GIS) coverages that were developed during preparation of the Salt and Nutrient Management Plan for the Basin (GSSI, 2016; GSI, 2014). Those coverages were obtained from the following sources: (1) the SCAG 2008 land use survey; (2) the OVOV land use planning process; and (3) Newhall Land personnel for the *Final Additional Analysis to the Specific Plan and Water Reclamation Plant Final Environmental Impact Project Report* (Newhall Ranch Specific Plan) (Impact Sciences, 2003) and four other developments (Legacy Village, Entrada North Village, Entrada South Village, and Valencia Commerce Center). These land use coverages provide planning-level estimates of future land uses; actual land uses will differ as development plans are permitted in the future.

6.2.4.6 Deep Percolation from Septic Systems

Infiltration from septic systems was defined for residential developments that are served by public water supplies but not served by sanitary storm sewers. In these developments, the onsite treatment of wastewater (via septic systems) represents an importation of water into the residential development with resulting recharge to groundwater from the septic systems.

The locations of these areas were obtained in 2013 during development of the Salt and Nutrient Management Plan for the Basin (GSSI, 2016; GSI, 2014). In the historical water budget, septic systems are introduced beginning in 1961 and are assumed to have increased to a full build-out level for septic systems by the late 1980s. The current and projected water budgets maintain the full build-out (late 1980s) number of septic systems. The deep percolation rate from septic systems is 2,432 AF/yr, which is the rate that was estimated during development of the Salt and Nutrient Management Plan (GSSI, 2016; GSI, 2014). The loading rate from septic systems over the 1,750-acre area in the groundwater model grid where septic systems are present is 1.39 ft per year, which is equivalent to 16.7 in/yr.

6.2.4.7 Point Discharges of Water into the Santa Clara River

No diversions of water are known to occur from the Santa Clara River or its tributaries within the Basin. Water is discharged into the Santa Clara River from the Saugus WRP east of I-5 and the Valencia WRP west of I-5, both of which are owned and operated by the Los Angeles County Sanitation District, which was the source of the discharge data that were used to construct the historical water budget. A third WRP (the Newhall WRP) is planned to be constructed just east of the western basin boundary to treat wastewater from the future Newhall Ranch community and is likely to discharge a portion of its treated wastewater during the coolest months of the year.

Additionally, periodic short-duration discharges to the river have occurred from two outfalls conveying treated water from perchlorate-treatment programs at certain wells pumping from the Saugus Formation. A third outfall began operating in 2017, is currently in operation, and is expected to continue operating for the indefinite future. These three outfalls are the following:

- Outfall for wells SCWD-Saugus1 and SCWD-Saugus2, discharging just upstream of the Saugus WRP; operated from May 2010 through January 2011; further discharges are unlikely because the treatment system has been permitted to allow for the treated water to be used as municipal supply.
- Outfall for well VWD-201, discharging just downstream of the Saugus WRP; began operating in January 2018 and continues operating at this time; this is expected to end soon because the treatment system is being permitted to allow for the treated water to be used as municipal supply.
- Outfall for onsite extraction wells at the Whittaker-Bermite property, discharging about 1 mile upstream of the Saugus WRP: began operating in August 2017; discharges currently at or below about 500 AFY; future discharges assumed to be 500 AFY.

6.2.4.8 Evapotranspiration Demands by Phreatophytes

As described in Section 3.3.5 of Appendix G, the model development report (GSI, 2021), the groundwater flow model simulates uptake of groundwater by phreatophyte plant communities. The locations of two types of communities identified as potential GDEs in the Basin are described by ESA (2020) and are programmed into the model; these communities are riparian mixed hardwood forests and coast live oak woodlands. See Figure 6.1-6 for a map showing their geographic distribution. The riparian mixed hardwood forests and coast live oak woodlands occupy 1,780 acres and 520 acres, respectively, in the model grid.

The mapping work indicates that the predominant species that are present in the riparian mixed hardwood forests are Fremont cottonwood (40 percent), willow trees and shrubs (30 percent), and non-native grasses such as *Arundo donax (Arundo)* (30 percent). For this mixed plant community, monthly ET demands under current conditions (i.e., without climate change) range from 0.22 to 0.87 ft per month (ft/month) (67 to 270 millimeters per month [mm/month]), with peak demands occurring during the summer. ET demands for the coast live oak woodlands range from 0.02 to 0.33 ft/month (5 to 100 mm/month), with peak demands occurring during the winter and spring, and the lowest demands occurring in the late summer and early fall. (See Section 3.3.5 of Appendix G, the model development report [GSI, 2021] for details regarding the derivation of the monthly ET demands.) The monthly distributions for ET demands by these two types of plant communities are programmed directly into the groundwater flow model and are assumed to be representative of potential ET demands in all years throughout the 1925 through 2019 period for the historical water budget. These rates are adjusted upwards for the 2030 and 2070 climate change scenarios, respectively, based on the DWR climate-change factors for reference ET that are listed in Table 6.2-5. As shown in Table 6.2-7, the climate-change adjustment for the riparian mixed hardwood forest results in future ET demands that are 1.044 and 1.052 times the present-day demands in 2030 and 2070, respectively.

6.3 Historical Water Budget

This section presents a summary-level description of historical water uses in the Basin (Section 6.3.1), the historical surface water and groundwater budgets (Sections 6.3.2 and 6.3.3), a summary of the influence of land and water use conversions on the historical water budget (Section 6.3.4), and the uncertain aspects of the historical water budget (Section 6.3.5). Figures 6.3-1 and 6.3-2 and Table I-1 in Appendix I present the year-by-year historical surface water budget. Figures 6.3-3 and 6.3-4 and Table I-2 in Appendix I present the year-by-year historical groundwater budget.

6.3.1 Description of Historical Water Uses in the Basin

As discussed in Section 6.1, the Basin was largely rural during the 1800s and early 1900s, with ranches, rural populations, and small villages present. The first large-scale use of groundwater is thought to have occurred with the construction of agricultural supply wells along the Santa Clara River in the western and central portions of the Basin beginning in the mid-1930s. Inspection of air photos from 1947 and a USGS study of the Basin's agricultural and early urban years (Robson, 1972) indicates that groundwater pumping for agricultural uses supported irrigated crop cultivation on as much as 6,100 acres (approximately) of land lying along the alluvial corridors that hold the Santa Clara River and certain tributaries. See Appendix I for the locations of these lands and the wells that are estimated to have provided the irrigation water supply, based on their construction dates. Calculations by Robson (1972), CH2M HILL (2004), and GSI (2021) for the mixture of crops farmed in those days and more recently indicate that (1) crop irrigation demands range from about 4 to 10 acre-feet (AF) per acre per year and (2) crops consume approximately 50 to 70 percent of the land-applied irrigation water pumped from the Alluvial Aquifer, with the remainder lost to evaporation from soils and seepage back to the underlying water table. Accordingly, annual groundwater pumping in the Basin to support agricultural irrigation is thought to have averaged approximately 50,000 acre-feet per year (AFY) by the mid-1940s and continuing through much, if not all, of the 1950s. Beginning in the early 1960s, certain parcels of agricultural land, located primarily east of the modern-day I-5 freeway, were retired and eventually urbanized. Agricultural groundwater pumping from the Alluvial Aquifer declined to 23,000 AFY by 1967 (Robson, 1972), and, until the mid-1990s, total pumping from the Alluvial Aquifer (for agricultural plus municipal supplies) remained below 30,000 AFY in most years as the Basin gradually urbanized. Pumping from the Alluvial Aquifer has averaged approximately 36,000 AFY since the mid-1990s, which includes an assumed 500 AFY of small domestic uses in unincorporated rural areas. The highest annual pumping volume from the Alluvial Aquifer since urbanization began in the 1960s (43,406 AFY during 1999)[36] was approximately 6,600 AFY below the historical average amount of agricultural pumping (50,000 AFY).

The Saugus Formation was not a source of groundwater supply until the early 1950s, when the newly formed Newhall County Water District drilled wells along the South Fork Santa Clara River in the town of Newhall. In 1964, an irrigation well was drilled in the Saugus Formation to supply a newly built golf course west of the Valencia Town Center, which was also under development. The Newhall Land and Farming Company constructed an agricultural water supply well in the Saugus Formation in 1961; this was generally pumped only periodically until it was taken out of service in 2012 and then abandoned. Pumping from the Saugus Formation remained below 5,000 AFY until 1986, then rose to between 10,600 and 14,900 AFY during the early 1990s before decreasing to below 10,000 AFY for nearly 20 years and then returning to levels between approximately 10,000 and 12,000 AFY in recent years. Pumping from the Saugus Formation is primarily for municipal uses, although The Disney Corporation pumps localized Saugus Formation groundwater for irrigation supply along the southern margin of the Basin.

[36] See Table 3 in Appendix A of LSCE, 2020.

Table 6.3-1 shows the historical human water demands and the sources of water used to meet those demands. As discussed in Sections 6.1 and 6.2, the values prior to 1980 are estimates, whereas the values from 1980 through 2019 are obtained from the most recent annual water report for the Basin (LSCE, 2020). Table 6.3-2 summarizes the historical annual groundwater pumping by water-use sector. Agriculture was the dominant user of groundwater during the peak agricultural years of 1945 through 1960 and remained the largest use through the late 1970s and into the early 1980s. Golf course water use began in the 1960s, and small domestic uses are thought to have begun in the 1960s as urbanization was accompanied by an increase in the number of rural homes and their associated domestic water uses. The past four decades as a whole have been characterized by municipal uses becoming the largest uses of groundwater, followed by agricultural irrigation (which occurs primarily along I-5 in and near Castaic Junction and in portions of the alluvial valley situated west of I-5). Golf course water use has also been higher during the past four decades than before 1980.

6.3.2 Historical Surface Water Budget

The GSP regulations (§354.18) require development of a surface water budget for the GSP. The surface water budget quantifies important sources of surface water and evaluates their historical and future reliability. The BMP document for water budget development (DWR, 2016; see page 19) states that surface water sources should be identified as one of the following:

- Central Valley Project
- State Water Project
- Colorado River Project
- Local imported supplies
- Local supplies

The Basin has three of these surface water source types: (1) SWP water and (2) local imported supplies, both of which are stored in Castaic Lake, which lies along the margin of the Bulletin 118 basin boundary for the Basin; and (3) local river/stream systems, which are not sources of agricultural, municipal, or private water supplies in the Basin but instead exist in the form of perennial streamflows in the western portion of the Basin and ephemeral streamflows in other portions of the Basin. Following are discussions of these historical surface water source types.

Table 6.3-1. Historical Municipal and Non-Municipal Water Demands and Supplies

	Municipal Users				Other Users	Total	
Calendar Year	Local Groundwater	Imported Water	Recycled Water	Total	Local Groundwater	Local Groundwater	Demand
1925	0	0	0	0	0	0	0
1926	0	0	0	0	0	0	0
1927	0	0	0	0	0	0	0
1928	0	0	0	0	0	0	0
1929	0	0	0	0	0	0	0
1930	0	0	0	0	0	0	0
1931	0	0	0	0	0	0	0
1932	0	0	0	0	0	0	0
1933	0	0	0	0	0	0	0
1934	0	0	0	0	0	0	0
1935	0	0	0	0	0	0	0
1936	0	0	0	0	4,933	4,933	4,933
1937	0	0	0	0	9,865	9,865	9,865
1938	0	0	0	0	14,798	14,798	14,798
1939	0	0	0	0	19,730	19,730	19,730
1940	0	0	0	0	24,663	24,663	24,663
1941	0	0	0	0	29,595	29,595	29,595
1942	0	0	0	0	34,528	34,528	34,528
1943	0	0	0	0	39,460	39,460	39,460
1944		0	0	0	44,393	44,393	44,393
1945	0	0	0	0	49,325	49,325	49,325
1946	0	0	0	0	49,325	49,325	49,325
1947	0	0	0	0	49,325	49,325	49,325
1948	0	0	0	0	49,325	49,325	49,325
1949	0	0	0	0	49,325	49,325	49,325
1950	500	0	0	500	49,325	49,825	49,825
1951	500	0	0	500	49,325	49,825	49,825
1952	500	0	0	500	49,325	49,825	49,825
1953	500	0	0	500	49,325	49,825	49,825
1954	500	0	0	500	49,325	49,825	49,825
1955	500	0	0	500	49,325	49,825	49,825
1956	500	0	0	500	49,325	49,825	49,825
1957	500	0	0	500	49,325	49,825	49,825
1958	500	0	0	500	49,325	49,825	49,825
1959	500	0	0	500	49,325	49,825	49,825
1960	1,000	0	0	1,000	49,325	50,325	50,325
1961	1,000	0	0	1,000	47,512	48,512	48,512
1962	1,000	0	0	1,000	41,532	42,532	42,532
1963	4,000	0	0	4,000	35,364	39,364	39,364
1964	5,500	0	0	5,500	29,291	34,791	34,791
1965	8,000	0	0	8,000	23,657	31,657	31,657
1966	9,500	0	0	9,500	24,584	34,084	34,084
1967	10,500	0	0	10,500	18,370	28,870	28,870
1968	11,250	0	0	11,250	18,149	29,399	29,399
1969	12,000	0	0	12,000	17,866	29,866	29,866
1970	12,750	0	0	12,750	17,583	30,333	30,333
1971	13,500	0	0	13,500	17,362	30,862	30,862
1972	14,250	0	0	14,250	17,079	31,329	31,329
1973	15,000	0	0	15,000	16,797	31,797	31,797
1974	15,750	0	0	15,750	16,575	32,325	32,325
1975	16,500	0	0	16,500	16,292	32,792	32,792
1976	17,250	0	0	17,250	16,010	33,260	33,260
1977	18,000	0	0	18,000	15,788	33,788	33,788
1978	18,750	0	0	18,750	15,506	34,256	34,256
1979	19,500	7	0	19,507	15,223	34,723	34,730
1980	20,639	1,126	0	21,765	15,413	36,052	37,178

Table 6.3-1. Historical Municipal and Non-Municipal Water Demands and Supplies

	Municipal Users				Other Users	Total	
Calendar Year	Local Groundwater	Imported Water	Recycled Water	Total	Local Groundwater	Local Groundwater	Demand
1981	18,482	5,817	0	24,299	17,278	35,760	41,577
1982	12,253	9,659	0	21,912	13,705	25,958	35,617
1983	12,201	9,185	0	21,386	11,937	24,138	33,323
1984	16,390	10,996	0	27,386	15,377	31,767	42,763
1985	16,659	11,823	0	28,482	13,403	30,062	41,885
1986	17,393	13,759	0	31,152	12,297	29,690	43,449
1987	17,592	16,285	0	33,877	10,611	28,203	44,488
1988	18,601	19,033	0	37,634	9,975	28,576	47,609
1989	21,195	21,618	0	42,813	10,285	31,480	53,098
1990	21,453	21,613	0	43,066	11,284	32,737	54,350
1991	31,825	7,968	0	39,793	10,279	42,104	50,072
1992	27,355	13,911	0	41,266	11,160	38,515	52,426
1993	29,959	13,393	0	43,352	10,777	40,736	54,129
1994	31,599	14,389	0	45,988	13,559	45,158	59,547
1995	28,677	16,996	0	45,673	14,347	43,024	60,020
1996	32,054	18,093	0	50,147	14,570	46,624	64,717
1997	32,025	22,148	0	54,173	15,319	47,344	69,492
1998	28,604	20,254	0	48,858	13,599	42,203	62,457
1999	29,968	27,282	0	57,250	17,154	47,122	74,404
2000	28,409	32,579	0	60,988	15,608	44,017	76,596
2001	25,367	35,369	0	60,736	16,362	41,729	77,098
2002	26,457	41,763	0	68,220	16,979	43,436	85,199
2003	22,978	44,416	50	67,444	14,829	37,807	82,273
2004	24,671	47,205	420	72,296	15,590	40,261	87,886
2005	32,316	37,997	418	70,731	12,785	45,101	83,516
2006	33,061	40,048	419	73,528	17,312	50,373	90,840
2007	31,690	45,151	470	77,311	14,768	46,458	92,079
2008	33,884	41,705	311	75,900	14,750	48,634	90,650
2009	31,100	38,546	328	69,974	16,564	47,664	86,538
2010	33,152	30,578	336	64,066	16,098	49,250	80,164
2011	33,624	30,808	373	64,805	15,439	49,063	80,244
2012	33,726	35,558	428	69,712	15,694	49,420	85,406
2013	29,779	43,281	400	73,460	16,151	45,930	89,611
2014	34,612	33,092	474	68,178	12,885	47,497	81,063
2015	29,893	24,148	450	54,491	12,079	41,972	66,570
2016	26,329	31,130	507	57,966	14,360	40,689	72,326
2017	16,403	46,651	501	63,555	13,438	29,841	76,993
2018	22,869	41,999	352	65,220	13,071	35,940	78,291
2019	17,547	42,072	458	60,077	12,510	30,057	72,587

Notes

All values are in units of acre-feet per year. Values for 1980-2019 are from basin annual reports. Prior years are estimated.
Data are for calendar years, to be consistent with 1980-2019 water use information presented in annual reports.

See Table I-2 in Appendix I for water-year values of groundwater pumping.

Municipal supplies are currently provided by SCV Water and Los Angeles County Water Works District 36 (LACWD).
Municipal users include all commercial and industrial water users in the Santa Clarita Valley.

Other users are FivePoint (The Newhall Land and Farming Company), which historically has pumped from the Alluvial Aquifer and the Saugus Formation; the Pitchess Detention Center and Sand Canyon Country Club, which pump from the Alluvial Aquifer; Valencia County Club, Vista Valencia Golf Course, and the groundwater pumping/treatment system on the Whittaker-Bermite property, all of which pump from the Saugus Formation; and small private domestic well owners, who pump primarily from the Alluvial Aquifer but may also pump small quantities of water from adjoining bedrock units.

Table 6.3-2. Estimated Historical Municipal and Non-Municipal Groundwater Use by Water Use Sector for the Basin (Calendar Years 1945—2019)

Water Use Sector	Minimum	Maximum	Average
Peak Agricultural Period (1945-1960)			
Agricultural	---	---	50,000
Municipal	---	---	1,000
Golf Courses	0	0	0
Rural Domestic	---	---	---
Small Public Water Systems	0	0	0
Total	---	---	51,000
Transitional Period (1961-1979)			
Agricultural	14,200	47,500	21,500
Municipal	1,000	19,500	11,800
Golf Courses	0	500	375
Rural Domestic	0	500	250
Small Public Water Systems	0	0	0
Total	28,900	48,500	33,900
Modern Record (1980-2019)			
Agricultural	5,950	14,300	10,350
Municipal	12,200	34,600	25,800
Golf Courses	425	1,375	800
Rural Domestic	500	500	500
Small Public Water Systems	1,000	3,500	2,350
Total	24,150	50,375	39,800

Notes

All values are in units of acre-feet. Values for 1980-2019 are from basin annual reports. Prior years are estimated.

Data are for calendar years, to be consistent with 1980-2019 water use information presented in annual reports.

Municipal supplies are currently provided by SCV Water and Los Angeles County Water Works District 36 (LACWD). Municipal water demands include all commercial and industrial water uses in the Santa Clarita Valley.

Agricultural groundwater use is by The Newhall Land and Farming Company. These pumping volumes do not include agricultural pumping by the Disney Corporation along the southern margin of the basin.

For the period of modern record (1980-2019), the "small public water system" water use sector consists solely of the Pitchess Detention Center (which was formerly called Wayside Honor Rancho).

Golf course groundwater is dedicated to golf courses and is not obtained from potable water supplies.

Dashed values are for cases where the values are unknown and cannot be readily estimated.

For the minimum and maximum values, the total values shown in this table are not equal to the sum of the individual values because the minimum values of the individual terms occur in different years, and similarly for the maximum values.

6.3.2.1 Historical Imported Supplies

SCV Water's portfolio of imported water supplies consists of SWP water and local imported supplies that are available from groundwater banking and water exchange programs outside the Basin (LSCE, 2020). Historically, the imported supplies used by SCV Water have consisted primarily of SWP water. As documented in the 2010 and 2015 UWMPs (KJC et al., 2011 and 2016), the 2017 *Water Supply Reliability Plan Update* (Clemm and KJC, 2017), the 2020 UWMP (KJ, 2021), and the 2021 *Draft Water Supply Reliability Plan Update* (Geosyntec, 2021), the combination of imported water management in conjunction with the operating plan for the local groundwater basin forms the basis for current and future water planning in the Santa Clarita Valley. By design, the Basin Operating Plan draws upon the groundwater storage reserves of the Basin (primarily in the Saugus Formation) to augment imported supplies during drought years in the SWP, then reduces pumping at other times to facilitate the natural replenishment of those reserves. This operating plan is integral to the water resources plan for SCV Water as described in its UWMPs, as the imported water puts the region in a position where available water supplies exceed human demands for water (KJ, 2021).

SCV Water takes deliveries of its imported water supplies at Castaic Lake, which serves as the terminal reservoir of the SWP's West Branch. SCV Water treats this water at its Earl Schmitt Filtration Plant or its Rio Vista Water Treatment Plant. This treated water then enters the municipal water supply distribution system where it is blended with locally pumped municipal groundwater supplies. No accounting is available to track the amount of the imported supply applied to different categories of urban land uses. Hence, in the Basin it is not possible to develop an accounting of applied surface water by water use sector (as described in the water budget BMP [DWR, 2016] with regards to the requirements of §354.18(b)(1) of the GSP regulations). The historical annual usage of imported water supplies is tabulated in the annual water reports for the Basin (LSCE, 2020) and is included in Table 6.3-1.

In 2017, CLWA (SCV Water's predecessor agency) prepared a Water Supply Reliability Report Update that demonstrated the ability of CLWA's imported water supply portfolio to meet supplemental water demands fully and reliably within CLWA's service area. The reliability study incorporated the Basin Operating Plan and analyzed CLWA's imported water portfolio through 2050 build-out using the variety of historical hydrologic conditions that have been recorded in the region for nearly a century. The report demonstrated full reliability under 2015 UWMP assumptions. The report also concluded that, even with a significant reduction in the delivery capability of the SWP system, the full demands within the service area can be met without exceeding the pumping volumes outlined in the Basin Operating Plan. The 2021 *Draft Water Supply Reliability Plan Update* (Geosyntec, 2021) reached the same conclusions—specifically, that, with planned investments, there would be a supply surplus that would greatly exceed any projected shortfalls, as long as the remaining supply capacity in the Saugus Formation and/or in specific water banks is fully developed.

6.3.2.2 Historical Local Surface Water Inflows

Local surface water inflows in river and stream systems are not sources of municipal or agricultural water supply in the Basin, but instead consist solely of stormwater and other flows in the Santa Clara River and its tributaries. These surface water inflows consist of the following:

- Ungaged surface water flows arising as precipitation runoff (stormwater) within the Basin (estimated from precipitation data and modeling studies)
- Gaged surface water flow in the Santa Clara River that enters the Basin from the upstream Acton Basin (obtained from intermittently available stream gaging records at Lang Station and from streamflow regression estimates)

- Ungaged surface water flows that enter the Basin in other tributaries to the Santa Clara River, which originate in the upper portions of the watersheds lying outside the groundwater basin boundary (estimated from precipitation data and modeling studies)
- Periodic releases of water into Castaic Creek from the Castaic Lake/Lagoon complex (from records maintained by DWR)
- Releases of water from Bouquet Reservoir into Bouquet Creek upstream of the Basin, a portion of which can flow into the Basin (estimated from data and modeling studies)
- Discharges of treated water to the Santa Clara River from the Saugus and Valencia WRPs (from records provided by the Los Angeles County Sanitation District)
- Periodic point discharges to the river from groundwater treatment facilities
- Natural discharges of groundwater, which occur primarily in perennial (gaining) reaches of the Santa Clara River

Table 6.3-3 summarizes the average, minimum, and maximum values of these annual historical surface inflows to the Basin.

6.3.2.3 Historical Surface Water Outflows

The estimated annual surface water outflow leaving the Basin (as storm and non-storm flows in the Santa Clara River at the western basin boundary, deep percolation from ephemeral streams, and evaporative losses) are summarized in Table 6.3-4 for the historical base period. The non-storm flow in the Santa Clara River at the western basin boundary is estimated from groundwater flow modeling, given that the historical period begins before stream gaging began.

For the purpose of reporting the water budgets, the historical non-storm flows in the Santa Clara River at the western basin boundary include the amount of subsurface outflow that occurs within a thin veneer of alluvium that is present at the western basin boundary, which comprises the western boundary of the groundwater flow model. These subsurface flows are included in the non-storm surface water outflow term because (1) the alluvium generally thins in a westerly direction in this area, and (2) aerial imagery indicates the stream channel becomes more defined (less braided and narrower) just downstream of the western basin boundary with notable streamflow continuing downstream to the existing stream gage at Las Brisas Bridge (USGS Station 11109000, located 3.5 miles downstream of the western basin boundary).

6.3.2.4 Historical Surface Water Budget

A comparison of Tables 6.3-3 and 6.3-4 shows the following noteworthy observations about the historical surface water budget:

- The point discharges to the river are a minor portion of the total surface water inflows. However, because these discharges occur primarily in the western portion of the Basin, they have a notable influence on streamflows at the western basin boundary, as shown by a comparison of the point discharges with gaging records near the western basin boundary during the summer season, when little to no storm flow occurs in the river. (See Figure 6.3-2.)
- The controlled releases of water from Bouquet Reservoir also are a minor portion of the total surface water inflows. In contrast, controlled releases from Castaic Lake can be significant during wet years but have little to no influence on the surface water budget during dry periods.
- The amount of stormwater generated from precipitation falling directly within the Basin is an important component of the surface water budget, as is the streamflow entering the Basin in the Santa Clara River and its tributaries.

- Groundwater discharges to the perennial reach of the river are the highest source of inflow to surface water on average, and the minimum value of these discharges is also the highest of the minimums for all surface water inflow terms.
- As shown in Table 6.3-4 and in Table I-1 of Appendix I, on average, 16 percent of the surface water generated in the Basin leaves as non-storm flow at the western basin boundary while another 33 percent is lost to a combination of stormwater outflow and ET. Groundwater recharge within and outside of stream channels constitutes 43 percent and 8 percent, respectively, of the total surface water outflow from the Basin.
- As shown in Table I-1 of Appendix I, for the non-storm surface water outflows, the minimum annual volume (11,311 AFY) is about 25 percent of the average annual volume for the 95-year historical period (44,905 AFY). As shown in Figures 6.3-2 and 6.3-4, the lowest flows occurred during the mid-1940s through the early 1960s, which is the period when groundwater pumping from the Alluvial Aquifer was at its historical highest (to meet agricultural irrigation needs before urbanization began).

Table 6.3-3. Estimated Historical Annual Surface Water Inflows to the Basin (Water Years 1925–2019)

Surface Water Inflow Component	Minimum	Maximum	Average	Percent of Total
In-Basin Precipitation	27,400	224,500	87,600	32%
Stormwater Generated from In-Basin Precipitation	25,100	135,800	67,000	---
Stream Inflow (Santa Clara River)	0	37,850	5,170	2%
Stream Inflow (Releases from Castaic Lake/Lagoon)	0	101,800	14,750	5%
Stream Inflow (Releases from Bouquet Reservoir)	0	130	95	0.03%
Stream Inflow (Other Santa Clara River Tributaries)	0	148,400	24,150	9%
Discharges to Santa Clara River from Saugus WRP	0	7,840	2,800	1%
Discharges to Santa Clara River from Valencia WRP	0	18,150	4,975	2%
Discharges to Santa Clara River from Groundwater Treatment Systems	0	3,700	85	0.03%
Groundwater Discharge to Streams	62,600	268,500	134,500	49%
Total	98,900	766,000	274,100	100%

Notes

All values are in units of acre-feet per year (AFY) and are for the period of water years 1925 through 2019. Percentages are calculated from the average values.
All values are rounded from the statistics calculated in Table I-1 of Appendix I.

Bouquet Reservoir releases began in 1934. 5% of the releases from this reservoir are assumed to remain as surface flow where the creek enters the Basin.

Castaic Lake/Lagoon releases began in 1974. Flows in earlier times were natural streamflows prior to construction of Castaic Dam.

Releases from the Saugus WRP and the Valencia WRP began in 1963 and 1967, respectively.

During the 95-year period for this water budget, discharges from groundwater treatment systems occurred in 2011, 2018, and 2019.

Total values do not include stormwater generated from in-basin precipitation, which is an internal flow process (and not an inflow to, or outflow from, the basin).

For the minimum and maximum and average values, the total values shown at the bottom of this table are not equal to the sum of the individual terms because the minimum, maximum, and average values of the individual terms are for different years.

Table 6.3-4. Estimated Historical Annual Surface Water Outflows from the Basin (Water Years 1925–2019)

Surface Water Outflow Component	Minimum	Maximum	Average	Percent of Total
Santa Clara River Non-Storm Outflow at the Western Basin Boundary	11,300	100,000	44,900	16%
Groundwater Recharge from Precipitation	0	103,000	20,600	8%
Groundwater Recharge from Streams	51,200	253,000	117,300	43%
ET and Stormwater Outflow	24,300	331,500	91,300	33%
Total	98,900	766,000	274,100	100%

Notes

All values are in units of acre-feet per year (AFY) and are for the period of water years 1925 through 2019. Percentages are calculated from the average values. All values are rounded from the statistics calculated in Table I-1 of Appendix I.

Outflows at County line are from modeling analyses, rather than using data from the gages which are located further downstream.

Subsurface outflow through the thin alluvial material beneath the river at the western boundary of the Basin is accounted for as outflow in the surface water budget because the historical and current stream gages are located further downstream where bedrock is thought to be at or just beneath the river channel, which causes most if not all subsurface water at the western basin boundary to appear in the river upstream of those gages.

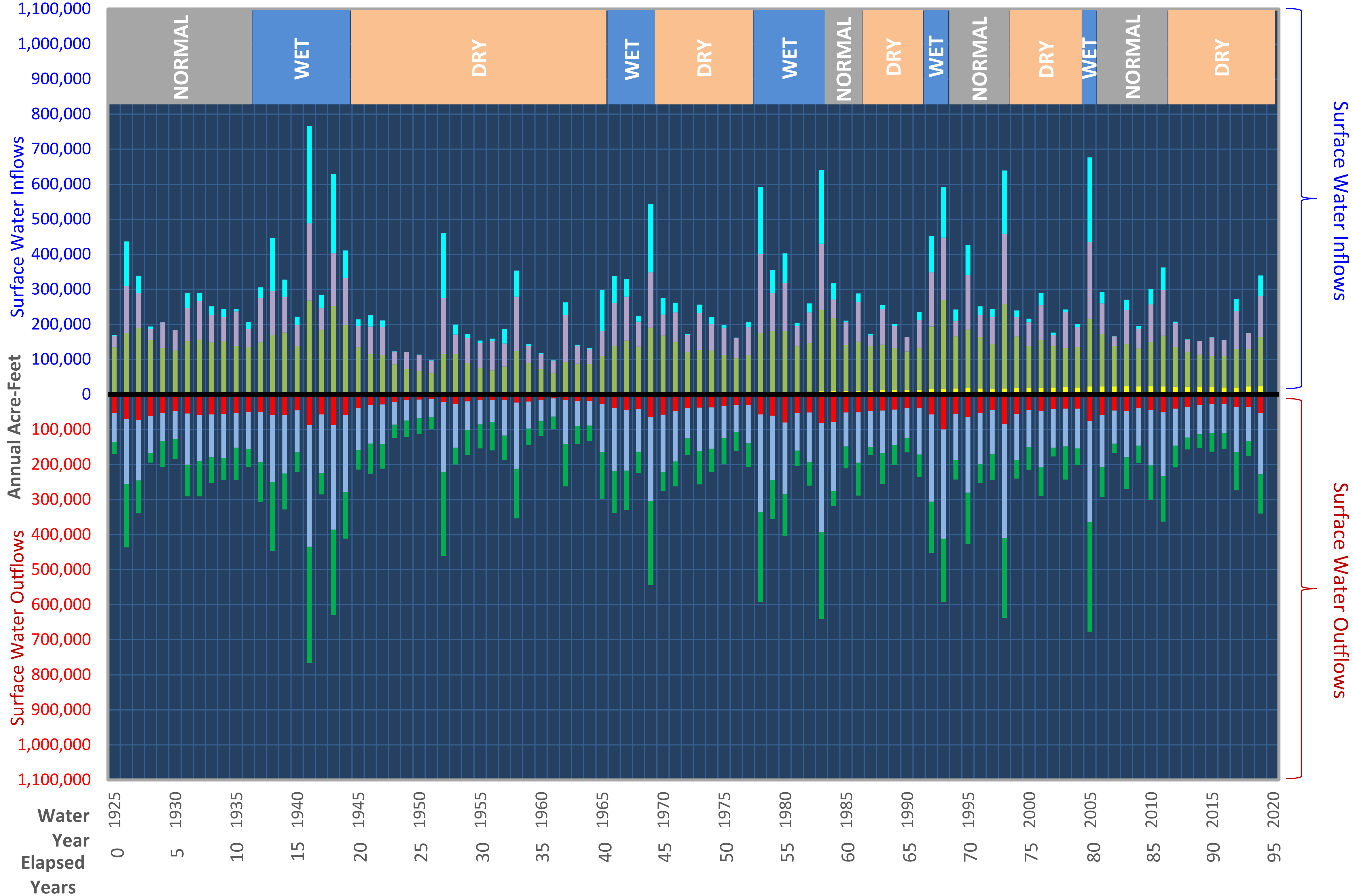
For the minimum and maximum values, the total values shown in this table are not equal to the sum of the individual outflow terms because the minimum values of the individual terms occur in different years, and similarly for the maximum values.

ET = evapotranspiration

FIGURE 6.3-1

Historical Surface Water Budget (Water Years 1925-2019)

Santa Clara River Valley
East Groundwater Subbasin
Groundwater Sustainability Plan



LEGEND

- Precipitation
- Stream Inflows
- Point-Source Flows to Streams
- Net Inflow from Groundwater
- Non-Storm Flow at County Line
- ET and Storm Outflows
- Groundwater Recharge from Streams and Rainfall

NOTES
This projected water budget is developed by projecting the 1925-2019 historical hydrology forward in time.
ET: evapotranspiration

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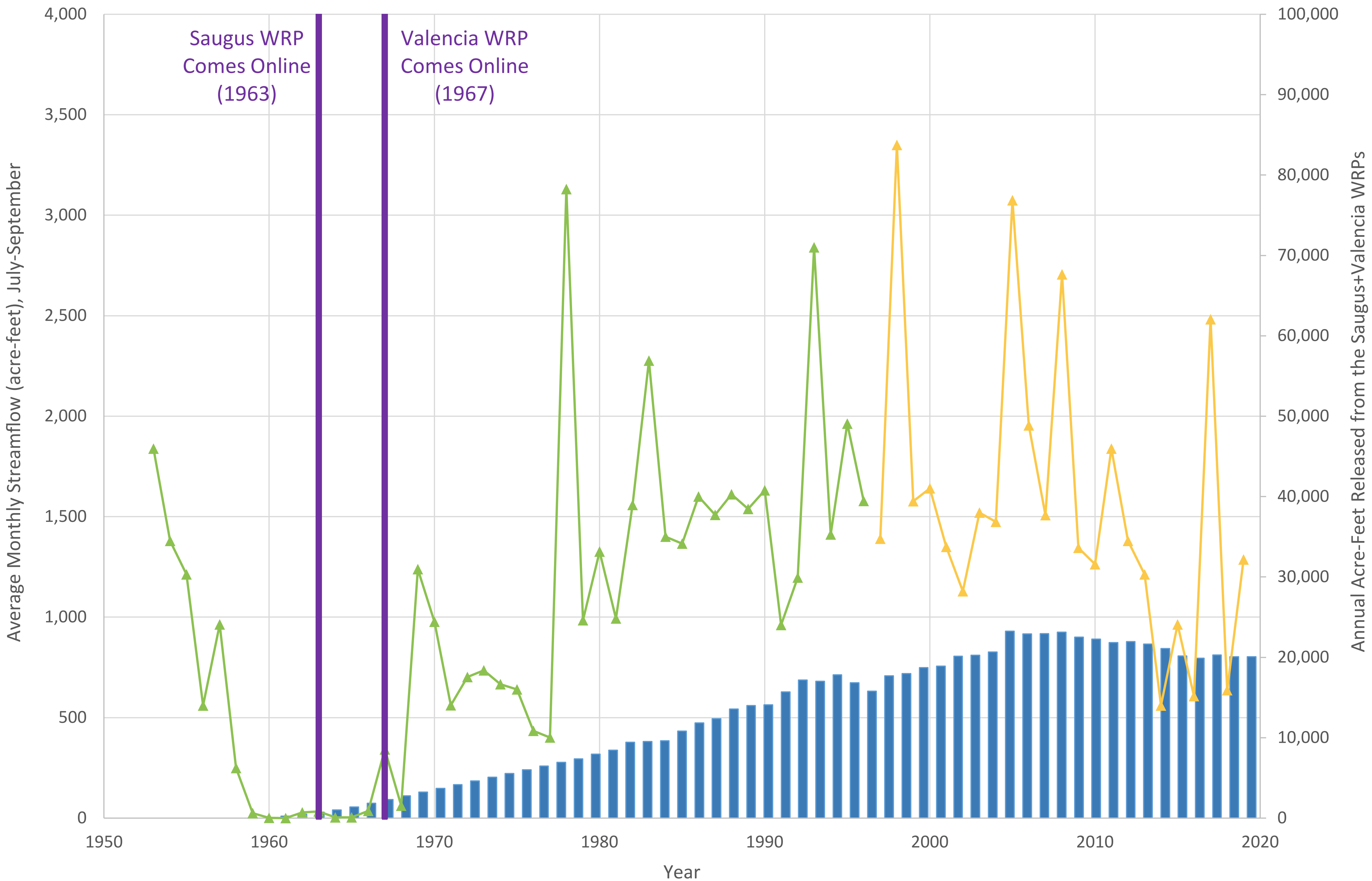

FIGURE 6.3-2

Historically Measured Annual WRP Flow Volumes and Summer-Season Streamflow Volumes in the Santa Clara River at the LA/Ventura County Line and Piru Stream Gages

Santa Clara River Valley
East Groundwater Subbasin
Groundwater Sustainability Plan

LEGEND

Annual WRP Discharge Volume (Saugus+Valencia)
LA/Ventura County Line Stream Gage
Piru Stream Gage

NOTES
LA: Los Angeles
WRP: Water Reclamation Plant

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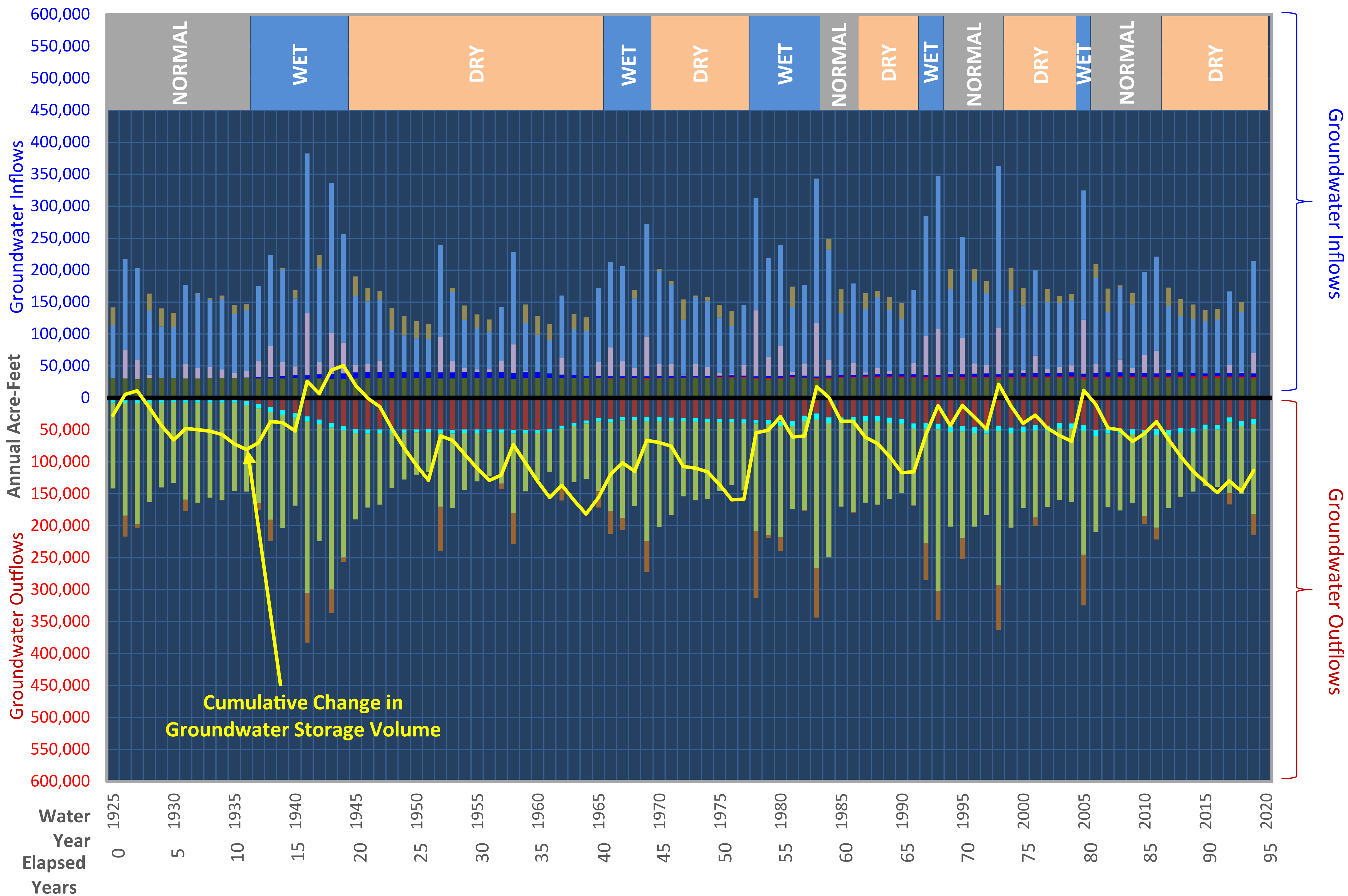

FIGURE 6.3-3

Historical Groundwater Budget (Water Years 1925-2019)

Santa Clara River Valley
East Groundwater Subbasin
Groundwater Sustainability Plan

LEGEND

- Stream Gains
- Stream Losses
- Precipitation
- Ag+Muni Irrigation
- Subsurface Inflow in Tributaries
- Septic
- Pumping
- ET
- Groundwater Storage Increase
- Groundwater Storage Reduction

NOTES

This projected water budget is developed by projecting the 1925-2019 historical hydrology forward in time.
Ag: agriculture
Muni: municipal
ET: evapotranspiration

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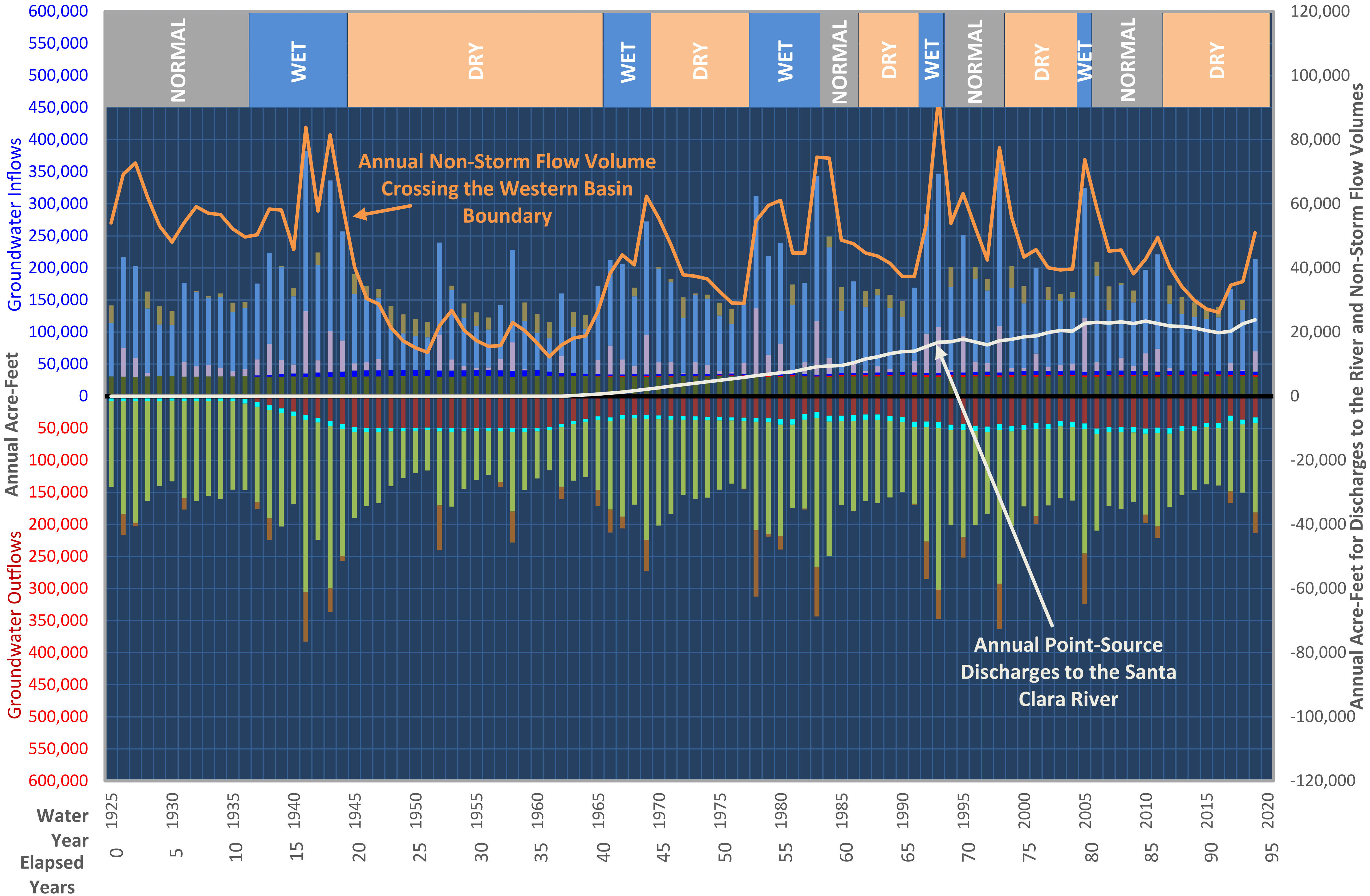

FIGURE 6.3-4

Historical Groundwater Budget and Annual Non-Storm Flows at the Western Basin Boundary

Santa Clara River Valley
East Groundwater Subbasin
Groundwater Sustainability Plan

LEGEND

- Stream Gains
- Stream Losses
- Precipitation
- Ag+Muni Irrigation
- Subsurface Inflow in Tributaries
- Septic
- Pumping
- ET
- Groundwater Storage Increase
- Groundwater Storage Reduction

NOTES

This projected water budget is developed by projecting the 1925-2019 historical hydrology forward in time.
Ag: agriculture
Muni: municipal
ET: evapotranspiration

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6.3.3 Historical Groundwater Budget

The annual historical groundwater budget is shown on Figures 6.3-3 and 6.3-4 and in Table I-2 in Appendix I.

6.3.3.1 Historical Groundwater Inflows

Table 6.3-5 summarizes the average, minimum, and maximum values of the annual inflows to groundwater in the Basin. Noteworthy observations are as follows:

- Recharge from streams provides by far the most important source of recharge to the Basin's groundwater resources, contributing about 67 percent of the total recharge on average during the 95-year historical period.
- During wet years, recharge from precipitation falling within the Basin is also an important source of groundwater recharge; however, the 95-year average of this recharge term is only 12 percent of total recharge.
- Subsurface inflows entering the Basin in the thin veneers of alluvium that are present beneath the Santa Clara River and its 48 tributaries are the second-highest recharge source during normal and dry years, as the upstream contributing watersheds steadily drain their water and provide it in the form of a steady subterranean flow into the Basin.
- On average, septic systems have provided less than 1 percent of total recharge to groundwater in the Basin, while irrigation (applied water) has provided almost 3 percent of the total recharge to groundwater. The contribution from irrigation on a long-term basis has been below 3 percent, regardless of whether the irrigation uses comprised agricultural irrigation alone (as occurred before the 1960s) or a mixture of agricultural and municipal irrigation (since 1960). However, during the peak agricultural years, the estimated maximum value of irrigation recharge (9,540 AFY) may have provided as much as 10 percent of total recharge to groundwater during the low-precipitation periods (such as water years 1948 through 1951 and 1960; see Table I-2 of Appendix I).

6.3.3.2 Historical Groundwater Outflows

Table 6.3-6 summarizes the average, minimum, and maximum values of the annual outflows (discharges) of groundwater from the Basin. Groundwater discharges to streams are by far the biggest source of outflow, with groundwater pumping becoming the second largest source of outflow once the Basin went into agricultural production and continuing with the expansion of urbanization after 1960. Groundwater withdrawals by riparian vegetation (phreatophytes) have remained within a relatively narrow range of values, varying over a range of about 5,150 AFY (from about 4,100 to 9,250 AFY), in contrast to an average of about 175,650 AFY for total groundwater discharge (which ranged between 115,500 AFY and 305,100 AFY).

Table 6.3-5. Estimated Historical Annual Inflows to Groundwater in the Basin (Water Years 1925–2019)

Groundwater Inflow Component	Minimum	Maximum	Average	Percent of Total
Recharge from Precipitation	0	103,000	20,600	12%
Recharge from Streams	51,200	253,000	117,300	67%
Subsurface Inflow Beneath Castaic Dam	1,675	1,680	1,675	1%
Subsurface Inflow Beneath Santa Clara River and Other Tributaries	28,000	29,700	29,070	17%
Septic System Percolation	0	2,440	1,140	<1%
Recharge of Applied Water	0	9,540	4,690	<3%
Total	90,350	382,750	174,450	100%

Notes

All values are in units of acre-feet per year (AFY) and are for the period of water years 1925 through 2019. Percentages are calculated from the average values. All values are rounded from the statistics calculated in Table I-2 of Appendix I.

Deep percolation from streams is the combined amount in ephemeral and perennial reaches.

Deep percolation from irrigation is the sum for agricultural and municipal lands.

Septic system percolation applies to areas served by public water supplies that do not have public sewer collection systems.

For the minimum and maximum values, the total values shown in this table are not equal to the sum of the individual inflow terms because the minimum values of the individual terms occur in different years, and similarly for the maximum values.

Table 6.3-6. Estimated Historical Annual Groundwater Outflows from the Basin (Water Years 1925–2019)

Groundwater Outflow Component	Minimum	Maximum	Average	Percent of Total
Groundwater Pumping	0	50,500	34,160	19%
Riparian Evapotranspiration	4,100	9,250	7,025	4%
Groundwater Discharge to Streams	62,600	268,500	134,500	77%
Total	115,500	305,130	175,650	100%

Notes

All values are in units of acre-feet per year (AFY) and are for the period of water years 1925 through 2019. Percentages are calculated from the average values. All values are rounded from the statistics calculated in Table I-2 of Appendix I.

Groundwater discharge to streams is the combined amount in ephemeral and perennial reaches.

Subsurface outflow through the thin alluvial material beneath the river at the western boundary of the Basin is accounted for as outflow in the surface water budget because the historical and current stream gages are located further downstream where bedrock is thought to be at or just beneath the river channel, which causes most if not all subsurface water at the western basin boundary to appear in the river upstream of those gages.

For the minimum and maximum values, the total values shown in this table are not equal to the sum of the individual outflow terms because the minimum values of the individual terms occur in different years, and similarly for the maximum values.

6.3.3.3 Historical Changes in Groundwater Storage

The yellow line on Figure 6.3-3 shows how much the volume of stored groundwater changes progressively over time. The slopes of this cumulative-change-in-storage line are the primary indicators of the storage changes over the short and long terms. A rising slope indicates that recharge is greater than discharge, and a declining slope indicates that recharge is less than discharge. Figure 6.3-3 shows that the occurrence of rising compared with declining slopes varies frequently during the 95-year historical period. In the year 2011, which was one year before the recent drought began, the cumulative change in storage was similar to that of the first year in the 1925 through 2019 historical period, indicating that no long-term decline in storage had occurred. In 2012, the onset of the drought began a period of declining storage that lasted until the curve began rising in 2017. The curve's slope during the drought from 2012 through 2016 is similar to that calculated for prior drought periods, such as 1945 through 1965 and 1987 through 1991. Most importantly, the historical water budget indicates that the onset of groundwater pumping and the changing locations and uses of groundwater have not resulted in an overdraft condition in the Basin.

6.3.4 Influence of Land and Water Use Conversions on the Historical Water Budget

The historical surface and groundwater budgets are influenced by the conversion of land and water uses in the Basin beginning in the 1960s.

- For the surface water budget, historical stream gaging data show that stormwater flows into and out of the Basin were highly variable from year to year, based on year-to-year variations in precipitation. Figure 6.3-2 shows that historically, the seasonal low (summer-season) flow volumes in the river at and downstream of the western basin boundary have increased since 1965 because of increases in treated water discharges from WRPs as the Basin became increasingly urbanized and more water was imported from SWP to meet human water demands. The annual volume of combined discharges to the river from the two local WRPs increased to as high as 22,900 AFY in 2005 and ranged between approximately 20,000 AFY and 22,000 AFY from 2011 through 2019. As shown in Figure 6.3-4, groundwater flow model simulations of historical conditions indicate that annual non-storm flow volumes crossing the western basin boundary were likely lower during the period of peak agricultural production (from the mid-1940s through the early to mid-1960s) than occurred before or after that period. This is thought to be the result of the prevailing dry conditions in the region plus groundwater pumping from the Alluvial Aquifer (which was greater in those years than any other time before or after). This is consistent with an early water budget analysis for the downstream Piru Subbasin by Mann (1959), which estimated groundwater inflows from the Basin but did not quantify dry-weather surface inflows from the Basin, which suggests that dry-weather surface flows out of the Basin were negligible prior to the onset of urbanization in the Basin.
- In the groundwater budget, the initiation of urbanization and the corresponding retirement of certain agricultural lands from the 1960s through the 1980s coincides with an increase in the minimum and maximum inflection points on the cumulative-change curve shown in Figure 6.3-3 for groundwater storage volumes. These inflection points arise partly from greater precipitation but also from reduced pumping (see the maroon bars) as agricultural pumping quickly decreased while urban pumping slowly increased. The gradual rise in the cumulative change in storage curve (the yellow line in Figure 6.3-3) continued through the early to mid-2000s despite increased municipal pumping during this period, in part because of the lack of a prolonged drought but also because of the continued pumping of the Alluvial Aquifer at levels lower than occurred during the years of peak agricultural land uses. Along with the increased importation of SWP water into the Basin starting in 1979, the changing groundwater pumping patterns and changing water use patterns associated with urbanization and reduced agricultural production have kept the Basin in a sustainable condition with respect to the SGMA criterion of chronic lowering of groundwater levels.

6.3.5 Uncertain Aspects of the Historical Water Budget

The definitions section of the GSP regulations (§351) defines uncertainty as follows:

> (ai) “Uncertainty” refers to a lack of understanding of the basin setting that significantly affects an Agency’s ability to develop sustainable management criteria and appropriate projects and management actions in a Plan, or to evaluate the efficacy of Plan implementation, and therefore may limit the ability to assess whether a basin is being sustainably managed.

Uncertainties in the historical water budget exist in the form of (1) data gaps and measurement accuracy and (2) modeling uncertainties.

The primary data gaps and uncertainties that may have effects on the groundwater flow model and the historical water budget are the following:

- A long record of precipitation data is available in the Basin, consisting of monthly records dating back to late 1927 and annual (calendar-year) records dating to the late 1880s. In contrast, no streamflow records are available prior to the early 1950s for the Santa Clara River and prior to 1974 for the watershed upstream of Castaic Lake. Precipitation records and regression techniques have been used to estimate streamflows prior to these times, as well as to fill in data gaps during the period of record (an issue primarily at the Lang Gage, where the Santa Clara River enters the Basin).
- For agricultural lands, data on groundwater pumping volumes, irrigated crop types and acreages, and irrigation return flow volumes are not available prior to the modern era of record-keeping (i.e., prior to 1980). This information has been estimated from aerial photos showing the locations of agricultural lands, general descriptions of historical cropping, and the application of more recent data on the water needs of various types of crops.
- Pumping volumes for wells owned by SCV Water are metered and are available from recording systems that provide real-time operational information, thereby minimizing uncertainty in municipal groundwater pumping records. Other wells in the Basin report their groundwater pumping on an annual, or occasionally monthly, basis using meter readings and/or electrical performance tests.
- Elevation surveys are not available for some non-purveyor-owned wells in the Basin. This creates a small amount of uncertainty in converting groundwater level depth measurements to groundwater elevations. Additionally, the documentation of protocols for measuring “static” groundwater levels at other non-purveyor-owned wells (when they are not pumping) is not readily available. These factors create uncertainty in interpreting groundwater level measurements in the western portion of the Basin and calibrating the groundwater flow model in this area.
- Few wells are present in certain areas—specifically, in the northwestern portion of the Saugus Formation and in certain tributary valleys in the Alluvial Aquifer. This creates uncertainty in calibrating the groundwater flow model in these outlying areas.

Groundwater flow modeling uncertainties pertain to (1) a model’s general ability to replicate actual physical conditions in streams and in the subsurface and (2) a model’s calibration quality. As discussed in Appendix G, the model development report (GSI, 2021), the regional groundwater flow model for the Basin has been created through a detailed process of planning, construction, and calibration, which has evolved over the course of the past 20 years and included the development of an earlier version of the groundwater flow model (CH2M HILL, 2004) and numerous applications of that earlier model. In the judgment of the GSP development team, the model and its underlying data render the current model a viable and reliable tool for the SCV-GSA and SCV Water to use for development, implementation, and monitoring of the GSP for the Basin, and for other groundwater resource planning and management programs. Nonetheless, despite its detail and the in-depth nature of the calibration and validation process, the groundwater flow model is a simplification of a complex hydrogeologic system and has been designed with certain built-in assumptions. As with any groundwater model, there are data limitations inherent in the use of the model, as described above. Nonetheless, reasonable estimates of conditions for periods when data are missing or are uncertain have been possible to derive in the Basin using information from periods of more detailed recordkeeping. Additionally, the process of calibrating the model to a 40-year record of (1) streamflows at the western basin boundary and (2) groundwater level fluctuations in numerous pumping and non-pumping wells in both the Alluvial Aquifer and the Saugus Formation has provided substantial insights regarding the relative influences of the multiple hydrologic processes across the Basin and in specific locations. As discussed in Appendix G, the model development report, the modeling tools and the basin understanding that have arisen from the process of collecting data routinely for 40 years and fitting a model to those data have provided tools and a historical water budget that likely would not change appreciably if additional calibration refinements were to be sought. This means that the SCV-GSA's approach to maintaining the historical non-overdraft condition and conducting related decision-making is not likely to change with further calibration work, which in turn means that the definition of uncertainty as cited in §351 of the GSP regulations does not exist with regards to the historical water budget.

6.4 Current Water Budget

As discussed in Section 6.2.2.2, the current water budget examines how the land and water uses in 2014 would have affected the Basin on a long-term basis if the 2014 land and water uses were to be repeated throughout the historical precipitation sequence (i.e., the historical precipitation and streamflow conditions during the period 1925 through 2019).

6.4.1 Current Water Uses Under the 2014 Level of Development

The current water budget uses SCV Water's actual 2014 pumping distribution and the overlying land uses that were present that year. The 2014 land uses are believed to be within 1 percent of those found in 2019, based on the number of water accounts served by SCV Water. For other pumpers, the current water budget uses those purveyors' average pumping during the last 10 years. This is consistent with estimation procedures used in past UWMP analyses. Table 6.4-1 shows how human water demands would be satisfied at the current level of development and the associated current level of human water demands and groundwater pumping. Table 6.4-2 shows the annual groundwater pumping by water use sector under the 2014 level of development, as evaluated for the current water budget.

6.4.2 Current Surface Water Budget

For the current water budget (which evaluates the effects of the 2014 level of development and water use for the historical hydrology that occurred during water years 1925 through 2019), the annual surface water budget is shown on Figure 6.4-1 and in Table I-3 of Appendix I.

6.4.2.1 Current Imported Supplies

The historical annual usage of imported water supplies is tabulated in the annual water reports for the Basin (LSCE, 2020) and presented in Table 6.3-1 for the period 1925 through 2019 that is used to report the historical water budget. For the current water budget, the imported water volume is 33,092 AF, which was the actual amount of water imported into the Basin in 2014.

As discussed in the annual water reports for the Santa Clarita Valley (such as LSCE, 2020), SCV Water's imported water supply initially consisted of SWP water only but now includes several additional sources of water outside of the Basin. As of 2020, these programs consist of the following:

- Two water banks (one with the Semitropic Water Storage District [now called the Stored Water Recovery Unit, SWRU] and one with the Rosedale Rio-Bravo Water Storage District)
- Two water exchange programs (one with the Antelope Valley-East Kern Water Agency, and one with the United Water Conservation District)
- An option contract under the Yuba Accord Agreement with DWR and the Yuba County Water Agency

These imported supplies are in addition to the SWP water supply, for which SCV Water holds a contractual Table A amount of 92,500 AFY.[37] During the recent drought, SCV Water's allocations of Table A water (excluding Article 56 carryover water) ranged from 5 percent in 2014 to 60 percent in 2016. After the drought period, the Table A allocations were 85 percent in 2017, 35 percent in 2018, 75 percent in 2019, and 20 percent in 2020.

[37] The amount of SWP water received by each SWP contractor each year is determined by multiple factors, including the contractor's maximum contracted allotment (referred to as its Table A amount) and the amount of available water supply in the SWP system.

Table 6.4-1. Municipal and Non-Municipal Water Demands and Supplies for the Current Water Budget (Under the 2014 Level of Development)

Municipal Users				Other Users	Total	
Local Groundwater	Imported Water	Recycled Water	Total	Local Groundwater	Local Groundwater	Demand
34,612	33,092	474	68,178	14,623	49,235	82,801

Notes

All values are in units of acre-feet per year (AFY) and are for 365-day years. Values will be higher in leap years.

Municipal supplies are currently provided by SCV Water and Los Angeles County Water Works District 36 (LACWD). Municipal water demands include all commercial and industrial water uses in the Santa Clarita Valley.

Groundwater pumping consists of actual 2014 municipal water use, 2010-2019 average pumping for other pumpers, and 500 AFY for the groundwater pumping/treatment system on the Whittaker-Bermite property.

Other users are FivePoint (The Newhall Land and Farming Company), the Pitchess Detention Center, and Sand Canyon Country Club, which all pump from the Alluvial Aquifer; Valencia County Club, Vista Valencia Golf Course, and the groundwater pumping/treatment system on the Whittaker-Bermite property, all of which pump from the Saugus Formation; and small private domestic well owners, who pump primarily from the Alluvial Aquifer but may also pump small quantities of water from adjoining bedrock units.

Table 6.4-2. Estimated Annual Municipal and Non-Municipal Groundwater Pumping by Water Use Sector for the Basin (Under the 2014 Level of Development)

Water Use Sector	Annual Groundwater Pumping
Agricultural	10,497
Municipal	34,612
Golf Courses	1,044
Rural Domestic	500
Small Public Water Systems	2,082
Whittaker-Bermite Contaminant Treatment/Extraction System	500
Total	**49,235**

Notes

All values are in units of acre-feet per year (AFY) and are for 365-day years. Values will be higher in leap years.

Municipal supplies are currently provided by SCV Water and Los Angeles County Water Works District 36 (LACWD). Municipal water demands include all commercial and industrial water uses in the Santa Clarita Valley.

Agricultural groundwater use is by The Newhall Land and Farming Company. These pumping volumes do not include agricultural pumping by the Disney Corporation along the southern margin of the basin.

The Pitchess Detention Center is counted as a small public water system for the purpose of calculating the current water budget.

Golf course groundwater is dedicated to golf courses and is not obtained from potable water supplies.

For the minimum and maximum values, the total values shown in this table are not equal to the sum of the individual values because the minimum values of the individual terms occur in different years, and similarly for the maximum values.

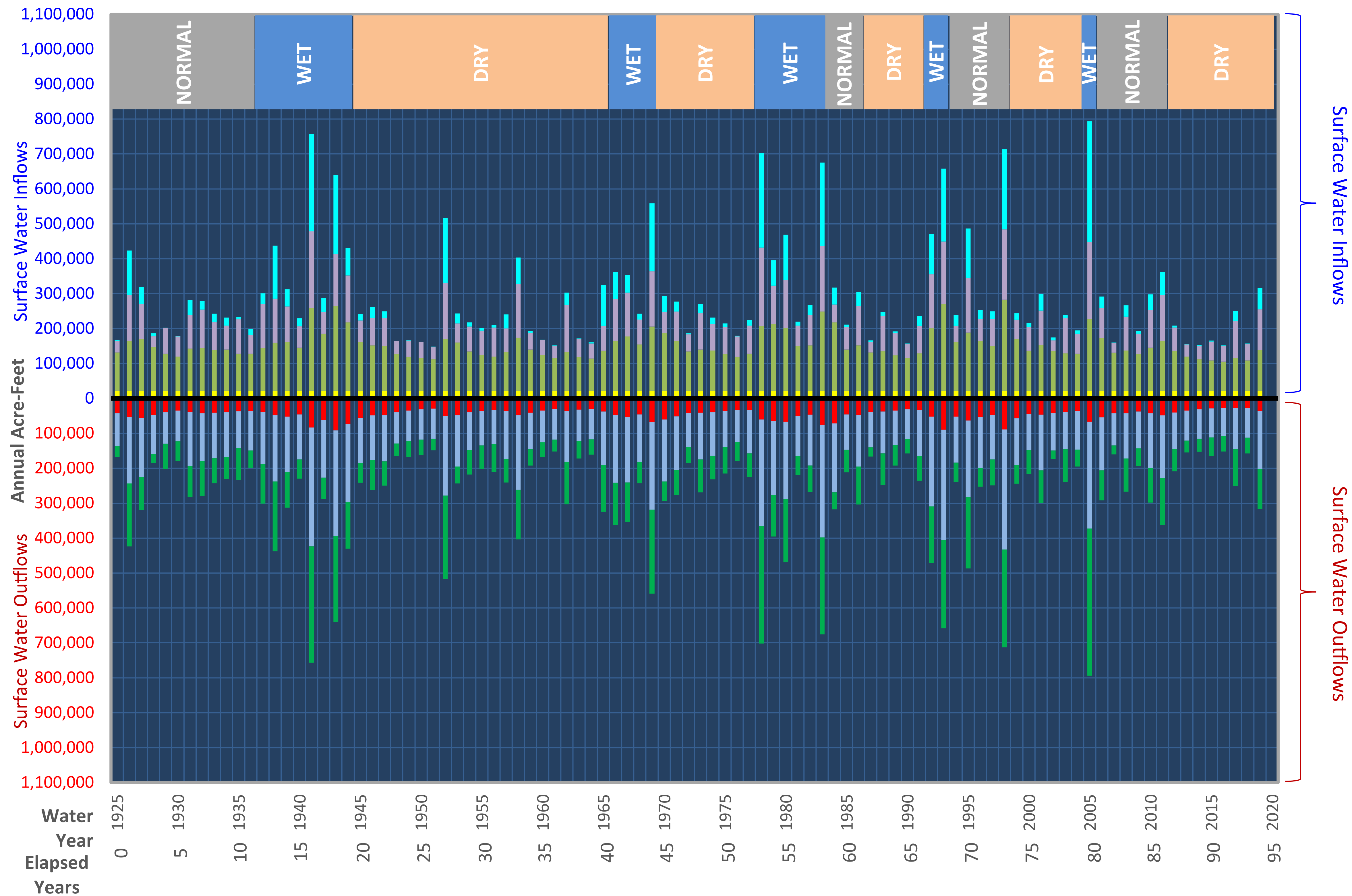

FIGURE 6.4-1

Current Surface Water Budget Under the 2014 Level of Development

Santa Clara River Valley
East Groundwater Subbasin
Groundwater Sustainability Plan

LEGEND

- Precipitation
- Stream Inflows
- Point-Source Flows to Streams
- Net Inflow from Groundwater
- Non-Storm Flow at County Line
- ET and Storm Outflows
- Groundwater Recharge from Streams and Rainfall

NOTES

This projected water budget is developed by projecting the 1925-2019 historical hydrology forward in time.
ET: evapotranspiration

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6.4.2.2 Current Local Surface Water Inflows

Table 6.4-3 summarizes the average, minimum, and maximum values of these annual surface water inflows to the Basin in the current water budget, as computed by applying the 2014 level of human water demand to the historical hydrology of 1925 through 2019. (See Figure 4-1 and Table I-3 in Appendix I for the annual water budgets during each year.) In-basin precipitation and upwelling of groundwater are the largest sources of inflows to the surface water system, even during below-normal precipitation years (such as the drought years of 2012 through 2016). On average, the next largest sources of streamflow are the combined natural and controlled inflows to the Santa Clara River and its tributaries, followed by discharges to the Santa Clara River in the western portion of the Basin from local WRPs.

6.4.2.3 Current Surface Water Outflows

Surface water outflows for the current water budget are shown in Figure 6.4-1, Table 6.4-4, and Table I-3 of Appendix I. Groundwater recharge in streambeds is the largest outflow term, comprising 43 percent of the total outflow of surface water on average during the period 1925 through 2019. Evaporative losses (ET) and stormwater outflows together comprise 33.5 percent of the total outflow of surface water on average.[38] Non-storm streamflows at the western basin boundary are the next-highest outflow (16 percent on average), followed by groundwater recharge from in-basin precipitation outside of streambeds (7 percent). During drought periods (such as the years 2015, 2016, and 2018), most stormwater generated from precipitation within the Basin is lost to evaporation, because little to no deep percolation of this stormwater occurs.

6.4.3 Current Groundwater Budget

The groundwater budget for current conditions (which simulated the effects of the 2014 level of development and water use for the historical hydrology that occurred during water years 1925 through 2019) is shown on Figure 6.4-2 and in Table I-4 of Appendix I.

6.4.3.1 Current Groundwater Inflows

Table 6.4-5 summarizes the average, minimum, and maximum values of the annual inflows to groundwater in the Basin. The percentage contribution of each recharge term in the current water budget to total groundwater recharge is similar to the percentages in the historical water budget (shown in Table 6.3-5). Recharge from streams provides by far the most important source of recharge to the Basin's groundwater resources, followed by subsurface inflows and precipitation recharge, with irrigation and septic system recharge being minor contributors.

[38] As discussed in Section 6.3.2.3 for the historical water budget, the non-storm flows in the Santa Clara River at the western basin boundary under the current water budget include the amount of subsurface outflow that occurs within a thin veneer of alluvium that is present at the western basin boundary, which comprises the western boundary of the groundwater flow model.

Table 6.4-3. Estimated Annual Surface Water Inflows to the Basin for the Current Water Budget (Under the 2014 Level of Development and Using 1925–2019 Rainfall)

Surface Water Inflow Component	Minimum	Maximum	Average	Percent of Total
In-Basin Precipitation	27,400	224,500	87,600	30%
Stormwater Generated from In-Basin Precipitation	25,100	135,800	67,000	---
Stream Inflow (Santa Clara River)	0	37,850	5,170	2%
Stream Inflow (Releases from Castaic Lake/Lagoon)	200	197,500	20,050	7%
Stream Inflow (Releases from Bouquet Reservoir)	110	110	110	0.04%
Stream Inflow (Other Santa Clara River Tributaries)	0	148,400	24,150	8%
Discharges to Santa Clara River from Saugus WRP	5,005	5,020	5,010	2%
Discharges to Santa Clara River from Valencia WRP	16,815	16,860	16,825	6%
Discharges to Santa Clara River from Groundwater Treatment Systems	500	501	500	0.2%
Groundwater Discharge to Streams	83,200	260,450	130,700	45%
Total	148,600	793,800	290,100	100%

Notes

All values are in units of acre-feet per year (AFY) and are for the 95-year model simulation period (which uses the historical rainfall record of water years 1925 through 2019). Percentages are calculated from the average values. All values are rounded from the statistics calculated in Table I-3 of Appendix I.

5% of the releases from Bouquet Reservoir are assumed to remain as surface flow where Bouquet Creek enters the Basin.

The term "Net inflow from Groundwater" is the difference between stream gains and stream losses arising from groundwater/surface water exchanges in the Santa Clara River and its tributaries.

Total values do not include stormwater generated from in-basin precipitation, which is an internal flow process (and not an inflow to, or outflow from, the basin).

The total values shown at the bottom of this table are not equal to the sum of the individual terms because the minimum, maximum, and average values occur in different years for each of the individual surface water inflows.

Table 6.4-4. Estimated Annual Surface Water Outflows from the Basin for the Current Water Budget (Under the 2014 Level of Development and Using 1925-2019 Rainfall)

Surface Water Outflow Component	Minimum	Maximum	Average	Percent of Total
Santa Clara River Non-Storm Outflow at the Western Basin Boundary	26,250	91,300	46,000	16%
Groundwater Recharge from Precipitation	0	103,000	20,600	7%
Groundwater Recharge from Streams	81,000	271,200	126,300	43.5%
ET and Stormwater Outflow	25,300	421,700	97,200	33.5%
Total	148,600	793,800	290,100	100%

Notes

All values are in units of acre-feet per year (AFY) and are for the 95-year model simulation period (which uses the historical rainfall record of water years 1925 through 2019). Percentages are calculated from the average values. All values are rounded from the statistics calculated in Table I-3 of Appendix I.

Subsurface outflow through the thin alluvial material beneath the river at the western boundary of the Basin is accounted for as outflow in the surface water budget because the historical and current stream gages are located further downstream where bedrock is thought to be at or just beneath the river channel, which causes most if not all subsurface water at the western basin boundary to appear in the river upstream of those gages.

The total values shown at the bottom of this table are not equal to the sum of the individual terms because the minimum, maximum, and average values occur in different years for each of the individual surface water outflows.

ET = evapotranspiration

Table 6.4-5. Estimated Annual Inflows to Groundwater in the Basin for the Current Water Budget (Under the 2014 Level of Development and Using 1925–2019 Rainfall)

Groundwater Inflow Component	Minimum	Maximum	Average	Percent of Total
Recharge from Precipitation	0	103,000	20,600	11%
Recharge from Streams	81,000	271,200	126,300	68%
Subsurface Inflow Beneath Castaic Dam	1,675	1,680	1,675	1%
Subsurface Inflow Beneath Santa Clara River and Other Tributaries	28,000	29,700	29,000	16%
Septic System Percolation	2,430	2,440	2,435	1%
Recharge of Applied Water	5,750	5,760	5,750	3%
Total	120,700	382,000	185,800	100%

Notes

All values are in units of acre-feet per year (AFY) and are for the 95-year model simulation period (which uses the historical rainfall record of water years 1925 through 2019). Percentages are calculated from the average values. All values are rounded from the statistics calculated in Table I-4 of Appendix I.

Deep percolation from irrigation is the sum for agricultural and municipal lands.

Septic system percolation applies to areas served by public water supplies that do not have public sewer collection systems.

For the minimum and maximum values, the total values shown in this table are not equal to the sum of the individual inflow terms because the minimum values of the individual terms occur in different years, and similarly for the maximum values.

6.4.3.2 Current Groundwater Outflows

Table 6.4-6 summarizes the average, minimum, and maximum values of the annual outflows (discharges) of groundwater from the Basin. As was seen in the historical water budget for water years 1925 through 2019 (shown in Table 6.3-6), groundwater discharges to streams are by far the largest source of groundwater outflows in the current water budget, with groundwater pumping being the second-largest outflow from the groundwater system. Annual groundwater withdrawals by phreatophytes are substantially lower than the other groundwater discharge mechanisms.

6.4.3.3 Changes in Groundwater Storage Under Current Conditions

The yellow line on Figure 6.4-2 shows how much the volume of stored groundwater changes progressively over time when simulating the effects of the 2014 level of development and water uses through the historical hydrologic record projected forward in time. Figure 6.4-2 shows that the occurrence of rising versus declining slopes in the modeled cumulative-change curve varies frequently during the 95-year historical period and has a shape that is generally similar to the cumulative-change curve for actual historical conditions during that 95-year period (Figure 6.3-3).

Close inspection of Figures 6.3-3 and 6.4-2 also shows that the downward slope of the cumulative-change curve during the drought period for 1945 through 1965 is greater under historical conditions (Figure 6.3-3) than under the 2014 level of development and water uses (Figure 6.4-2). This difference is attributable to the lesser amount of groundwater pumping from the Alluvial Aquifer under the 2014 land and water uses (38,131 AFY) than the approximately 50,000 AFY of pumping that is estimated to have actually occurred from the Alluvial Aquifer during the historical peak agricultural period.

6.4.4 Summary of Basin Condition Under the Current Water Budget

As with the historical water budget, the current water budget assessment for the 2014 level of development and water use in the Basin indicates that no long-term decline in the volume of stored groundwater would be expected to have arisen if the 2014 level of groundwater pumping had occurred throughout the past 95 years. This observation in turn indicates that the Basin likely would not be in an overdraft condition under a sustained level of pumping at the 2014 level of human demand for groundwater. Figure 6.4-3 shows that non-storm flows in the river during the agricultural period are higher when simulating the current (2014) conditions for development, groundwater pumping, and WRP discharges, compared with non-storm river flows under the actual historical pumping condition (Figure 6.3-4).

Table 6.4-6. Estimated Annual Groundwater Outflows from the Basin for the Current Water Budget (Under the 2014 Level of Development and Using 1925–2019 Rainfall)

Groundwater Outflow Component	Minimum	Maximum	Average	Percent of Total
Groundwater Pumping	49,235	49,340	49,260	26%
Riparian Evapotranspiration	5,000	9,150	7,050	4%
Groundwater Discharge to Streams	83,200	260,450	130,700	70%
Total	139,450	318,800	187,000	100%

Notes

All values are in units of acre-feet per year (AFY) and are for the 95-year model simulation period (which uses the historical rainfall record of water years 1925 through 2019). Percentages are calculated from the average values. All values are rounded from the statistics calculated in Table I-4 of Appendix I.

Groundwater discharge to streams is the combined amount in ephemeral and perennial reaches.

Subsurface outflow through the thin alluvial material beneath the river at the western boundary of the Basin is accounted for as outflow in the surface water budget because the historical and current stream gages are located further downstream where bedrock is thought to be at or just beneath the river channel, which causes most if not all subsurface water at the western basin boundary to appear in the river upstream of those gages.

The "percent of total" values are computed using the average values shown in this table.

For the minimum and maximum values, the total values shown in this table are not equal to the sum of the individual outflow terms because the minimum values of the individual terms occur in different years, and similarly for the maximum values.

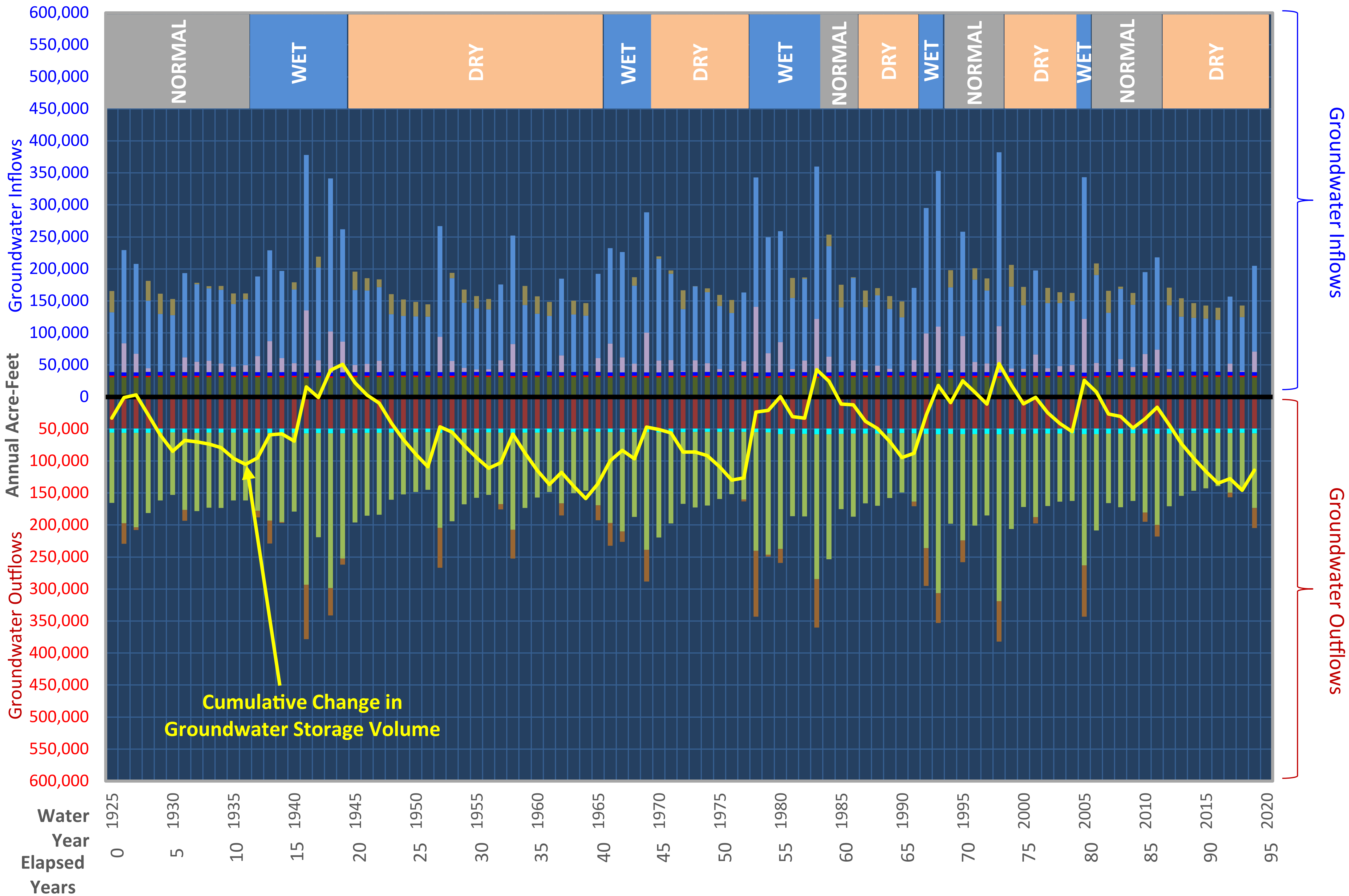

FIGURE 6.4-2

Current Groundwater Budget Under the 2014 Level of Development

Santa Clara River Valley East Groundwater Subbasin Groundwater Sustainability Plan

LEGEND

- Stream Gains
- Stream Losses
- Precipitation
- Ag+Muni Irrigation
- Subsurface Inflow in Tributaries
- Septic
- Pumping
- ET
- Groundwater Storage Increase
- Groundwater Storage Reduction

NOTES

This projected water budget is developed by projecting the 1925-2019 historical hydrology forward in time.
Ag: agriculture
Muni: municipal
ET: evapotranspiration

GSI Water Solutions, Inc.

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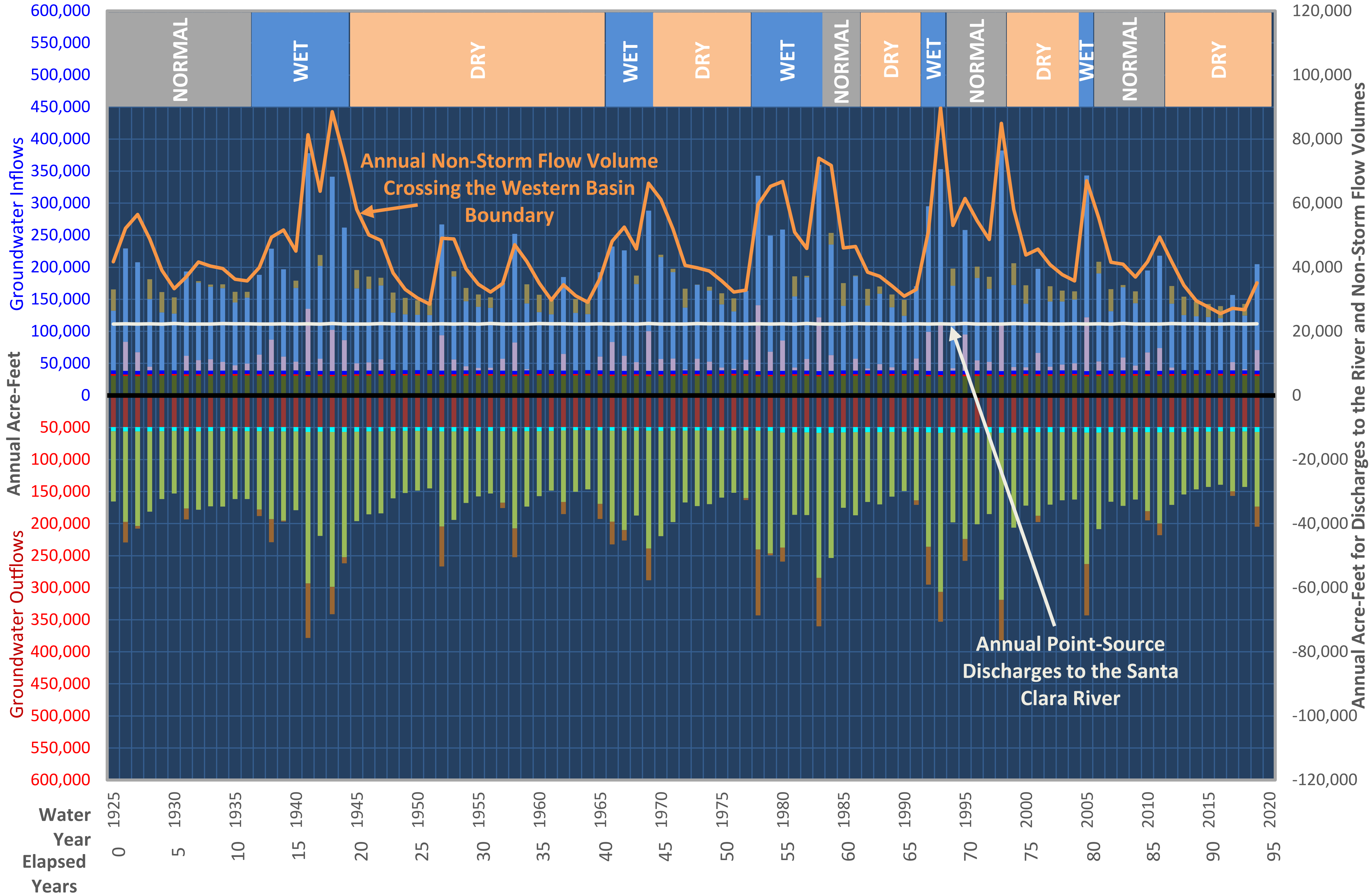

FIGURE 6.4-3

Current Groundwater Budget and Annual Non-Storm Flows at the Western Basin Boundary Under the 2014 Level of Development

Santa Clara River Valley
East Groundwater Subbasin
Groundwater Sustainability Plan

LEGEND

- Stream Gains
- Stream Losses
- Precipitation
- Ag+Muni Irrigation
- Subsurface Inflow in Tributaries
- Septic
- Pumping
- ET
- Groundwater Storage Increase
- Groundwater Storage Reduction

NOTES

This projected water budget is developed by projecting the 1925-2019 historical hydrology forward in time.
Ag: agriculture
Muni: municipal
ET: evapotranspiration

6.5 Projected Water Budget

As discussed in Section 6.2.2.3, three sets of projected water budgets are developed to quantify the estimated effects of future build-out conditions and climate change in the Basin. Section 6.5.1 presents the details of the water use scenario for these projected water budgets. Sections 6.5.2 through 6.5.4 present the three projected water budgets. Section 6.5.5 summarizes the projected basin conditions, and Section 6.5.6 discusses the uncertainties in the analysis.

6.5.1 Water Use Scenario for Future Projected Conditions

For all three projected water budgets, the water use scenario accounts for full build-out of land uses in the Basin, as identified in the SCAG and OVOV local land-use plans. The SCAG and OVOV full build-out volumes are incorporated into human water demand estimation during preparation of UWMPs for the Basin (KJC et al., 2016; KJ, 2021). The use of groundwater under these land-use plans is based on the existing Basin Operating Plan, which is described in the annual reports for the Basin and in the most recent (2020) and prior (2010 and 2015) UWMPs. The Basin Operating Plan calls for pumping as follows:

	Groundwater Production (AFY)			
	Normal Years	**Dry Year 1**	**Dry Year 2**	**Dry Year 3**
Alluvial Aquifer	30,000 to 40,000	30,000 to 35,000	30,000 to 35,000	30,000 to 35,000
Saugus Formation	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**

Note

AFY = acre-feet per year

The Basin Operating Plan is modeled for future projected conditions as follows:

	Groundwater Production (AFY)			
	Normal Years	**Dry Year 1**	**Dry Year 2**	**Dry Year 3**
Alluvial Aquifer	**37,193**	**32,500**	**32,500**	**32,500**
SCV Water, LACWD	30,783	26,090	26,090	26,090
FivePoint	3,459	3,459	3,459	3,459
Pitchess Detention Center	2,082	2,082	2,082	2,082
Sand Canyon Country Club (Robinson Ranch)	369	369	369	369
Small Domestic Pumpers	500	500	500	500
Saugus Formation	**11,100**	**20,000**	**25,000**	**35,000**
SCV Water	9,925	18,825	23,825	33,825
Whittaker-Bermite	500	500	500	500
Valencia Country Club and Vista Valencia Golf Course	675	675	675	675
Total Production	**48,293**	**52,500**	**57,500**	**67,500**

Notes

AFY = acre-feet per year

LACWD = Los Angeles County Waterworks District No. 36, Val Verde

SCV Water = Santa Clarita Valley Water Division

Basin-wide water demand and water usage for the projected future condition is modeled as follows:

	Annual Volume (AFY)			
	Normal Years	**Dry Year 1**	**Dry Year 2**	**Dry Year 3**
Municipal Users (SCV Water and LACWD)				
Annual Water Demand	**101,000**	**107,100**	**102,870**	**102,870**
Annual Water Use	**101,000**	**107,100**	**102,870**	**102,870**
Alluvial Aquifer	30,783	26,090	26,090	26,090
Saugus Formation	9,925	18,825	23,825	33,825
Recycled Water	8,961	8,961	8,961	8,961
Imported Water	51,331	53,224	43,994	33,994
Other Water Users (Pumping from the Alluvial Aquifer)				
Annual Water Use	**6,410**	**6,410**	**6,410**	**6,410**
FivePoint	3,459	3,459	3,459	3,459
Pitchess Detention Center	2,082	2,082	2,082	2,082
Sand Canyon Country Club (Robinson Ranch)	369	369	369	369
Small Domestic Pumpers	500	500	500	500
Other Water Users (Pumping from the Saugus Formation)				
Annual Water Use	**1,175**	**1,175**	**1,175**	**1,175**
Whittaker-Bermite	500	500	500	500
Valencia Country Club and Vista Valencia Golf Course	675	675	675	675
Total Groundwater Production				
Total Production	**48,293**	**52,500**	**57,500**	**67,500**
Alluvial Aquifer	37,193	32,500	32,500	32,500
Saugus Formation	11,100	20,000	25,000	35,000

Notes

Consistent with SCV Water's 2020 UWMP, pumping from the Saugus Formation may be higher during the first year of an SWP curtailment for the reasons described in Section 6.5.1.3.

AFY = acre-feet per year

LACWD = Los Angeles County Waterworks District No. 36, Val Verde

SCV Water = Santa Clarita Valley Water Division

In the water budget analyses for projected future conditions, the performance of the Basin is simulated by subjecting the Basin Operating Plan to future full build-out conditions for land and water uses while also (1) simulating a repeat of the 95-year historical hydrologic record (1925 through 2019) and then (2) further adjusting this hydrologic record to account for potential changes in climate at two future time frames (the years 2030 and 2070). The definition of normal versus dry years is governed by (1) local hydrologic (precipitation) conditions and Saugus Formation groundwater production volumes in the case of pumping from the Alluvial Aquifer and (2) the allocation amounts of imported water supplies in the case of pumping from the Saugus Formation. The year-to-year patterns of normal-year and dry-year pumping in the Alluvial Aquifer and the Saugus Formation are shown in Table 6.5-1 and discussed in Section 6.5.1.1 for the Saugus Formation and in Section 6.5.1.2 for the Alluvial Aquifer. The magnitudes of groundwater pumping by SCV Water and other groundwater users are discussed in Section 6.5.1.3, and the generation and use of recycled water is discussed in Section 6.5.1.4.

6.5.1.1 Variations in Normal-Year and Dry-Year Pumping (Saugus Formation)

The Basin Operating Plan draws upon the groundwater storage reserves of the Saugus Formation to augment imported supplies during drought years in the SWP system, then reduces Saugus Formation pumping at other times to facilitate the natural replenishment of those reserves. This operating plan is integral to the water resources plan for SCV that has been described in its 2020 and two prior (2010 and 2015) UWMPs.

As discussed in Section 6.1.1.3 and Section 6.3.2, SCV Water has acquired additional supplies of imported water that can be accessed when SWP supplies are curtailed. Accordingly, estimates of SWP deliveries to SCV Water under existing and future conditions in the SWP (as published by DWR in its biannual DCRs) by themselves do not reflect the full amount of imported supply that is available to SCV Water (from the SWP and other sources). Nonetheless, DWR's most recent DCR (DWR, 2020) was used as the basis for identifying the sequence of normal-year and dry-year pumping from the Saugus Formation in the projected water budget, given that the DCR provides a direct and easy-to-understand mechanism for defining the sequence of SWP availability and hence pumping patterns in the Saugus Formation. Table 6.5-2 shows the relationship of SWP deliveries to the definition of Saugus Formation pumping year types, based on (1) SWP delivery estimates for SCV Water that are published in the Final 2019 DCR for the period of 1922 through 2003 and (2) the actual availability to SCV Water of SWP supplies during the period of 2004 through 2019. As shown in Table 6.5-2, it is estimated that approximately 24 of the past 98 years of the historical record (from 1922 through 2019) could have been characterized as years when Saugus pumping would be at dry-year rates, including four dry-year periods lasting between 3 and 7 years, one dry-year period lasting 2 years, and a single dry year (1977) when the allocation would have been about 11 percent or less and thereby warranted pumping the Saugus Formation at its Dry Year 3 rate. In addition to the 24 dry years, another 12 years would have been transitional (post-drought) years in which pumping would have remained at dry-year rates during the winter and early spring and then would have been returned to normal-year rates in May or June once SWP delivery volumes were better known for the remainder of the calendar year.

6.5.1.2 Variations in Normal-Year and Dry-Year Pumping (Alluvial Aquifer)

The sequence of normal-year and dry-year pumping from the Alluvial Aquifer is shown in Table 6.5-3. The determination of the year type in any given year is based primarily on the amount of rainfall that occurred in the basin during the prior year. A dry year for Alluvial Aquifer pumping is considered to occur when annual rainfall during the prior year is less than 85 percent of the long-term average rainfall.

The year type for the Alluvial Aquifer factors into the geographic distribution of pumping from this aquifer. Two geographic distributions are used in the projected water budget, as shown in Table 6.5-3. A normal-year distribution of pumping occurs when the local hydrology is normal or wet, as long as the Saugus Formation is not being pumped above its normal-year rate. During years when the local hydrology is dry and/or when the Saugus Formation is pumped above its normal-year rate, the geographic distribution of pumping from the Alluvial Aquifer is based on the geographic distribution that occurred in 2014, which was characterized by reducing pumping in the eastern portion of the Alluvial Aquifer (east of the Bouquet Canyon Road crossing of the Santa Clara River) and increasing pumping in the central portion of the Alluvial Aquifer (between the Bouquet Canyon Road bridge crossing and I-5). While the **geographic distribution** of pumping from the Alluvial Aquifer is determined by the year type and by the Saugus pumping rate, the **total volume** of pumping from the Alluvial Aquifer in any given year is based solely on the amount of pumping occurring from the Saugus Formation.

Table 6.5-1. Year Types for Groundwater Pumping (Calendar Years 1925–2019)

Calendar Year	Year Type for Groundwater Pumping from the Alluvial Aquifer	Year Type for Groundwater Pumping from the Saugus Formation
1925	Dry Year 2	Dry Year 2
1926	Dry Year 3	Dry Year 3
1927	Normal	Post-Drought
1928	Normal	Normal
1929	Dry Year 1	Dry Year 1
1930	Dry Year 2	Dry Year 2
1931	Dry Year 3	Dry Year 3
1932	Normal	Dry Year 4
1933	Dry Year 1	Dry Year 5
1934	Normal	Dry Year 6
1935	Dry Year 1	Post-Drought
1936	Dry Year 2	Normal
1937	Normal	Normal
1938	Normal	Normal
1939	Normal	Normal
1940	Dry Year 1	Normal
1941	Normal	Normal
1942	Normal	Normal
1943	Dry Year 1	Normal
1944	Normal	Normal
1945	Normal	Normal
1946	Normal	Normal
1947	Normal	Normal
1948	Dry Year 1	Normal
1949	Dry Year 2	Dry Year 1
1950	Dry Year 3	Post-Drought
1951	Dry Year 4	Normal
1952	Dry Year 5	Normal
1953	Normal	Normal
1954	Dry Year 1	Normal
1955	Dry Year 2	Dry Year 1
1956	Dry Year 3	Post-Drought
1957	Dry Year 4	Normal
1958	Dry Year 5	Normal
1959	Normal	Normal
1960	Dry Year 1	Normal
1961	Dry Year 2	Dry Year 1
1962	Dry Year 3	Post-Drought
1963	Dry Year 4	Normal

Table 6.5-1. Year Types for Groundwater Pumping (Calendar Years 1925–2019)

Calendar Year	Year Type for Groundwater Pumping from the Alluvial Aquifer	Year Type for Groundwater Pumping from the Saugus Formation
1964	Dry Year 5	Normal
1965	Dry Year 6	Normal
1966	Normal	Normal
1967	Dry Year 1	Normal
1968	Normal	Normal
1969	Dry Year 1	Normal
1970	Normal	Normal
1971	Normal	Normal
1972	Dry Year 1	Normal
1973	Dry Year 2	Normal
1974	Dry Year 3	Normal
1975	Dry Year 4	Normal
1976	Dry Year 5	Normal
1977	Dry Year 6	Dry Year 3
1978	Dry Year 7	Post-Drought
1979	Normal	Normal
1980	Normal	Normal
1981	Normal	Normal
1982	Dry Year 1	Normal
1983	Normal	Normal
1984	Normal	Normal
1985	Dry Year 1	Normal
1986	Dry Year 2	Normal
1987	Dry Year 3	Normal
1988	Dry Year 4	Dry Year 1
1989	Dry Year 5	Post-Drought
1990	Dry Year 6	Dry Year 2
1991	Dry Year 7	Dry Year 3
1992	Dry Year 8	Dry Year 4
1993	Normal	Post-Drought
1994	Normal	Dry Year 5
1995	Dry Year 1	Post-Drought
1996	Normal	Normal
1997	Normal	Normal
1998	Dry Year 1	Normal
1999	Normal	Normal
2000	Dry Year 1	Normal
2001	Dry Year 2	Dry Year 1
2002	Dry Year 3	Post-Drought

Table 6.5-1. Year Types for Groundwater Pumping (Calendar Years 1925–2019)

Calendar Year	Year Type for Groundwater Pumping from the Alluvial Aquifer	Year Type for Groundwater Pumping from the Saugus Formation
2003	Dry Year 4	Normal
2004	Dry Year 5	Normal
2005	Normal	Normal
2006	Normal	Normal
2007	Dry Year 1	Normal
2008	Dry Year 2	Dry Year 1
2009	Dry Year 3	Dry Year 2
2010	Dry Year 4	Post-Drought
2011	Normal	Normal
2012	Normal	Normal
2013	Dry Year 1	Normal
2014	Dry Year 2	Dry Year 1
2015	Dry Year 3	Dry Year 2
2016	Dry Year 4	Dry Year 3
2017	Dry Year 5	Post-Drought
2018	Dry Year 6	Normal
2019	Dry Year 7	Normal

Notes

Information is presented on a calendar-year basis, to be consistent with information presented by DWR for SWP delivery reliability (which determines the year type for pumping from the Saugus Formation).

DWR = California Department of Water Resources

SWP = State Water Project

Tan = local dry year, which has a different geographic distribution of pumping than normal years in the case of the Alluvial Aquifer, and which dictates the rate of pumping in the case of the Saugus Formation. The annual pumping volume from the Alluvial Aquifer in any given year is based on the year type for the Saugus Formation.

Blue = year of increased SWP deliveries and a return to normal-year pumping from the Saugus Formation by May or June.

Table 6.5-2. SWP Deliveries and Relationship to Future Saugus Formation Pumping

Historical Calendar Year	Historical SWP Hydrology	SWP Deliveries to SCV Water (Percent of Max. Table A + Article 56 Deliveries)[a]		Saugus Formation Pumping Year Type	
		Existing Conditions	Future Conditions		
1922	Above Normal	49%	47%	Normal	
1923	Below Normal	75%	91%	Normal	
1924	Critical	32%	27%	Dry Year 1	
1925	Dry	26%	33%	Dry Year 2	3-Year Dry Period (1924-1926)
1926	Dry	39%	29%	Dry Year 3	
1927	Wet	53%	57%	Post-Drought	
1928	Above Normal	76%	67%	Normal	
1929	Critical	48%	37%	Dry Year 1	
1930	Dry	14%	23%	Dry Year 2	
1931	Critical	37%	37%	Dry Year 3	
1932	Dry	29%	14%	Dry Year 4	6-Year Dry Period (1929-1934)
1933	Critical	38%	39%	Dry Year 5	
1934	Critical	20%	14%	Dry Year 6	
1935	Below Normal	42%	55%	Post-Drought	
1936	Below Normal	54%	57%	Normal	
1937	Below Normal	52%	57%	Normal	
1938	Wet	79%	66%	Normal	
1939	Dry	88%	82%	Normal	
1940	Above Normal	49%	56%	Normal	
1941	Wet	60%	52%	Normal	
1942	Wet	85%	57%	Normal	
1943	Wet	80%	65%	Normal	
1944	Dry	43%	46%	Normal	
1945	Below Normal	53%	53%	Normal	
1946	Below Normal	73%	65%	Normal	
1947	Dry	56%	52%	Normal	
1948	Below Normal	46%	53%	Normal	
1949	Dry	39%	26%	Dry Year 1	Single Dry Year
1950	Below Normal	48%	51%	Post-Drought	
1951	Above Normal	48%	54%	Normal	
1952	Wet	80%	73%	Normal	
1953	Wet	99%	60%	Normal	
1954	Above Normal	65%	58%	Normal	
1955	Dry	41%	45%	Dry Year 1	Single Dry Year
1956	Wet	47%	55%	Post-Drought	
1957	Above Normal	93%	73%	Normal	
1958	Wet	54%	63%	Normal	
1959	Below Normal	94%	57%	Normal	
1960	Dry	52%	32%	Normal	
1961	Dry	37%	42%	Dry Year 1	Single Dry Year
1962	Below Normal	49%	55%	Post-Drought	
1963	Wet	58%	63%	Normal	
1964	Dry	64%	58%	Normal	
1965	Wet	60%	56%	Normal	
1966	Below Normal	51%	58%	Normal	
1967	Wet	75%	54%	Normal	
1968	Below Normal	99%	85%	Normal	
1969	Wet	58%	58%	Normal	
1970	Wet	74%	67%	Normal	
1971	Wet	77%	50%	Normal	
1972	Below Normal	59%	42%	Normal	
1973	Above Normal	62%	58%	Normal	
1974	Wet	70%	74%	Normal	
1975	Wet	95%	81%	Normal	
1976	Critical	73%	48%	Normal	
1977	Critical	7%	11%	Dry Year 3	Single Critical Dry Year (1977)
1978	Above Normal	42%	56%	Post-Drought	
1979	Below Normal	94%	48%	Normal	
1980	Above Normal	62%	54%	Normal	
1981	Dry	83%	70%	Normal	
1982	Wet	52%	56%	Normal	
1983	Wet	77%	68%	Normal	
1984	Wet	73%	78%	Normal	
1985	Dry	53%	81%	Normal	
1986	Wet	61%	54%	Normal	
1987	Dry	62%	35%	Normal	
1988	Critical	12%	11%	Dry Year 1	
1989	Dry	50%	55%	Post-Drought	
1990	Critical	13%	14%	Dry Year 2	
1991	Critical	26%	22%	Dry Year 3	7-Year Dry Period (1988-1994)
1992	Critical	18%	20%	Dry Year 4	
1993	Above Normal	54%	57%	Post-Drought	
1994	Critical	45%	32%	Dry Year 5	
1995	Wet	51%	56%	Post-Drought	

Table 6.5-2. SWP Deliveries and Relationship to Future Saugus Formation Pumping

Historical Calendar Year	Historical SWP Hydrology	SWP Deliveries to SCV Water (Percent of Max. Table A + Article 56 Deliveries)[a]		Saugus Formation Pumping Year Type	
		Existing Conditions	Future Conditions		
1996	Wet	57%	56%	Normal	
1997	Wet	71%	72%	Normal	
1998	Wet	84%	68%	Normal	
1999	Wet	100%	100%	Normal	
2000	Above Normal	66%	86%	Normal	
2001	Dry	58%	18%	Dry Year 1	Single Dry Year
2002	Dry	41%	43%	Post-Drought	
2003	Above Normal	49%	52%	Normal	
2004	Below Normal / Dry	65%		Normal	
2005	Wet / Above Normal	90%		Normal	
2006	Wet / Wet	100%		Normal	
2007	Dry / Critical	60%		Normal	
2008	Critical	35%		Dry Year 1	2-Year Dry Period (2008-2009)
2009	Dry	40%		Dry Year 2	
2010	Below Normal	50%		Post-Drought	
2011	Wet	80%		Normal	
2012		65%		Normal	
2013		35%		Normal	
2014		5%		Dry Year 1	3-Year Dry Period (2014-2016)
2015		20%		Dry Year 2	
2016		60%		Dry Year 3	
2017		85%		Post-Drought	
2018		35%		Normal	
2019		75%		Normal	

Notes

[a]Delivery values for calendar years 1922 through 2003 are from the document *Technical Addendum to The State Water Project Final Delivery Capability Report 2019* (DWR, August 26, 2020); see Table A-7 for existing conditions and Table B-9 for future (2035) conditions. The percentages for those years are from CALSIM II simulations and reported by DWR for the sum of Table A Water and Article 56 water (the latter of which consists of carryover water from the prior year). Values in calendar years 2004 through 2019 are not simulated by CALSIM II but instead are the percentages of Table A water that were available to SCV Water during those years (excluding Article 56 water). In any given future year, actual deliveries may include carryover water from the prior year (Article 56 deliveries) and/or turnback-pool water.

SCV Water = Santa Clarita Valley Water Agency SWP = State Water Project

Tan = significant curtailment year in the SWP, and therefore a year of increased pumping from the Saugus Formation.

Blue = year of increased SWP deliveries and a return to normal-year pumping from the Saugus Formation by May or June.

Table 6.5-3. Derivation of Year Types for Geographic Distribution of Pumping in the Alluvial Aquifer (Calendar Years 1925–2019)

Calendar Year	Precipitation (inches)	Year Type for Alluvial Aquifer Pumping	Logic	Geographic Distribution of Alluvial Aquifer Pumping
1922	31.07	Normal	Assume normal-year pumping	Historical Normal Years
1923	13.63	Normal	Rainfall is well above normal; assume normal-year pumping	Historical Normal Years
1924	8.01	Dry Year 1	Prior-year rainfall is modestly below normal; drought begins	Historical Dry Year 2014
1925	7.49	Dry Year 2	Prior-year rainfall is below normal	Historical Dry Year 2014
1926	25.53	Dry Year 3	Prior-year rainfall is below normal	Historical Dry Year 2014
1927	23.66	Normal	Prior-year rainfall is well above normal; resume normal-year pumping	Historical Normal Years
1928	11.24	Normal	Prior-year rainfall is above normal; continue normal-year pumping	Historical Normal Years
1929	9.04	Dry Year 1	Prior-year rainfall is modestly below normal; drought begins	Historical Dry Year 2014
1930	13.98	Dry Year 2	Prior-year rainfall is below normal	Historical Dry Year 2014
1931	24.41	Dry Year 3	Prior-year rainfall is below normal	Historical Dry Year 2014
1932	13.73	Normal	Prior-year rainfall is well above normal, but Saugus is pumping at dry-year rates	Historical Dry Year 2014
1933	20.52	Dry Year 1	Prior-year rainfall is modestly below normal; drought begins	Historical Dry Year 2014
1934	18.05	Normal	Prior-year rainfall is modestly above normal, but Saugus is pumping at dry-year rates	Historical Dry Year 2014
1935	12.21	Dry Year 1	Prior-year rainfall is only modestly above normal; dry-year pumping continues	Historical Dry Year 2014
1936	20.47	Dry Year 2	Prior-year rainfall is below normal	Historical Dry Year 2014
1937	17.92	Normal	Prior-year rainfall is modestly above normal; resume normal-year pumping	Historical Normal Years
1938	32.75	Normal	Prior-year rainfall is normal; resume normal-year pumping	Historical Normal Years
1939	11.27	Normal	Prior-year rainfall is substantially above normal; resume normal-year pumping	Historical Normal Years
1940	21.37	Dry Year 1	Prior-year rainfall is modestly below normal; drought begins	Historical Dry Year 2014
1941	42.14	Normal	Prior-year rainfall is modestly above normal; resume normal-year pumping	Historical Normal Years
1942	7.10	Normal	Prior-year rainfall is substantially above normal; resume normal-year pumping	Historical Normal Years
1943	37.03	Dry Year 1	Prior-year rainfall is substantially below normal; drought begins	Historical Dry Year 2014
1944	24.63	Normal	Prior-year rainfall is substantially above normal; resume normal-year pumping	Historical Normal Years
1945	14.56	Normal	Prior-year rainfall is above normal; continue normal-year pumping	Historical Normal Years
1946	21.71	Normal	Prior-year rainfall is slightly below normal; continue normal-year pumping	Historical Normal Years
1947	4.16	Normal	Prior-year rainfall is above normal; continue normal-year pumping	Historical Normal Years
1948	9.13	Dry Year 1	Prior-year rainfall is substantially below normal; drought begins	Historical Dry Year 2014
1949	9.93	Dry Year 2	Prior-year rainfall is below normal	Historical Dry Year 2014
1950	6.84	Dry Year 3	Prior-year rainfall is below normal	Historical Dry Year 2014
1951	12.42	Dry Year 4	Prior-year rainfall is below normal	Historical Dry Year 2014
1952	34.19	Dry Year 5	Prior-year rainfall is below normal	Historical Dry Year 2014
1953	4.88	Normal	Prior-year rainfall is substantially above normal; resume normal-year pumping	Historical Normal Years
1954	15.82	Dry Year 1	Prior-year rainfall is substantially below normal; drought begins	Historical Dry Year 2014
1955	13.91	Dry Year 2	Prior-year rainfall is below normal	Historical Dry Year 2014
1956	14.21	Dry Year 3	Prior-year rainfall is below normal	Historical Dry Year 2014
1957	22.85	Dry Year 4	Prior-year rainfall is below normal	Historical Dry Year 2014
1958	23.14	Dry Year 5	Prior-year rainfall is only modestly above normal; dry-year pumping continues	Historical Dry Year 2014
1959	9.81	Normal	Second year of modestly above normal rainfall; resume normal-year pumping	Historical Normal Years
1960	11.64	Dry Year 1	Prior-year rainfall is substantially below normal; drought begins	Historical Dry Year 2014
1961	8.82	Dry Year 2	Prior-year rainfall is below normal	Historical Dry Year 2014
1962	21.22	Dry Year 3	Prior-year rainfall is below normal	Historical Dry Year 2014
1963	12.79	Dry Year 4	Prior-year rainfall is only modestly above normal; dry-year pumping continues	Historical Dry Year 2014
1964	10.09	Dry Year 5	Prior-year rainfall is below normal	Historical Dry Year 2014
1965	32.28	Dry Year 6	Prior-year rainfall is below normal	Historical Dry Year 2014
1966	14.57	Normal	Prior-year rainfall is substantially above normal; resume normal-year pumping	Historical Normal Years
1967	23.23	Dry Year 1	Prior-year rainfall is modestly below normal; drought begins	Historical Dry Year 2014
1968	6.90	Normal	Second year of modestly above normal rainfall; resume normal-year pumping	Historical Normal Years
1969	32.42	Dry Year 1	Prior-year rainfall is below normal	Historical Dry Year 2014
1970	23.19	Normal	Prior-year rainfall is substantially above normal; resume normal-year pumping	Historical Normal Years
1971	13.75	Normal	Prior-year rainfall is above normal; continue normal-year pumping	Historical Normal Years
1972	4.15	Dry Year 1	Prior-year rainfall is modestly below normal; drought begins	Historical Dry Year 2014
1973	19.79	Dry Year 2	Prior-year rainfall is below normal	Historical Dry Year 2014
1974	18.04	Dry Year 3	Prior-year rainfall is only modestly above normal; dry-year pumping continues	Historical Dry Year 2014
1975	10.92	Dry Year 4	Prior-year rainfall is only modestly above normal; dry-year pumping continues	Historical Dry Year 2014
1976	14.02	Dry Year 5	Prior-year rainfall is below normal	Historical Dry Year 2014
1977	20.87	Dry Year 6	Prior-year rainfall is below normal	Historical Dry Year 2014
1978	42.17	Dry Year 7	Prior-year rainfall is only modestly above normal; dry-year pumping continues	Historical Dry Year 2014
1979	21.47	Normal	Prior-year rainfall is substantially above normal; resume normal-year pumping	Historical Normal Years
1980	24.32	Normal	Prior-year rainfall is above normal; continue normal-year pumping	Historical Normal Years
1981	13.42	Normal	Prior-year rainfall is above normal; continue normal-year pumping	Historical Normal Years
1982	20.20	Dry Year 1	Prior-year rainfall is modestly below normal; drought begins	Historical Dry Year 2014
1983	39.07	Normal	Prior-year rainfall is modestly above normal; resume normal-year pumping	Historical Normal Years
1984	12.86	Normal	Prior-year rainfall is above normal; continue normal-year pumping	Historical Normal Years
1985	8.37	Dry Year 1	Prior-year rainfall is modestly below normal; drought begins	Historical Dry Year 2014
1986	18.02	Dry Year 2	Prior-year rainfall is below normal	Historical Dry Year 2014
1987	14.45	Dry Year 3	Prior-year rainfall is only slightly above normal; dry-year pumping continues	Historical Dry Year 2014
1988	16.92	Dry Year 4	Prior-year rainfall is modestly below normal; drought begins	Historical Dry Year 2014
1989	7.56	Dry Year 5	Prior-year rainfall is below normal	Historical Dry Year 2014
1990	6.98	Dry Year 6	Prior-year rainfall is below normal	Historical Dry Year 2014
1991	17.21	Dry Year 7	Prior-year rainfall is below normal	Historical Dry Year 2014
1992	32.03	Dry Year 8	Prior-year rainfall is near normal; dry-year pumping continues	Historical Dry Year 2014
1993	31.50	Normal	Prior-year rainfall is substantially above normal; resume normal-year pumping	Historical Normal Years
1994	10.27	Normal	Prior-year rainfall is above normal; continue normal-year pumping	Historical Normal Years
1995	29.15	Dry Year 1	Prior-year rainfall is substantially below normal; drought begins	Historical Dry Year 2014
1996	15.79	Normal	Prior-year rainfall is substantially above normal; resume normal-year pumping	Historical Normal Years
1997	7.11	Normal	Prior-year rainfall is near normal; normal-year pumping continues	Historical Normal Years
1998	28.19	Dry Year 1	Prior-year rainfall is substantially below normal; drought begins	Historical Dry Year 2014
1999	8.96	Normal	Prior-year rainfall is substantially above normal; resume normal-year pumping	Historical Normal Years
2000	13.64	Dry Year 1	Prior-year rainfall is substantially below normal; drought begins	Historical Dry Year 2014
2001	18.81	Dry Year 2	Prior-year rainfall is below normal	Historical Dry Year 2014
2002	7.83	Dry Year 3	Prior-year rainfall is only slightly above normal; dry-year pumping continues	Historical Dry Year 2014
2003	15.58	Dry Year 4	Prior-year rainfall is below normal	Historical Dry Year 2014
2004	22.79	Dry Year 5	Prior-year rainfall is below normal	Historical Dry Year 2014
2005	37.15	Normal	Prior-year rainfall is modestly above normal; resume normal-year pumping	Historical Normal Years
2006	13.89	Normal	Prior-year rainfall is substantially above normal; continue normal-year pumping	Historical Normal Years
2007	5.78	Dry Year 1	Prior-year rainfall is modestly below normal; drought begins	Historical Dry Year 2014

Table 6.5-3. Derivation of Year Types for Geographic Distribution of Pumping in the Alluvial Aquifer (Calendar Years 1925–2019)

Calendar Year	Precipitation (inches)	Year Type for Alluvial Aquifer Pumping	Logic	Geographic Distribution of Alluvial Aquifer Pumping
2008	18.21	Dry Year 2	Prior-year rainfall is below normal	Historical Dry Year 2014
2009	11.59	Dry Year 3	Prior-year rainfall is only slightly above normal; dry-year pumping continues	Historical Dry Year 2014
2010	24.32	Dry Year 4	Prior-year rainfall is below normal	Historical Dry Year 2014
2011	16.03	Normal	Prior-year rainfall is modestly above normal; resume normal-year pumping	Historical Normal Years
2012	8.95	Normal	Prior-year rainfall is slightly below normal; normal-year pumping continues	Historical Normal Years
2013	3.75	Dry Year 1	Prior-year rainfall is substantially below normal; drought begins	Historical Dry Year 2014
2014	13.27	Dry Year 2	Prior-year rainfall is below normal	Historical Dry Year 2014
2015	6.06	Dry Year 3	Prior-year rainfall is below normal	Historical Dry Year 2014
2016	13.35	Dry Year 4	Prior-year rainfall is below normal	Historical Dry Year 2014
2017	14.88	Dry Year 5	Prior-year rainfall is below normal	Historical Dry Year 2014
2018	12.68	Dry Year 6	Prior-year rainfall is below normal	Historical Dry Year 2014
2019	23.75	Dry Year 7	Prior-year rainfall is below normal	Historical Dry Year 2014
Average (1925-2019)	**17.26**		**Number of Years with Normal Geographic Distribution**	**31 of 95 Years**
Median (1925-2019)	**14.57**		**Number of Years with 2014 Geographic Distribution**	**64 of 95 Years**
85% of Average	**14.67**			
115% of Average	**19.85**			

Notes

For Alluvial Aquifer pumping, the first dry year occurs when rainfall is below 85% of the median rainfall.

Information in this table is presented on a calendar-year basis, to facilitate comparison with the yearly sequence for the Saugus Formation (in Tables 6.5-1 and 6.5-2).

Tan = local dry year, which has a different geographic distribution of pumping than normal years in the case of the Alluvial Aquifer.
The annual pumping volume from the Alluvial Aquifer in any given year is based on the year type for the Saugus Formation.

Orange = Prior-year rainfall is well above normal, but the geographic distribution of Alluvial Aquifer pumping is the dry-year distribution because the Saugus Formation is pumping at dry-year rates.

6.5.1.3 Projected Groundwater Pumping Volumes and Uses

The primary aspects of water use that are simulated in the groundwater flow model for full build-out conditions in the Basin are (1) groundwater pumping under the Basin Operating Plan; (2) retirement of agricultural lands in the Basin, with the exception of the Disney Corporation; (3) construction of new urban developments as identified in local land-use plans; and (4) recycled water uses and discharges of treated water from WRPs into the Santa Clara River. Table 6.5-4 shows the distribution of pumping by water-use sector for each aquifer and year type, and Table 6.5-5 shows the year-by-year amounts of pumping from the two principal aquifers (the Alluvial Aquifer and the Saugus Formation) in the projected water budget. Specific details regarding the design of the water-use scenario for full build-out conditions are as follows:

- Groundwater pumping from the Alluvial Aquifer during normal years is 37,193 AFY. During years of increased Saugus Formation pumping (as a result of curtailments of SWP supplies), municipal pumping from the Alluvial Aquifer is reduced by 4,693 AFY, which results in 32,500 AFY of total pumping from this aquifer. Additional aspects of Alluvial Aquifer pumping in the projected water budgets are as follows:
  - Consistent with the Newhall Ranch Specific Plan (Impact Sciences, 2003) and other agreements, groundwater pumping from Alluvial Aquifer irrigation wells owned by Newhall Land is reduced by 7,038 AFY. Corresponding adjustments to municipal pumping are shown in Table 6.5-4. These changes in pumping are assumed to involve the decommissioning of some or all of Newhall Land's existing C and E series of wells located along and near the lower portion of the alluvial valley that includes Castaic Creek, to be replaced by pumping from existing and future SCV Water wells.
  - Newhall Land continues pumping, on average, an assumed 3,459 AFY of Alluvial Aquifer groundwater from its B series wells, which are the furthest west of its existing agricultural supply wells. This water is assumed to be conveyed out of the Basin to land parcels owned by Newhall Land in the Piru Basin.
- Groundwater pumping from the Saugus Formation during normal years is 11,100 AFY, which consists of the actual 2014 historical groundwater pumping volume (10,600 AFY) plus an assumed 500 AFY of pumping for containment and treatment of a contaminant plume on the Whittaker-Bermite property (near the mouth of the South Fork Santa Clara River). During the first, second, third and ongoing years of increased Saugus pumping, total pumping from this aquifer is capped at volumes of 20,000 AFY, 25,000 AFY, and 35,000 AFY, respectively, which includes the 500 AFY of site remediation pumping occurring on the Whittaker-Bermite property. If the first year of increased Saugus pumping is a year of an especially significant curtailment in SWP water deliveries, as occurred in 1977, then SCV Water may elect to pump as much as 33,825 AFY from the Saugus Formation during the first year of SWP curtailments (resulting in 35,000 AFY of total pumping from the Saugus Formation) and then reduce Saugus pumping in one or more subsequent years if the curtailment persists. Saugus pumping at a basin-wide rate of 35,000 AFY would include operating at least six new wells, two of which are currently in final design and are awaiting approval from the California Division of Drinking Water.
- Newhall Land's agricultural lands in the Basin are retired, with no further irrigation for agricultural purposes except by the Disney Corporation, which pumps localized Saugus Formation groundwater along the southern margin of the Basin. Irrigation for urban uses occurs inside Newhall Ranch, in four other communities being developed by Newhall Land, and in other currently undeveloped areas identified in local land-use plans for future development.
- The treatment system that is currently treating groundwater pumped from the Whittaker-Bermite property discharges 500 AFY of treated water to the Santa Clara River at its existing outfall, located about 1 mile upstream of the Saugus WRP.

Table 6.5-4. Annual Municipal and Non-Municipal Groundwater Pumping by Water Use Sector for the Current and Projected Water Budgets in the Basin

			Future			
Groundwater Pumpers	**Type of Water Use**	**Current Conditions**	**Normal Years**	**Dry Year 1**	**Dry Year 2**	**Dry Year 3+**
Alluvial Aquifer						
Municipal	Municipal	24,687	30,783	26,090	26,090	26,090
FivePoint	Agricultural	10,497	3,459	3,459	3,459	3,459
Pitchess	Small Public Water System	2,082	2,082	2,082	2,082	2,082
Robinson Ranch	Golf Course	369	369	369	369	369
Domestic	Domestic	500	500	500	500	500
	Subtotal	**38,135**	**37,193**	**32,500**	**32,500**	**32,500**
Saugus Formation						
Municipal	Municipal	9,925	9,925	18,825	23,825	33,825
Valencia Country Club & Vista Valencia	Golf Course	675	675	675	675	675
Whittaker-Bermite	Site Remediation	500	500	500	500	500
	Subtotal	**11,100**	**11,100**	**20,000**	**25,000**	**35,000**
Alluvial Aquifer and Saugus Formation Combined						
	TOTAL	**49,235**	**48,293**	**52,500**	**57,500**	**67,500**

Notes

All values are in units of acre-feet per year (AFY) and are for 365-day years. Values will be higher in leap years.
Municipal supplies are currently provided by SCV Water and Los Angeles County Water Works District 36 (LACWD).
Municipal water demands include all commercial and industrial water uses in the Santa Clarita Valley.
FivePoint is the successor in interest to The Newhall Land and Farming Company. Pitchess refers to the Pitchess Detention Center.

Table 6.5-5. Annual Groundwater Pumping from the Two Principal Aquifers in the 95-Year Model Simulation for the Projected Water Budgets

	Year Type		Alluvial Aquifer Pumping			Saugus Formation Pumping			
Calendar Year	Alluvial Aquifer	Saugus Formation	Municipal Pumping	Pumping by Other Users	Total	Municipal Pumping	Pumping by Other Users	Total	Total Pumping
1925	Dry Year 2	Dry Year 2	26,090	6,410	32,500	23,825	1,175	25,000	57,500
1926	Dry Year 3	Dry Year 3	26,090	6,410	32,500	33,825	1,175	35,000	67,500
1927	Normal	Post-Drought	30,783	6,410	37,193	20,008	1,175	21,183	58,376
1928	Normal	Normal	30,849	6,422	37,271	9,952	1,177	11,129	48,400
1929	Dry Year 1	Dry Year 1	26,090	6,410	32,500	18,825	1,175	20,000	52,500
1930	Dry Year 2	Dry Year 2	26,090	6,410	32,500	23,825	1,175	25,000	57,500
1931	Dry Year 3	Dry Year 3	26,090	6,410	32,500	33,825	1,175	35,000	67,500
1932	Normal	Dry Year 4	26,146	6,422	32,568	33,904	1,177	35,081	67,649
1933	Dry Year 1	Dry Year 5	26,090	6,410	32,500	33,825	1,175	35,000	67,500
1934	Normal	Dry Year 6	26,090	6,410	32,500	33,825	1,175	35,000	67,500
1935	Dry Year 1	Post-Drought	30,783	6,410	37,193	20,008	1,175	21,183	58,376
1936	Dry Year 2	Normal	30,849	6,422	37,271	9,952	1,177	11,129	48,400
1937	Normal	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
1938	Normal	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
1939	Normal	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
1940	Dry Year 1	Normal	30,849	6,422	37,271	9,952	1,177	11,129	48,400
1941	Normal	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
1942	Normal	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
1943	Dry Year 1	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
1944	Normal	Normal	30,849	6,422	37,271	9,952	1,177	11,129	48,400
1945	Normal	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
1946	Normal	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
1947	Normal	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
1948	Dry Year 1	Normal	30,849	6,422	37,271	9,952	1,177	11,129	48,400
1949	Dry Year 2	Dry Year 1	26,090	6,410	32,500	18,825	1,175	20,000	52,500
1950	Dry Year 3	Post-Drought	30,783	6,410	37,193	15,867	1,175	17,042	54,235
1951	Dry Year 4	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
1952	Dry Year 5	Normal	30,849	6,422	37,271	9,952	1,177	11,129	48,400
1953	Normal	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
1954	Dry Year 1	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
1955	Dry Year 2	Dry Year 1	26,090	6,410	32,500	18,825	1,175	20,000	52,500
1956	Dry Year 3	Post-Drought	30,849	6,422	37,271	15,924	1,177	17,101	54,372
1957	Dry Year 4	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
1958	Dry Year 5	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
1959	Normal	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
1960	Dry Year 1	Normal	30,849	6,422	37,271	9,952	1,177	11,129	48,400
1961	Dry Year 2	Dry Year 1	26,090	6,410	32,500	18,825	1,175	20,000	52,500
1962	Dry Year 3	Post-Drought	30,783	6,410	37,193	15,867	1,175	17,042	54,235
1963	Dry Year 4	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
1964	Dry Year 5	Normal	30,849	6,422	37,271	9,952	1,177	11,129	48,400
1965	Dry Year 6	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
1966	Normal	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
1967	Dry Year 1	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
1968	Normal	Normal	30,849	6,422	37,271	9,952	1,177	11,129	48,400
1969	Dry Year 1	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
1970	Normal	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
1971	Normal	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
1972	Dry Year 1	Normal	30,849	6,422	37,271	9,952	1,177	11,129	48,400
1973	Dry Year 2	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
1974	Dry Year 3	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
1975	Dry Year 4	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
1976	Dry Year 5	Normal	30,849	6,422	37,271	9,952	1,177	11,129	48,400
1977	Dry Year 6	Dry Year 3	26,090	6,410	32,500	33,825	1,175	35,000	67,500
1978	Dry Year 7	Post-Drought	30,783	6,410	37,193	20,008	1,175	21,183	58,376
1979	Normal	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
1980	Normal	Normal	30,849	6,422	37,271	9,952	1,177	11,129	48,400
1981	Normal	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
1982	Dry Year 1	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293

Table 6.5-5. Annual Groundwater Pumping from the Two Principal Aquifers in the 95-Year Model Simulation for the Projected Water Budgets

	Year Type		Alluvial Aquifer Pumping			Saugus Formation Pumping			
Calendar Year	Alluvial Aquifer	Saugus Formation	Municipal Pumping	Pumping by Other Users	Total	Municipal Pumping	Pumping by Other Users	Total	Total Pumping
1983	Normal	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
1984	Normal	Normal	30,849	6,422	37,271	9,952	1,177	11,129	48,400
1985	Dry Year 1	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
1986	Dry Year 2	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
1987	Dry Year 3	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
1988	Dry Year 4	Dry Year 1	26,146	6,422	32,568	18,872	1,177	20,049	52,617
1989	Dry Year 5	Post-Drought	30,783	6,410	37,193	15,867	1,175	17,042	54,235
1990	Dry Year 6	Dry Year 2	26,090	6,410	32,500	23,825	1,175	25,000	57,500
1991	Dry Year 7	Dry Year 3	26,090	6,410	32,500	33,825	1,175	35,000	67,500
1992	Dry Year 8	Dry Year 4	26,146	6,422	32,568	33,904	1,177	35,081	67,649
1993	Normal	Post-Drought	30,783	6,410	37,193	20,008	1,175	21,183	58,376
1994	Normal	Dry Year 5	26,090	6,410	32,500	33,825	1,175	35,000	67,500
1995	Dry Year 1	Post-Drought	30,783	6,410	37,193	20,008	1,175	21,183	58,376
1996	Normal	Normal	30,849	6,422	37,271	9,952	1,177	11,129	48,400
1997	Normal	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
1998	Dry Year 1	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
1999	Normal	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
2000	Dry Year 1	Normal	30,849	6,422	37,271	9,952	1,177	11,129	48,400
2001	Dry Year 2	Dry Year 1	26,090	6,410	32,500	18,825	1,175	20,000	52,500
2002	Dry Year 3	Post-Drought	30,783	6,410	37,193	15,867	1,175	17,042	54,235
2003	Dry Year 4	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
2004	Dry Year 5	Normal	30,849	6,422	37,271	9,952	1,177	11,129	48,400
2005	Normal	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
2006	Normal	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
2007	Dry Year 1	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
2008	Dry Year 2	Dry Year 1	26,146	6,422	32,568	18,872	1,177	20,049	52,617
2009	Dry Year 3	Dry Year 2	26,090	6,410	32,500	23,825	1,175	25,000	57,500
2010	Dry Year 4	Post-Drought	30,783	6,410	37,193	20,008	1,175	21,183	58,376
2011	Normal	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
2012	Normal	Normal	30,849	6,422	37,271	9,952	1,177	11,129	48,400
2013	Dry Year 1	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
2014	Dry Year 2	Dry Year 1	26,090	6,410	32,500	18,825	1,175	20,000	52,500
2015	Dry Year 3	Dry Year 2	26,090	6,410	32,500	23,825	1,175	25,000	57,500
2016	Dry Year 4	Dry Year 3	26,146	6,422	32,568	33,904	1,177	35,081	67,649
2017	Dry Year 5	Post-Drought	30,783	6,410	37,193	20,008	1,175	21,183	58,376
2018	Dry Year 6	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
2019	Dry Year 7	Normal	30,783	6,410	37,193	9,925	1,175	11,100	48,293
AVERAGE (1925-2019)			**29,662**	**6,413**	**36,075**	**14,987**	**1,175**	**16,162**	**52,237**

Notes

All values are in units of acre-feet per year (AFY). Values are for calendar years; hence the groundwater pumping volumes shown in this table differ from the values shown in Appendix I, which use water years to present pumping volumes and other water budget values.

Municipal supplies are currently provided by SCV Water and Los Angeles County Water Works District 36 (LACWD).
Municipal water demands include all commercial and industrial water uses in the Santa Clarita Valley.

Other users are FivePoint (The Newhall Land and Farming Company), the Pitchess Detention Center, and Sand Canyon Country Club, which all pump from the Alluvial Aquifer; Valencia County Club, Vista Valencia Golf Course, and the groundwater pumping/treatment system on the Whittaker-Bermite property, all of which pump from the Saugus Formation; and small private domestic well owners, who pump primarily from the Alluvial Aquifer but may also pump small quantities of water from adjoining bedrock units.

6.5.1.4 Generation and Use of Recycled Water

Table 6.5-6 shows the details of all point discharges to the Santa Clara River. Wastewater flows into local WRPs total to 30,300 AFY in the projected water budget, as defined in a human water demand modeling forecast conducted by Maddaus (2019). This study estimates the amount of indoor water use savings that will arise from the implementation of plumbing codes and conservation program measures through the projected build-out year of 2050 in the Basin. The plumbing codes and conservation measures accounted for in the study reduce indoor water use to 50 gallons per capita per day (gpcpd) by the year 2030, per state requirements in legislation that was passed in 2018 (Senate Bill 606 and Assembly Bill 1668). The demand modeling forecast for the Basin uses 50 gpcpd as the indoor water use rate for new developments and also accounts for how existing housing stock will experience increased efficiencies in indoor water uses as (1) remodeling projects occur under the new plumbing code, and (2) existing appliances and plumbing fixtures are replaced by new and more efficient units. Of the 30,300 AFY of flows that will occur into local WRPs under the forecasts from the 2019 study, approximately 21,000 AFY is discharged to the Santa Clara River and 9,300 AFY becomes recycled water supply. During the winter months, a small portion of the treated water that is discharged to the Santa Clara River from local WRPs is estimated to come from the future Newhall WRP, which will be located about 0.5 mile upstream of (east of) the western basin boundary. More recent updates to the full build-out water demand estimates (for the 2020 UWMP; see KJ, 2021) have slightly reduced the forecasted amount of indoor use and flows into the WRPs, which has reduced the amount of recycled water to 8,961 AFY; these updated projections do not reduce the amount of WRP discharges (approximately 21,000 AFY) to the river.

6.5.2 Projected Water Budget without Climate Change

6.5.2.1 Surface Water Budget

Figure 6.5-1 displays the year-by-year projected surface water budget without climate change. See also Table I-5 in Appendix I for detailed calculations.

Projected Imported Supplies

The amounts of imported and other water supplies in the projected water budget are displayed in Table 6.5-7 for normal years, a single dry year (labeled as Dry Year 1 in the table), and multiple dry years (Dry Year 2 and Dry Year 3+ in the table). The magnitudes of imported water are the amounts that meet the human water demands listed in the table after accounting for the other supply amounts that are specified in the projected water budget. The human water demands are obtained from the 2020 UWMP (KJ, 2021); see the values for the year 2050 in Tables 7-2, 7-3, and 7-4 of the 2020 UWMP. Table 6.5-8 shows these values for each year in the 95-year groundwater flow model simulations that were used to construct the projected water budgets.[39]

The imported water volumes presented in the 2020 UWMP (KJ, 2021) (and which are displayed in Tables 6.5-7 and 6.5-8) are less than the amount of combined imported supply that is available from (1) the SWP system and (2) the additional imported supplies that have been secured to date by SCV Water (which were discussed in Section 6.4.2.1). Table 6.5-9 shows the available amounts of each water supply source for normal years, single dry years, and multiple dry years, and compares the total supply to the human demands for water under full-build-out conditions in the Santa Clarita Valley.

[39] Table 6.5-8 identifies the first year after a dry year or dry period as being a "post-drought" year. This year type was included in the projected water budget because, operationally, the end of a dry period often is not known until the spring season arrives. Until then, municipal pumping remains at dry-year levels, then will return to normal-year levels typically by May or June.

Table 6.5-6. Annual Point Discharges to the Santa Clara River for the Projected Water Budgets in the Basin

		Future			
Source	Current Conditions	Normal Years	Dry Year 1	Dry Year 2	Dry Year 3+
Saugus WRP	5,004	5,004	5,004	5,004	5,004
Valencia WRP	16,813	15,514	15,514	15,514	15,514
Subtotal	**21,817**	**20,518**	**20,518**	**20,518**	**20,518**
Newhall WRP	0	480	480	480	480
Subtotal	**21,817**	**20,998**	**20,998**	**20,998**	**20,998**
Whittaker-Bermite	500	500	500	500	500
TOTAL	**22,317**	**21,498**	**21,498**	**21,498**	**21,498**

Note

All values are in units of acre-feet per year (AFY) and are for 365-day years. Values will be higher in leap years.

Table 6.5-7. Annual Municipal and Non-Municipal Water Supplies and Demands in Normal and Dry Years for the Projected Water Budgets

	Municipal Users				Other Users	Total	
Year Type	Local Groundwater	Imported Water	Recycled Water	Total	Local Groundwater	Local Groundwater	Demand
Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
Dry Year 1	44,915	53,224	8,961	107,100	7,585	52,500	114,685
Dry Year 2	49,915	43,994	8,961	102,870	7,585	57,500	110,455
Dry Year 3+	59,915	33,994	8,961	102,870	7,585	67,500	110,455
Average (1925-2019)	**44,649**	**48,365**	**8,966**	**101,980**	**7,588**	**52,237**	**109,568**

Notes

Normal-year and dry-year values are in units of acre-feet per year (AFY) and are for 365-day years. Values will be higher in leap years.

Average values for 1925-2019 include leap years. Hence the average values for recycled water and local groundwater are slightly higher than shown for normal and dry years.

Municipal supplies are currently provided by SCV Water and Los Angeles County Water Works District 36 (LACWD).
Municipal water demands include all commercial and industrial water uses in the Santa Clarita Valley.

Other users are FivePoint (The Newhall Land and Farming Company), the Pitchess Detention Center, and Sand Canyon Country Club, which all pump from the Alluvial Aquifer; Valencia County Club, Vista Valencia Golf Course, and the groundwater pumping/treatment system on the Whittaker-Bermite property, all of which pump from the Saugus Formation; and small private domestic well owners, who pump primarily from the Alluvial Aquifer but may also pump small quantities of water from adjoining bedrock units.

Total demand by municipal users in normal years (101,000 AFY), single-dry years (107,100 AFY), and multiple-dry years (102,870 AFY) is for Year 2050, as shown in Tables 7-2, 7-3, and 7-4 of the 2020 Urban Water Management Plan (KJ, 2021), and is the demand with the plumbing code and active conservation.

Table 6.5-8. Annual Municipal and Non-Municipal Water Demands and Supplies in the 95-Year Model Simulation for the Projected Water Budgets

		Municipal Users				Other Users	Total	
Calendar Year	Year Type	Local Groundwater	Imported Water	Recycled Water	Total	Local Groundwater	Local Groundwater	Demand
1925	Dry Year 2	49,915	43,994	8,961	102,870	7,585	57,500	110,455
1926	Dry Year 3	59,915	33,994	8,961	102,870	7,585	67,500	110,455
1927	Post-Drought	50,791	42,183	8,961	101,935	7,585	58,376	109,520
1928	Normal	40,801	51,435	8,980	101,216	7,599	48,400	108,815
1929	Dry Year 1	44,915	53,224	8,961	107,100	7,585	52,500	114,685
1930	Dry Year 2	49,915	43,994	8,961	102,870	7,585	57,500	110,455
1931	Dry Year 3	59,915	33,994	8,961	102,870	7,585	67,500	110,455
1932	Dry Year 4	60,050	34,060	8,980	103,090	7,599	67,649	110,689
1933	Dry Year 5	59,915	33,994	8,961	102,870	7,585	67,500	110,455
1934	Dry Year 6	59,915	33,994	8,961	102,870	7,585	67,500	110,455
1935	Post-Drought	50,791	42,183	8,961	101,935	7,585	58,376	109,520
1936	Normal	40,801	51,435	8,980	101,216	7,599	48,400	108,815
1937	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
1938	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
1939	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
1940	Normal	40,801	51,435	8,980	101,216	7,599	48,400	108,815
1941	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
1942	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
1943	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
1944	Normal	40,801	51,435	8,980	101,216	7,599	48,400	108,815
1945	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
1946	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
1947	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
1948	Normal	40,801	51,435	8,980	101,216	7,599	48,400	108,815
1949	Dry Year 1	44,915	53,224	8,961	107,100	7,585	52,500	114,685
1950	Post-Drought	46,650	46,324	8,961	101,935	7,585	54,235	109,520
1951	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
1952	Normal	40,801	51,435	8,980	101,216	7,599	48,400	108,815
1953	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
1954	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
1955	Dry Year 1	44,915	53,224	8,961	107,100	7,585	52,500	114,685
1956	Post-Drought	46,773	46,400	8,980	102,153	7,599	54,372	109,752
1957	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
1958	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
1959	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
1960	Normal	40,801	51,435	8,980	101,216	7,599	48,400	108,815
1961	Dry Year 1	44,915	53,224	8,961	107,100	7,585	52,500	114,685
1962	Post-Drought	46,650	46,324	8,961	101,935	7,585	54,235	109,520
1963	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
1964	Normal	40,801	51,435	8,980	101,216	7,599	48,400	108,815
1965	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
1966	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
1967	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
1968	Normal	40,801	51,435	8,980	101,216	7,599	48,400	108,815
1969	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
1970	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
1971	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
1972	Normal	40,801	51,435	8,980	101,216	7,599	48,400	108,815
1973	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
1974	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
1975	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
1976	Normal	40,801	51,435	8,980	101,216	7,599	48,400	108,815
1977	Dry Year 3	59,915	33,994	8,961	102,870	7,585	67,500	110,455
1978	Post-Drought	50,791	42,183	8,961	101,935	7,585	58,376	109,520
1979	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
1980	Normal	40,801	51,435	8,980	101,216	7,599	48,400	108,815
1981	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
1982	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
1983	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585

Table 6.5-8. Annual Municipal and Non-Municipal Water Demands and Supplies in the 95-Year Model Simulation for the Projected Water Budgets

		Municipal Users				Other Users	Total	
Calendar Year	Year Type	Local Groundwater	Imported Water	Recycled Water	Total	Local Groundwater	Local Groundwater	Demand
1984	Normal	40,801	51,435	8,980	101,216	7,599	48,400	108,815
1985	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
1986	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
1987	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
1988	Dry Year 1	45,018	53,332	8,980	107,330	7,599	52,617	114,929
1989	Post-Drought	46,650	46,324	8,961	101,935	7,585	54,235	109,520
1990	Dry Year 2	49,915	43,994	8,961	102,870	7,585	57,500	110,455
1991	Dry Year 3	59,915	33,994	8,961	102,870	7,585	67,500	110,455
1992	Dry Year 4	60,050	34,060	8,980	103,090	7,599	67,649	110,689
1993	Post-Drought	50,791	42,183	8,961	101,935	7,585	58,376	109,520
1994	Dry Year 5	59,915	33,994	8,961	102,870	7,585	67,500	110,455
1995	Post-Drought	50,791	42,183	8,961	101,935	7,585	58,376	109,520
1996	Normal	40,801	51,435	8,980	101,216	7,599	48,400	108,815
1997	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
1998	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
1999	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
2000	Normal	40,801	51,435	8,980	101,216	7,599	48,400	108,815
2001	Dry Year 1	44,915	53,224	8,961	107,100	7,585	52,500	114,685
2002	Post-Drought	46,650	46,324	8,961	101,935	7,585	54,235	109,520
2003	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
2004	Normal	40,801	51,435	8,980	101,216	7,599	48,400	108,815
2005	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
2006	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
2007	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
2008	Dry Year 1	45,018	53,332	8,980	107,330	7,599	52,617	114,929
2009	Dry Year 2	49,915	43,994	8,961	102,870	7,585	57,500	110,455
2010	Post-Drought	50,791	42,183	8,961	101,935	7,585	58,376	109,520
2011	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
2012	Normal	40,801	51,435	8,980	101,216	7,599	48,400	108,815
2013	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
2014	Dry Year 1	44,915	53,224	8,961	107,100	7,585	52,500	114,685
2015	Dry Year 2	49,915	43,994	8,961	102,870	7,585	57,500	110,455
2016	Dry Year 3	60,050	34,060	8,980	103,090	7,599	67,649	110,689
2017	Post-Drought	50,791	42,183	8,961	101,935	7,585	58,376	109,520
2018	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
2019	Normal	40,708	51,331	8,961	101,000	7,585	48,293	108,585
AVERAGE	1925-2019	44,649	48,365	8,966	101,980	7,588	52,237	109,568

Notes

All values are in units of acre-feet per year (AFY). Values are for calendar years; hence the groundwater pumping volumes shown in this table differ from the values shown in Appendix I, which use water years to present pumping volumes and other water budget values.

Municipal supplies are currently provided by SCV Water and Los Angeles County Water Works District 36 (LACWD).
Municipal water demands include all commercial and industrial water uses in the Santa Clarita Valley.

Values of total demand by municipal users in normal years (101,000 AFY in non-leap years), in single-dry years (107,100 AFY in non-leap years), and in multiple-dry years (102,870 AFY in non-leap years) are for Year 2050, as shown in Tables 7-2, 7-3, and 7-4 of the 2020 Urban Water Management Plan (KJ, 2021), and represent the demand with the plumbing code and active conservation.

Other users are FivePoint (The Newhall Land and Farming Company), the Pitchess Detention Center, and Sand Canyon Country Club, which all pump from the Alluvial Aquifer; Valencia County Club, Vista Valencia Golf Course, and the groundwater pumping/treatment system on the Whittaker-Bermite property, all of which pump from the Saugus Formation; and small private domestic well owners, who pump primarily from the Alluvial Aquifer but may also pump small quantities of water from adjoining bedrock units.

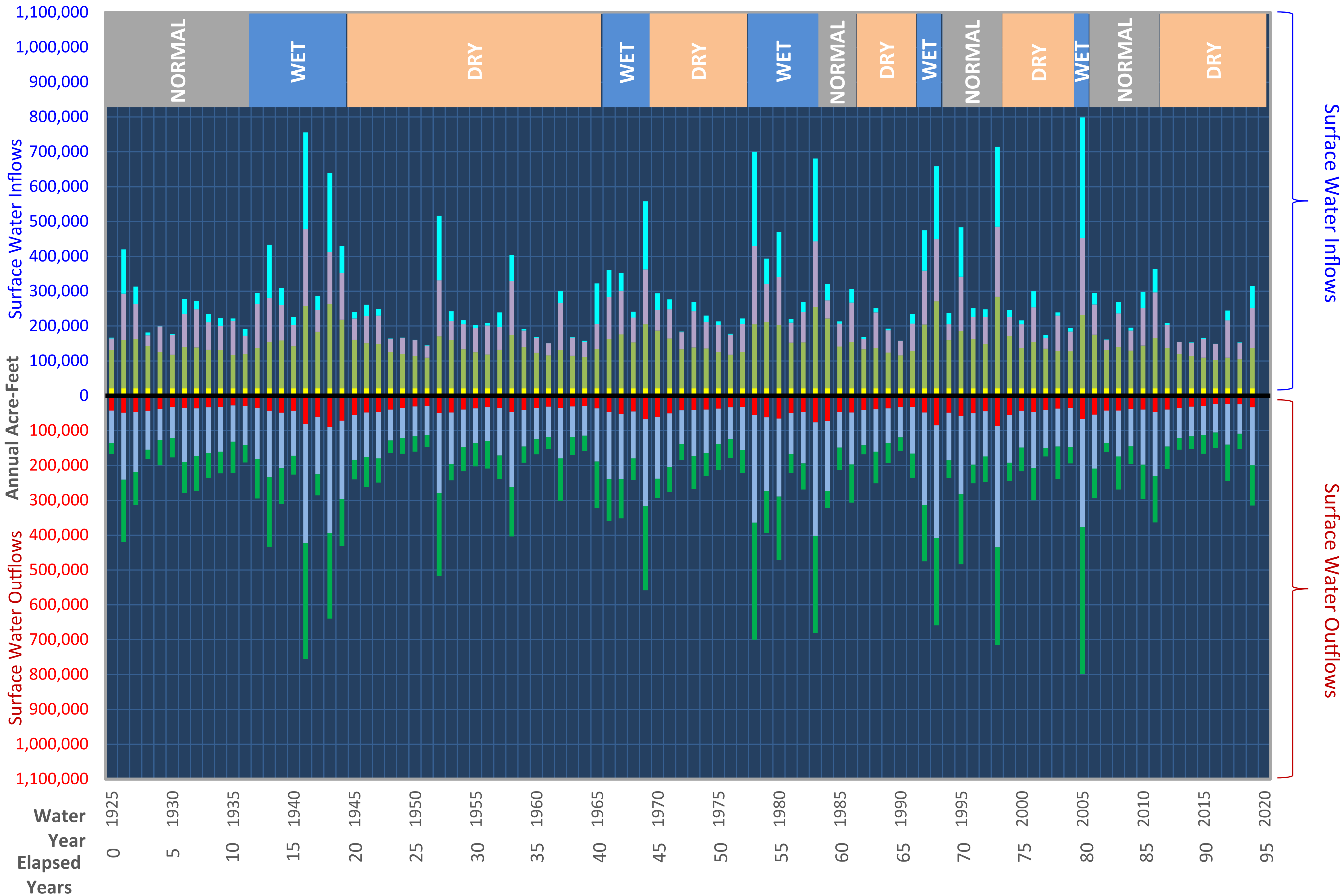

FIGURE 6.5-1

Projected Surface Water Budget Under Full Build-out Conditions Without Climate Change

Santa Clara River Valley
East Groundwater Subbasin
Groundwater Sustainability Plan

LEGEND

- Precipitation
- Stream Inflows
- Point-Source Flows to Streams
- Net Inflow from Groundwater
- Non-Storm Flow at County Line
- ET and Storm Outflows
- Groundwater Recharge from Streams and Rainfall

NOTES

This projected water budget is developed by projecting the 1925-2019 historical hydrology forward in time.
ET: evapotranspiration

GSI Water Solutions, Inc.

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This comparison uses the supply and demand details presented for the year 2050 in Tables 7-2, 7-3, and 7-4 of the 2020 UWMP (KJ, 2021). For SWP water, the estimates of imported water supplies are based on the 2019 DCR for the SWP system (DWR, 2020), which was the basis for incorporating uncertainties about future SWP deliveries into the reliability planning portion of the 2020 UWMP. As shown in Table 6.5-9, under full build-out conditions, the available supplies exceed the human water demand estimates by an estimated 11,258 AFY in normal years, by an estimated 12,498 AFY in single dry years, and by an estimated 25,488 AFY during a multiple-dry-year period.

As discussed in Section 6.1.6.2, SCV Water's 2020 UWMP contains the most current water supply and demand values for full build-out (Year 2050) conditions. The UWMP incorporates (1) DWR's most current estimates of future SWP delivery capability as outlined in the 2019 DCR (DWR, 2020) and (2) the Basin Operating Plan for its groundwater supply analyses. The projected water budgets that have been developed to support preparation of the GSP use the Basin Operating Plan for the Basin. Additionally, because the 2017 *Water Supply Reliability Plan Update* (Clemm and KJC, 2017) and a recent draft update to that plan (Geosyntec, 2021) found that SCV Water's Basin Operating Plan and its portfolio of imported water supplies can fully and reliably meet the Year 2050 full build-out water demands in SCV Water's service area, the Basin Operating Plan is therefore simulated in all three of the projected water budget scenarios described in this section (no climate change, 2030 climate change, and 2070 climate change).

Projected Local Surface Water Inflows

Table 6.5-10 summarizes the average, minimum, and maximum values of the annual surface inflows to the Basin in the projected water budget without climate change. (See Table I-5 in Appendix I for detailed calculations.) These inflows are the same as for the current water budget for the 2014 level of development (shown in Table 6.4-6), with the exception of the discharge volumes from the Valencia WRP, the addition of discharges from the future Newhall WRP, and minor differences in the amount of groundwater upwelling (discharge) to streams.

Projected Surface Water Outflows

Table 6.5-11 summarizes the average, minimum, and maximum values of the annual surface outflows from the Basin for the projected water budget without climate change. (See Table I-5 in Appendix I for detailed calculations.) Non-storm surface water flows crossing the western basin boundary[40] show a wider range historically (11,300 AFY to 100,000 AFY) than under the projected water budget (22,600 AFY to 89,400 AFY), but the average values are similar (44,900 AFY historically and 44,400 AFY projected), which suggests that the constant nature of the point discharges to the river from one year to the next tempers the variability in these non-storm flows compared with the highly variable point discharges of the past. Total annual surface water outflows for the projected water budget without climate change (averaging 289,000 AFY) are slightly higher than under the actual historical conditions for the Basin (an average of 274,100 AFY, as shown in Table 6.3-4). This is primarily because of an increase in the amount of groundwater recharge from streams that arises as a result of a greater 95-year volume of WRP discharges to the Santa Clara River during the future 95-year simulation period than the 95-year volume that occurred historically (from 1925 through 2019).

[40] As discussed in Section 6.3.2.3 for the historical water budget, the non-storm flows in the Santa Clara River at the western basin boundary under the projected water budget include the amount of subsurface outflow that occurs within a thin veneer of alluvium that is present at the western basin boundary, which comprises the western boundary of the groundwater flow model.

Table 6.5-9. Annual Municipal Water Supply and Demand Comparisons for Municipal Water Use in Year 2050 (From the 2020 UWMP)

Year Type	SWP and Related Sources[(a)]	Banking and Exchange Programs[(b)]	Total Imported Water Supply[(c)]	Local Groundwater	Recycled Water	Total Municipal Supply	Total Municipal Demand[(d)]	Total Municipal Supply Minus Total Municipal Demand
Normal Year	62,107	0	62,107	41,190	8,961	112,258	101,000	11,258
Single Dry Year	22,047	29,950	51,997	58,640	8,961	119,598	107,100	12,498
Multiple Dry-Year Period	37,727	29,950	67,677	51,720	8,961	128,358	102,870	25,488

Notes

All values are in units of acre-feet per year (AFY), are on a calendar-year basis, and are for 365-day years. Values will be higher in leap years.

Values are for the year 2050 and are from Tables 7-2, 7-3, and 7-4 in the 2020 Urban Water Management Plan (UWMP) (KJ, 2021).

(a) Related sources are listed in Tables 7-2, 7-3, and 7-4 of the 2020 UWMP (KJ, 2021) under the "Imported Water" row of each table and consist of flexible storage accounts, Buena Vista-Rosedale, Nickel Water-Newhall Land, and Yuba Accord water.

(b) Banking and exchange programs are listed in Tables 7-2, 7-3, and 7-4 of the 2020 UWMP (KJ, 2021) and consist of Rosedale-Rio Bravo Bank, Semitropic Bank, Semitropic-Newhall Land Bank, Antelope Valley East Kern (AVEK) Water Agency Exchange, and United Water Conservation District (UWCD) Exchange.

(c) The total imported water supply is the sum of the prior two columns.

(d) Total demand by municipal users is the demand that accounts for the plumbing code and active conservation.

SWP = State Water Project

UWMP = Urban Water Management Plan

Table 6.5-10. Estimated Annual Surface Water Inflows to the Basin for the Projected Water Budget (Using 1925–2019 Rainfall Without Climate Change)

Surface Water Inflow Component	Minimum	Maximum	Average	Percent of Total
In-Basin Precipitation	27,400	224,500	87,600	30%
Stormwater Generated from In-Basin Precipitation	25,100	135,800	67,000	---
Stream Inflow (Santa Clara River)	0	37,850	5,170	2%
Stream Inflow (Releases from Castaic Lake/Lagoon)	200	197,500	20,050	7%
Stream Inflow (Releases from Bouquet Reservoir)	110	110	110	0.04%
Stream Inflow (Other Santa Clara River Tributaries)	0	148,400	24,150	8%
Discharges to Santa Clara River from Saugus WRP	5,005	5,020	5,010	2%
Discharges to Santa Clara River from Valencia WRP and Newhall WRP	15,995	16,055	16,000	6%
Discharges to Santa Clara River from Groundwater Treatment Systems	500	501	500	0.2%
Groundwater Discharge to Streams	81,550	262,850	130,450	45%
Total	146,200	798,400	289,000	100%

Notes

All values are in units of acre-feet per year (AFY) and are for the 95-year model simulation period (which uses the historical rainfall record of water years 1925 through 2019). Percentages are calculated from the average values. All values are rounded from the statistics calculated in Table I-5 of Appendix I.

This projected water budget is developed by projecting the 1925-2019 historical hydrology forward in time.

5% of the releases from Bouquet Reservoir are assumed to remain as surface flow where Bouquet Creek enters the Basin.

The term "Net inflow from Groundwater" is the difference between stream gains and stream losses arising from groundwater/surface water exchanges in the Santa Clara River and its tributaries.

Total values do not include stormwater generated from in-basin precipitation, which is an internal flow process (and not an inflow to, or outflow from, the basin).

The total values shown at the bottom of this table are not equal to the sum of the individual terms because the minimum, maximum, and average values occur in different years for each of the individual surface water inflows.

WRP = water reclamation plant

Table 6.5-11. Estimated Annual Surface Water Outflows from the Basin for the Projected Water Budget (Using 1925–2019 Rainfall Without Climate Change)

Surface Water Outflow Component	Minimum	Maximum	Average	Percent of Total
Santa Clara River Non-Storm Outflow at the Western Basin Boundary	22,600	89,400	44,400	15.5%
Groundwater Recharge from Precipitation	0	103,000	20,600	7%
Groundwater Recharge from Streams	81,350	275,100	127,300	44%
ET and Stormwater Outflow	24,500	421,850	96,800	33.5%
Total	146,200	798,400	289,000	100%

Notes

All values are in units of acre-feet per year (AFY) and are for the 95-year model simulation period (which uses the historical rainfall record of water years 1925 through 2019). Percentages are calculated from the average values. All values are rounded from the statistics calculated in Table I-5 of Appendix I.

This projected water budget is developed by projecting the 1925-2019 historical hydrology forward in time.

Subsurface outflow through the thin alluvial material beneath the river at the western boundary of the Basin is accounted for as outflow in the surface water budget because the historical and current stream gages are located further downstream where bedrock is thought to be at or just beneath the river channel, which causes most if not all subsurface water at the western basin boundary to appear in the river upstream of those gages.

The total values shown at the bottom of this table are not equal to the sum of the individual terms because the minimum, maximum, and average values occur in different years for each of the individual surface water outflows.

ET = evapotranspiration

6.5.2.2 Groundwater Budget

Figures 6.5-2 and 6.5-3 display the year-by-year projected groundwater budget without climate change. See also Table I-6 in Appendix I for detailed calculations.

Projected Groundwater Inflows

Table 6.5-12 summarizes the average, minimum, and maximum values of the annual inflows to groundwater in the Basin for the projected water budget without climate change. (See Table I-6 in Appendix I for detailed calculations.) Compared with historical groundwater inflows (Table 6.3-5), the primary difference in groundwater inflows under the projected water budget is the constant amounts of recharge from septic systems and irrigation in urbanized areas and the elimination of agricultural irrigation return flows. Differences in the amount of recharge from stream leakage also occur, because of differences at various locations in the ephemeral and perennial reaches of the Santa Clara River. Recharge from streams is also higher because of timing differences between large natural inflows to Castaic Lake (which are used in the projected water budget) and the later controlled releases during its early operating years (which are used in the historical water budget). These changes occur despite the omission of periodic historical releases of SWP water in the projected water budget.

Projected Groundwater Outflows

Table 6.5-13 summarizes the average, minimum, and maximum values of the annual outflows of groundwater from the Basin for the projected water budget without climate change. (See Table I-6 in Appendix I for detailed calculations.) Compared with historical groundwater outflows (Table 6.3-6), the average projected water budget shows higher groundwater pumping rates but similar rates of phreatophyte (riparian) ET and groundwater discharges to streams. Average groundwater pumping (52,190 AFY) is 18,030 AFY higher than in the historical water budget (34,160 AFY) and appears to be partly compensated for by a 14,050 AFY increase in average groundwater recharge under projected conditions (118,500 AFY on average) compared with historical conditions (174,450 AFY on average).

Projected Changes in Groundwater Storage

The yellow line on Figure 6.5-2 shows how much the volume of stored groundwater changes progressively over time when simulating the effects of the full build-out level of development and water uses through the historical hydrologic record projected forward in time. Figure 6.5-2 shows that the cumulative-change curve for groundwater storage that is calculated by the numerical groundwater flow model for the projected water budget has a shape that is generally similar to the shape of the cumulative-change curve for actual historical conditions (see Figure 6.3-3) during that same 95-year period. The occurrence of rising versus declining slopes in the modeled cumulative-change curve for projected conditions varies frequently during the 95-year historical period, as is the case for historical conditions. Accordingly, as was indicated by the water budgets for historical conditions and the 2014 level of development, the water budget assessment for the full build-out level of development and water use in the Basin indicates that a chronic long-term decline (i.e., a continual year-to-year decline) in the volume of stored groundwater is not expected to arise from increased future development or from the increased pumping that will occur in the future under the Basin Operating Plan. The Basin is anticipated to remain in a sustainable condition with respect to the SGMA criterion of chronic lowering of groundwater levels and not be in an overdraft condition as a result of future development and associated groundwater uses. The combined influence of full build-out conditions and climate change is examined next, in Sections 6.5.3 and 6.5.4.

Table 6.5-12. Estimated Annual Groundwater Inflows to the Basin for the Projected Water Budget (Using 1925–2019 Rainfall Without Climate Change)

Groundwater Inflow Component	Minimum	Maximum	Average	Percent of Total
Recharge from Precipitation	0	103,000	20,600	11%
Recharge from Streams	81,350	275,100	127,300	68%
Subsurface Inflow Beneath Castaic Dam	1,675	1,680	1,675	1%
Subsurface Inflow Beneath Santa Clara River and Other Tributaries	28,000	29,700	29,000	15%
Septic System Percolation	2,430	2,440	2,435	1%
Recharge of Applied Water	7,485	7,500	7,490	4%
Total	122,750	387,700	188,500	100%

Notes

All values are in units of acre-feet per year (AFY) and are for the 95-year model simulation period (which uses the historical rainfall record of water years 1925 through 2019). Percentages are calculated from the average values. All values are rounded from the statistics calculated in Table I-6 of Appendix I.

This projected water budget is developed by projecting the 1925-2019 historical hydrology forward in time.

Deep percolation from irrigation is the sum for agricultural and municipal lands.

Septic system percolation applies to areas served by public water supplies that do not have public sewer collection systems.

For the minimum and maximum values, the total values shown in this table are not equal to the sum of the individual inflow terms because the minimum values of the individual terms occur in different years, and similarly for the maximum values.

Table 6.5-13. Estimated Annual Groundwater Outflows from the Basin for the Projected Water Budget (Using 1925–2019 Rainfall Without Climate Change)

Groundwater Outflow Component	Minimum	Maximum	Average	Percent of Total
Groundwater Pumping	48,295	67,650	52,190	27%
Riparian Evapotranspiration	5,825	9,215	7,220	4%
Groundwater Discharge to Streams	81,550	262,850	130,450	69%
Total	138,275	321,200	189,850	100%

Notes

All values are in units of acre-feet per year (AFY) and are for the 95-year model simulation period (which uses the historical rainfall record of water years 1925 through 2019). Percentages are calculated from the average values. All values are rounded from the statistics calculated in Table I-6 of Appendix I.

This projected water budget is developed by projecting the 1925-2019 historical hydrology forward in time.

Groundwater discharge to streams is the combined amount in ephemeral and perennial reaches.

Subsurface outflow through the thin alluvial material beneath the river at the western boundary of the Basin is accounted for as outflow in the surface water budget because the historical and current stream gages are located further downstream where bedrock is thought to be at or just beneath the river channel, which causes most if not all subsurface water at the western basin boundary to appear in the river upstream of those gages.

For the minimum and maximum values, the total values shown in this table are not equal to the sum of the individual outflow terms because the minimum values of the individual terms occur in different years, and similarly for the maximum values.

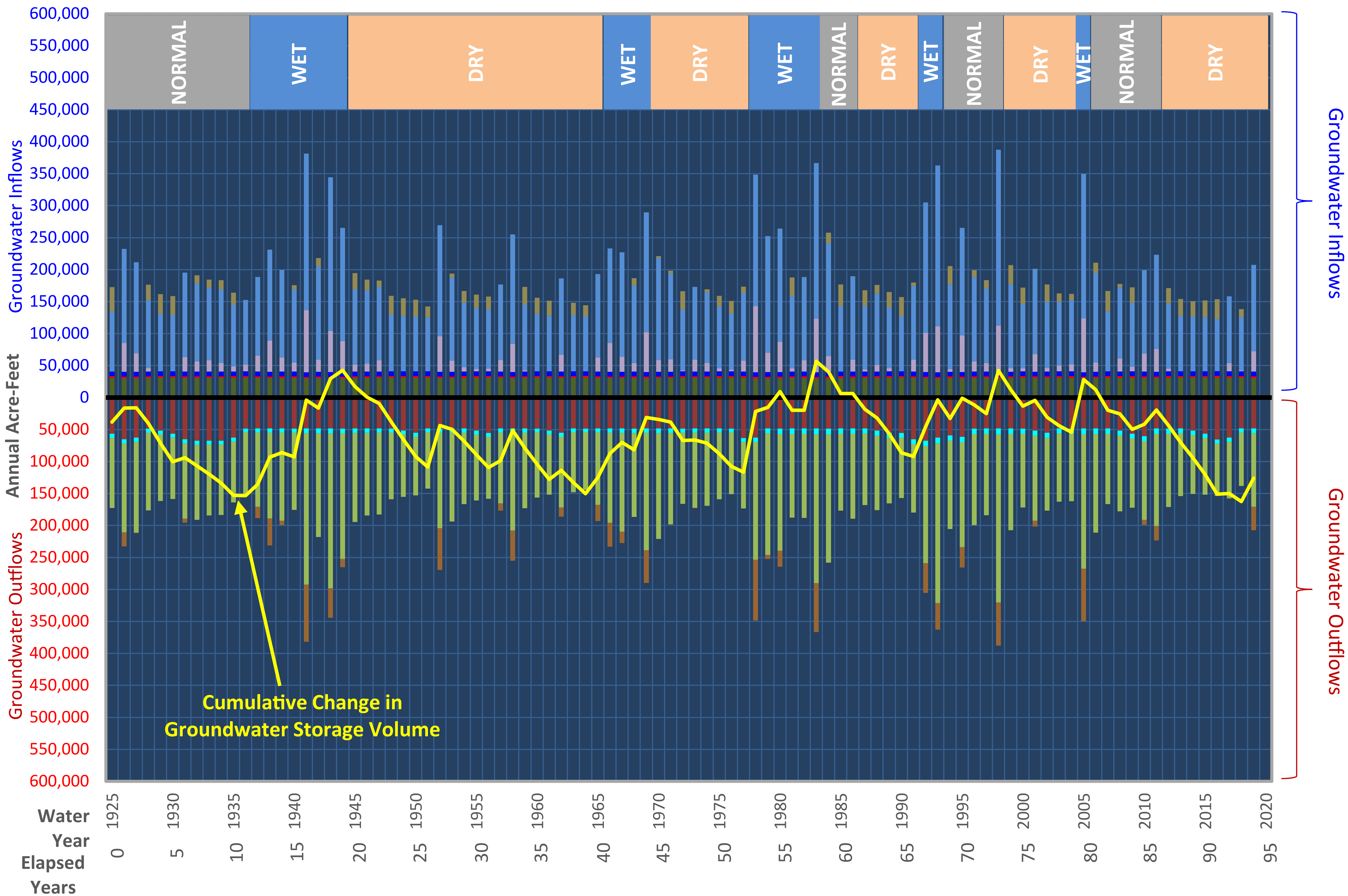

FIGURE 6.5-2

Projected Groundwater Budget Under Full Build-out Conditions Without Climate Change

Santa Clara River Valley
East Groundwater Subbasin
Groundwater Sustainability Plan

LEGEND

- Stream Gains
- Stream Losses
- Precipitation
- Ag+Muni Irrigation
- Subsurface Inflow in Tributaries
- Septic
- Pumping
- ET
- Groundwater Storage Increase
- Groundwater Storage Reduction

NOTES

This projected water budget is developed by projecting the 1925-2019 historical hydrology forward in time.
Ag: agriculture
Muni: municipal
ET: evapotranspiration

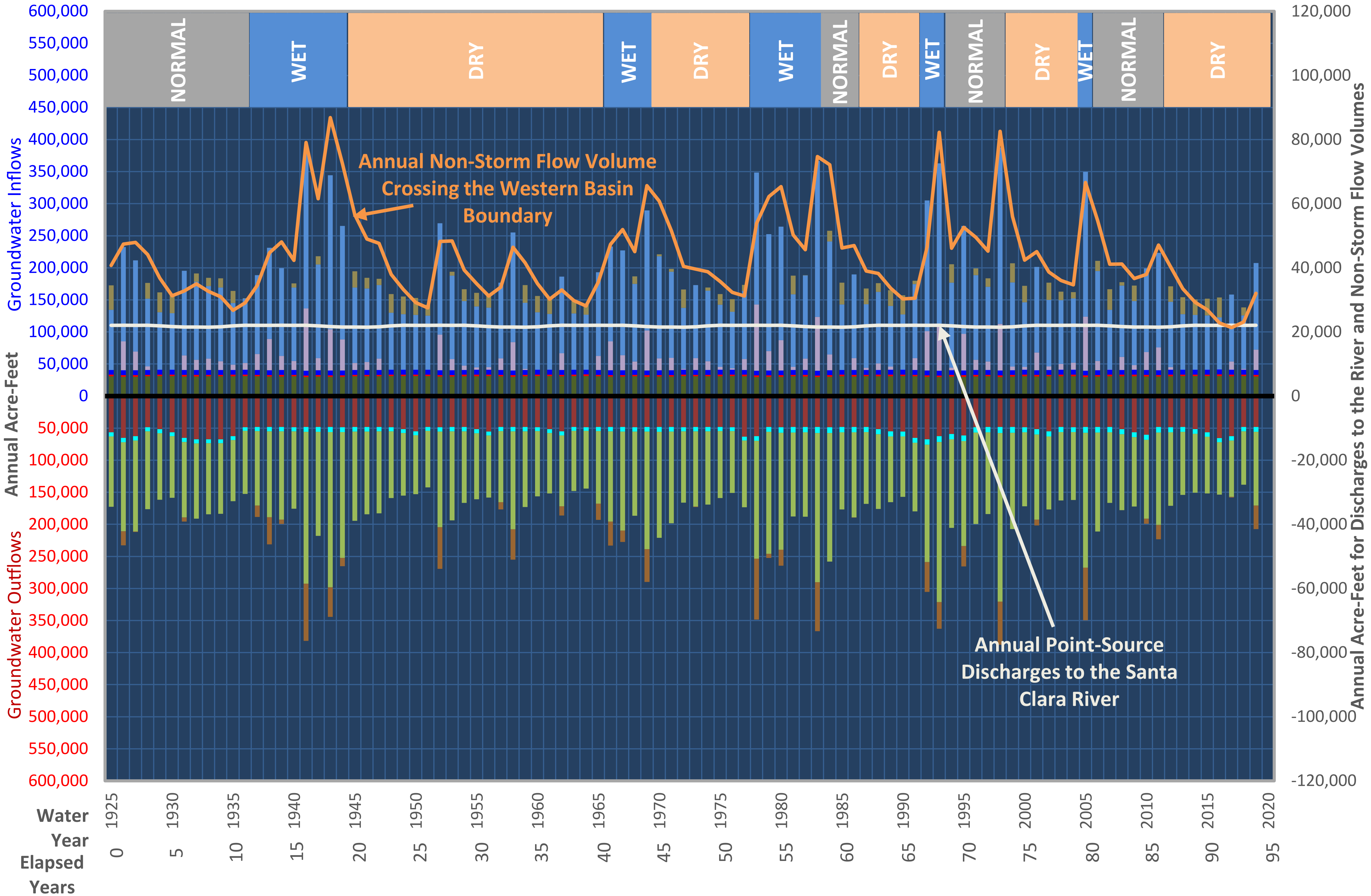

FIGURE 6.5-3

Projected Groundwater Budget and Annual Non-Storm Flows at the Western Basin Boundary Under Full Build-out Conditions Without Climate Change

Santa Clara River Valley
East Groundwater Subbasin
Groundwater Sustainability Plan

LEGEND

- Stream Gains
- Stream Losses
- Precipitation
- Ag+Muni Irrigation
- Subsurface Inflow in Tributaries
- Septic
- Pumping
- ET
- Groundwater Storage Increase
- Groundwater Storage Reduction

NOTES

This projected water budget is developed by projecting the 1925-2019 historical hydrology forward in time.
Ag: agriculture
Muni: municipal
ET: evapotranspiration

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6.5.3 Projected 20-Year Water Budget (Year 2042 Conditions)

As DWR discusses in its BMP for water budget development (DWR, 2016), the climate change analysis is a process in which variability in the historical climatic record is preserved while the magnitudes of events are increased or decreased based on projected changes in precipitation and air temperature, as obtained from global climate model outputs that have been downscaled to localized areas such as the Basin. This approach is used because it is impossible to know the actual precipitation and air temperatures in the year 2042, which is the end of the 20-year period for achieving sustainability under SGMA (based on the planned submittal in early 2022 of the GSP for the Basin). As a result, the projected water budgets for year 2042 conditions apply the 2030 climate-change factors to the historical (1925 through 2019) climate record while simulating full build-out of land and water uses. Output for the water budget is displayed in figures and tables as being for the period 1925 through 2019, even though the water budget is for year 2042 conditions.

6.5.3.1 Surface Water Budget for Year 2042 Conditions

Figure 6.5-4 displays the year-by-year projected surface water budget for year 2042 conditions. See also Table I-7 in Appendix I for detailed calculations.

Projected Imported Supplies

Projected imported supplies for the Year 2042 water budget are the same as for the projected water budget without climate change. See the discussion of projected imported supplies in Section 6.5.2.1 for details.

Projected Local Surface Water Inflows

Table 6.5-14 summarizes the average, minimum, and maximum values of the annual surface inflows to the Basin for the Year 2042 water budget. (See Table I-7 in Appendix I for detailed calculations.) These inflows are the same as for the projected water budget without climate change (see Table 6.5-10), with the exception of stormwater generation and stream inflows in the Santa Clara River and its tributaries (including Castaic Creek inflows), all of which are directly varied by DWR's climate change factors for 2030. Additionally, the net inflow of groundwater to streams changes as the result of the aquifer system's response to climate-change influences. The net effect of these changes during the 95-year historical hydrologic period projected forward in time is an average surface water inflow of 279,800 AFY under 2030 climate change, compared with an average 289,000 AFY in the projected surface water budget without climate change (a difference of approximately 9,200 AFY, or 3.3 percent).

Projected Surface Water Outflows

Table 6.5-15 summarizes the average, minimum, and maximum values of the annual surface outflows from the Basin for the Year 2042 water budget. (See Table I-7 in Appendix I for detailed calculations.) Each of the four surface outflow terms are slightly smaller under 2030 climate change than without climate change (see Table 6.5-11). Total surface water outflows are equal to total surface water inflows because there is no reservoir storage in the Basin.[41]

[41] As discussed in Section 6.3.2.3 for the historical water budget, the non-storm flows in the Santa Clara River at the western basin boundary under the projected water budgets include the amount of subsurface outflow that occurs within a thin veneer of alluvium that is present at the western basin boundary, which comprises the western boundary of the groundwater flow model.

Table 6.5-14. Estimated Annual Surface Water Inflows to the Basin for the Year 2042 Projected Water Budget (Using 1925–2019 Rainfall With 2030 Climate Change Factors)

Surface Water Inflow Component	Minimum	Maximum	Average	Percent of Total
In-Basin Precipitation	27,450	221,600	86,800	31%
Stormwater Generated from In-Basin Precipitation	23,950	135,900	67,500	---
Stream Inflow (Santa Clara River)	0	35,700	4,900	2%
Stream Inflow (Releases from Castaic Lake/Lagoon)	185	186,300	18,900	7%
Stream Inflow (Releases from Bouquet Reservoir)	110	110	110	0.04%
Stream Inflow (Other Santa Clara River Tributaries)	0	140,400	22,100	8%
Discharges to Santa Clara River from Saugus WRP	5,005	5,020	5,010	2%
Discharges to Santa Clara River from Valencia WRP and Newhall WRP	15,995	16,055	16,000	6%
Discharges to Santa Clara River from Groundwater Treatment Systems	500	501	500	0.2%
Groundwater Discharge to Streams	79,350	253,300	125,500	45%
Total	145,100	757,000	279,800	100%

Notes

All values are in units of acre-feet per year (AFY) and are for the 95-year model simulation period (which applies climate-change factors to the historical rainfall record of water years 1925 through 2019). Percentages are calculated from the average values. All values are rounded from the statistics calculated in Table I-7 of Appendix I.

This projected water budget is developed by projecting the 1925-2019 historical hydrology forward in time.

5% of the releases from Bouquet Reservoir are assumed to remain as surface flow where Bouquet Creek enters the Basin.

The term "Net inflow from Groundwater" is the difference between stream gains and stream losses arising from groundwater/surface water exchanges in the Santa Clara River and its tributaries.

Total values do not include stormwater generated from in-basin precipitation, which is an internal flow process (and not an inflow to, or outflow from, the basin).

The total values shown at the bottom of this table are not equal to the sum of the individual terms because the minimum, maximum, and average values occur in different years for each of the individual surface water inflows.

WRP = water reclamation plant

Table 6.5-15. Estimated Annual Surface Water Outflows from the Basin for the Year 2042 Projected Water Budget (Using 1925–2019 Rainfall With 2030 Climate Change Factors)

Surface Water Outflow Component	Minimum	Maximum	Average	Percent of Total
Santa Clara River Non-Storm Outflow at the Western Basin Boundary	20,950	84,750	42,050	15%
Groundwater Recharge from Precipitation	0	98,700	19,250	7%
Groundwater Recharge from Streams	80,300	269,400	123,600	44%
ET and Stormwater Outflow	24,200	401,550	94,850	34%
Total	145,100	757,000	279,800	100%

Notes

All values are in units of acre-feet per year (AFY) and are for the 95-year model simulation period (which applies climate-change factors to the historical rainfall record of water years 1925 through 2019). Percentages are calculated from the average values. All values are rounded from the statistics calculated in Table I-7 of Appendix I.

Subsurface outflow through the thin alluvial material beneath the river at the western boundary of the Basin is accounted for as outflow in the surface water budget because the historical and current stream gages are located further downstream where bedrock is thought to be at or just beneath the river channel, which causes most if not all subsurface water at the western basin boundary to appear in the river upstream of those gages.

This projected water budget is developed by projecting the 1925-2019 historical hydrology forward in time.

The total values shown at the bottom of this table are not equal to the sum of the individual terms because the minimum, maximum, and average values occur in different years for each of the individual surface water outflows.

ET = evapotranspiration

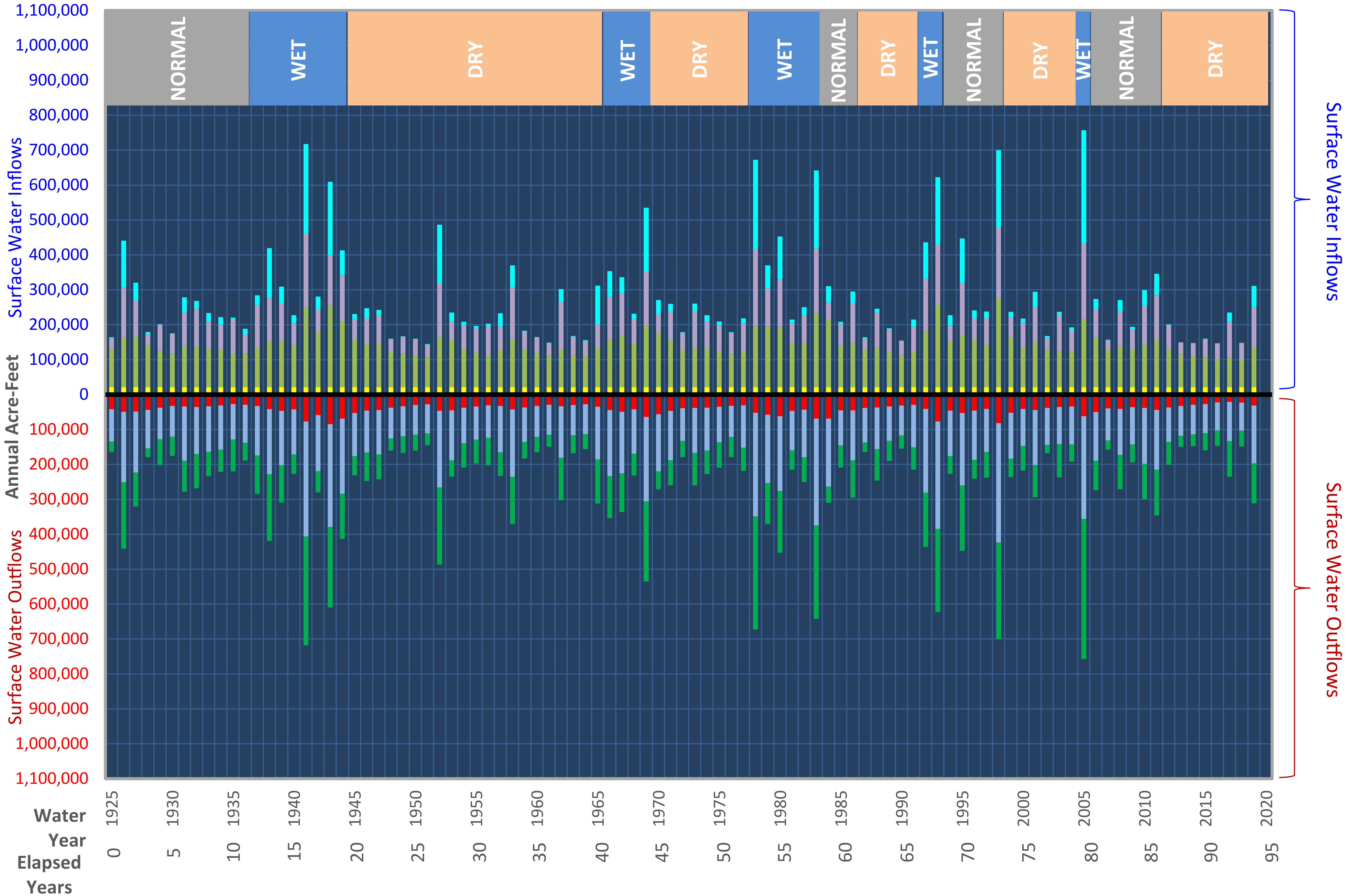

FIGURE 6.5-4

Projected Surface Water Budget for Year 2042 Conditions (Full Build-out Conditions With 2030 Average Climate Change)

Santa Clara River Valley
East Groundwater Subbasin
Groundwater Sustainability Plan

LEGEND

- Precipitation
- Stream Inflows
- Point-Source Flows to Streams
- Net Inflow from Groundwater
- Non-Storm Flow at County Line
- ET and Storm Outflows
- Groundwater Recharge from Streams and Rainfall

NOTES

This projected water budget is developed by projecting the 1925-2019 historical hydrology forward in time.
ET: evapotranspiration

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6.5.3.2 Groundwater Budget for Year 2042 Conditions

Figures 6.5-5 and 6.5-6 display the year-by-year projected groundwater budget for Year 2042 conditions. See also Table I-8 in Appendix I for detailed calculations.

Projected Groundwater Inflows

Table 6.5-16 summarizes the average, minimum, and maximum values of the annual inflows to groundwater in the Basin for the Year 2042 water budget (with DWR's 2030 climate change factors). (See Table I-8 in Appendix I for detailed calculations.) These inflows are the same as for the projected water budget without climate change (see Table 6.5-12), except for small reductions in deep percolation from stormwater and from precipitation falling directly within the Basin. The net effect of these changes during the 95-year historical hydrologic period is an average groundwater inflow of 183,550 AFY under the 2030 climate change scenario, compared with 188,500 AFY in the projected groundwater budget without climate change (see Table 6.5-12), which is a difference of 4,950 AFY, or 2.7 percent.

Projected Groundwater Outflows

Table 6.5-17 summarizes the average, minimum, and maximum values of the annual outflows from groundwater in the Basin for the Year 2042 water budget (with DWR's 2030 climate change factors). (See Table I-8 in Appendix I for detailed calculations.) Groundwater pumping is the same as for the projected water budget without climate change (see Table 6.5-13), while riparian ET increases slightly and groundwater discharge to streams decreases slightly using DWR's 2030 climate change factors. The average groundwater outflow is 185,100 AFY under 2030 climate change, which is 4,750 AFY (2.6 percent) lower than the 189,850 AFY of outflow that occurs in the projected groundwater budget without climate change (see Table 6.5-13).

Projected Changes in Groundwater Storage

The yellow line on Figure 6.5-5 shows how much the volume of stored groundwater changes progressively over time when simulating the combined effects of (1) 2030 climate change and (2) full build-out land and water uses through the historical hydrologic record projected forward in time. As with the cumulative-change plots for groundwater storage that were discussed previously for historical and current conditions (Figures 6.3-3 and 6.4-2), the cumulative-change plots for groundwater storage under Year 2042 conditions (Figure 6.5-5) show that the occurrence of rising versus declining slopes in the cumulative-change curve varies frequently during the 95-year historical period and that the cumulative-change curve under Year 2042 conditions has a shape generally similar to the cumulative-change curves for the groundwater budgets discussed previously. Accordingly, the water budget assessment for Year 2042 conditions indicates that (1) the combined effects of increased future development, (2) the increased pumping that will occur in the future under the Basin Operating Plan, and (3) 2030 climate change are not likely to create a chronic long-term decline in the volume of stored groundwater. The Basin is anticipated to remain in a sustainable condition with respect to the SGMA criterion of avoiding chronic lowering of groundwater levels and not being in an overdraft condition as a result of future development, associated groundwater uses, and the influences of 2030 climate change.

Table 6.5-16. Estimated Annual Groundwater Inflows to the Basin for the Year 2042 Projected Water Budget (Using 1925–2019 Rainfall With 2030 Climate Change Factors)

Groundwater Inflow Component	Minimum	Maximum	Average	Percent of Total
Recharge from Precipitation	0	98,700	19,250	10.5%
Recharge from Streams	80,300	269,400	123,600	67.3%
Subsurface Inflow Beneath Castaic Dam	1,675	1,680	1,675	1%
Subsurface Inflow Beneath Santa Clara River and Other Tributaries	28,100	29,700	29,100	16%
Septic System Percolation	2,430	2,440	2,435	1%
Recharge of Applied Water	7,485	7,500	7,490	4%
Total	121,600	381,700	183,550	100%

Notes

All values are in units of acre-feet per year (AFY) and are for the 95-year model simulation period (which applies climate-change factors to the historical rainfall record of water years 1925 through 2019). Percentages are calculated from the average values. All values are rounded from the statistics calculated in Table I-8 of Appendix I.

This projected water budget is developed by projecting the 1925-2019 historical hydrology forward in time.

Deep percolation from irrigation is the sum for agricultural and municipal lands.

Septic system percolation applies to areas served by public water supplies that do not have public sewer collection systems.

For the minimum and maximum values, the total values shown in this table are not equal to the sum of the individual inflow terms because the minimum values of the individual terms occur in different years, and similarly for the maximum values.

Table 6.5-17. Estimated Annual Groundwater Outflows from the Basin for the Year 2042 Projected Water Budget (Using 1925–2019 Rainfall With 2030 Climate Change Factors)

Groundwater Outflow Component	Minimum	Maximum	Average	Percent of Total
Groundwater Pumping	48,295	67,650	52,190	28%
Riparian Evapotranspiration	6,000	9,450	7,400	4%
Groundwater Discharge to Streams	79,350	253,300	125,500	68%
Total	135,000	311,000	185,100	100%

Notes

All values are in units of acre-feet per year (AFY) and are for the 95-year model simulation period (which applies climate-change factors to the historical rainfall record of water years 1925 through 2019). Percentages are calculated from the average values. All values are rounded from the statistics calculated in Table I-8 of Appendix I.

This projected water budget is developed by projecting the 1925-2019 historical hydrology forward in time.

Groundwater discharge to streams is the combined amount in ephemeral and perennial reaches.

Subsurface outflow through the thin alluvial material beneath the river at the western boundary of the Basin is accounted for as outflow in the surface water budget because the historical and current stream gages are located further downstream where bedrock is thought to be at or just beneath the river channel, which causes most if not all subsurface water at the western basin boundary to appear in the river upstream of those gages.

For the minimum and maximum values, the total values shown in this table are not equal to the sum of the individual outflow terms because the minimum values of the individual terms occur in different years, and similarly for the maximum values.

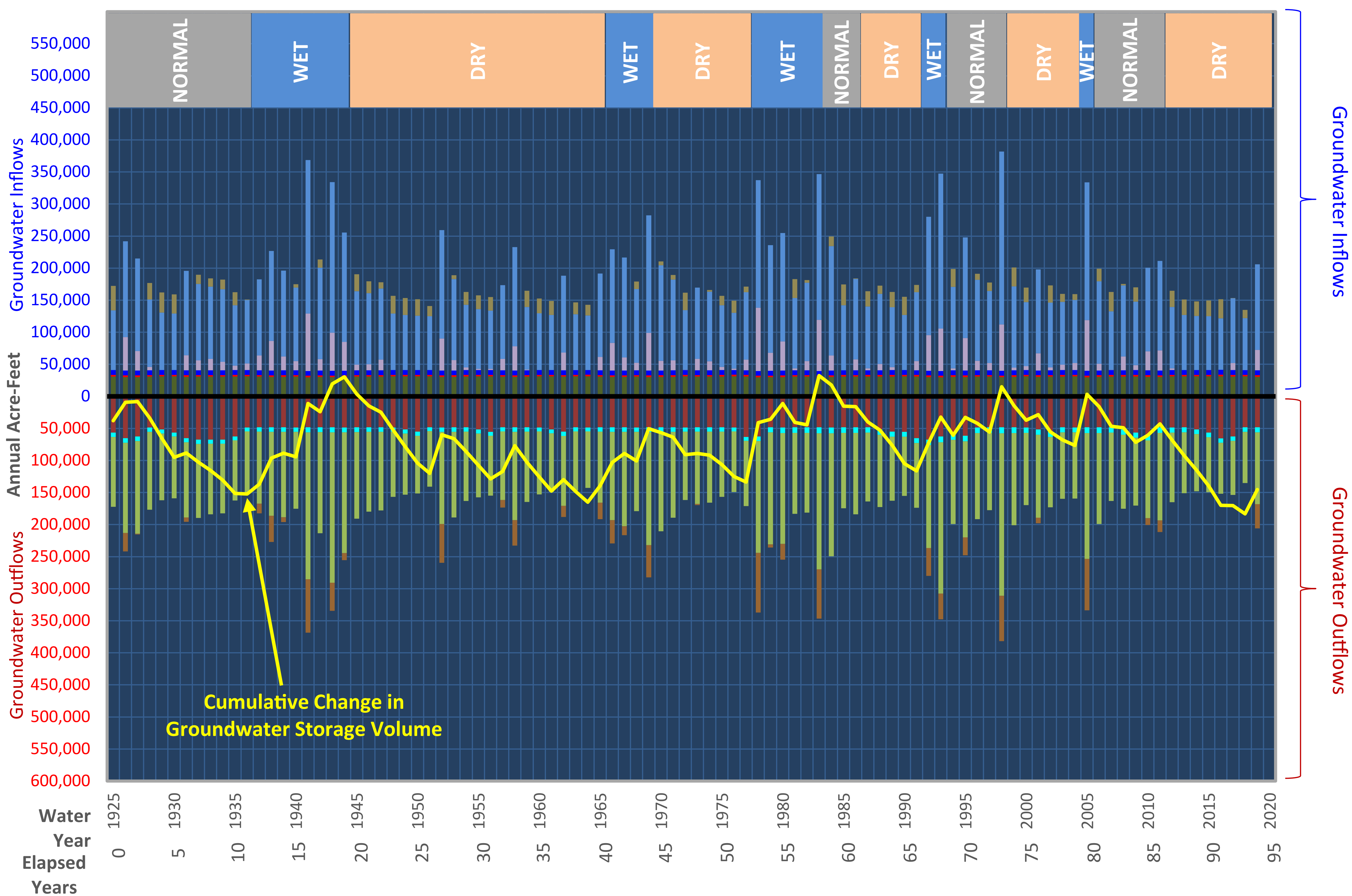

FIGURE 6.5-5

Projected Groundwater Budget For Year 2042 Conditions (Full Build-out Conditions With 2030 Average Climate Change)

Santa Clara River Valley
East Groundwater Subbasin
Groundwater Sustainability Plan

LEGEND

- Stream Gains
- Stream Losses
- Precipitation
- Ag+Muni Irrigation
- Subsurface Inflow in Tributaries
- Septic
- Pumping
- ET
- Groundwater Storage Increase
- Groundwater Storage Reduction

NOTES

This projected water budget is developed by projecting the 1925-2019 historical hydrology forward in time.
Ag: agriculture
Muni: municipal
ET: evapotranspiration

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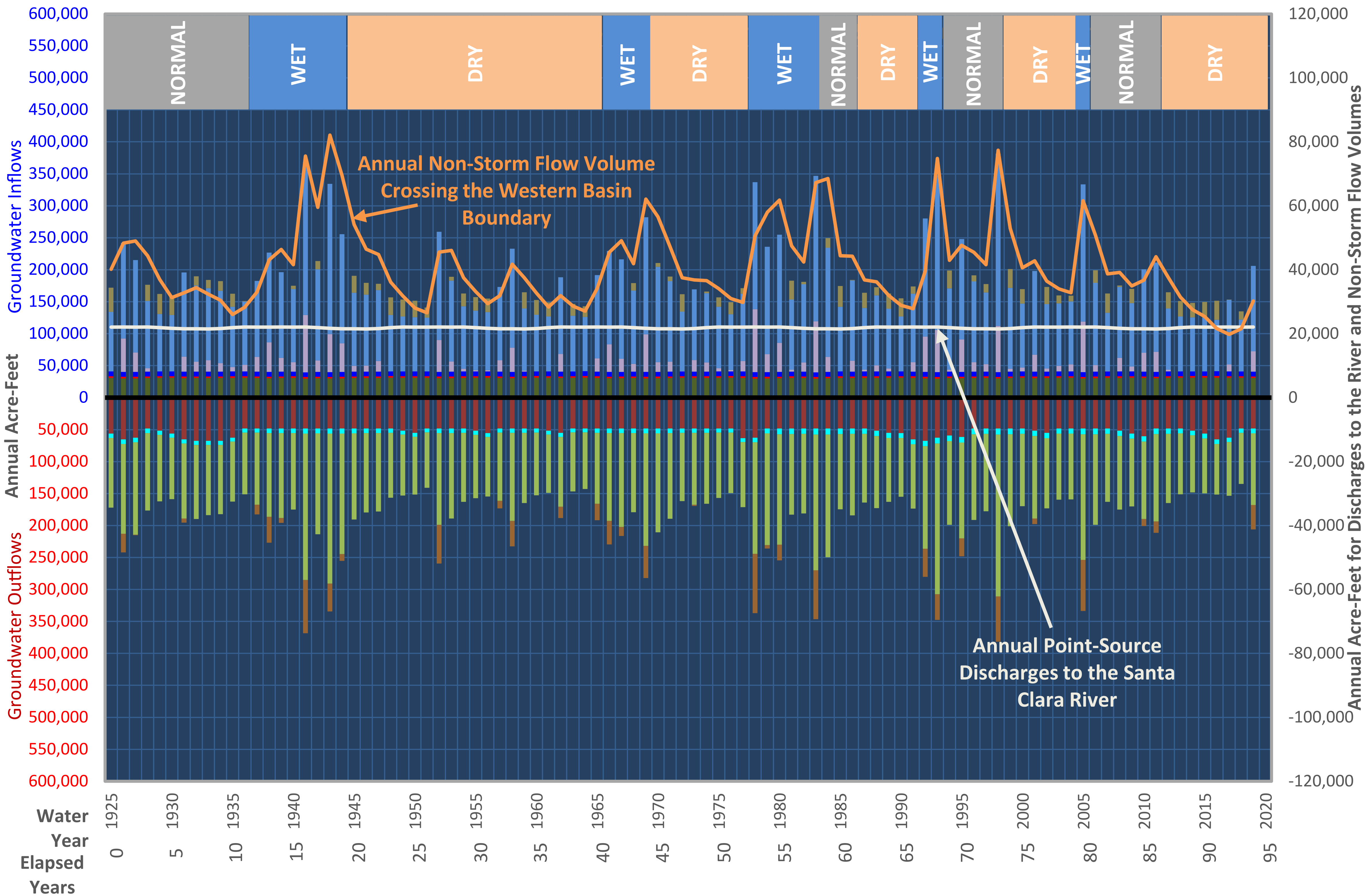

FIGURE 6.5-6

Projected Groundwater Budget and Annual Non-Storm Flows at the Western Basin Boundary for Year 2042 Conditions (Full Build-out Conditions With 2030 Average Climate Change)

Santa Clara River Valley
East Groundwater Subbasin
Groundwater Sustainability Plan

LEGEND

- Stream Gains
- Stream Losses
- Precipitation
- Ag+Muni Irrigation
- Subsurface Inflow in Tributaries
- Septic
- Pumping
- ET
- Groundwater Storage Increase
- Groundwater Storage Reduction

NOTES

This projected water budget is developed by projecting the 1925-2019 historical hydrology forward in time.
Ag: agriculture
Muni: municipal
ET: evapotranspiration

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6.5.4 Projected 50-Year Water Budget (Year 2072 Conditions)

As DWR discusses in its BMP for water budget development (DWR, 2016), the climate change analysis is a process in which variability in the historical climatic record is preserved while the magnitudes of events are increased or decreased based on projected changes in precipitation and air temperature, as obtained from global climate model outputs that have been downscaled to localized areas such as the Basin. This approach is used because it is impossible to know what precipitation and air temperatures will actually be in the year 2072, which is the end of the 50-year planning horizon for the projected water budget. As a result, the projected water budgets for Year 2072 conditions apply the 2070 climate-change factors to the historical (1925 through 2019) climate record while simulating full build-out of land and water uses. Output for the water budget is displayed in figures and tables as being for the period 1925 through 2019, even though the water budget is for Year 2072 conditions.

6.5.4.1 Surface Water Budget for Year 2072 Conditions

Figure 6.5-7 displays the year-by-year projected surface water budget for Year 2072 conditions. See also Table I-9 in Appendix I for detailed calculations.

Projected Imported Supplies

Projected imported supplies for the Year 2072 water budget are the same as for the projected water budget without climate change. See the discussion of projected imported supplies in Section 6.5.2.1 for details.

Projected Local Surface Water Inflows

Table 6.5-18 summarizes the average, minimum, and maximum values of the annual surface inflows to the Basin for the Year 2072 water budget. (See Table I-9 in Appendix I for detailed calculations.) These inflows are the same as for the projected water budget without climate change (see Table 6.5-10), with the exception of stormwater generation and stream inflows in the Santa Clara River and its tributaries (including Castaic Creek inflows), all of which are directly varied by DWR's climate change factors for 2070. Additionally, the net inflow of groundwater to streams changes as the result of the aquifer system's response to climate-change influences. The net effect of these decreases during the 95-year historical hydrologic period projected forward in time is an average surface water inflow of 269,400 AFY under 2070 climate change, compared with an average 289,000 AFY in the projected surface water budget without climate change (a difference of approximately 19,600 AFY, or 7.3 percent).

Projected Surface Water Outflows

Table 6.5-19 summarizes the average, minimum, and maximum values of the annual surface outflows from the Basin for the Year 2072 water budget. (See Table I-9 in Appendix I for detailed calculations.) Each of the four surface outflow terms are somewhat smaller under 2070 climate change than without climate change (see Table 6.5-11). Total surface water outflows are equal to total surface water inflows because there is no reservoir storage in the Basin.[42]

6.5.4.2 Groundwater Budget for Year 2072 Conditions

Figures 6.5-8 and 6.5-9 display the year-by-year projected groundwater budget for Year 2072 conditions. See also Table I-10 in Appendix I for detailed calculations.

[42] As discussed in Section 6.3.2.3 for the historical water budget, the non-storm flows in the Santa Clara River at the western basin boundary under the projected water budgets include the amount of subsurface outflow that occurs within a thin veneer of alluvium that is present at the western basin boundary, which comprises the western boundary of the groundwater flow model.

Table 6.5-18. Estimated Annual Surface Water Inflows to the Basin for the Year 2072 Projected Water Budget (Using 1925–2019 Rainfall With 2070 Climate Change Factors)

Surface Water Inflow Component	Minimum	Maximum	Average	Percent of Total
In-Basin Precipitation	24,400	233,000	86,300	32%
Stormwater Generated from In-Basin Precipitation	20,675	138,150	68,350	---
Stream Inflow (Santa Clara River)	0	33,700	4,600	2%
Stream Inflow (Releases from Castaic Lake/Lagoon)	175	175,800	17,850	7%
Stream Inflow (Releases from Bouquet Reservoir)	110	110	110	0.04%
Stream Inflow (Other Santa Clara River Tributaries)	0	150,200	19,900	7%
Discharges to Santa Clara River from Saugus WRP	5,005	5,020	5,010	2%
Discharges to Santa Clara River from Valencia WRP and Newhall WRP	15,995	16,055	16,000	6%
Discharges to Santa Clara River from Groundwater Treatment Systems	500	501	500	0.2%
Groundwater Discharge to Streams	76,000	238,300	119,100	44%
Total	140,600	716,800	269,400	100%

Notes

All values are in units of acre-feet per year (AFY) and are for the 95-year model simulation period (which applies climate-change factors to the historical rainfall record of water years 1925 through 2019). Percentages are calculated from the average values. All values are rounded from the statistics calculated in Table I-9 of Appendix I.

This projected water budget is developed by projecting the 1925-2019 historical hydrology forward in time.

5% of the releases from Bouquet Reservoir are assumed to remain as surface flow where Bouquet Creek enters the Basin.

The term "Net inflow from Groundwater" is the difference between stream gains and stream losses arising from groundwater/surface water exchanges in the Santa Clara River and its tributaries.

Total values do not include stormwater generated from in-basin precipitation, which is an internal flow process (and not an inflow to, or outflow from, the basin).

The total values shown at the bottom of this table are not equal to the sum of the individual terms because the minimum, maximum, and average values occur in different years for each of the individual surface water inflows.

WRP = water reclamation plant

Table 6.5-19. Estimated Annual Surface Water Outflows from the Basin for the Year 2072 Projected Water Budget (Using 1925–2019 Rainfall With 2070 Climate Change Factors)

Surface Water Outflow Component	Minimum	Maximum	Average	Percent of Total
Santa Clara River Non-Storm Outflow at the Western Basin Boundary	19,300	81,200	39,100	15%
Groundwater Recharge from Precipitation	0	106,100	17,950	7%
Groundwater Recharge from Streams	78,650	258,800	118,450	44%
ET and Stormwater Outflow	21,750	391,750	93,850	35%
Total	140,600	716,800	269,400	100%

Notes

All values are in units of acre-feet per year (AFY) and are for the 95-year model simulation period (which applies climate-change factors to the historical rainfall record of water years 1925 through 2019). Percentages are calculated from the average values. All values are rounded from the statistics calculated in Table I-9 of Appendix I.

Subsurface outflow through the thin alluvial material beneath the river at the western boundary of the Basin is accounted for as outflow in the surface water budget because the historical and current stream gages are located further downstream where bedrock is thought to be at or just beneath the river channel, which causes most if not all subsurface water at the western basin boundary to appear in the river upstream of those gages.

This projected water budget is developed by projecting the 1925-2019 historical hydrology forward in time.

The total values shown at the bottom of this table are not equal to the sum of the individual terms because the minimum, maximum, and average values occur in different years for each of the individual surface water outflows.

ET = evapotranspiration

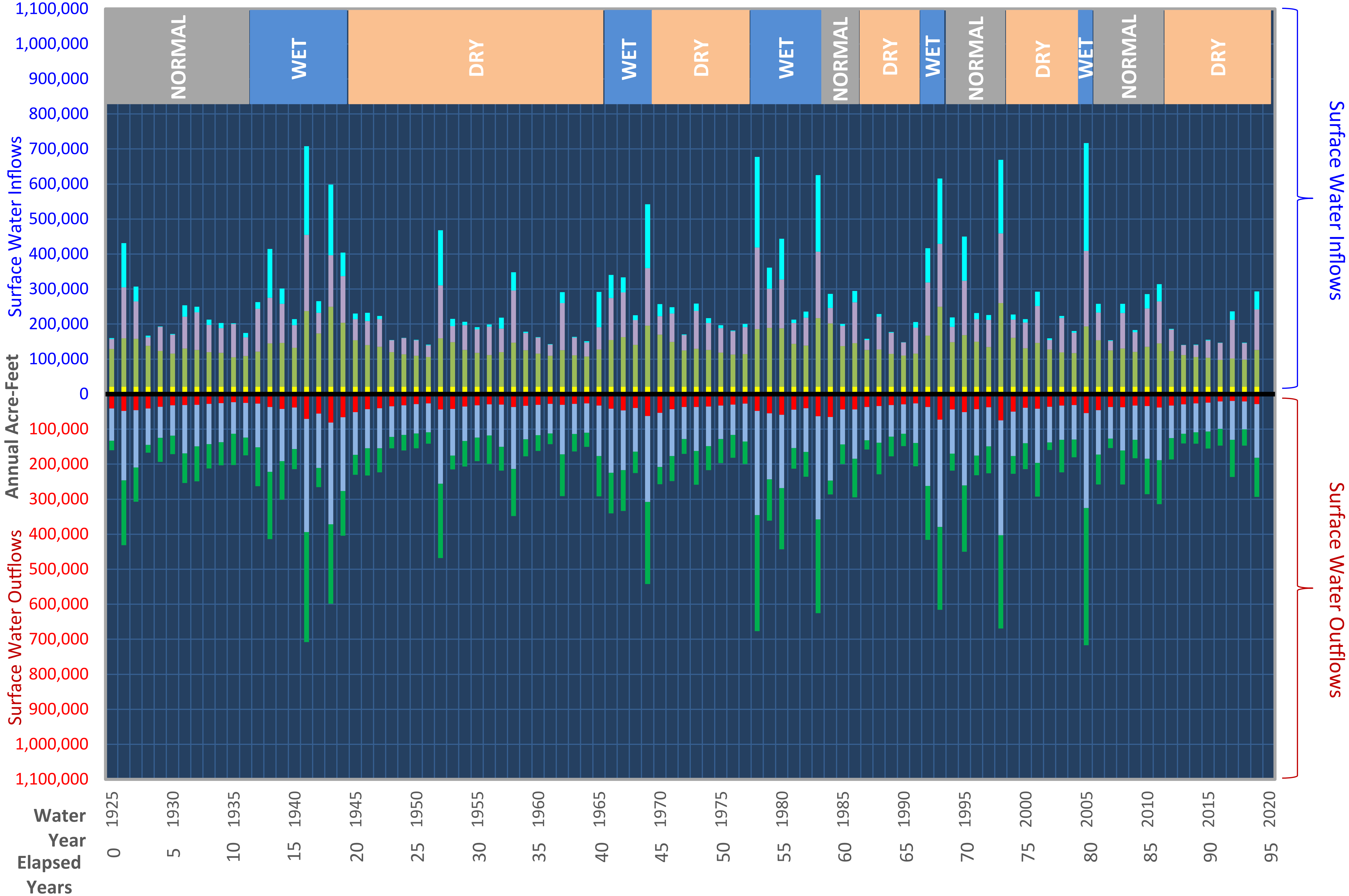

FIGURE 6.5-7

Projected Surface Water Budget for Year 2072 Conditions (Full Build-out Conditions With 2070 Average Climate Change)

Santa Clara River Valley
East Groundwater Subbasin
Groundwater Sustainability Plan

LEGEND

- Precipitation
- Stream Inflows
- Point-Source Flows to Streams
- Net Inflow from Groundwater
- Non-Storm Flow at County Line
- ET and Storm Outflows
- Groundwater Recharge from Streams and Rainfall

NOTES

This projected water budget is developed by projecting the 1925-2019 historical hydrology forward in time.
ET: evapotranspiration

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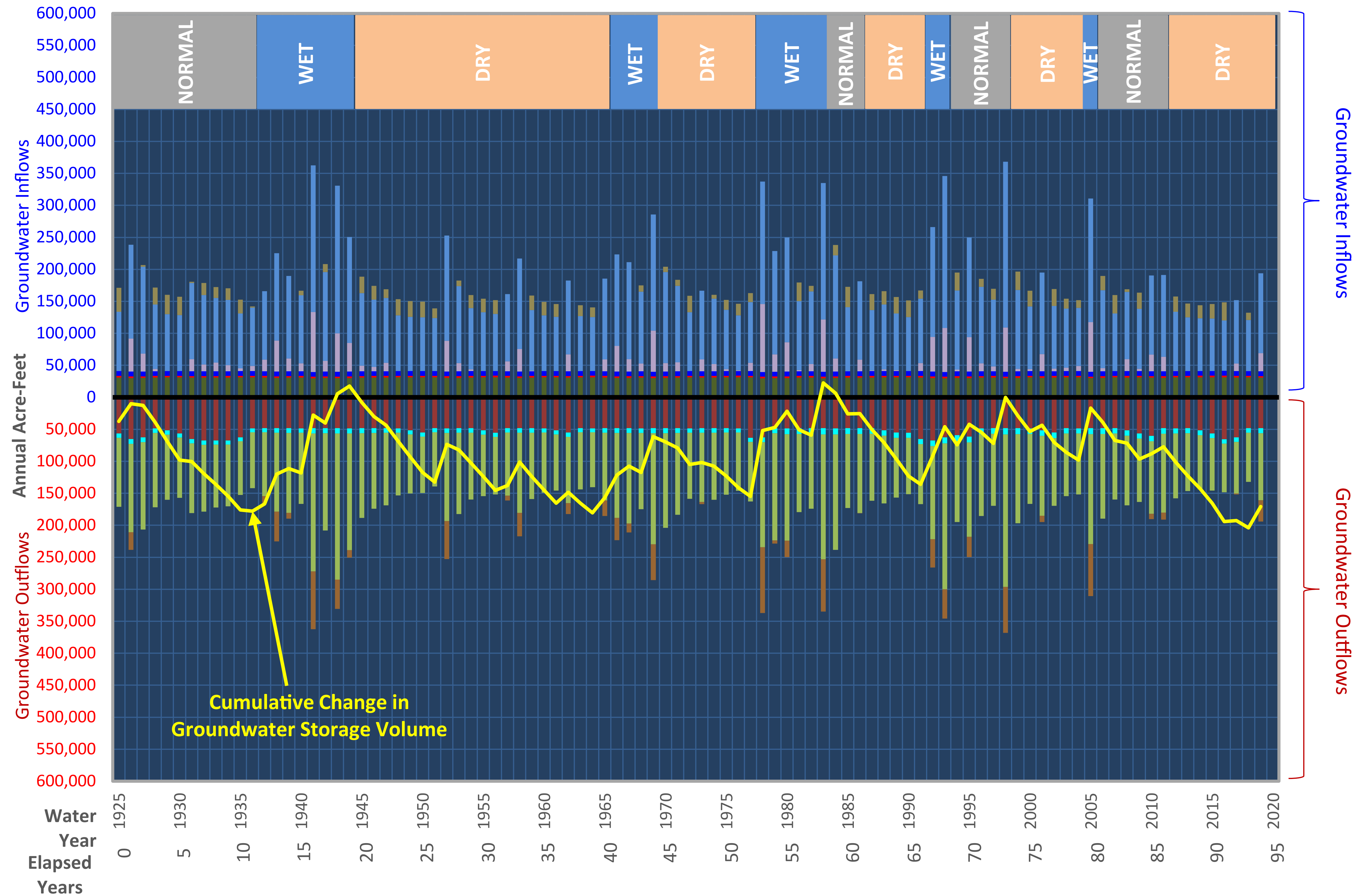

FIGURE 6.5-8

Projected Groundwater Budget For Year 2072 Conditions (Full Build-out Conditions With 2070 Average Climate Change)

Santa Clara River Valley
East Groundwater Subbasin
Groundwater Sustainability Plan

LEGEND

- Stream Gains
- Stream Losses
- Precipitation
- Ag+Muni Irrigation
- Subsurface Inflow in Tributaries
- Septic
- Pumping
- ET
- Groundwater Storage Increase
- Groundwater Storage Reduction

NOTES

This projected water budget is developed by projecting the 1925-2019 historical hydrology forward in time.
Ag: agriculture
Muni: municipal
ET: evapotranspiration

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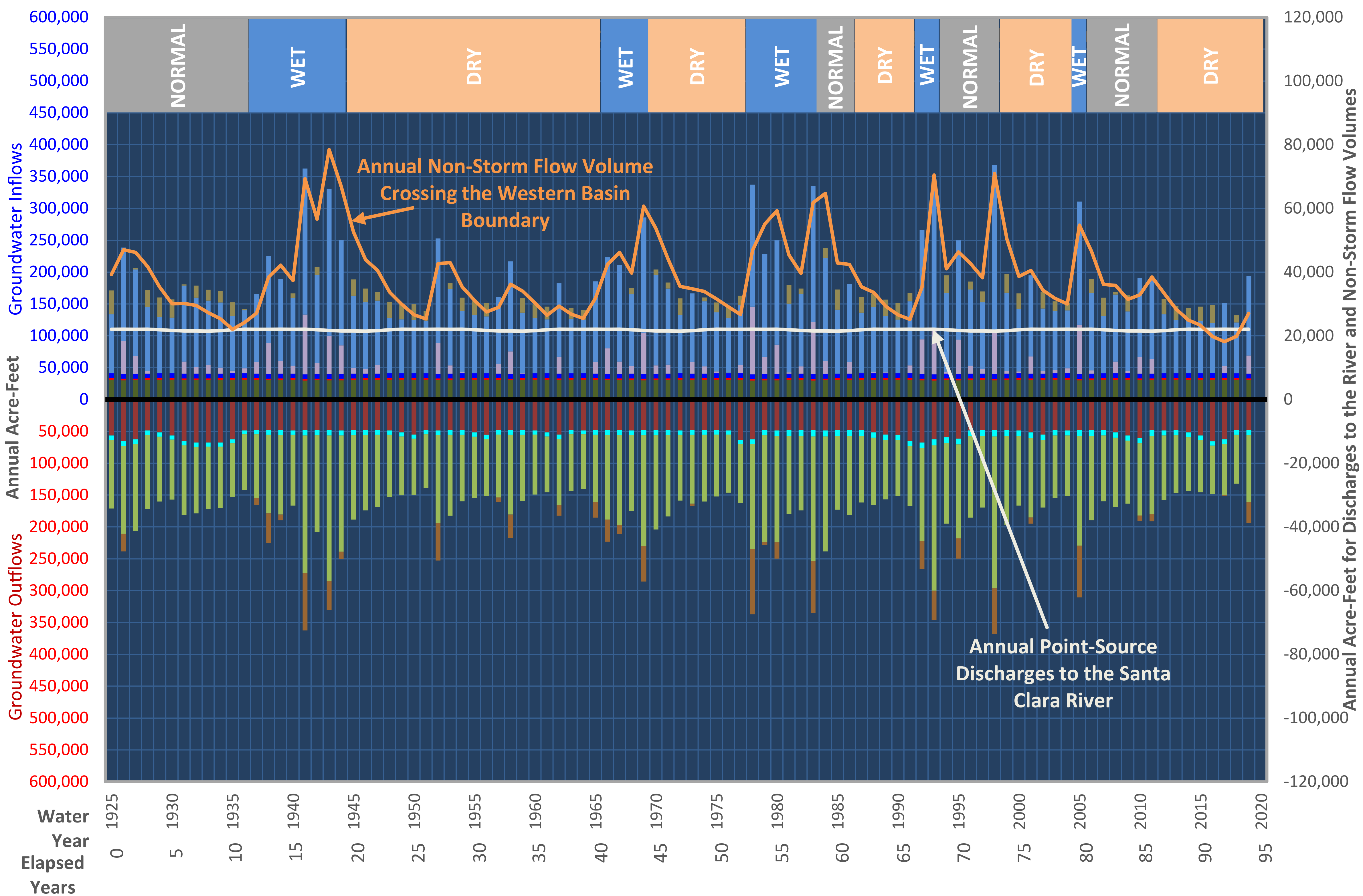

FIGURE 6.5-9

Projected Groundwater Budget and Annual Non-Storm Flows at the Western Basin Boundary for Year 2072 Conditions (Full Build-out Conditions With 2070 Average Climate Change)

Santa Clara River Valley
East Groundwater Subbasin
Groundwater Sustainability Plan

LEGEND

- Stream Gains
- Stream Losses
- Precipitation
- Ag+Muni Irrigation
- Subsurface Inflow in Tributaries
- Septic
- Pumping
- ET
- Groundwater Storage Increase
- Groundwater Storage Reduction

NOTES

This projected water budget is developed by projecting the 1925-2019 historical hydrology forward in time.
Ag: agriculture
Muni: municipal
ET: evapotranspiration

GSI Water Solutions, Inc.

Projected Groundwater Inflows

Table 6.5-20 summarizes the average, minimum, and maximum values of the annual inflows to groundwater in the Basin for the Year 2072 water budget (with DWR's 2070 climate change factors). (See Table I-10 in Appendix I for detailed calculations.) These inflows are the same as for the projected water budget without climate change (see Table 6.5-12), except for reductions in deep percolation from stormwater and from precipitation falling directly within the Basin. The net effect of these changes during the 95-year historical hydrologic period projected forward in time is an average groundwater inflow of 177,100 AFY under 2070 climate change compared with 188,500 AFY in the projected groundwater budget without climate change (see Table 6.5-12), which is a difference of 11,400 AFY, or 6.4 percent.

Projected Groundwater Outflows

Table 6.5-21 summarizes the average, minimum, and maximum values of the annual outflows from groundwater in the Basin for the Year 2072 water budget (with DWR's 2070 climate change factors). (See Table I-10 in Appendix I for detailed calculations.) Groundwater pumping is the same as for the projected water budget without climate change (see Table 6.5-13), while riparian ET increases by 380 AFY and groundwater discharge to streams decreases by 11,350 AFY under 2070 climate change. The average groundwater outflow is 178,900 AFY under 2070 climate change, which is 10,950 AFY (6.0 percent) lower than the 189,850 AFY of outflow that occurs in the projected groundwater budget without climate change (see Table 6.5-13).

Projected Changes in Groundwater Storage

The yellow line on Figure 6.5-8 shows how much the volume of stored groundwater changes progressively over time when simulating the combined effects of (1) 2070 climate change and (2) full build-out land and water uses through the historical hydrologic record projected forward in time. As with the cumulative change plots for groundwater budgets discussed previously (Figures 6.3-3, 6.4-2, and 6.5-5), the cumulative-change plots for groundwater storage under Year 2072 conditions (Figure 6.5-8) shows that (1) the occurrence of rising versus declining slopes in the cumulative-change curve calculated by the numerical groundwater flow model varies frequently during the 95-year historical period, and (2) the cumulative-change curve under Year 2072 conditions has a shape that is generally similar to the cumulative-change curves for the groundwater budgets discussed previously. Accordingly, the water budget assessment for Year 2072 conditions indicates that the combined effects of increased future development, the increased pumping that will occur in the future under the Basin Operating Plan, and 2070 climate change are not likely to create a chronic long-term decline in the volume of stored groundwater. The Basin is anticipated to remain in a sustainable condition with respect to the SGMA criterion of avoiding chronic lowering of groundwater levels and not being in an overdraft condition as a result of future development, associated groundwater uses, and the influences of 2070 climate change.

Table 6.5-20. Estimated Annual Groundwater Inflows to the Basin for the Year 2072 Projected Water Budget (Using 1925–2019 Rainfall With 2070 Climate Change Factors)

Groundwater Inflow Component	Minimum	Maximum	Average	Percent of Total
Recharge from Precipitation	0	106,100	17,950	10%
Recharge from Streams	78,650	258,800	118,450	67%
Subsurface Inflow Beneath Castaic Dam	1,675	1,680	1,675	1%
Subsurface Inflow Beneath Santa Clara River and Other Tributaries	28,100	29,700	29,100	16.5%
Septic System Percolation	2,430	2,440	2,435	1.5%
Recharge of Applied Water	7,480	7,490	7,485	4%
Total	120,000	368,100	177,100	100%

Notes

All values are in units of acre-feet per year (AFY) and are for the 95-year model simulation period (which applies climate-change factors to the historical rainfall record of water years 1925 through 2019). Percentages are calculated from the average values. All values are rounded from the statistics calculated in Table I-10 of Appendix I.

This projected water budget is developed by projecting the 1925-2019 historical hydrology forward in time.

Deep percolation from irrigation is the sum for agricultural and municipal lands.

Septic system percolation applies to areas served by public water supplies that do not have public sewer collection systems.

For the minimum and maximum values, the total values shown in this table are not equal to the sum of the individual inflow terms because the minimum values of the individual terms occur in different years, and similarly for the maximum values.

Table 6.5-21. Estimated Annual Groundwater Outflows from the Basin for the Year 2072 Projected Water Budget (Using 1925–2019 Rainfall With 2070 Climate Change Factors)

Groundwater Outflow Component	Minimum	Maximum	Average	Percent of Total
Groundwater Pumping	48,295	67,650	52,190	29%
Riparian Evapotranspiration	6,050	9,750	7,600	4%
Groundwater Discharge to Streams	76,000	238,300	119,100	67%
Total	132,200	300,200	178,900	100%

Notes

All values are in units of acre-feet per year (AFY) and are for the 95-year model simulation period (which applies climate-change factors to the historical rainfall record of water years 1925 through 2019). Percentages are calculated from the average values. All values are rounded from the statistics calculated in Table I-10 of Appendix I.

This projected water budget is developed by projecting the 1925-2019 historical hydrology forward in time.

Groundwater discharge to streams is the combined amount in ephemeral and perennial reaches.

Subsurface outflow through the thin alluvial material beneath the river at the western boundary of the Basin is accounted for as outflow in the surface water budget because the historical and current stream gages are located further downstream where bedrock is thought to be at or just beneath the river channel, which causes most if not all subsurface water at the western basin boundary to appear in the river upstream of those gages.

For the minimum and maximum values, the total values shown in this table are not equal to the sum of the individual outflow terms because the minimum values of the individual terms occur in different years, and similarly for the maximum values.

6.5.5 Summary of Basin Conditions Under the Projected Water Budgets

The projected water budgets show that the cumulative change curve for groundwater storage may shift slightly downward with the onset of slightly reduced precipitation and greater ET in the Basin. However, as with the historical and current water budgets, the three projected water budgets for the Basin indicate that chronic long-term declines in the volume of stored groundwater are not expected to occur in the future under (1) the pattern of wet/normal/dry year fluctuations observed during the past 95 years and (2) the influence of climate change on the magnitudes of precipitation and streamflows during that 95-year period. This observation in turn indicates (1) the Basin is not likely to be in an overdraft condition under a sustained level of pumping at the full-build-out level of human demand for groundwater, even under the average climate change scenarios for 2030 and 2070; and (2) the operating plan for the Basin's groundwater resources is expected to continue maintaining a condition that does not create an overdraft condition (chronic long-term declines in groundwater levels) in the future.

Figures 6.5-3, 6.5-6, and 6.5-9 show that the projected annual non-storm flow volumes across the western basin boundary are expected to fluctuate according to precipitation patterns but otherwise show no discernible long-term trends in the future. This occurs in part because of the year-to-year uniformity in WRP discharge volumes to the river that is expected to occur once the Basin is fully built out. A 2019 study (Maddaus, 2019) estimated that under full build-out conditions in the Basin, future inflows to local WRPs will rise to 30,300 AFY, with approximately 21,000 AFY of this inflow becoming treated water that will be discharged to the river, with the remaining 9,300 AFY available as recycled water supply for urban irrigation uses. More recent updates to the full build-out water demand estimates (for the 2020 UWMP; see KJ, 2021) have slightly reduced the forecasted amount of indoor use and flows into the WRPs, which has reduced the amount of recycled water to 8,961 AFY; this updated projection does not reduce the amount of WRP discharges (approximately 21,000 AFY) to the river.

6.5.6 Uncertainties

The uncertainties in the projected water budgets fall into four categories:

- **Data and quantification methods**, including how the basin responds and how well the numerical groundwater flow model of the Basin represents the responses (i.e., a discussion of the model's calibration quality, plus the model's limitations/uncertainties as discussed in Appendix G, the model development report [GSI, 2021])
- **Future water demands, water uses, and WRP discharges to the river**
- **Restrictions in the availability of future imported supplies** (restrictions that are minimized because of the breadth of SCV Water's imported water supply portfolio, SCV Water's past and ongoing investments in banked supply sources outside the Basin, and SCV Water's use of water exchanges with neighboring water districts)
- **Climate change and future cycles of wet/normal/dry year conditions**

Estimating the effects of future climate changes and changes in land use and human water demands 20 and 50 years into the future is challenging and full of uncertainties. The uncertainty of data and quantification methods is described and addressed in Section 6.3.5. The three other uncertainties listed above pertain to topics that have been examined and defined in detail in the following:

- Local land-use plans (SCAG, OVOV, and the Newhall Ranch Specific Plan)
- Local water-use plans (the 2020 UWMP; see KJ, 2021)

- A local water supply reliability study (Clemm and KJC, 2017) that was conducted after the 2015 UWMP was completed[43] and was recently updated (Geosyntec, 2021) in support of the 2020 UWMP
- A recent study of indoor water uses and the resulting inflows to local WRPs under full build-out conditions in the Basin (Maddaus, 2019)
- Past and recent DCRs for the SWP system (DWR, 2015 and 2020)
- Climate change studies by DWR, which has provided local climate-change factors for the GSP development team's use in developing the projected water budgets for the Basin

Accordingly, these references provide the best possible estimates of most aspects of future build-out, human water demands, water supply availability, and climate-change conditions. Nonetheless, certain assumptions have been required to develop the projected water budgets—primarily the (1) amount of pumping by private groundwater users and (2) future volumes of WRP flows to be discharged to the river versus used as recycled water supply for urban irrigation purposes. Additionally, a close examination of DWR's climate-change factors for precipitation and reference ET was conducted to develop modifications to the precipitation-recharge relationship that is used by the groundwater flow model to define recharge from local precipitation and stormwater inflows under future climate-change influences. Through these efforts, sufficient planning and climate-change analysis has occurred to date such that reasonable assumptions regarding these uncertainties can be made for the purposes of developing the projected water budgets. If future planning indicates that the amounts of these or other specified inflow terms to the Basin are likely to differ from the values presented in these projected water budgets, then the new estimates can be incorporated into modeling and water budget analyses during the GSP implementation period for the purpose of developing updated projected water budgets.

6.6 Basin Yield Estimate

The basin yield for a groundwater basin is the average annual volume of pumping that can occur on a long-term basis without creating a chronic (i.e., continual) year-over-year lowering of groundwater levels and reduction in groundwater storage volumes. Basin yield is generally considered equal to the average replenishment rate of the aquifer from natural and artificial recharge sources. ET and basin outflow are also factored into replenishment rates. If pumping exceeds recharge on a long-term basis, the basin yield of a groundwater basin can be estimated to be equal to the average amount of historical pumping minus the change in storage under the observed historical conditions.

Basin yield is not the same as sustainable yield. As defined by SGMA, sustainable groundwater management avoids the occurrence of an undesirable result. An undesirable result is one or more of the following effects:

- Chronic water level declines in the aquifer system[44]
- Significant and unreasonable reductions in groundwater storage

[43] As discussed in Section 6.3.2.1, CLWA (SCV Water's predecessor agency) prepared a Water Supply Reliability Report Update in 2017 that demonstrated the ability of CLWA's imported water supply portfolio to meet supplemental water demands fully and reliably within CLWA's service area. The reliability study incorporated the groundwater operating plan and analyzed CLWA's imported water portfolio through 2050 build-out using the historical hydrologic conditions that have been recorded for nearly a century in the region. The report demonstrated full reliability under 2015 UWMP assumptions. The report also concluded that, even with a significant reduction in SWP reliability, the full demands within the service area can be met without exceeding the groundwater operating plan. A recent draft update of the Water Supply Reliability Plan (Geosyntec, 2021) reached the same conclusions—specifically, that, with planned investments, there would be a supply surplus that would greatly exceed any projected shortfalls, as long as the remaining supply capacity in the Saugus Formation and/or in specific water banks is fully developed.

[44] A chronic decline means a decline that continues and progresses over time, with groundwater levels and groundwater storage volumes not achieving a long-term equilibrium condition.

- Significant and unreasonable degradation of water quality
- Seawater intrusion
- Significant and unreasonable land subsidence that interferes with surface land uses
- Depletion of interconnected surface water that has significant and unreasonable adverse impacts on beneficial uses of surface water, including impacts to GDEs

Defining the annual groundwater withdrawal volume that constitutes the basin yield volume for a groundwater basin provides a starting point for later establishing sustainability criteria through the consideration of each of the six sustainability indicators (undesirable results) listed above. As discussed in Sections 8 and 9 of the GSP, undesirable results arising from pumping in the groundwater basin have not been identified to date and are not expected to occur under the Basin Operating Plan—given that the operating plan is expected to not create a chronic decline in groundwater levels, a reduction of groundwater in storage, nor significant and unreasonable depletion of surface water. These conditions will be monitored and evaluated under the monitoring program described in Section 7 of the GSP, along with monitoring of the two other sustainability indicators that are pertinent in the Basin (degraded groundwater quality and land subsidence). If undesirable results are identified in the future, then the GSP will include projects and management actions to return the Basin to a sustainable condition. Because undesirable results are not expected to occur, the basin yield volume of at least 52,200 AFY is numerically equivalent to the sustainable yield of the Basin (and potentially might be higher).

The water budgets presented in this section identify that conditions indicative of groundwater overdraft have not been observed historically and are not likely to occur during the 50-year planning horizon for SGMA (through the year 2072) under the Basin's existing Basin Operating Plan and under future full build-out conditions (which are expected to occur by 2050). The lack of overdraft conditions is indicated by the cumulative-change-in-storage curves for the historical, current, and projected (2042 and 2072) groundwater budgets, which show a lack of chronic declines in groundwater storage volumes during the 95-year historical hydrologic record through which each level of groundwater pumping demand has been evaluated. In particular, the 2042 and 2072 projected water budgets indicate that the combination of a changing climate and full build-out of the Basin are unlikely to create chronic declines in the Basin's groundwater resources over long periods (i.e., no repeated lowering of groundwater levels and groundwater storage volumes is expected to occur from one period to the next when viewed on a multi-decadal scale). As with the historical record, short-term periods of lowered groundwater storage volumes are likely to occur in the future in tandem with local droughts that are prolonged (as occurred from 1945 through 1965) and/or local droughts that are particularly intense (i.e., with substantially below-normal precipitation, as occurred from 2012 through 2016).

Historical observations are consistent with the finding from the water budget analyses of the absence of an overdraft condition to date in the groundwater system. Modeling analyses of the historical water budget indicate that the period of peak groundwater pumping from the Alluvial Aquifer during the Basin's peak agricultural years did not create year-over-year continued and sustained chronic declines in groundwater levels that could not be recovered once agricultural lands began to be retired (starting in the 1960s). Since that time, the municipal water providers have pumped groundwater from the Alluvial Aquifer at rates that have not created a condition of chronic reductions in groundwater levels and groundwater storage in the Basin's groundwater system, as indicated by (1) water level data that are presented in the annual water reports for the Basin, including the 2019 annual report (LSCE, 2020), and (2) modeling analyses of historical basin conditions.

Given that the historical, current, and projected water budgets indicate that the Basin's operating plan for its local groundwater resources does not produce chronic and sustained declines in groundwater storage volumes or groundwater levels in the aquifer system on a long-term basis, the basin yield volume for the

Basin is likely higher than the average pumping rate simulated in the projected water budget for full build-out conditions. Table 6.6-1 compares the annual groundwater pumping volumes that were modeled for the projected water budget with the annual pumping volumes for the Basin that are specified in the Basin Operating Plan. As discussed in a prior detailed study (LSCE and GSI, 2009), the Basin Operating Plan calls for maximizing the use of Alluvial Aquifer groundwater and imported water during years of normal or above-normal availability of those supplies, limiting the use of Saugus Formation groundwater during those periods, and temporarily increasing Saugus Formation pumping during years when imported SWP water supplies are significantly curtailed. The Basin Operating Plan calls for total groundwater production from the Basin ranging from a limit of 55,000 AFY during normal years (locally and with respect to SWP water availability) to a limit of 70,000 AFY during years that are characterized by both locally dry conditions and a multi-year curtailment of SWP water. The average annual pumping volume in the numerical groundwater flow model simulations of full build-out conditions was 52,200 AFY and pumping during each multiple-year dry-year period was simulated at rates of up to 67,500 AFY.

The projected water budgets described in Section 6.5 indicate that if the Basin continues to be operated conjunctively as was modeled for full build-out conditions (i.e., if Saugus Formation pumping is low except during periods of significant curtailments of SWP water), then the Basin can be expected to not be in overdraft, and hence to remain in a sustainable condition with respect to the SGMA criterion of avoiding chronic water level declines in the aquifer system. The results of the projected water budget analyses also indicate that, pursuant to the Basin Operating Plan, the Basin can be pumped at an annual rate of at least 67,500 AFY for multiple dry years without causing chronic water level declines. The number of consecutive dry years that the Basin can be pumped at or above 67,500 AFY without causing chronic water level declines has not been tested or determined. Thus, it is prudent to consider the basin yield volume for the Basin to be at least 52,200 AFY, based on the long-term average amount of pumping in the projected water budget.

Table 6.6-1. Annual Groundwater Pumping for the Basin Operating Plan and the Projected Water Budgets

Year Type	Modeled Groundwater Pumping for the Projected Water Budgets	Pumping Ranges Specified in the Basin Operating Plan
Normal	48,300	37,500 to 55,000
Dry Year 1	52,500	45,000 to 60,000
Dry Year 2	57,500	51,000 to 60,000
Dry Year 3+	67,500	51,000 to 70,000
Modeled Average for Projected Water Budgets	**52,200**	

Notes

Normal-year and dry-year values are in units of acre-feet per year (AFY) and are for 365-day years. Values will be higher in leap years.

The modeled average of 52,200 AFY is for the 95-year time period that is simulated in the numerical groundwater flow model, and is rounded from values presented in other tables and in Appendix I.

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7. Monitoring Networks

7.1 Introduction

This section evaluates existing monitoring programs in the Santa Clara River Valley Groundwater Basin, East Subbasin (Basin) and incorporate elements of existing monitoring programs into a GSP monitoring network and program to be consistent with SGMA regulations and presents a recommended GSP monitoring program.

7.2 Existing Monitoring Programs

Existing monitoring programs considered relevant to monitoring of sustainability indicators were evaluated to identify monitoring sites and historical data that can be utilized in the development of a monitoring network for this GSP. Existing monitoring programs in the Basin that relate to sustainability indicators include efforts conducted by the following entities and agencies:

- Santa Clarita Valley Water Agency (SCV Water) groundwater elevation and quality monitoring programs (reported in the Santa Clarita Valley Water Report)
- County of Los Angeles Waterworks District 36 groundwater production well monitoring
- County of Los Angeles Flood Control District Groundwater Elevation monitoring
- Los Angeles County Department of Public Works (LACDPW) and U.S. Geological Survey (USGS) streamflow monitoring
- CASGEM – Santa Clara River Valley Basin – Santa Clara River Valley East
- University NAVSTAR Consortium (UNAVCO) Plate Boundary Observatory
- California Drinking Water Watch
- Department of Toxic Substances Control (Whittaker-Bermite)
- Santa Clarita Valley Water Agency Salt and Nutrient Management Plan monitoring
- Santa Clarita Valley Sanitation District of Los Angeles County (SCVSD)

The focus of the monitoring program evaluation will be on existing monitoring programs conducted by the agencies listed above. Short-term monitoring such as programs under the purview of the Regional Water Quality Control Boards will not be discussed, as those efforts are concerned with items outside the scope of Groundwater Sustainability Agencies (GSAs) in the monitoring of sustainability indicators under the SGMA regulations.

Previous reports on monitoring programs such as the Salt and Nutrient Management Plan (GSSI, 2016) and the Santa Clarita Valley Water Report (LSCE, 2020), have summarized existing monitoring programs in the Basin. The purpose of this section is to identify components of existing monitoring programs that can be utilized for GSP development and implementation based on the six sustainability indicators for which monitoring is identified in the SGMA regulations. Brief summaries of each program are provided below.

7.2.1 Santa Clarita Valley Water Agency: Basin Groundwater Monitoring

The Santa Clarita Valley Water Agency (SCV Water) collects water level measurements from production and observation wells within the Basin. These monitoring efforts were described in the *Groundwater Management Plan, Santa Clara River Valley Groundwater Basin, East Subbasin, Los Angeles County, California* (LSCE, 2003), and monitoring results have been reported in the annual Santa Clarita Valley Water

Report that has been prepared every year since 1999. See LSCE (2020) for the most recent annual report, which documents basin groundwater conditions and water uses in the Santa Clarita Valley during the year 2019. Currently, SCV Water's monitoring network includes 53 municipal wells, 10 irrigation wells, and two observation wells (see Table 7-1). Measurements of groundwater elevations conform to standards stated in SGMA regulations § 352.4, however, the accuracy of some of the reference point elevations are to the nearest foot rather than to the nearest tenth of a foot, consistent with SGMA regulations and best management practices (BMPs). The BMP guidance states that historically, water level measurements have been collected on a semi-annual to quarterly basis and recommends that monitoring continue at the same frequency. However, an official schedule has not been developed. In recent years, most of the monitored wells have had water levels measured on a monthly basis. The spatial distribution of SCV Water's current groundwater level monitoring network is displayed in Figure 7-1.

Table 7-1. SCV Annual Report Water Level Monitoring Network

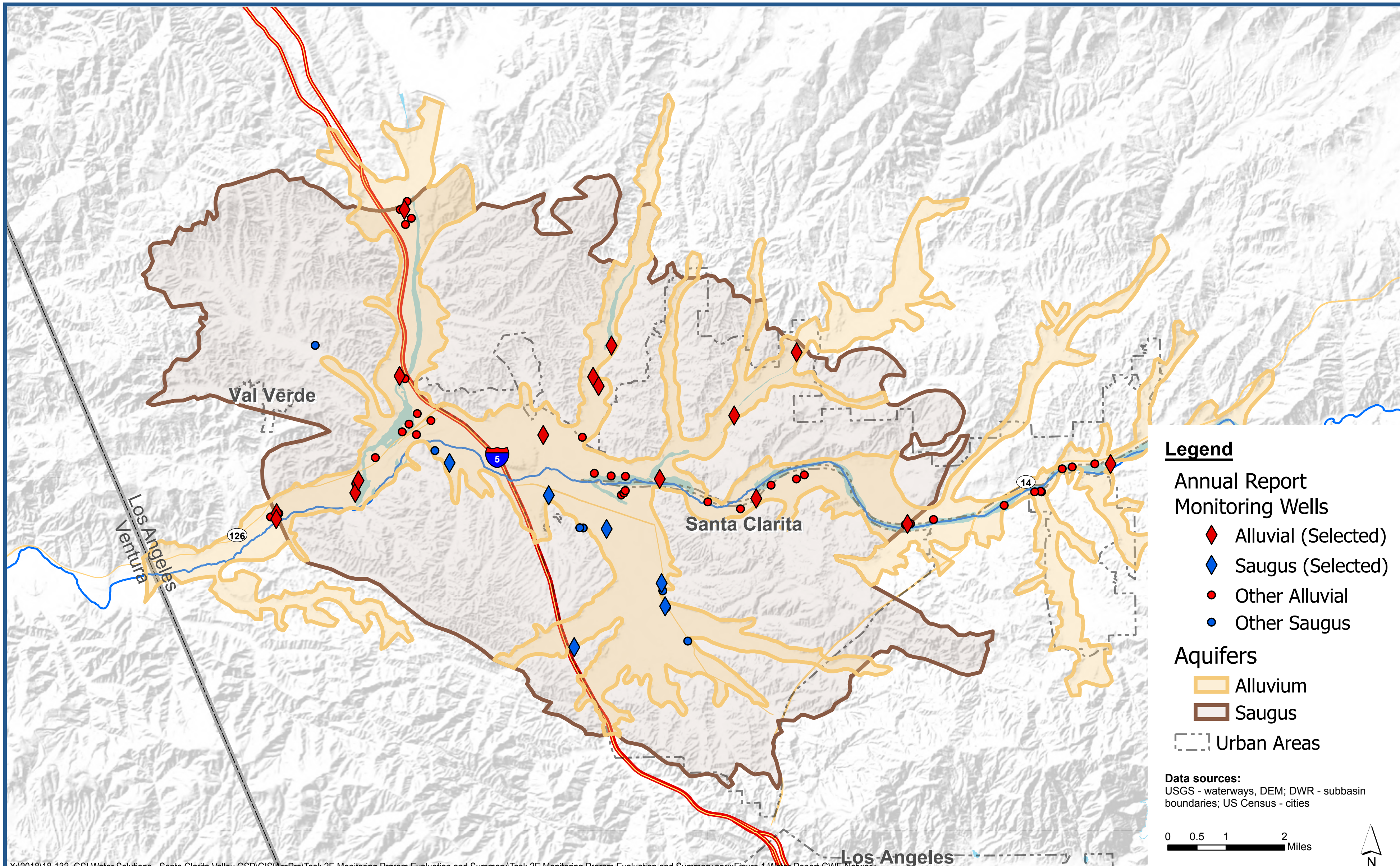
Well Name	Depth (ft bgs)	Reference Point Elevation (ft asl)	Latitude	Longitude	Aquifer	Well Use	Water Level/ Quality Network
NWD-Castaic 2	120	1135	34.492868	-118.614793	Alluvial	MUN	Yes/Yes
SCWD-Clark	160	1253	34.440422	-118.51665	Alluvial	MUN	Yes/Yes
SCWD-Guida	116	1342	34.455905	-118.497607	Alluvial	MUN	Yes/Yes
SCWD-N. Oaks Central	244	1391	34.412772	-118.465123	Alluvial	MUN	Yes/Yes
VWD-D	142	1035.617	34.4515184	-118.617003	Alluvial	MUN	Yes/Yes
VWD-Q2	170	1166.641	34.424925	-118.539325	Alluvial	MUN	Yes/Yes
VWD-U4	135	1242.795	34.4196891	-118.510433	Alluvial	MUN	Yes/Yes
VWD-W9	160	1174.995	34.450584	-118.558871	Alluvial	MUN	Yes/Yes
NWD-12	1340	1204	34.393227	-118.538274	Saugus	MUN	Yes/Yes
VWD-160	2000	1102.083	34.4213	-118.572743	Saugus	MUN	Yes/Yes
VWD-W11	180	1208.253	34.4583091	-118.553181	Alluvial	MUN	Yes/Yes
VWD-201	1690	1152	34.4127002	-118.555486	Saugus	MUN	Yes/Yes
VWD-206	2060	1059	34.4297323	-118.602348	Saugus	MUN	Yes/Yes
VWD-159	1950	1291	34.3834173	-118.565787	Saugus	IRR	Yes/No
NLF-B10	142	896	34.416345	-118.654631	Alluvial	IRR	Yes/No
NLF-C4	148	951	34.422612	-118.630799	Alluvial	IRR	Yes/No
NLF-W5	265	1155	34.448255	-118.557233	Alluvial	IRR	Yes/No
NWD-Pinetree 1	235	1583.5	34.426846	-118.40386	Alluvial	MUN	Yes/Yes
VWD-I	171	1089	34.436308	-118.574092	Alluvial	MUN	Yes/Yes
NWD-11	1136	1188	34.398992	-118.539234	Saugus	MUN	Yes/No
VWD-E15	160	1022.957	34.4420904	-118.611842	Alluvial	MUN	Yes/Yes
VWD-S8	220	1143.355	34.4257389	-118.5496	Alluvial	MUN	Yes/Yes
VWD-T7	No Data	1211.08	34.4190488	-118.524976	Alluvial	MUN	Yes/Yes
VWD-205	1950	1148.531	34.4131026	-118.563544	Saugus	MUN	Yes/Yes

Well Name	Depth (ft bgs)	Reference Point Elevation (ft asl)	Latitude	Longitude	Aquifer	Well Use	Water Level/ Quality Network
NWD-Castaic 1	310	1129	34.489194	-118.614561	Alluvial	MUN	Yes/Yes
NWD-Castaic 7	No Data	1149	34.49292794	-118.616072	Alluvial	MUN	Yes/Yes
NWD-Pinetree 5	No Data	1597	34.42695067	-118.408591	Alluvial	MUN	Yes/Yes
SCWD-Honby	202	1280	34.424401	-118.498265	Alluvial	MUN	Yes/Yes
SCWD-Lost Canyon 2	310	1532	34.420205	-118.424712	Alluvial	MUN	Yes/Yes
SCWD-Lost Canyon 2A	252	1532	34.420332	-118.425014	Alluvial	MUN	Yes/Yes
SCWD-Mitchell #5A	360	1486	34.416997	-118.436016	Alluvial	MUN	Yes/Yes
SCWD-Mitchell #5B	164	1486	34.416997	-118.436016	Alluvial	MUN	Yes/Yes
SCWD-N. Oaks East	150	1391	34.412814	-118.464233	Alluvial	MUN	Yes/Yes
SCWD-N. Oaks West	136	1387	34.412589	-118.465772	Alluvial	MUN	Yes/Yes
SCWD-Sand Canyon	250	1525	34.420241	-118.426799	Alluvial	MUN	Yes/Yes
SCWD-SantaClara	160	1289	34.42538	-118.49586	Alluvial	MUN	Yes/Yes
SCWD-Sierra	175	1417	34.413762	-118.457296	Alluvial	MUN	Yes/Yes
SCWD-Valley Center	133	1256	34.42296	-118.50591	Alluvial	MUN	Yes/Yes
VWD-N	280	1131.558	34.4210879	-118.550912	Alluvial	MUN	Yes/Yes
VWD-N7	200	1131.606	34.4215732	-118.550156	Alluvial	MUN	Yes/Yes
VWD-N8	210	1133.314	34.4221711	-118.549702	Alluvial	MUN	Yes/Yes
VWD-S6	220	1127.164	34.4265943	-118.558928	Alluvial	MUN	Yes/Yes
VWD-S7	210	1128.645	34.4258737	-118.553892	Alluvial	MUN	Yes/Yes
VWD-U6	175	1230.6	34.4171894	-118.515197	Alluvial	MUN	Yes/Yes
VWD-W10	190	1130.285	34.4356123	-118.562372	Alluvial	MUN	Yes/Yes
LA36-19	2120	No Data	34.45945	-118.64221	Saugus	MUN	Yes/No
NWD-13	1300	1194	34.397092	-118.538908	Saugus	MUN	Yes/Yes
VWD-207	1220	1035.74	34.4328289	-118.606697	Saugus	MUN	Yes/Yes
NWD-Pinetree 3	146	1560	34.426279	-118.415378	Alluvial	MUN	Yes/Yes
NWD-07	994	1250	34.384496	-118.531647	Saugus	MUN	Yes/No
NLF-B14	No Data	904	34.41778	-118.65383	Alluvial	IRR	Yes/No

Well Name	Depth (ft bgs)	Reference Point Elevation (ft asl)	Latitude	Longitude	Aquifer	Well Use	Water Level/ Quality Network
NLF-B16	No Data	898	34.41691045	-118.656344	Alluvial	IRR	Yes/No
NLF-C10	No Data	956	34.42487028	-118.630607	Alluvial	IRR	Yes/No
NLF-E	180	1024	34.450829	-118.615362	Alluvial	IRR	Yes/No
NLF-G3	No Data	1002	34.43687414	-118.612169	Alluvial	IRR	Yes/No
NLF-X3	161	1014	34.440306	-118.607767	Alluvial	IRR	Yes/No
NWD-Castaic 4	203	1129	34.490718	-118.612751	Alluvial	MUN	Yes/No
NWD-Castaic 6	142	No Data	34.494919	-118.613978	Alluvial	MUN	Yes/No
NWD-Pinetree 4	185	1552.5	34.425847	-118.418405	Alluvial	MUN	Yes/No
VWD-All. Mon. Well	190	1152	34.4125844	-118.555505	Alluvial	OBS	Yes/No
VWD-E14	150	1000	34.43951	-118.61437	Alluvial	MUN	Yes/No
VWD-E16	170	996	34.43762	-118.61644	Alluvial	MUN	Yes/No
VWD-E17	150	983	34.4313	-118.62463	Alluvial	MUN	Yes/Yes
NWD-10	1555	1204	34.392909	-118.537921	Saugus	MUN	Yes/No
VWD-205M	1956	1142	34.4130384	-118.562501	Saugus	OBS	Yes/No

Notes

ft bgs = feet below ground surface   ft asl = feet above sea level



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Santa Clarita Valley Water Agency
Annual Groundwater Level Monitoring Network

Santa Clara River Valley East Subbasin
Groundwater Sustainability Plan

Figure 7-1

SCV Water also monitors groundwater quality in the Basin as part of municipal water supply permitting requirements and for other purposes. The groundwater quality constituents of most concern that are presently monitored by SCV Water are volatile organic compounds, perchlorate, total dissolved solids (TDS), and per- and polyfluoroalkyl substances (PFAS). These constituents are discussed in the Annual Water Report (see LSCE, 2020). Other water quality constituents that are monitored include boron, chloride, nitrate, and sulfate, among other general minerals and trace elements. The network of wells regularly sampled for groundwater quality includes 33 Alluvial Aquifer wells and eight Saugus Formation wells. Water quality data for wells in the network are collected on varying schedules as required by California State Water Resources Control Board (SWRCB) Division of Drinking Water. The groundwater quality monitoring network is displayed in Figure 7-2. Wells within each aquifer have been selected as representative of aquifer conditions in each of the two primary aquifers in the Basin (the Alluvial Aquifer and the Saugus Formation). Well depth and location information, and aquifer designation for the wells commonly used for groundwater quality sampling are presented in Table 7-1.

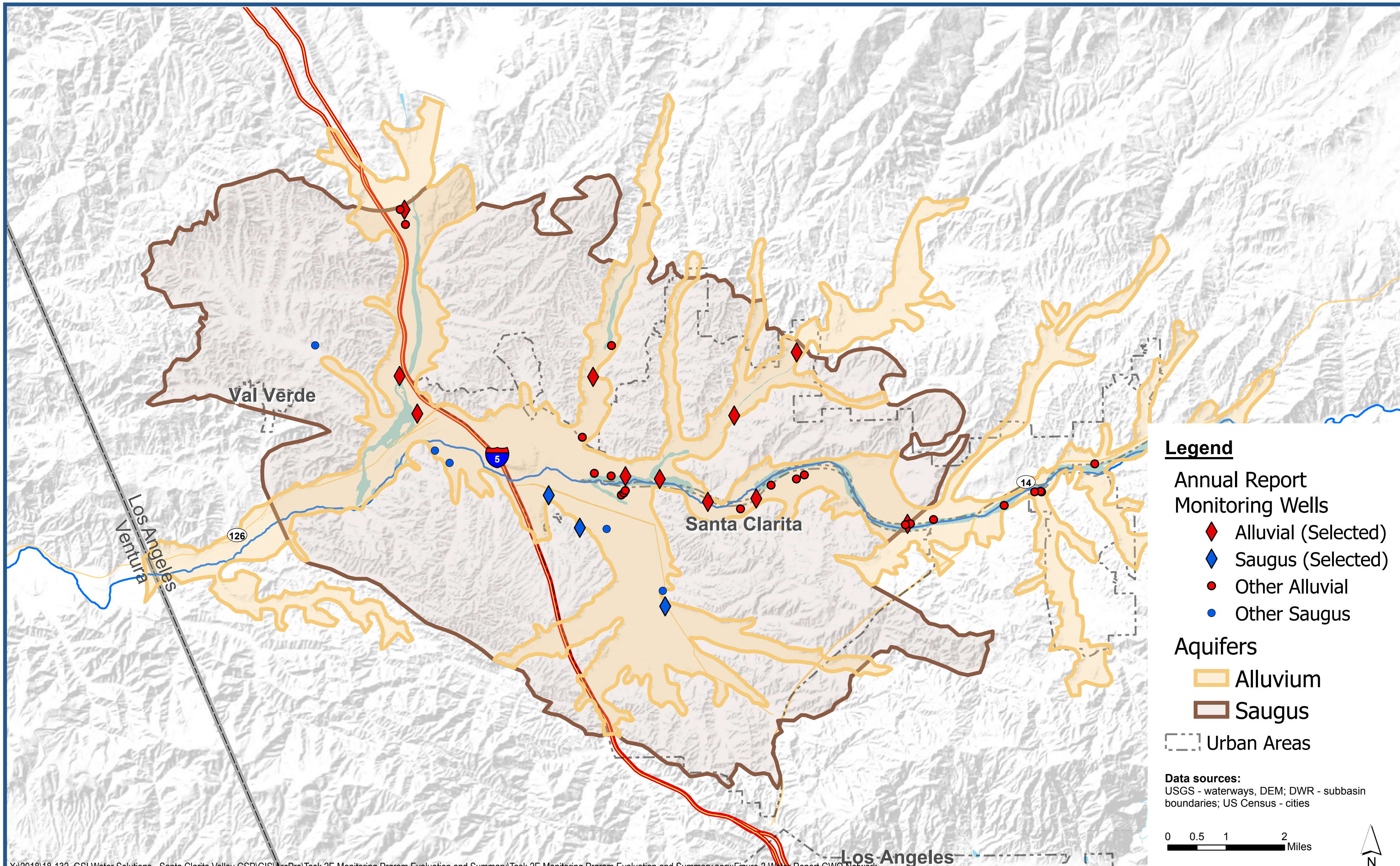
7.2.2 Los Angeles County Department of Public Works and USGS Streamflow Monitoring

The Annual Water Report (LSCE, 2020) includes data on streamflow conditions in the Santa Clara River Valley that are collected by the Los Angeles County Department of Public Works (LACDPW) and streamflow data collected on the Santa Clara River downstream of the Basin by the USGS. The locations of stream gaging sites are presented in Figure 7-3.

Three stations are monitored on the Santa Clara River – the upstream Capra Road Railroad Crossing gage (LACDPW station F93C-R), the Old Road Bridge gage immediately west of Interstate 5 (LACDPW/USGS gage F92C-R), and the downstream Santa Clara River at Piru gage in Ventura County (USGS station 11109000). The upstream and downstream gaging stations are located just outside of the boundaries of the Basin, and the Capra stream gage is located 0.8 miles upstream of the basin boundary and the Piru gage is located 3.5 miles downstream of the basin boundary. A stream gage was formerly located approximately 0.75 mile downstream of the western basin boundary (the “County Line” gage station 11108500); this gage operated from October 1952 until it was decommissioned in October 1996.

Streamflow at Capra Road Railroad Crossing (station F93C-R) is measured at 5-minute intervals, with records beginning in February 2002. Streamflow at Old Road Bridge (station F92C-R) is measured using a continuous water stage recorder. Data from these and all other gages in LACDPW’s stream gaging network are reported annually by LACDPW in the form of mean daily discharge for all days of the year; maximum, minimum, and mean daily flows for each individual water year; and the dates and rates of peak instantaneous flow during each individual water year. Streamflow at the Santa Clara River at Piru (station 11109000) is measured at 2-hour intervals, with records beginning in October 1996 and is available online from the USGS in the form of daily average flow and monthly flow statistics.

The Old Road Bridge gage appears to be well-maintained and to have provided a reliable data set in recent years, although at low flows such as those seen throughout water years 2013 through 2019 much of the data set has been flagged as consisting of estimated values. The data during this recent low-flow period show small fluctuations in these low-flow readings and daily differences on the order of a few hundredths to a tenth of a cubic foot per second (cfs) between successive days, which suggests that the gage is a potentially useful candidate for monitoring low flows in the Santa Clara River in the middle of the Basin. It is important to note that this gage is approximately 0.5 mile upstream of the Valencia Water Reclamation Plant, which is the primary source of dry weather streamflows in the western portion of the Basin.



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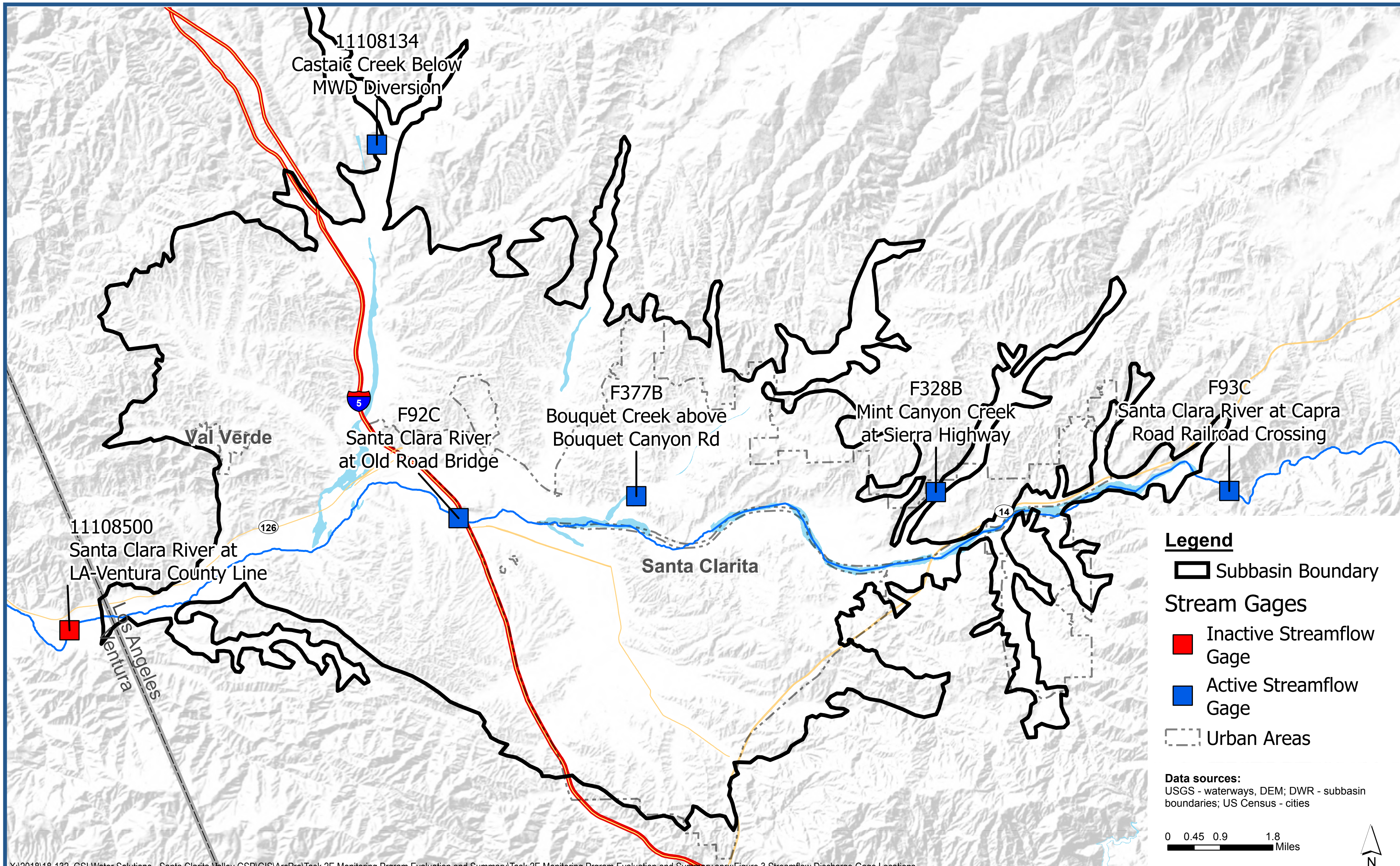
Santa Clarita Valley Water Agency
Annual Report Groundwater Quality Monitoring Network

Santa Clara River Valley East Subbasin
Groundwater Sustainability Plan

Figure 7-2



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Streamflow Gage Locations

Santa Clara River Valley East Subbasin
Groundwater Sustainability Plan

Figure 7-3

LACDPW also monitors streamflows at two locations on tributaries to the Santa Clara River: station F328-R in Mint Canyon and station F377-R in Bouquet Canyon. These gages are located on ephemeral streams that flow only in response to storm events.

Streamflow releases into Castaic Creek from Castaic Lagoon are also reported on a daily and monthly basis by the California Department of Water Resources (DWR). However, no streamflow gaging station is currently active on Castaic Creek.

Point-source discharges occur into the Santa Clara River by SCVSD from the Saugus and Valencia Water Reclamation Plants (WRPs) and by Whittaker-Bermite at a National Pollutant Discharge Elimination System (NPDES)-permitted outfall located 1 mile upstream of the outfall for the Saugus WRP. Periodic discharges of pumped groundwater by SCV Water also have occurred in the past to stormwater outfalls leading to the Santa Clara River. Monthly and annual records of the volumes of these discharges are maintained by the agencies conducting these discharges and will continue to be collected, compiled, and analyzed in tandem with streamflow measurement data.

7.2.3 California Statewide Groundwater Elevation Monitoring Program (CASGEM)

The CASGEM program[45] was established in 2009, and SCV Water has been providing groundwater elevation data to the state program since 2011.

Similar to the annual Santa Clarita Valley Water Report, this program has monitored groundwater elevations from wells completed in the Alluvial Aquifer and Saugus Formation. The CASGEM program reports water levels on a semi-annual basis with measurements in the winter or spring to represent seasonal high water levels, and one measurement in the late summer or fall to represent seasonal low water levels. The CASGEM program is administered by DWR; the system provides a statewide repository for groundwater level data. Local agencies function as “Monitoring Entities,” and are responsible for reporting data on the CASGEM Portal. The CASGEM monitoring network is presented in Figure 7-4, which represents monitoring locations for each of the aquifers in the Basin. The CASGEM program includes a primary CASGEM network and additional voluntary sites. Construction and location information for each of these wells is presented in Table 7-2.

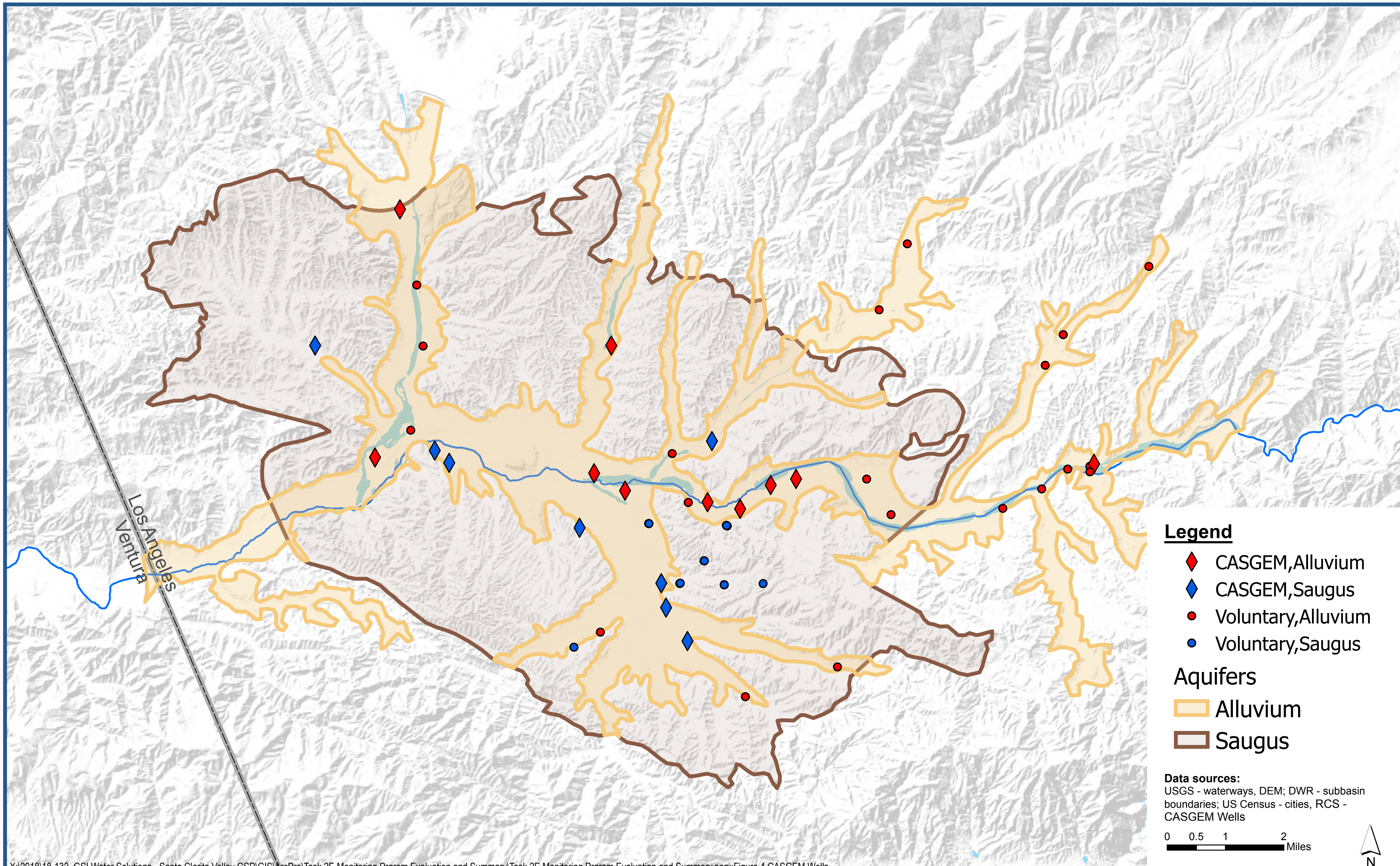
Monitoring sites from the CASGEM program can be used to monitor groundwater elevations and groundwater storage. The CASGEM network also provides the necessary construction details that are required for GSP monitoring wells.

7.2.4 Division of Drinking Water

The California Division of Drinking Water’s (DDW’s) Drinking Water Watch is a public web portal to view public water systems location, facilities, sources, and water quality data (https://sdwis.waterboards.ca.gov/PDWW/). A public water system is defined as piped water for human consumption that has at least 15 service connections or regularly serves 25 or more people daily for at least 60 days out of the year. There are 11 public water systems in the Basin (see Figure 7-5). Additional information on each of these systems is provided in Table 7-3. The Water Watch web portal provides water quality results based on a schedule set by DDW. The analytes measured and sampling frequency are provided in Table 7-4.

[45] The CASGEM portal is available at https://www.casgem.water.ca.gov/OSS/(S(x2c43om5moplmx0zovlg3auc))/Default.aspx?ReturnUrl=/oss). (Accessed June 12, 2021).

Information from California Drinking Water Watch on public water systems provides an existing source of historical water quality measurements and future water quality sampling that can be used for GSP monitoring. The site also provides information that can be used for identifying beneficial uses and users of groundwater and total water use for GSP annual reporting.



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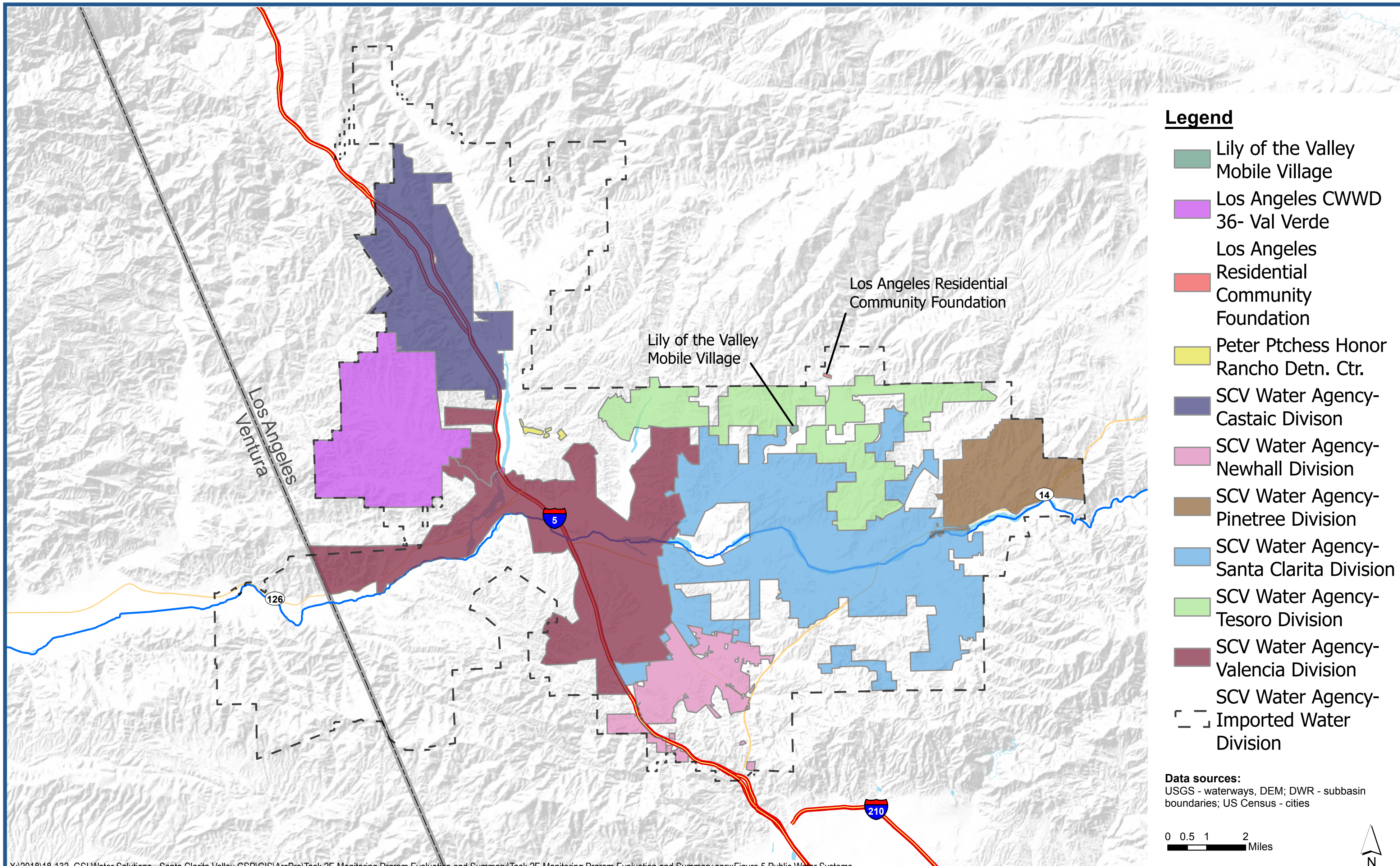
Santa Clara River Valley - East Subbasin
CASGEM Monitoring Network

Figure 7-4

Santa Clara River Valley East Subbasin
Groundwater Sustainability Plan



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East Subbasin Division of Drinking Water Public Water Systems

Santa Clara River Valley East Subbasin
Groundwater Sustainability Plan

Figure 7-5

Table 7-2. CASGEM Monitoring Network

Well No./Name	State Well No.	Well Owner	GSE (ft asl)	RP Description	GSE (ft asl)	Well Use	Well Status	Well Completion Type	Total Depth of Casing (ft)	Aquifer	Voluntary Reporting?	Perforation Interval (ft bgs)
36-19	04N017W03J00S	LACCWD	1238	2-in pipe	1234	Residential	Active	Single Well	2120	Saugus	No	400-1250 1850-2100
NCWD 10	04N16W34A003S	NCWD	ND	ND	1211	Residential	Inactive	Single Well	1556	Saugus	No	780 - 1544
NCWD 11	04N16W27J003S	NCWD	ND	ND	1195	Residential	Inactive	Single Well	1500	Saugus	No	200 - 1075
NCWD 7	04N16W35L001S	NCWD	ND	ND	1255	Residential	Inactive	Single Well	994	Saugus	No	520-528 622-664 720-726 874-974
NCWD Castaic 7	05N17W25D007S	NCWD	1149	ND	1146	Residential	Active	Single Well	150	Alluvium	No	70 - 140
NCWD Pinetree 5	ND	NCWD	1597	ND	1589	Residential	Active	Single Well	160	Alluvium	No	70 - 130
SCWD Lombardi	04N16W13D001S	SCWC	ND	ND	1240	Irrigation	Active	Single Well	ND	Saugus	No	ND
SCWD Honby	04N15W18N003S	SCWC	ND	ND	1282	Residential	Active	Single Well	202	Alluvium	No	50 -202
SCWD Valley Center	04N16W13S001S	SCWC	ND	ND	1262	Residential	Active	Single Well	135	Alluvium	No	90 -125
VWC 205M	ND	VWC	1149.68	Sounding Tube	1148	Observation	Active	Single Well	1956	Saugus	No	820 - 1936
VWC 206	04N16W21L001S	VWC	1061.04	Sounding Tube	1059	Residential	Active	Single Well	2130	Saugus	No	490 - 2100
VWC 207	04N16W18E001S	VWC	1039.73	Sounding Tube	1036	Residential	Active	Single Well	1220	Saugus	No	507 - 1199
VWC E-17	04N17W14J001S	VWC	985.74	Sounding Tube	993	Residential	Active	Single Well	150	Alluvium	No	73 - 113
VWC N-8	04N16W22C012S	VWC	1135.61	Sounding Tube	1135	Residential	Active	Single Well	210	Alluvium	No	120 - 190
VWC S6	04N16W16Q004S	VWC	1128.91	Sounding Tube	1129	Residential	Active	Single Well	220	Alluvium	No	130 - 195
VWC T-7	04N16W23H002S	VWC	1212.38	Sounding Tube	1203	Residential	Active	Single Well	140	Alluvium	No	82 - 115
VWC U-6	04N16W24E001S	VWC	1233.2	Sounding Tube	1232	Residential	Active	Single Well	176	Alluvium	No	103 - 146
VWC W-11	04N16W03M001S	VWC	1210.51	Sounding Tube	1171	Residential	Active	Single Well	180	Alluvium	No	110 - 155
5841	04N16W34L001S	LACCWD	1227.4	ND	1230	Unknown	Unknown	Single Well	160	Alluvium	Yes	140-150
5882	03N16W01M001S	LACCWD	1311.4	2-in pipe	1312	Unknown	Unknown	Single Well	127	Alluvium	Yes	ND
5912A	03N15W06A001S	LACCWD	1447.2	1.5-in pipe	1447	Unknown	Unknown	Single Well	ND	Alluvium	Yes	ND
6986	04N17W13C002S	LACCWD	986	top of casing	987	Irrigation	Unknown	Single Well	148	Alluvium	Yes	24 - 128
6994	04N17W01J001S	LACCWD	1045.9	2-in pipe	1053.9	Irrigation	Unknown	Single Well	120	Alluvium	Yes	50 - 100
7066D	04N16W06P001S	LACCWD	1200	ND	1186	Unknown	Unknown	Single Well	116	Alluvium	Yes	ND
7123B	04N15W05B001S	LACCWD	1483.5	1.5-in pipe	1482	Irrigation	Unknown	Single Well	110	Alluvium	Yes	ND
7127D	04N15W20B001S	LACCWD	1331.6	4-in pipe vault	1331.4	Observation	Unknown	Single Well	154	Alluvium	Yes	126 - 147
7138D	04N15W21N007S	LACCWD	1392.5	top of casing	1392	Residential	Unknown	Single Well	132	Alluvium	Yes	53 - 115
7140B	05N15W28G001S	LACCWD	1627	1.5-in pipe	1625	Unknown	Unknown	Single Well	ND	Alluvium	Yes	ND
7168C	04N15W22J001S	LACCWD	1484	ND	1498	Unknown	Unknown	Single Well	262	Alluvium	Yes	ND
7174D	04N15W11B002S	LACCWD	1703	2-in pipe	1703	Residential	Unknown	Single Well	145	Alluvium	Yes	59 - 73 109 - 145
7178D	04N15W23F005S	LACCWD	1552.5	2-in pipe	1552	Unknown	Unknown	Single Well	127	Alluvium	Yes	ND
7184C	04N15W02J002S	LACCWD	1737	2-in pipe	1735	Unknown	Unknown	Single Well	ND	Alluvium	Yes	ND

Well No./Name	State Well No.	Well Owner	GSE (ft asl)	RP Description	GSE (ft asl)	Well Use	Well Status	Well Completion Type	Total Depth of Casing (ft)	Aquifer	Voluntary Reporting?	Perforation Interval (ft bgs)
7187B	04N15W14R003S	LACCWD	1570.5	2-in pipe	1560	Residential	Unknown	Single Well	146	Alluvium	Yes	50 - 135
7197D	04N15W13P002S	LACCWD	1579	2-in pipe	1577	Residential	Unknown	Single Well	132	Alluvium	Yes	50 - 130
7197G	04N15W13Q004S	LACCWD	1602.5	2-in pipe	1595	Residential	Unknown	Single Well	235	Alluvium	Yes	50 - 210
7212E	05N14W31F004S	LACCWD	1951	2-in pipe	1950	Residential	Unknown	Single Well	ND	Alluvium	Yes	ND
Robinson Ranch	ND	Private	1583	2-in pipe	1571	Irrigation	Active	Single Well	ND	Alluvium	Yes	ND
VWC 159	04N16W33L001S	VWC	1293.47	Sounding Tube	1293	Irrigation	Active	Single Well	1950	Saugus	Yes	662 - 1900
WHR 17	05N17W36H001S	WHR	ND	ND	1090	Unknown	Unknown	Single Well	130	Alluvium	Yes	70 - 125
CW-22A	ND	Whittaker-Bermite	1441.03	top of casing	1438.5	Observation	Unknown	Single Well	345	Saugus	Yes	325 - 340
CW22B	ND	Whittaker-Bermite	1441.74	top of casing	1439.2	Observation	Unknown	Single Well	480	Saugus	Yes	455 - 475
CW-22C	ND	Whittaker-Bermite	1441.46	top of casing	1438.9	Observation	Unknown	Single Well	754	Saugus	Yes	560 -580
MW-10	ND	Whittaker-Bermite	1537.49	top of casing	1535.99	Observation	Unknown	Single Well	697.5	Saugus	Yes	677.5 -697.5
CW-21A	ND	Whittaker-Bermite	1328.3	top of casing	1326.18	Observation	Unknown	Single Well	300	Saugus	Yes	240 - 250
CW-21B	ND	Whittaker-Bermite	1328.9	top of casing	1326.23	Observation	Unknown	Single Well	325	Saugus	Yes	310 - 320
CW-21C	ND	Whittaker-Bermite	1328.51	top of casing	1326.39	Observation	Unknown	Single Well	435	Saugus	Yes	420 - 430
CW-21D	ND	Whittaker-Bermite	1328.72	top of casing	1326.59	Observation	Unknown	Single Well	525	Saugus	Yes	485 - 495
11-MW-01	ND	Whittaker-Bermite	1236.83	top of casing	1229	Observation	Unknown	Single Well	54	Alluvium	Yes	21 - 51
11-MW-02	ND	Whittaker-Bermite	1236.83	top of casing	1231	Observation	Unknown	Single Well	83	Alluvium	Yes	70 - 80
11-MW-03	ND	Whittaker-Bermite	1235.83	top of casing	1233.8	Observation	Unknown	Single Well	150	Saugus	Yes	128 -138
11-MW-04	ND	Whittaker-Bermite	1236.84	top of casing	1231.4	Observation	Unknown	Single Well	110	Saugus	Yes	94 - 104
AL-12A	ND	Whittaker-Bermite	1165.63	top of casing	1165.89	Observation	Unknown	Single Well	82	Alluvium	Yes	60 - 80
AL-12B	ND	Whittaker-Bermite	1165.57	top of casing	1165.89	Observation	Unknown	Single Well	193	Alluvium	Yes	180 - 190
OS-MW-02A	ND	Whittaker-Bermite	1188.1	top of casing	1188.04	Observation	Unknown	Single Well	64	Alluvium	Yes	53 - 63
OS-MW-02B	ND	Whittaker-Bermite	1187.88	top of casing	1187.3	Observation	Unknown	Single Well	200	Alluvium	Yes	70 - 80
SG1-HSU1	ND	Whittaker-Bermite	1165.6	top of casing	1165.89	Observation	Unknown	Single Well	300	Saugus	Yes	265 - 285

Well No./Name	State Well No.	Well Owner	GSE (ft asl)	RP Description	GSE (ft asl)	Well Use	Well Status	Well Completion Type	Total Depth of Casing (ft)	Aquifer	Voluntary Reporting?	Perforation Interval (ft bgs)
OS-MW-05A	ND	Whittaker-Bermite	1198.2	top of casing	1198.6	Observation	Unknown	Single Well	148	Saugus	Yes	130 - 145
OS-MW-05B	ND	Whittaker-Bermite	1198.36	top of casing	1198.7	Observation	Unknown	Single Well	198	Saugus	Yes	185 - 195
OS-MW-05C	ND	Whittaker-Bermite	1198.48	top of casing	1198.8	Observation	Unknown	Single Well	473	Saugus	Yes	335 - 350
OS-MW-05D	ND	Whittaker-Bermite	1198.73	top of casing	1199	Observation	Unknown	Single Well	563	Saugus	Yes	550 -560

Notes

ft = feet   ft bgs = feet below ground surface   ft asl = feet above sea level

Table 7-3. Basin Public Water Systems

Water System No.	Water System Name	Primary Source	Service Connections	Population Served	Active Well Count
1910250	SCV Water - Pinetree Division	State Water Project	(57 AG) (5 CM) (2740 RS)	9247	4
1900046	Peter Pitchess Detention Center	Groundwater	1952 CM	7000	5
1910017	SCV Water - Santa Clarita Division	State Water Project	(1110 AG) (906 CM) (24 IN) (29741 RS)	127992	13
1910048	SCV Water - Imported	Surface Water	26 RS	258652	2
1910096	SCV Water - Newhall Division	State Water Project	(117 AG) (364 CM) (5 IN) (3324 RS)	12573	2
1910247	SCV Water - Castaic Division	State Water Project	(44 AG) (91 CM) (1 IN) (1779 RS)	6376	5
1910240	SCV Water - Valencia Division	State Water Project	(1340 AG) (895 CM) (380 IN) (RS 27529)	98603	17
1910185	Los Angeles CWWD 36 - Val Verde	State Water Project	(18 CM) (1331 RS)	5173	1
1900913	Lily of the Valley Mobile Village	Groundwater	182 CB	495	1
1900062	Los Angeles Residential Community – Foundation	Groundwater	22 CB	184	0
1910255	SCV Water - Tesoro Division	State Water Project	(71 AG) (9 CM) (1090 RS)	3861	0

Notes

AG = Agricultural CB = Combined CM = Commercial IN = Industrial PP = Power Production RS = Residential

Table 7-4. DDW Water Quality Analytes

Analyte Name	Unit	Maximum Contaminant Level	Detection Level for Purpose of Reporting	Sampling Interval (months)
Bicarbonate alkalinity	mg/L	0	0	36
Calcium	mg/L	0	0	36
Carbonate alkalinity	mg/L	0	0	36
Chloride	mg/L	500	0	36
Color	Colorimetric	15	0	36
Copper	µg/L	1000	50	36
Foaming agents (MBAS)	mg/L	0.5	0	36
Hardness (total) as CACO3	mg/L	0	0	36
Hydroxide alkalinity	mg/L	0	0	36
Iron	µg/L	300	100	36
Magnesium	mg/L	0	0	36
Manganese	µg/L	50	20	36
Odor threshold @ 60 C	TON	3	1	36
pH, laboratory	pH unit	0	0	36
Silver	µg/L	100	10	36
Sodium	mg/L	0	0	36
Specific conductance	µs/cm	1600	0	36
Sulfate	mg/L	500	0.5	36
Total dissolved solids	mg/L	1000	0	36
Turbidity, laboratory	NTU	5	0.1	36
Zinc	µg/L	5000	50	36
Aluminum	µg/L	1000	50	36
Antimony	µg/L	6	6	36
Arsenic	µg/L	10	2	36
Barium	µg/L	1000	100	36
Beryllium	µg/L	4	1	36
Cadmium	µg/L	5	1	36
Chromium (total)	µg/L	50	10	36
Cyanide	µg/L	150	100	36
Fluoride (F) (natural-source)	mg/L	2	0.1	36
Mercury	µg/L	2	1	36
Nickel	µg/L	100	10	36
Perchlorate	µg/L	6	4	12
Selenium	µg/L	50	5	36
Thallium	µg/L	2	1	36

Analyte Name	Unit	Maximum Contaminant Level	Detection Level for Purpose of Reporting	Sampling Interval (months)
Nitrate (as N)	mg/L	10	0.4	12
Nitrite (as N)	mg/L	1	0.4	36
Gross alpha	pCi/L	15	3	108
Uranium (pCi/L)	pCi/L	20	1	72
1,1,1-trichloroethane	µg/L	200	0.5	12
1,1,2,2-tetrachloroethane	µg/L	1	0.5	12
1,1,2-trichloroethane	µg/L	5	0.5	12
1,1-dichloroethane	µg/L	5	0.5	12
1,1-dichloroethylene	µg/L	6	0.5	12
1,2,4-trichlorobenzene	µg/L	5	0.5	12
1,2-dichlorobenzene	µg/L	600	0.5	12
1,2-dichloroethane	µg/L	0.5	0.5	12
1,2-dichloropropane	µg/L	5	0.5	12
1,3-dichloropropene (total)	µg/L	0.5	0.5	12
1,4-dichlorobenzene	µg/L	5	0.5	12
Benzene	µg/L	1	0.5	12
Carbon tetrachloride	µg/L	0.5	0.5	12
Cis-1,2-dichloroethylene	µg/L	6	0.5	12
Dichloromethane	µg/L	5	0.5	12
Ethyl benzene	µg/L	300	0.5	12
Methyl-tert-butyl-ether (MTBE)	µg/L	13	3	12
Monochlorobenzene	µg/L	70	0.5	12
Styrene	µg/L	100	0.5	12
Tetrachloroethylene	µg/L	5	0.5	12
Toluene	µg/L	150	0.5	12
Trans-1,2-dichloroethylene	µg/L	10	0.5	12
Trichloroethylene	µg/L	5	0.5	12
Trichlorofluoromethane freon 11	µg/L	150	5	12
Trichlorotrifluoroethane (freon 113)	µg/L	1200	10	12
Vinyl chloride	µg/L	0.5	0.5	12
Xylenes (total)	µg/L	1750	0.5	12
1,2,3-trichloropropane (1,2,3-TCP)	µg/L	0.005	0.005	33
2,3,7,8-TCDD (dioxin)	pg/L	30	5	36
2,4,5-TP (silvex)	µg/L	50	1	36
2,4-D	µg/L	70	10	36

Analyte Name	Unit	Maximum Contaminant Level	Detection Level for Purpose of Reporting	Sampling Interval (months)
Alachlor	µg/L	2	1	36
Atrazine	µg/L	1	0.5	33
Bentazon	µg/L	18	2	36
Benzo (a) pyrene	µg/L	0.2	0.1	36
Carbofuran	µg/L	18	5	36
Chlordane	µg/L	0.1	0.1	36
Dalapon	µg/L	200	10	36
Di(2-ethylhexyl) adipate	µg/L	400	5	36
Di(2-ethylhexyl) phthalate	µg/L	4	3	36
Dibromochloropropane (DBCP)	µg/L	0.2	0.01	33
Dinoseb	µg/L	7	2	36
Diquat	µg/L	20	4	36
Endothall	µg/L	100	45	36
Endrin	µg/L	2	0.1	36
Ethylene dibromide (EDB)	µg/L	0.05	0.02	33
Glyphosate	µg/L	700	25	36
Heptachlor	µg/L	0.01	0.01	36
Heptachlor Epoxide	µg/L	0.01	0.01	36
Hexachlorobenzene	µg/L	1	0.5	36
Hexachlorocyclopentadiene	µg/L	50	1	36
Lindane	µg/L	0.2	0.2	36
Methoxychlor	µg/L	30	10	36
Molinate	µg/L	20	2	36
Oxamyl	µg/L	50	20	36
Pentachlorophenol	µg/L	1	0.2	36
Picloram	µg/L	500	1	36
Polychlorinated biphenyls, total, as DCB	µg/L	0.5	0.5	36
Simazine	µg/L	4	1	33
Toxaphene	µg/L	3	1	36

Notes

µg/L = microgram per liter
mg/L = milligram per liter
pg/L = picogram per liter
µS/cm = microsiemen per centimeter
NTU = Nephelometric Turbidity Unit
DDW= Division of Drinking Water
pCi/L = picocurie per liter

7.2.5 Subsidence Monitoring

7.2.5.1 UNAVCO Plate Boundary Observatory for Land Surface Elevation Monitoring

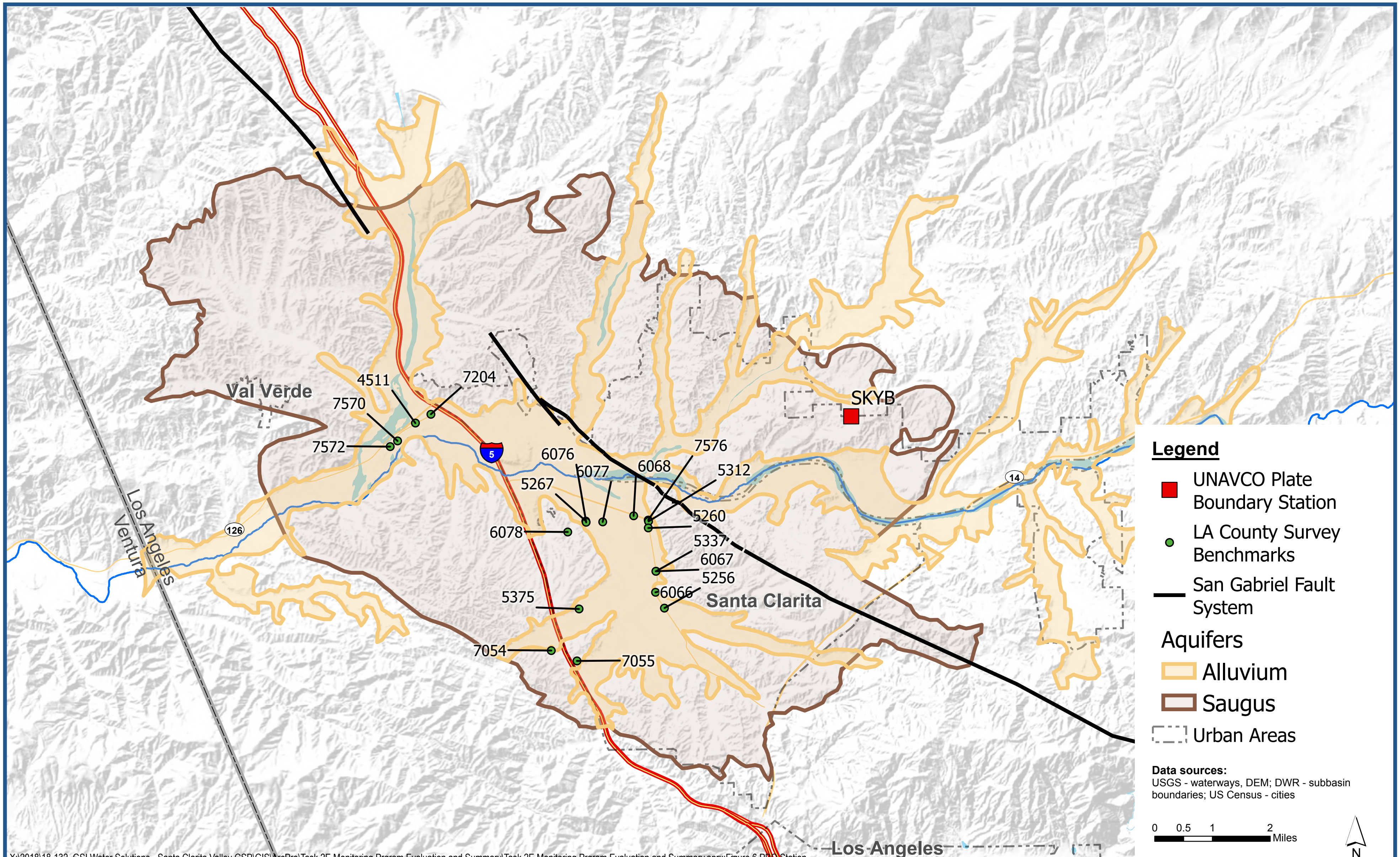
UNAVCO is a university-governed consortium with a focus on geodesy. Geodesy is the name for the collection of scientific disciplines focused on accurately measuring and representing earth's surface. UNAVCO has installed many global positioning system (GPS) monitoring stations throughout California—including one in the Basin—that monitor the movement of Earth's tectonic plates horizontally and vertically. The vertical component of these stations can be utilized to monitor subsidence or changes to land surface elevations due to extraction of fluids (such as water and petroleum) or to tectonic factors. The one UNAVCO station in the Basin, named SKYB, is displayed on Figure 7-6, located north of the San Gabriel fault and separated from the main area of the Basin where municipal pumping occurs. The station has collected daily GPS measurements since February 2000. The measurements are accurate to the nearest 0.01 millimeter (mm) (0.00003 ft), which exceeds SGMA accuracy requirements for subsidence. The data provided by the UNAVCO monitoring station provides data related to changes in land surface elevations in the Saugus Formation in the vicinity of the monitoring station.

7.2.5.2 California Department of Water Resources European Space Agency Interferometric Synthetic Aperture Radar (InSAR)

Subsidence data are also provided by the Department of Water Resources SGMA Data viewer. The TRE Altamira InSAR Dataset from the European Space Agency contains vertical displacement data from June 2015 through September 2019 and will likely have additional time series data in the future. These data were collected by the European Space Agency Sentinel-1A satellite and processed by TRE Altamira. The data set covers more than 200 groundwater basins across the state at a resolution of approximately 100 square meters (almost 1,100 square feet). The data accuracy report for InSAR data (Towill, Inc., 2020) states that "InSAR data accurately models change in ground elevation to an accuracy tested to be 16 mm (0.62 inches) at 95% confidence." Vertical displacement for subsets of time to parse out the inelastic component of subsidence (typically winter to winter comparisons) can be conducted at additional cost if not part of the annual report.

7.2.5.3 Los Angeles County Department of Public Works Benchmark Surveys

LACDPW has a network of over 100 benchmarks in the Basin as part of a larger survey network in Los Angeles County. LACDPW surveys these benchmarks approximately every 6 years. The last survey in the Basin was conducted in 2018. Selected benchmarks in the central area of the Basin in the vicinity of the former Whittaker-Bermite facility are presented in Figure 7-6. This is an area of the Basin that has been identified (LSCE, 2021) as having the potential for subsidence in the future. Land surface elevation data from these benchmarks are measured using the NAVD88 vertical datum required by DWR and date back to 1995. These selected benchmark locations will be utilized as part of a subsidence monitoring network, pending LACDPW approval.



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UNAVCO Plate Boundary Observatory Station and LA County Survey Benchmarks

Santa Clara River Valley East Subbasin
Groundwater Sustainability Plan

Figure 7-6

7.2.6 Water Quality Monitoring

7.2.6.1 California Department of Toxic Substances Control (Whittaker-Bermite Facility)

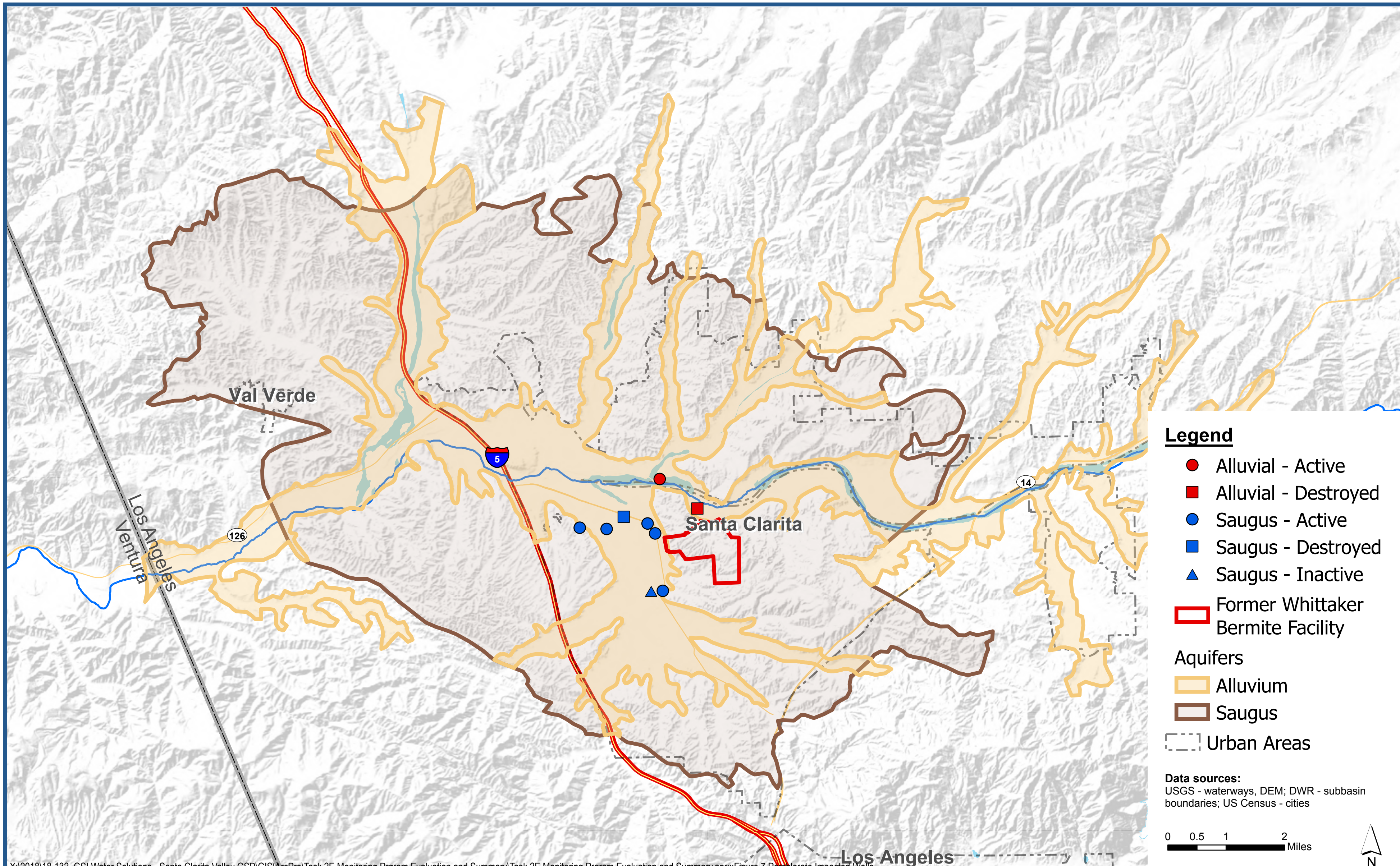
The manufacture and testing of explosives in the Basin by the Whittaker-Bermite Corporation from 1934 to 1987 resulted in perchlorate contamination of soils and water supply wells. In 1997, four water supply wells (NWD-11, VWD-157, SCWD-Saugus 1, and SCWD-Saugus 2) were impacted by perchlorate contamination. In 2007, the California Department of Public Health, now DDW, established a maximum contaminant level (MCL) for perchlorate of 6 micrograms per liter. The Department of Toxic Substances Control (DTSC) is the lead agency responsible for the regulatory oversight of the cleanup at the former Whittaker-Bermite facility. Currently, two ongoing cleanup projects related to the former facility are actively operating. Monitoring and reporting information related to these cleanup projects are stored on DTSC's EnviroStor database:

- Whittaker/Bermite Facility (19281087)
  https://www.envirostor.dtsc.ca.gov/public/profile_report?global_id=19281087
- Castaic Lake Water Agency – Whittaker Off-Site Groundwater Contamination (60000168)
  https://www.envirostor.dtsc.ca.gov/public/profile_report?global_id=60000168

The first case (19281087) is related to the removal and treatment of contaminated soils and waters at the physical 900-acre facility. The second case (60000168) involved SCV Water and was focused on the impacted production wells with perchlorate contamination. The DTSC and SCV Water (formerly the Castaic Lake Water Agency) entered into a voluntary cleanup agreement in 2003, titled Environmental Oversight Agreement, which was amended in 2012. The purpose of this was for DTSC to provide review and oversight of the response activities being undertaken related to the detection and treatment of impacted wells. The EnviroStor database contains documents of completed and future actions regarding the monitoring and cleanup of the groundwater contaminated with perchlorate. Quarterly monitoring reports contain data on sampled water quality analytes along with well construction information that meets requirements outlined in SGMA regulations §352.4. All wells with perchlorate detections are presented in Table 7-5 and displayed in Figure 7-7. All municipal supply wells are monitored for perchlorate and are reported on the CA Drinking Water Watch database.

Table 7-5. SCV Water Wells with Perchlorate Detections

Well Name	Year Detected	Well Status	Aquifer
NWD-11	1997	Inactive	Saugus
NWD-13	2006	Active	Alluvial
VWD-Q2	2005	Active	Saugus
VWD-157	1997	Destroyed – Replaced	Saugus
VWD-201	2010	Active – Well Head Treatment	Saugus
VWD-205	2012	Inactive	Saugus
SCWD-Saugus 1	1997	Active – Well Head Treatment	Saugus
SCWD-Saugus 2	1997	Active - Well Head Treatment	Saugus
SCWD-Stadium	2002	Destroyed – Replaced	Alluvial



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Perchlorate Impacted Production Wells - Former Whittaker Bermite Facility

Santa Clara River Valley East Subbasin
Groundwater Sustainability Plan

Figure 7-7

7.2.6.2 SCV Water Salt and Nutrient Management Plan (SNMP)

The purpose of the SNMP is to monitor the input of salt and nutrients into the surface water and groundwater systems. Water sources with elevated salinity and nutrient concentrations include urban and natural storm flows, discharge of treated wastewater, and naturally occurring salts found in sediments and groundwater within the Basin. An understanding of the amount of salt and nutrients being discharged into surface water and groundwater systems is important for the continued use of recycled water. Recycled water programs are an important aspect of long-term water supply assumptions for the Basin.

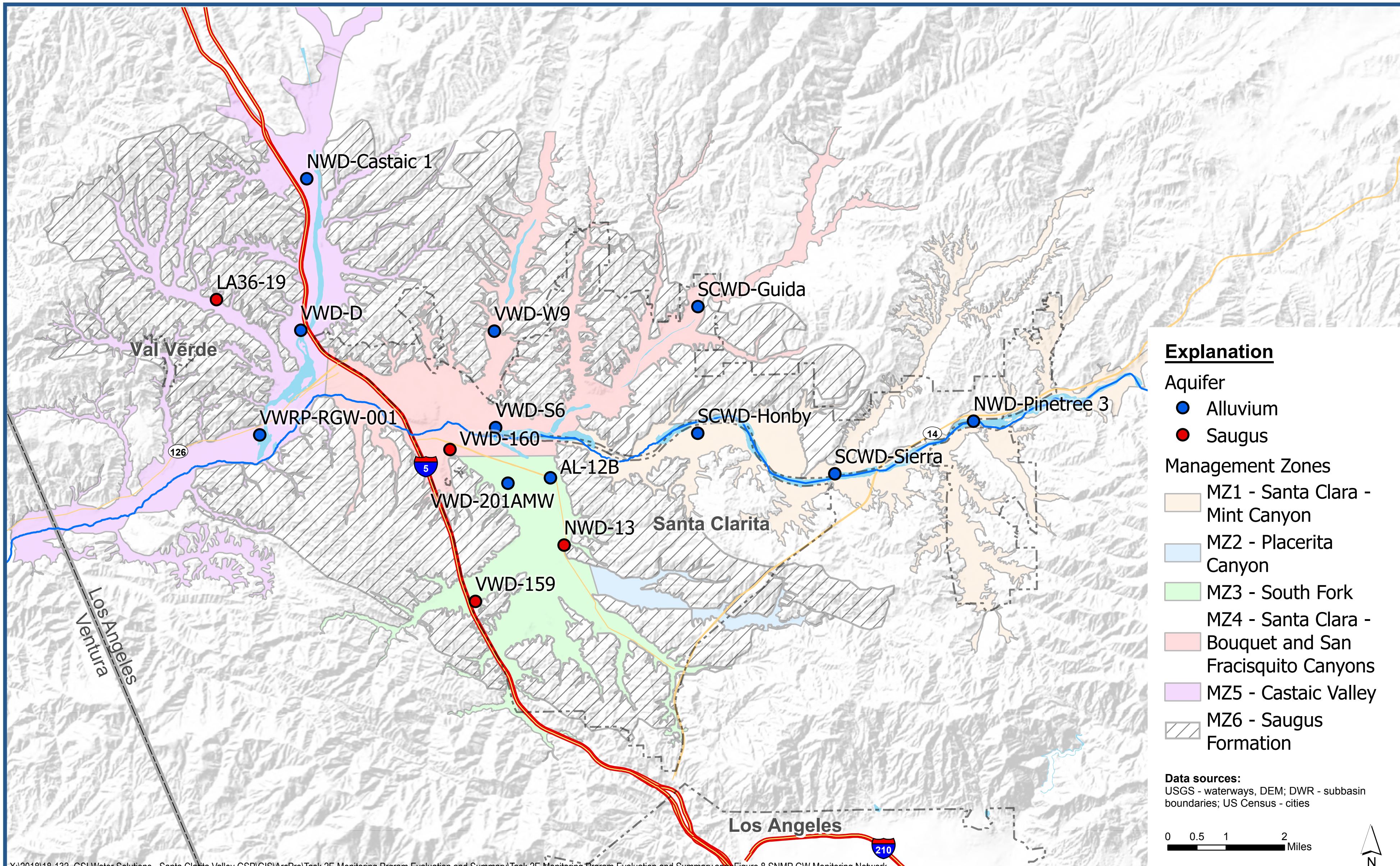
SCV Water's SNMP monitoring program includes the tracking and reporting of annual water sampling for TDS, chloride, nitrate, sulfate, and select chemicals of emerging concern (CECs) that primarily include per- and polyfluoroalkyl substances (PFAS). CECs are required to be sampled in accordance with U.S. Environmental Protection Agency's (EPA's) Unregulated Contaminant Monitoring Rule (UCMR) 3. Groundwater quality data used in the SNMP are obtained from existing monitoring programs where possible, including those overseen by SCV Water and other local entities (i.e., Los Angeles County Waterworks District 36, SCVSD, and FivePoint Holdings, LLC). Monitoring sites include wells and surface water locations; at least one new monitoring well site will be constructed in an area identified as a data gap. The SNMP Groundwater Management Zones and groundwater monitoring sites are depicted in Figure 7-8 and the surface water monitoring sites are depicted in Figure 7-9. The monitoring network presented here is based on Sections 12.3 and 12.4 (Table 4) of the SNMP. The drafting of the first SNMP Monitoring Report is currently underway.

The Lang Gage, which is included in the SNMP surface water monitoring network, was moved 150 feet upstream and was renamed the Capra Road Railroad Crossing (F93C-R) in June of 2013.

7.2.6.3 Santa Clarita Valley Sanitation District of Los Angeles County

The Los Angeles County Sanitation Districts operate two water reclamation facilities in the Basin: the Valencia WRP and the Saugus WRP. These two facilities treat millions of gallons of wastewater per day to be reused for beneficial purposes. These facilities discharge treated water into the Santa Clara River under Waste Discharge Requirements (WDR) with the Los Angeles Regional Water Quality Control Board (LARWQCB) and an NPDES permit for each individual facility. In addition, the Sanitation Districts are planning to build another WRP, the Newhall Ranch WRP. Currently, this proposed WRP has an NDPES permit and is also required to conduct monitoring prior to its operation. Monitoring programs were established for each WRP where effluent limitations are set for specific parameters. The Valencia WRP monitoring plan includes six monitoring locations, the Saugus WRP monitoring plan includes five monitoring locations, and the Newhall Ranch WRP monitoring plan includes two monitoring locations. The Saugus and Valencia monitoring sites include the influent, point of effluent discharge, sites up- and downstream of the effluent discharge along the Santa Clara River, and two groundwater wells (Saugus WRP – VWD-S6 and Valencia – VWRP-RGW-001). The Newhall Ranch WRP monitoring sites include two surface water locations up- and downstream of the proposed effluent discharge along the Santa Clara River. All monitoring sites for the Valencia and Saugus WRP WDR are included in the SNMP monitoring network (see Figures 7-8 and 7-9 and Table 7-6).

Receiving water quality requirements (monitored via Santa Clara River grab samples) are based on the water quality objectives from the Water Quality Control Plan: Los Angeles Region Basin Plan for the Coastal Watershed of Los Angeles and Ventura Counties. Effluent requirements include specific parameters such as boron, TDS, sulfate, chloride, nitrate, nitrite, ammonia nitrogen, copper, lead, mercury, nickel, zinc, cyanide, benzo anthracene, total trihalomethanes, and chronic toxicity.



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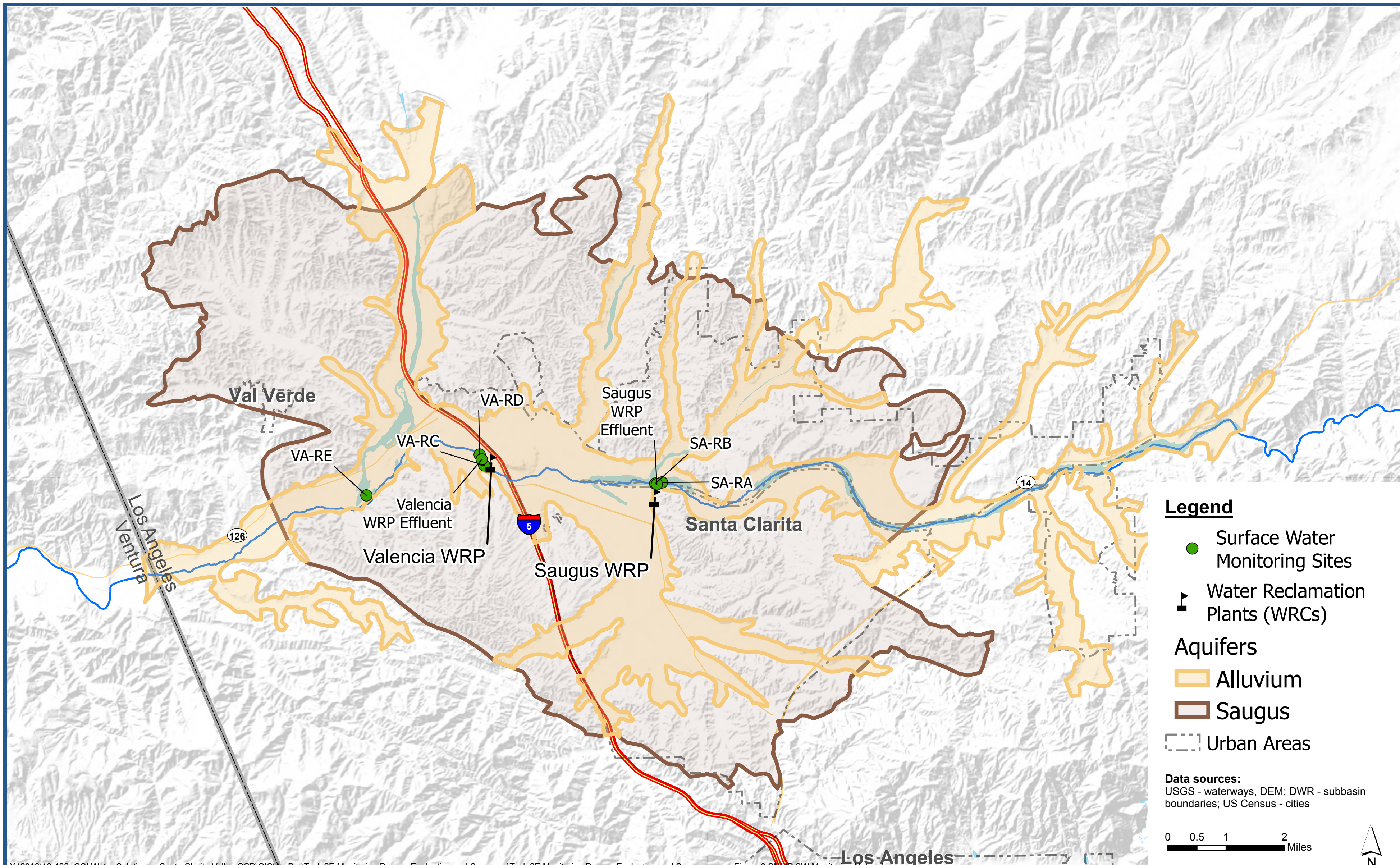
Salt and Nutrient Management Program
Groundwater Monitoring Network

Figure 7-8

Santa Clara River Valley East Subbasin
Groundwater Sustainability Plan



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Salt and Nutrient Management Program
Surface Water Monitoring Network

Santa Clara River Valley East Subbasin
Groundwater Sustainability Plan

Figure 7-9

Table 7-6. SNMP Monitoring Network

Well/ Sampling Name	Type of Well	Water Quality Constituent				Proposed Water Quality Sampling Frequency	Proposed Water Level Sampling Frequency	Management Area
		TDS	Chloride	Nitrate (as NO3)	Sulfate			
NWD-Pinetree 3	Alluvial	X	X	X	X	Annual	Annual	Mint Canyon
SCWD-Sierra	Alluvial	X	X	X	X	Annual	Annual	Mint Canyon
SCWD-Honby	Alluvial	X	X	X	X	Annual	Annual	Mint Canyon
AL-12B	Alluvial	X	X	X	X	Annual	Annual	South Fork
VWD-201AMW	Alluvial	X	X	X	X	Annual	Annual	South Fork
SCWD-Guida	Alluvial	X	X	X	X	Annual	Annual	Bouquet/ SanFran
VWD-S6	Alluvial	X	X	X	X	Annual	Annual	Bouquet/ SanFran
VWD-W9	Alluvial	X	X	X	X	Annual	Annual	Bouquet/ SanFran
NWD-Castaic 1	Alluvial	X	X	X	X	Annual	Annual	Castaic Valley
VWD-D	Alluvial	X	X	X	X	Annual	Annual	Castaic Valley
VWRP-RGW-001	Alluvial	X	X	X	X	Annual	Annual	Castaic Valley
NWD-13	Saugus	X	X	X	X	Annual	Annual	Saugus
VWD-159	Saugus	X	X	X	X	Annual	Annual	Saugus
VWD-160	Saugus	X	X	X	X	Annual	Annual	Saugus
LACWD 36-19	Saugus	X	X	X	X	Annual	Annual	Saugus
SA-RA	Surface	X	X	X	X	Annual	N/A	
SA-RB	Surface	X	X	X	X	Annual	N/A	
Saugus WRP Effluent [1]	Surface	X	X	X	X	Annual	N/A	
Valencia WRP Effluent [1]	Surface	X	X	X	X	Annual	N/A	
VA-RC	Surface	X	X	X	X	Annual	N/A	
VA-RD	Surface	X	X	X	X	Annual	N/A	
VA-RE	Surface	X	X	X	X	Annual	N/A	
Castaic Creek Below MWD Diversion	Surface	Surface water monitoring sites depicted in Figure 42 but not included in Table 5 of the SNMP						
USGS Blue Cut/County Line	Surface							
DPW Old Road Bridge	Surface							

Notes

1 Many other water quality constituents are monitored at these locations.

The WDRs for the water reclamation plants includes additional monitoring that addresses water quality conditions and biological health across the entire watershed. SCVSD submitted the Santa Clara River Watershed-Wide Monitoring Program and Implementation Plan to the Regional Water Board on December 15, 2011. The plan includes monitoring for trends in surface water quality across the watershed while also monitoring the biological health of the watershed. The bioassessment program includes an analysis of the community structure of the instream macroinvertebrate, algal assemblages, algal biomass, and physical habitat assessments.

7.3 Summary of GSP Monitoring Program

Portions of the existing monitoring programs described above will be used in the development of monitoring networks for each of the applicable sustainability indicators that either exist or could occur in the future in the Basin. Monitoring locations and protocols from these programs can be used to monitor groundwater elevation, groundwater storage, water quality, subsidence, and interconnected surface water. Selection of a subset of monitoring sites that will constitute the representative monitoring network for the GSP monitoring program will prioritize sites that have a long period of record and are expected to provide effective monitoring of sustainability indicators related to groundwater extraction, beneficial uses of groundwater, and climatic conditions.

This section describes the proposed monitoring network, including GSA monitoring objectives, monitoring protocols, and data reporting requirements. This section was prepared in accordance with SGMA regulations in Article 5, Subarticle 4 § 354.32, which states “[t]he monitoring network shall promote the collection of data of sufficient quality, frequency and distribution to characterize groundwater and related surface water conditions in the basin and evaluate changing conditions that occur through implementation of the Plan.”

The monitoring network was designed to collect data to allow for the analysis of short- and long-term trends, seasonal variations, and estimate annual changes in groundwater storage, water quality, interconnected surface water, and subsidence. The monitoring sites have been distributed across the Basin to provide data that will support a comprehensive analysis of current and ongoing conditions within the Basin. This widespread distribution coupled with the monitoring frequency will allow the GSA to chart its progress towards the established sustainability goals and will also ensure real-time tracking of any impacts on beneficial users. Specifically, the monitoring program will allow the GSA to quantify changes in the sustainability indicators and assess the effects of GSP implementation and any projects and management actions that may be required to avoid significant and unreasonable undesirable results. Near-term, this data will facilitate changes to management programs to maintain continued progress towards the GSA’s sustainability objectives and over the longer term will inform updates to the GSP and its sustainable management criteria (SMCs).

SGMA regulations require monitoring networks to be developed to promote the collection of data sets with enough quality, frequency, and spatial distribution to characterize groundwater and related surface water conditions in the groundwater basin and to evaluate changing conditions that occur through implementation of the GSP (§ 354.34(b)). The monitoring network should accomplish the following:

- Demonstrate progress towards achieving measurable objectives described in the GSP
- Monitor impacts to the beneficial uses and users of groundwater and interconnected surface water
- Monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds
- Quantify annual changes in water budget components (§ 354.34(b)(1)-(4))

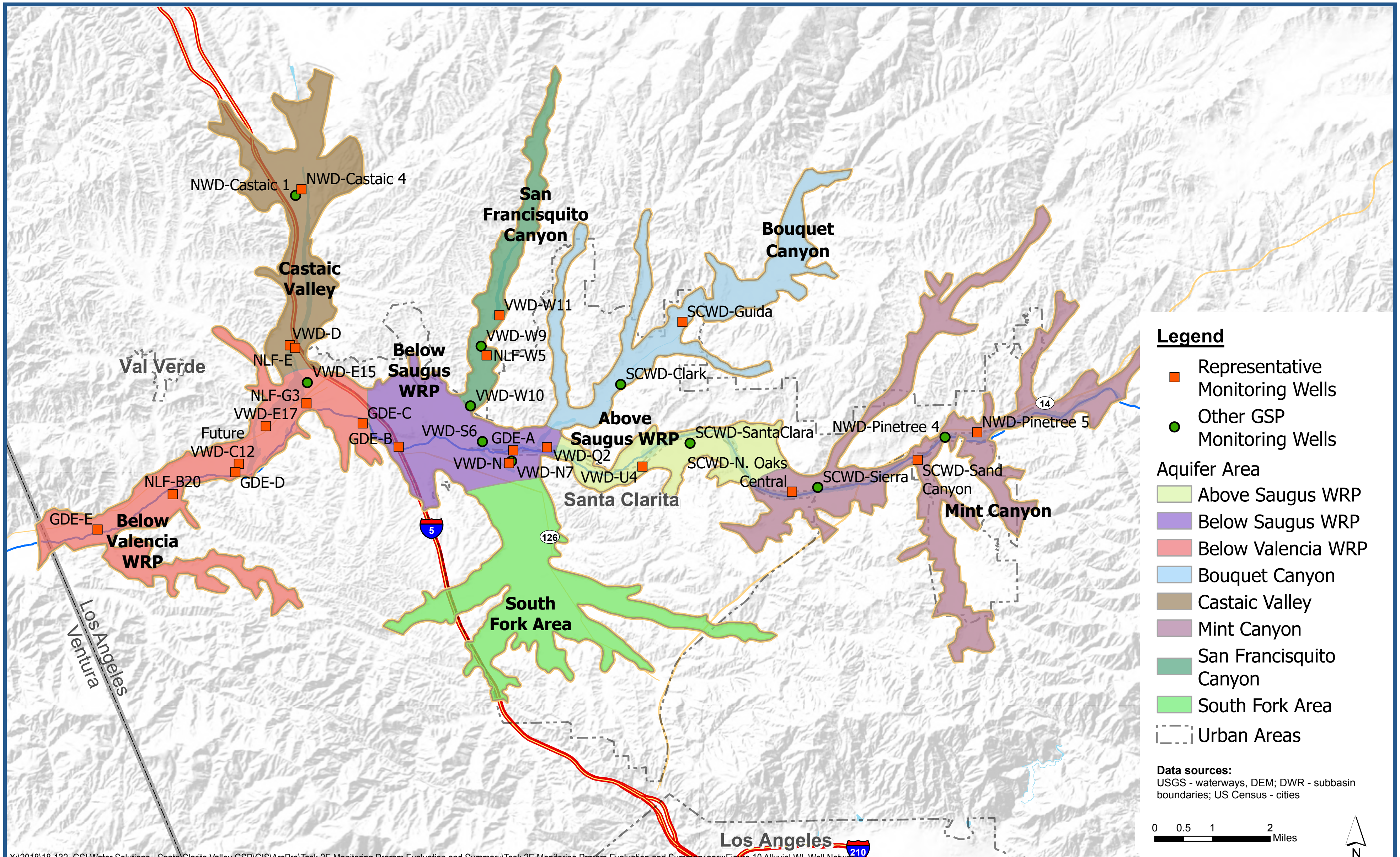
The minimum thresholds and measurable objectives for the network are described in Section 8 of the GSP. SGMA regulations require that if management areas are established, the quantity and density of monitoring sites in those areas shall be sufficient to evaluate conditions of the basin setting and the SMCs that are specific to a given management area (§ 354.34(d)). Management areas are not being defined for the Basin. If management areas are developed in the future, the monitoring network will be reevaluated to ensure that there is sufficient monitoring to evaluate conditions.

7.3.1 Description of Monitoring Network (§ 354.34)

The GSP monitoring network is composed of aquifer specific wells that are screened in one of the principal aquifers in the Basin (the Alluvial Aquifer or the Saugus Formation). The representative monitoring well network will not include composite wells that span both aquifers. The network will enable the collection of data to assess sustainability indicators, evaluate the effectiveness of management actions and projects that are designed to achieve sustainability, and evaluate adherence to measurable objectives for each applicable sustainability indicator. The Basin is isolated from the Pacific Ocean; therefore, this GSP does not provide monitoring for seawater intrusion sustainability indicators.

The Basin currently has over 70 wells that are actively monitored for water level and/or groundwater quality data. However, for the purposes of the GSP monitoring program, a subset of these wells was identified that meet SGMA regulation monitoring network and program requirements described above. These selected representative monitoring sites (RMS), or representative monitoring wells, provide geographical coverage across the areas where groundwater is pumped from each of the two principal aquifers, and each well has a historical data record lasting from a few years to several decades (§ 354.36). This effort resulted in the selection of 21 representative monitoring wells in the Alluvial Aquifer and 4 representative monitoring wells in the Saugus Formation, as documented in Tables 7-7 and 7-8 (the selection process for the RMS is described further below). In addition to the representative monitoring wells, Tables 7-7 and 7-8 identify 10 additional wells in the Alluvial Aquifer and 8 additional wells in the Saugus Formation that are not representative monitoring wells, but currently are being monitored by SCV Water under the requirements of existing water supply permits with DDW and, therefore, will be monitored for water quality as part of the GSP monitoring program. The GSA has compiled well construction information for these wells, which allows the GSA to determine with certainty the aquifer being monitored. The selection of monitoring wells that are geographically distributed in the Basin account for the ability to use each monitoring well site for multiple sustainability indicators. The wells identified below in Tables 7-7 and 7-8 as representative monitoring wells will be used for monitoring of groundwater elevation, storage, and quality, which will enable the GSA to have a streamlined and efficient GSP monitoring program. As stated previously, these wells are already part of existing monitoring networks or will be installed as part of the GSP monitoring program.

Figures 7-10 and 7-11 illustrate the GSP monitoring wells in the Alluvial Aquifer and Saugus Formation. This coverage allows for the collection of data to evaluate groundwater gradients and flow directions over time and the annual change in storage. Furthermore, the monitoring frequency of the wells will allow for the monitoring of seasonal highs and lows. Because wells were chosen with the existing length of historical data record in mind, future groundwater data will be able to be compared to historical data. The monitoring program for each of the sustainability indicators is discussed in the following subsections.



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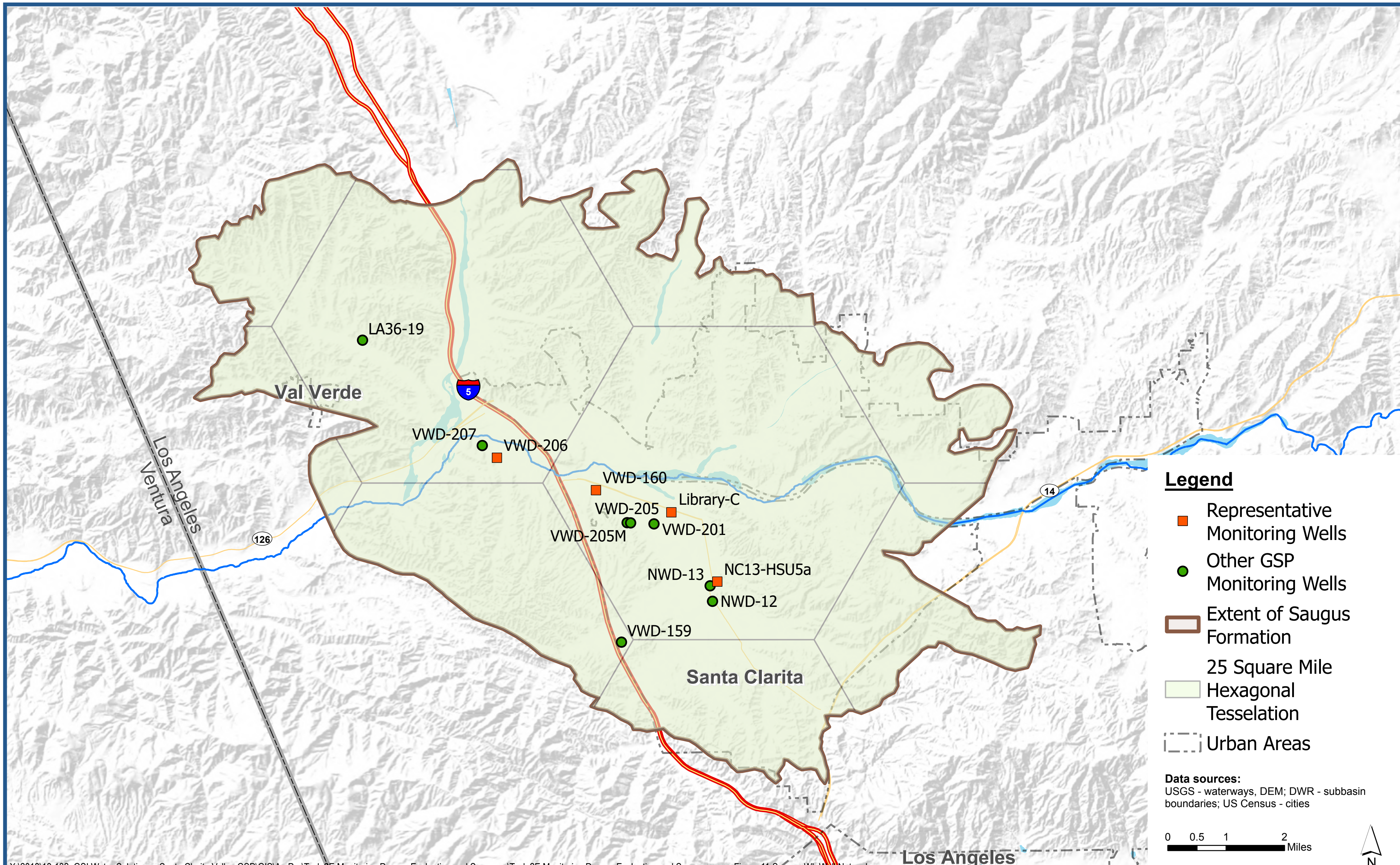
Representative Monitoring Well Network for the Alluvial Aquifer

Santa Clara River Valley East Subbasin
Groundwater Sustainability Plan

Figure 7-10



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Representative Monitoring Well Network for the Saugus Formation

Santa Clara River Valley East Subbasin
Groundwater Sustainability Plan

Figure 7-11

Table 7-7. Alluvial Aquifer GSP Monitoring Wells

Well Name	Latitude	Longitude	Reference Point Elevation (ft asl)	Well Depth (ft bgs)	Screened Interval (ft bgs)	Subarea	Sustainable Management Criteria
NWD-Castaic 1	34.489194	-118.614561	1129.0	310	110-297	Castaic Valley	GQ
NWD-Castaic 4[1]	34.490718	-118.612751	1129.0	203	59.5-UNK	Castaic Valley	GWL, S, GQ
NWD-Pinetree 4	34.425847	-118.418405	1552.5	185	110-185	Mint Canyon	GQ
NWD-Pinetree 5[1]	34.42695067	-118.4085914	1597.0	160	70-130	Mint Canyon	GWL, S, GQ
SCWD-Clark	34.440422	-118.51665	1253.0	160	20-120	Bouquet Canyon	GQ
SCWD-Guida[1]	34.455905	-118.497607	1342.0	116	56-150	Bouquet Canyon	GWL, S, GQ
SCWD-North Oaks Central[1]	34.412772	-118.465123	1391	244	50-244	Mint Canyon	GWL, S, GQ
SCWD-Sand Canyon[1]	34.420241	-118.426799	1525.0	250	60-140	Mint Canyon	GWL, S, GQ
SCWD-Santa Clara	34.42538	-118.49586	1289.0	160	90-135	Above Saugus WRP	GQ
SCWD-Sierra	34.413762	-118.457296	1417.0	175	60-175	Mint Canyon	GQ
Future VWD-C12[1, 2]	34.42193	-118.63297	953.0	TBD	TBD	Below Valencia WRP	GWL, S, GQ
VWD-D[1]	34.451518	-118.617003	1035.6	142	60-136	Castaic Valley	GWL, S, GQ
VWD-E15	34.44209	-118.611842	1023.0	160	90-135	Below Valencia WRP	GQ
VWD-E17[1]	34.4313	-118.62463	983.0	150	80-120	Below Valencia WRP	GWL, S, GQ
VWD-N[1]	34.4210879	-118.5509124	1131.56	280	76-237	Below Saugus WRP	GWL, S, GQ
VWD-N7	34.421573	-118.550156	1131.6	200	120-175	Below Saugus WRP	GQ
VWD-Q2[1]	34.424925	-118.539325	1166.6	170	76-126	Below Saugus WRP	GWL, S, GQ

Well Name	Latitude	Longitude	Reference Point Elevation (ft asl)	Well Depth (ft bgs)	Screened Interval (ft bgs)	Subarea	Sustainable Management Criteria
VWD-S6	34.426594	-118.558928	1127.2	220	130-195	Below Saugus WRP	GQ
VWD-U4[1]	34.419689	-118.510433	1242.8	135	60-130	Above Saugus WRP	GWL, S, GQ
VWD-W9	34.450584	-118.558871	1175.0	160	70-130	San Francisquito Canyon	GQ
VWD-W10	34.435612	-118.562372	1130.3	190	120-160	San Francisquito Canyon	GQ
VWD-W11[1]	34.458309	-118.553181	1208.3	180	110-155	San Francisquito Canyon	GWL, S, GQ
Future GDE-A[1]	TBD	TBD	TBD	TBD	TBD	TBD	ISW/GDE
Future GDE-B[1]	TBD	TBD	TBD	TBD	TBD	TBD	ISW/GDE
Future GDE-C[1]	TBD	TBD	TBD	TBD	TBD	TBD	ISW/GDE
Future GDE-D[1]	TBD	TBD	TBD	TBD	TBD	TBD	ISW/GDE
Future GDE-E[1]	TBD	TBD	TBD	TBD	TBD	TBD	ISW/GDE
NLF-B20[1]	34.41450	-118.65319	904.0	250	50-240	Below Valencia WRP	GWL, S, GQ
NLF-E[1]	34.450829	-118.615362	1024	180	12-93	Castaic Valley	ISW/GDE
NLF-G3[1]	34.43687414	-118.6121685	1002	190	90-160	Below Valencia WRP	ISW/GDE
NLF-W5[1]	34.448255	-118.557233	1155	265	20-116	San Francisquito Canyon	ISW/GDE

Notes

[1] This well is a representative monitoring well (i.e., a Representative Monitoring Site [RMS]).

[2] Information for this well is based on the existing well NLF-C12. A final name for this future well will be selected during final planning for its installation.

asl = above sea level
bgs = below ground surface
ft = feet
GDE = groundwater dependent ecosystem
GQ = Groundwater Quality
GWL =Groundwater Level
ISW = interconnected surface water
S = Groundwater Storage
TBD = to be determined
UNK = unknown

Table 7-8. Saugus Formation GSP Monitoring Wells

Well Name	Latitude	Longitude	Reference Point Elevation (ft. asl)	Well Depth (ft. bgs)	Screened Interval (ft. bgs)	Sustainable Management Criteria
LA36-19	34.45945	-118.64221	1248.0	2120	400-1250 1850-2100	GQ
Library-C[1]	34.4155	-118.55021	1151.66	857	832-852	GWL, S, GQ
NWD-12	34.393227	-118.538274	1204.0	1340	485-1280	GQ
NWD-13	34.397092	-118.538908	1194.0	1300	420-630	GQ
NC13-HSU5a[1]	34.3981	-118.53673	1198.84	530	505-525	GWL, S, GQ
VWD-159	34.383417	-118.565787	1291.2	1950	662-1900	GQ
VWD-160[1]	34.4213	-118.5727426	1102.1	2000	950-2000	GWL, S, GQ
VWD-201	34.4127	-118.555486	1151.7	1690	540-570	GQ
VWD-205	34.413103	-118.563544	1148.5	1950	820-1930	GQ
VWD-205M	34.413038	-118.562501	1142.0	1956	820-1504	GQ
VWD-206[1]	34.429732	-118.602348	1058.6	2060	490-630	GWL, S, GQ
VWD-207	34.432829	-118.606697	1035.7	1220	507-572	GQ

Notes

[1]This well is a representative monitoring well (i.e., a Representative Monitoring Site [RMS]).

asl = above sea level
bgs = below ground surface
ft = feet
GDE = Groundwater Dependent Ecosystems
GQ = Groundwater Quality
GWL = Groundwater Level
NA = not applicable
S = Groundwater Storage

The RMS network is designed to address each of the sustainability indicators:

- Chronic lowering of groundwater levels
- Reduction of groundwater storage
- Degraded Water quality
- Land subsidence
- Interconnected Surface Water (and impacts to GDEs)

Descriptions of the groundwater monitoring program's design and implementation with respect to each of these sustainability indicators are provided below.

7.3.2 Chronic Lowering of Groundwater Levels

As discussed previously, the groundwater elevation monitoring network should demonstrate the occurrence of groundwater (where it is present and influenced by groundwater pumping), flow direction, and hydraulic gradients between principal aquifers and surface water features:

- Sufficient density of monitoring wells to characterize groundwater table or potentiometric surface elevations in each principal aquifer.
- Static groundwater elevation values collected at least twice per year, to represent seasonal low and seasonal high groundwater conditions. Presently, groundwater levels are monitored monthly at RMS locations.

RMSs that are intended to monitor for chronic lowering of groundwater levels are presented in Figures 7-10 and 7-11 and construction details are provided in Tables 7-7 and 7-8.

7.3.2.1 Scientific Rationale for the Monitoring Site Selection Process

Considerations for the monitoring network density were based on the SCV Water groundwater operating plan for the Basin that describes the amount of planned pumping in each principal aquifer during normal, wet, and dry local climatic conditions, in consideration of the availability of SWP Table A allocations. The maximum amount that the Alluvial Aquifer will be pumped according to the operating plan is between 30,000 to 40,000 acre-feet per year (AFY). The maximum amount that the Saugus Formation will be pumped under the operating plan is approximately 35,000 AFY. The DWR BMPs document for monitoring network design recommends up to four wells per 100 square miles if groundwater pumping exceeds 10,000 AFY (DWR, 2016). For the Basin, that would result in a minimum of four wells in the Alluvial Aquifer and four wells in the Saugus Formation. A modified approach was used to develop a monitoring network that exceeded the minimum number recommended by DWR due to the differences between the Saugus Formation and Alluvial Aquifer, the geographic variability in groundwater conditions in the Basin, and the distribution of pumping in each aquifer.

After computing the minimum number of monitoring wells for the Basin based on the DWR BMPs (represented by the Hopkins method of four wells per 100 square miles [Hopkins and Anderson, 2016]), a hexagonal grid was generated over the Basin (see Figure 7-11). This was only conducted for the Saugus Formation, due to the limited extent and distribution of the Alluvial Aquifer. All available Saugus Formation wells with complete construction data and historical data were then mapped onto this grid. This overlay provided an indication that there is sufficient well coverage in the Saugus Formation with no data gaps for monitoring of the groundwater level, storage, and quality sustainability indicators. As the Basin is approximately 100 square miles in size, approximately one well per polygon is sufficient. However, additional wells were included to provide additional certainty in the monitoring of groundwater conditions in the Saugus Formation.

The monitoring network for the Alluvial Aquifer includes a subset of the existing wells monitored for CASGEM and other water management programs described previously. Wells with limited historical data, limited recent data, or wells that were in similar geographic locations to other wells with longer periods of record were omitted from the GSP monitoring network. The GSP monitoring network is sufficient for contouring of the entire aquifer. Due to the limited extent over which the Alluvial Aquifer covers in the Basin, two to three wells were selected per Alluvial subarea to allow for the determination of horizontal flow gradients.

7.3.2.2 Consistency with Data and Reporting Standards

The GSP monitoring of groundwater elevations will be conducted at least in the spring and late summer of each year to obtain seasonal high and low elevations as required by SGMA regulations. However, the wells in the network are already sampled on a monthly basis and should continue to be sampled at this interval to provide valuable additional data.

7.3.3 Reduction of Groundwater Storage

7.3.3.1 Scientific Rationale for the Monitoring Site Selection Process

Wells selected for the groundwater elevation sustainability indicator were also selected to be included in the groundwater storage monitoring network. The calculation of change in groundwater storage requires groundwater elevation data that are collected from the network of wells presented in Tables 7-7 and 7-8. The use of the groundwater elevation monitoring network will allow change in storage calculations to be calculated for each aquifer, either by computing the volume of groundwater represented by the difference in elevation between water years or by using the basin groundwater flow model. In either case, estimating annual changes in groundwater storage depends on groundwater elevation data collected from the groundwater elevation monitoring network.

7.3.3.2 Consistency with Data and Reporting Standards

The GSP monitoring of change in groundwater storage will be similar to the monitoring of groundwater elevations described above. Groundwater level data will be obtained at a minimum in the spring and late summer of each year to obtain seasonal high and low elevations as required by the SGMA regulations. This frequency will allow for the calculation of change in storage between consecutive seasonal high conditions, as described in §354.18(b)(4) of the SGMA regulations for water budget evaluations.

7.3.4 Seawater Intrusion

Seawater intrusion is not an issue in the Basin, as it is not a coastal basin. Therefore, no monitoring network or SMCs will be developed for this sustainability indicator.

7.3.5 Degraded Water Quality

7.3.5.1 Scientific Rationale for the Monitoring Site Selection Process

Wells were selected to be included in the water quality monitoring network based on their proximity to beneficial uses of groundwater. This includes the wells identified in Tables 7-7 and 7-8. Similar to monitoring of chronic declines in groundwater elevations and changes in groundwater storage, the same wells used for those sustainability indicators will be used to monitor for the degraded water quality sustainability indicator. This element of the GSP monitoring network will rely on existing monitoring programs currently being conducted by SCV Water that are required under existing water supply permits with DDW.

Private wells (e.g., domestic and agricultural) wells are presently not included in the SCV water quality monitoring network, nor does a program otherwise exist to monitor domestic well water quality. This is a data gap. Because domestic drinking water is a beneficial use of groundwater in the Basin, it will be necessary to develop a baseline of water quality for domestic well water quality in certain parts of the Basin that may be affected by basin-wide pumping or GSA activities in the future. It is hoped that owners of selected domestic wells will volunteer to have their wells sampled and tested. The process for selecting domestic wells to be included in the program are presented in Section 9. Domestic wells included in the program will be sampled and tested for salts and nutrients (TDS, sulfate, nitrate, boron, chloride), VOCs, perchlorate, and, potentially, other constituents such as PFAS.

7.3.5.2 Consistency with Data and Reporting Standards

The GSP monitoring of degraded water quality will be similar to the monitoring of groundwater elevations and storage described above with regard to the utilization of the same monitoring network. Except for the domestic well monitoring, the monitoring of groundwater quality will be consistent with existing permit requirements that SCV Water meets as part of providing groundwater supplies for beneficial uses. Groundwater quality sampling will be conducted at least annually each year to assess the occurrence of degraded water quality.

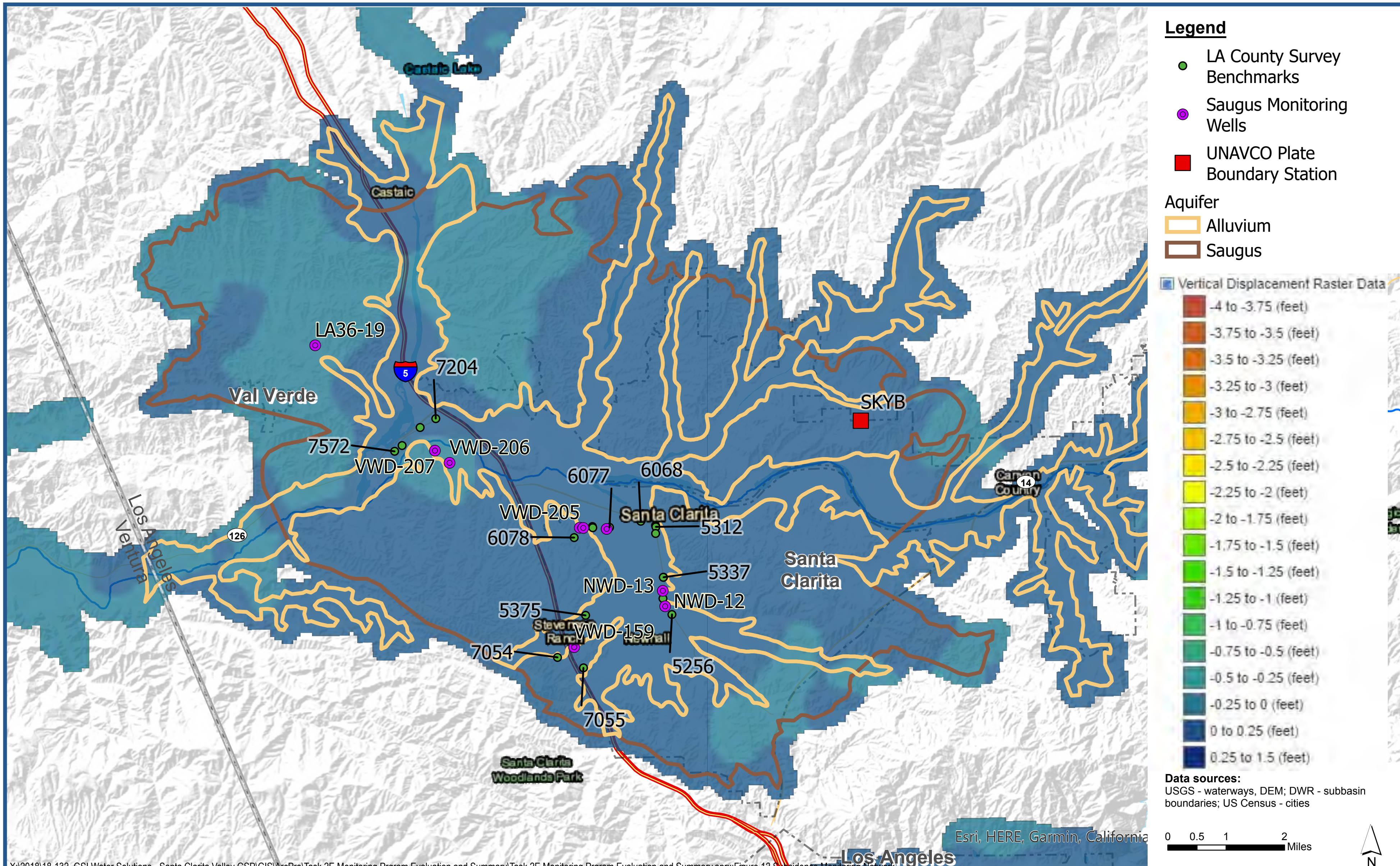
7.3.6 Land Subsidence

Saugus Formation groundwater pumping in the western and central areas of the Basin is expected to be greater and more frequent in selected areas in the future as compared to historical amounts due to additional groundwater wells in the west, and perchlorate containment activities in the central part of the Basin. This is predicted by the basin groundwater model to result in groundwater elevations that are temporarily (during dry periods) on the order of approximately 150 feet lower than long-term average historical elevations during extended dry periods west of the former Whittaker-Bermite site in the vicinity of well V201 (Appendix J). These lower groundwater elevations are also representative of full build-out land use conditions with pumping in accordance with the Basin operating plan and perchlorate containment objectives. These changes in groundwater elevations include continuous operation of these wells (V201, V205, Saugus 1, and Saugus 2) for perchlorate containment purposes, which is a departure from historical conditions (for wells V201 and V205) whereby wells V201 and V205 were operated at reduced levels when the groundwater was needed to meet water demands. Although analysis of subsidence data from existing programs described above were conducted and showed no conclusive evidence of subsidence, the potential for subsidence of some limited amount may occur due to projected changes in groundwater pumping patterns in an area. The combination of subsidence data obtained from DWR for InSAR coverage of the entire Basin, along with LACDPW benchmark surveys and groundwater elevation monitoring is considered sufficient to monitor for potential subsidence impacts in the future.

7.3.6.1 Scientific Rationale for the Monitoring Site Selection Process

Monitoring of subsidence in the Basin will utilize InSAR data and existing benchmarks established by LACDPW for subsidence monitoring in the Basin. On the order of 10 of these stations will be surveyed each January and August for elevation by SCV Water. The locations of selected LACDPW stations are shown on Figure 7-12. These locations were selected because they are in an area of the Basin considered to most susceptible to subsidence and where infrastructure, such as well V201, conveyance pipelines, and roadways are located. Final selection of benchmark locations will be made following discussions with LACDPW. The elevation of each benchmark station will be calibrated to benchmarks established by LACDPW so that consistency between historical elevations can be maintained.

The GSP monitoring of land subsidence will comply with the accuracy required by DWR and utilize data provided by that agency to assess the occurrence and magnitude of subsidence on a spatial basis at critical infrastructure locations where the greatest reductions in groundwater levels are likely to occur. The monitoring network for subsidence will utilize the InSAR data, supplemented by bi-annual elevation survey data obtained at LACDPW benchmark sites. Survey measurements will be compared to LACDPW data (which is collected only every 5 or 6 years) and adjusted as necessary to maintain consistency between the data sets. The combination of the two monitoring programs will provide SCV Water with the ability to evaluate subsidence on frequencies ranging from several times per year to every 6 years.



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Ground Surface Vertical Displacement Estimated Using InSAR Data

Santa Clara River Valley East Subbasin
Groundwater Sustainability Plan

Figure 7-12

7.3.7 Interconnected Surface Water (GDE) Monitoring Network

The GSP Monitoring Plan also includes elements to ensure the avoidance of impacts to GDEs. It includes groundwater level monitoring at 10 locations within the identified GDE area; see Figure 8-7 for the locations of these wells, which consist of four existing wells and six new wells. The GDE monitoring program includes the following elements:

1. Install 6 shallow monitoring wells (also referred to as piezometers) at locations along the river corridor representing river segments and two locations in selected tributaries where GDEs are present.
2. Measure the elevation of the monitoring well measuring points and thalweg nearest to the monitoring well.
3. Assess the relationship between water levels measured at the GDE monitoring wells, river flow, WRP discharges, rainfall, and nearby pumping to assess the validity of the data observed in these monitoring locations.
4. Calibrate the measured water levels with levels predicted by the groundwater flow model.
5. Conduct groundwater level monitoring to track water levels relative to triggers.
6. In monitoring wells that provide meaningful data, identify a trigger for each well based on historical low groundwater levels (data or estimate). Identify a trigger above historical low in areas where sensitive aquatic species reside (e.g., I-5 Bridge).
7. Monitor flow at the Old Road Bridge streamflow gage (the only nearby gage) downstream from where sensitive species (e.g., unarmored three-spine stickleback) are thought to exist in pools at the I-5 Bridge. Periodically visually observe and document surface water flow conditions at this location (I-5 Bridge pool area and streamflow gage) if surface water gauging is not possible during low-flow conditions.
8. Conduct limited periodic biological monitoring at GDE monitoring locations to assess conditions at those locations.
9. Use enhanced vegetation index data (EVI, time series, and map view) for the GDE area as a screening tool to assess changes in GDE area vegetation annually during the summer.

7.3.7.1 Use of Predictive Modeling

Because there is a lack of dedicated monitoring wells with a history of water levels in the GDE area, it was necessary to use SCV Water's groundwater flow model of the Basin to estimate groundwater levels at different points along the river. The model has been calibrated to historical data over the past four decades (1980 through 2019) and was used to identify groundwater levels based on historical hydrology, pumping, and land use conditions. These historical groundwater levels were used to identify trigger levels that, if approached or exceeded, would cause an evaluation of GDE conditions and if needed, an evaluation of methods to avoid impacts to GDEs (refer to Section 8 for a discussion of these trigger levels).

Modeling of future pumping patterns suggests that, if triggers were to be reached or approached in the future along the Santa Clara River, this would likely first occur approximately 1 mile downstream of the Valencia WRP discharge point during unprecedented drought conditions. This area may act as an early indication of lowering groundwater levels for the entire river valley. This area will likely experience the most severe declines in groundwater levels (and potential reductions below trigger levels) during the dry season of a drought period with potential recovery in the fall and winter seasons depending on local rainfall conditions. Used as an indicator of a more widespread effect, the initial signal of low groundwater levels near the western boundary of the Basin may indicate the need to anticipate evaluation and potential management actions in the east to protect priority GDEs (such as those near the I-5 Bridge) before adverse effects are manifested. This predictive ability will help to sustain the most vulnerable priority GDEs.

It is anticipated that the triggers that have been estimated using the groundwater model will be updated once GDE monitoring wells are installed and more is learned about correlation of groundwater elevations, streamflows, WRP discharges, and potential undesirable results to GDEs. Further, a correlation between modeled historical levels and actual levels measured at each monitoring well will be developed.

7.3.7.2 Future Multiple Dry Year Conditions

In evaluating the potential effects of climate change on the Santa Clara River watershed, it is estimated that, in the future, the area may experience drought conditions that are more severe and persist for longer durations than have been experienced to date. As a result, groundwater elevations below previously observed historical lows may occur. If groundwater pumping increases in the future, the combination of increased pumping and prolonged, or especially intense, drought conditions may lower groundwater levels beyond historical lows and potentially affect GDEs. In much of the river channel, the riparian vegetation may be resilient to these longer drought periods. Although vegetation may be stressed and may retreat in areas temporarily, habitat for sensitive species (including the presence of surface water for fish and amphibians and willow and cottonwood forests for birds) would remain in the river corridor and the ecology would recover when wetter conditions occurred. However, in areas where sensitive species rely on river flow and aquatic habitat, temporary elimination of surface flow could result in permanent loss of these sensitive aquatic species. In these priority areas where sensitive aquatic species (e.g., UTS) exist, more frequent groundwater monitoring and frequent observation of surface flow conditions will be conducted. If the trigger is reached, the evaluation process described below will be implemented, and, if necessary, management actions would be implemented early to avoid groundwater pumping-caused undesirable results to GDEs.

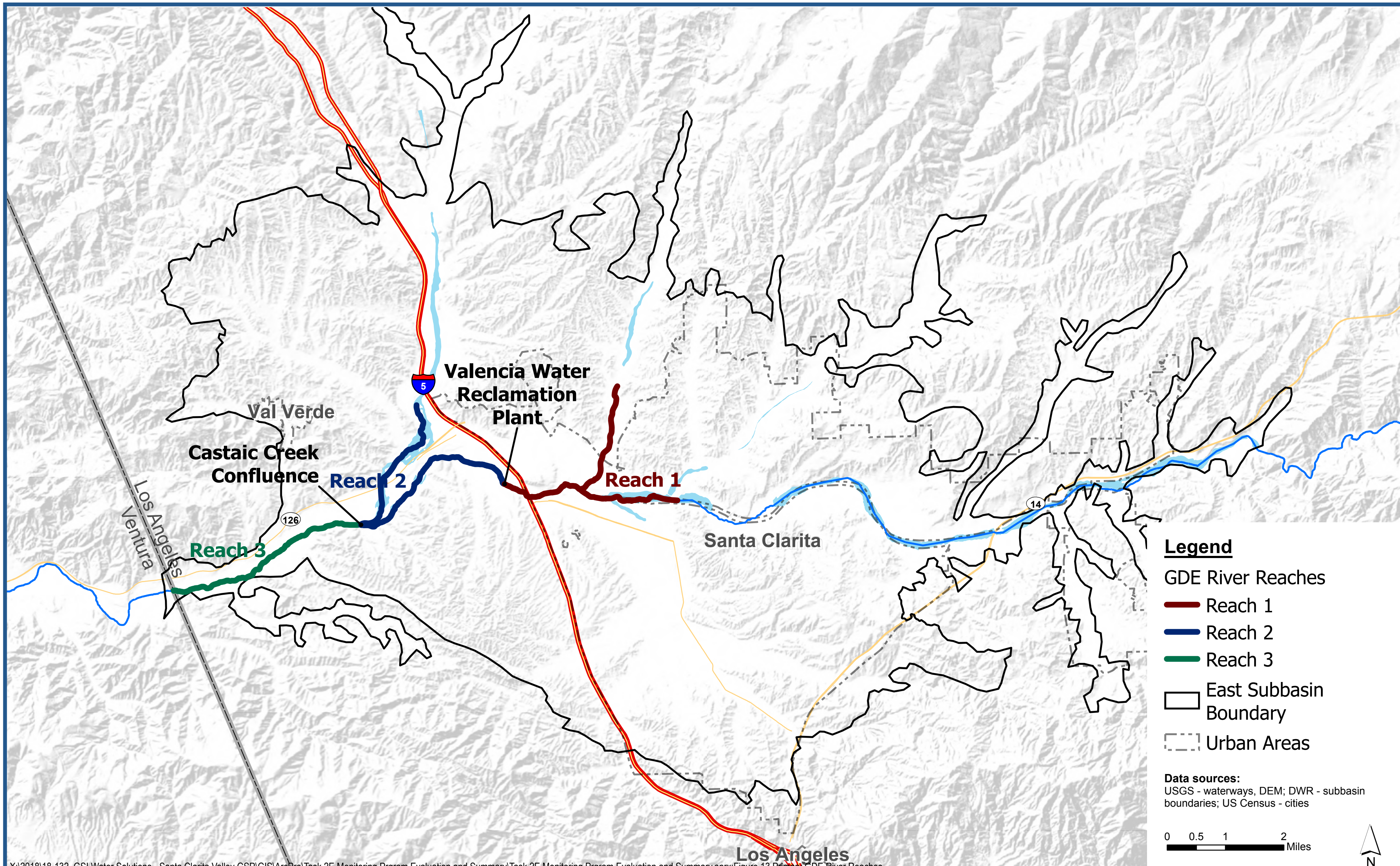
7.3.7.3 GDE Monitoring

GDE Monitoring Well Locations

Section 8 of the GSP identifies potential locations for monitoring wells along the river corridor where GDEs occur. The location of monitoring wells can be further refined into three distinct reaches supporting GDEs: Reach 1 from Bouquet Canyon to the Valencia WRP; Reach 2 from Valencia WRP to just below the Castaic Creek confluence; and Reach 3 from below Castaic Creek to the LA/Ventura County Line. These reaches, shown in Figure 7-13, correspond to predominantly gaining and losing river segments. Monitoring wells will be established to track average groundwater levels in these segments. Two monitoring wells will be established in each reach. In addition, two existing alluvial wells will be used to monitor groundwater levels up San Francisquito Creek and Castaic Creek (two tributaries to the Santa Clara River) because GDEs have also been identified in these areas. Exact locations of the monitoring wells are not known at this time; access agreements with landowners need to be obtained and locations that do not impact habitat must be identified.

GDE Triggers

For each monitoring well, the historical low groundwater level will be established to serve as the trigger (refer to Table 8-6). Triggers will be established 2 feet above the historical lows in River Reach 1, near the I-5 Bridge, to ensure that management actions, if needed, can be implemented in a timely manner. This reach contains priority GDEs, based on the presence of sensitive aquatic species. In addition to groundwater level monitoring in this priority reach, the presence of surface water flow will be monitored at the Old Road Bridge gage, checked (visually or with cameras), and documented on at least a weekly basis during low-flow periods in the area near the I-5 Bridge, where unarmored three-spine stickleback have been observed.



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Primary GDE River Reaches

Santa Clara River Valley East Subbasin
Groundwater Sustainability Plan

Figure 7-13

Elevation of Monitoring Wells and River Channel

The elevation of the monitoring wells and river channel will be surveyed. The river channel (low-flow channel thalweg), will be topographically surveyed within close proximity to each monitoring well. These elevations will assist in evaluating the significance of impacts associated when triggers are reached. The survey should be refreshed after major storm events as needed.

GDE Monitoring Plan Implementation

It is anticipated that it will be necessary to take time to evaluate the groundwater level data obtained from the newly installed GDE monitoring wells to better understand the validity of the data and how the data relate to a number of processes going on in the vicinity including streamflow, WRP flows, tributary flows, and pumping. Once it is determined that the data being generated are meaningful, groundwater levels will be obtained and recorded at approximately a monthly basis at GDE monitoring sites during low flow summer months and quarterly during wet periods. Periodic limited biological monitoring will also be performed at GDE monitoring locations and EVI analysis will be performed in the summer on an annual basis. During multiple drought years, the frequency may increase to implement management actions in a timely manner if necessary. The GDE monitoring well(s) will be fitted with transducers and data loggers so that high resolution daily data can be obtained. The GSA, in partnership with landowners, will record water level data, conduct quality assurance/quality control (QA/QC) of the data, and incorporate the data in the data management system (DMS).

When a trigger is reached or approached, a qualitative evaluation process will be implemented as described in the following section.

Evaluation Process when Triggers are Reached or Approached

Section 8 of the GSP states that when a trigger is reached or approached, an evaluation process will be initiated to determine whether the lowered groundwater levels are a result of pumping and could result in a significant and unreasonable effect to GDEs. This Monitoring Plan includes a process to report the trigger event to the GSA Board as needed with an accompanying Trigger Evaluation Report that evaluates the need for management actions to be implemented. Management Actions would be implemented if the lowering groundwater levels caused by groundwater extraction could result in permanent loss of GDEs anywhere in the GDE area or loss of aquatic habitat in areas that currently provide essential habitat to UTS (sensitive aquatic species in the vicinity of I-5 Bridge) where cessation of surface flow occurs during low-flow conditions in the river channel. The evaluation would be conducted in a timely manner if it appears that groundwater levels are approaching or likely to exceed GDE trigger levels discussed in Section 8 of the GSP.

Several questions have been identified below that may shed light on the significance of lowered groundwater levels.

Questions that will be addressed are presented below.

1. **Is the affected river segment supported by surface flow from WRP discharges? (Surface water may support habitats during temporary periods of low groundwater.)**

   Surface water is generally persistent from the VWRP to the western boundary of the Basin. The Trigger Evaluation Report (or Evaluation Report) may document that streamflows are persistent even with lowered groundwater levels. If streamflows are not present below the VWRP discharge, the Evaluation Report would conclude that surface flows are not sustaining vegetation during the historically low groundwater period, and further evaluation of the following questions may lead to management actions.

2. **Is the historical low groundwater level already below the tree/shrub root depths? (If so, further declines in the same year may not affect GDEs.)**

   The Evaluation Report may rely on topographic data and depth to groundwater data from recent monitoring well readings to determine whether groundwater levels are below tree/shrub root depths. The existing vegetation may not be relying on groundwater in areas where temporary drawdowns of 15 feet or more feet below ground surface (bgs) occur regularly. A topographic survey of the thalweg may be helpful to estimate root zone areas in the affected reach. In areas where groundwater is lowered more than 2 or 3 feet below the historical lows, GDEs may be disconnected from their groundwater water source to an unprecedented degree. If surface water is also not present in these areas, temporarily sustaining GDEs, management actions may be warranted.

3. **Will the GDEs survive the temporary loss of access to groundwater? (Depending on the season, groundwater levels may be expected to rise above historical lows within a month or two, avoiding permanent loss of habitat. When groundwater levels are restored sufficiently quickly in the winter months, effects to GDEs may not be significant.)**

   The Evaluation Report should evaluate the season to provide a qualitative assessment of the duration for which lower groundwater levels may occur, assuming that water levels will recover initially with cooler temperatures in the fall and then more substantively with rain events. If triggers are reached early in the year, the GDEs may experience more stress than if the triggers are reached late in the hot weather season. The Evaluation Report may recommend initiating vegetation monitoring to assess whether drought stress is visible in the river segment. If vegetation is showing signs of stress attributable to historically low or lower groundwater levels caused by pumping, then the Evaluation Report will be updated, and management actions may be warranted.

   For the aquatic habitat in Segment 1, any temporary loss of surface flow is to be avoided with management actions before it occurs.

4. **Has the trigger been reached often in recent years? Droughts that lower groundwater levels are a natural occurrence, but do not occur every year. To sustain GDEs over the long term, groundwater levels affected by drought conditions must recover sufficiently quickly and remain higher most years in order to support healthy, sustainable habitats over the long term.)**

   The Evaluation Report should report the frequency with which the triggers have been reached. If triggers have been reached in 2 or 3 years within a 10-year period, the Trigger Evaluation Report may recommend initiating vegetation monitoring to assess for recurring stress and gradual degradation of habitat. If a gradual decline in habitat quality is seen as a result of groundwater pumping that may lead to undesirable results, the Evaluation Report will be updated, and management actions may be warranted.

5. **Are the declines in groundwater levels resulting from pumping?**

   The Evaluation Report may compile pumping data from wells that are known to be pumping in the Basin and compare them to current pumping recorded for the recent past (months). If historical pumping levels are equal to or greater than current pumping rates, the Evaluation Report may identify that something other than groundwater pumping, such as unprecedented drought conditions or other changes in the water balance of the Basin are contributing to the condition. The Evaluation Report should then outline actions that could be taken to ensure undesirable results caused by groundwater pumping are avoided. If it is determined that the cause of groundwater levels below the trigger are likely caused by pumping, then management actions may be warranted.

6. **Has new information been obtained that can be used to refine the GDE trigger levels presented in Section 8?**

   The Evaluation Report should provide the context for recommendations of future evaluation, monitoring, and action items. It should seek to refine the trigger over time to better correlate with the potential for undesirable results. If there is new information that has been developed regarding the resilience or sensitivity of the GDEs and the special status species that rely on the habitat values, then the Evaluation Report should identify this updated information and recommend management actions as needed to avoid undesirable results.

Evaluation Report

The above Evaluation Process questions will be discussed in an Evaluation Report. The report will include a summary of available data and recommendations for implementation of management actions and/or revision of triggers and will include justification for the conclusions based on the priority of the affected river segment and the other Evaluation Process questions. As shown in Figure 7-13, these variables may present different conclusions in each of the river and tributary segments. In Segment 1, the trigger is set to trigger an evaluation in order to minimize the potential for reaching historical lows, before an evaluation report can be completed, providing protection for priority GDEs. In Segment 2 and the tributaries, groundwater levels below historical lows may not be significant, as groundwater levels are already 15 feet below the river channel. In Segment 3, a drawdown of 2 feet below historical lows may not result in adverse effects, due to the persistent surface water resulting from groundwater upwelling as a result of Saugus Formation discharging in this area. However, a further reduction may reduce flows in the river, which could be more significant. The Evaluation Report to the GSA Board will explain the significance of the evaluation and will recommend whether Management Actions are required. Possible management actions intended to respond to potential impacts to GDEs are presented in the Management Actions and Projects section of the GSP (Section 9).

Presentation to the GSA Board

The Evaluation Report will be presented to the GSA Board at its next regularly scheduled meeting, or sooner if necessary for the Board to consider implementing projects or management actions.

Upland GDEs (not likely to be affected by downstream groundwater extraction)

Upland areas that are understood to contain GDEs have been identified in Placerita Canyon and Sand Canyon, but the areas may not be connected to groundwater or may not be affected by pumping downstream (refer to Figure 3 in Appendix E). For these reasons, the areas are not included in the GDE monitoring and evaluation program described above; however, these areas are of interest to stakeholders and some limited assessment and monitoring is proposed.

Upland GDE Monitoring Program

A habitat survey will be conducted in upland areas in Placerita Canyon and Sand Canyon to better understand local GDE conditions. This evaluation will determine the extent to which these areas are supported by groundwater levels that may be influenced by groundwater pumping and will provide recommendations regarding the need to continue to monitor these areas.

7.3.8 Description of Monitoring Protocols (§ 354.34)

7.3.8.1 Protocols for Monitoring Sites

Monitoring protocols that will be used by the GSA as part of implementing this GSP are largely based on the DWR BMP *Sustainable Management of Groundwater: Monitoring Protocols, Standards, and Sites* (DWR, 2016). The recommended monitoring protocols were adjusted and added to fit the specific monitoring needs of the Basin to achieve sustainability. Monitoring protocols for seawater intrusion were not necessary, as the Basin is a groundwater basin approximately 40 miles inland from the coast. Monitoring protocols for measuring groundwater extraction amounts also are included. Monitoring protocols regarding groundwater extraction are not described in the BMP; accounting for groundwater pumping will be an integral part of achieving sustainability in the Basin. The monitoring protocols that are described in this document will provide the necessary data to track the minimum thresholds and measurable objectives for each of the sustainability indicators. The monitoring protocols established herein will be reviewed every 5 years as a part of periodic GSP updates. The following protocols will be applied to all monitoring sites:

- A unique identifier will be assigned that includes a written description of the site location, well or location identification (ID), date established, access instructions, type(s) of data to be collected, latitude, longitude, and elevation.
- A log will be kept in order to track all monitoring site details and track all modifications to the monitoring site.

7.3.8.2 Groundwater Level Elevation

Protocols for Measuring Groundwater Levels

Protocols for measuring groundwater levels include the following:

- Measure depth to water in the well using procedures appropriate for the measuring device. Equipment must be operated and maintained in accordance with manufacturer's instructions. Groundwater levels should be measured to the nearest 0.01 foot relative to the Reference Point (RP).
- Shut off pumping for at least 8 hours, if the well is normally operational, to obtain a static water level measurement. If the well has been pumped, multiple measurements should be collected to ensure the well reached equilibrium such that no significant changes in water level are observed. Every effort should be made to ensure that a representative stable depth to groundwater is recorded. If a well does not stabilize, the quality of the value should be appropriately qualified as a questionable measurement.
- The groundwater elevation should be calculated using the following equation.

$$GWE = RPE - DTW$$

Where:
GWE = Groundwater Elevation in NAVD88 datum
RPE = Reference Point (RP) Elevation in NAVD88 datum
DTW = Depth to Water

- The measurements of depth to water should be consistent in units of feet, to an accuracy of hundredths of a foot.
- The well caps or plugs should be secured following depth to water measurement.
- Groundwater level measurements are to be made on a semi-annual basis at a minimum, during periods that will capture seasonal highs and lows.

Recording Groundwater Level Measurements

- The sampler should record the well identifier, date, time (24-hour format), RPE, height of RP above or below ground surface, DTW, GWE, and comments regarding any factors that may influence the depth to water readings such as weather, nearby irrigation, flooding, potential for tidal influence, or well condition. If there is a questionable measurement or the measurement cannot be obtained, it should be noted. Standardized field RMSs should be used for all data collection.
- All data should be entered into the DMS as soon as possible. Care should be taken to avoid data entry mistakes and the entries should be checked by a second person.

Installing Pressure Transducers and Downloading Data

Many wells in the existing SCV Water monitoring program already have transducers installed. The following procedures will be followed during installation of new pressure transducers and periodic data downloads:

- The sampler must use an electronic sounder and follow the protocols listed above to measure the depth to groundwater (groundwater level) and calculate the groundwater elevation in the monitoring well to properly program and reference the installation. It is recommended that transducers record measured groundwater level to conserve data capacity; groundwater elevations can be calculated at a later time after downloading.
- The sampler must note the well identifier, the associated transducer serial number, transducer range, transducer accuracy, and cable serial number.
- Transducers must be able to record groundwater levels with an accuracy of at least 0.01 foot. Professional judgment will be exercised to ensure that the data being collected is meeting the data quality objectives (DQO) and that the instrument is capable. Consideration of the battery life, data storage capacity, range of groundwater level fluctuations, and natural pressure drift of the transducers should be included in the evaluation.
- The sampler must note whether the pressure transducer uses a vented or non-vented cable for barometric compensation. Vented cables are preferred, but non-vented units provide accurate data if properly corrected for natural barometric pressure changes. This requires the consistent logging of barometric pressures to coincide with measurement intervals.
- Follow manufacturer specifications for installation, calibration, data logging intervals, battery life, correction procedure (if non-vented cables used), and anticipated life expectancy, to ensure that DQOs are being met for the GSP.
- If the well is not already equipped with a pressure transducer, secure the cable to the well head with a well dock or another reliable method. Mark the cable at the elevation of the reference point with tape or an indelible marker. This will allow estimates of future cable slippage.
- The transducer data should periodically be checked against hand-measured groundwater levels to monitor electronic drift or cable movement. This should happen during routine site visits, at least annually, to maintain data integrity.
- The data should be downloaded as necessary on a regular basis to ensure no data are lost. It should be promptly entered into the DMS following the QA/QC program established for the GSP. Data collected with non-vented data logger cables should be corrected for atmospheric barometric pressure changes, as appropriate. After the sampler is confident that the transducer data have been safely downloaded and stored, the data should be deleted from the data logger to ensure that adequate data logger memory remains.

7.3.8.3 Groundwater Storage Measurements

The monitoring protocols for evaluating change in groundwater storage are the same as the protocols described above for groundwater levels.

7.3.8.4 Groundwater Quality Measurements

Annual monitoring of groundwater quality will include sampling and laboratory analysis of selected constituents that are required from existing programs permitted through DDW and as required by the SNMP (as shown in Tables 7-4 and 7-6). Additional constituents will be considered in the future as additional information becomes available. During sampling events, measurement of selected water quality parameters will take place in the field. These field parameters should be measured at an annual frequency and include electrical conductivity at 25 °C in µS/cm, pH, temperature (in °Celsius [C]), and dissolved oxygen in mg/L.

The GSP monitoring program will use the following protocols for collecting groundwater quality samples:

- Prior to sampling, the analytical laboratory will be contacted to schedule laboratory time, obtain appropriate sample containers, and clarify any sample holding times or sample preservation requirements.
- Each well used for groundwater quality monitoring will have a unique identifier. This identifier will appear on the well housing or the well casing to verify well identification.
- In the case of wells with dedicated pumps, samples should be collected at or near the wellhead following purging.
- Prior to sampling, the sampling port and sampling equipment will be cleaned of any contaminants. The equipment will be decontaminated between each sampling location or well to avoid cross-contamination.
- The static groundwater level in the well should be measured following appropriate protocols described above in the groundwater level measuring protocols.
- For any well not equipped with low-flow or passive sampling equipment, an adequate volume of water should be purged from the well to ensure that the groundwater sample is representative of ambient groundwater and not stagnant water in the well casing. Purging three well casing volumes is generally considered adequate. Professional judgment should be used to determine the proper configuration of the sampling equipment with respect to well construction, such that a representative ambient groundwater sample is collected. If pumping causes a well to be evacuated (go dry), document the condition and allow well to recover to within 90 percent of original level prior to sampling.
- Field parameters of pH, electrical conductivity and temperature should be collected during purging and prior to the collection of each sample. Field parameters should be evaluated during the purging of the well and should stabilize prior to sampling. Measurements of pH should only be measured in the field; lab pH analysis are typically unachievable due to short hold times. Other parameters—such as oxidation-reduction potential, dissolved oxygen (in situ measurements preferable), or turbidity—may also be useful for assessing purge conditions. All field instruments will be calibrated daily and evaluated for drift throughout the day.
- Sample containers should be labeled prior to sample collection. The sample label must include sample ID (often well ID), sample date and time, sample personnel, sample location, preservative used, and analytes and analytical method.
- Samples should be collected under laminar flow conditions. This may require reducing pumping rates prior to sample collection.

- All samples requiring preservation must be preserved as soon as practically possible, ideally at the time of sample collection. Ensure that samples are appropriately filtered as recommended for the specific analyte. Entrained solids can be dissolved by preservative leading to inconsistent results of dissolve analytes. Specifically, samples to be analyzed for metals should be field filtered prior to preservation; do not collect an unfiltered sample in a preserved container.
- Samples should be chilled and maintained at 4 °C to prevent degradation of the sample. The laboratory's Quality Assurance Management Plan should detail appropriate chilling and shipping requirements.
- Samples must be shipped under chain of custody documentation to the appropriate laboratory promptly to avoid violating holding time restrictions.
- Groundwater quality samples shall be collected annually.
- All data will be entered into the DMS as soon as possible. Data entries should be checked by a second person to avoid incorrect data.

7.3.8.5 Groundwater Extraction Measurements

Measurements of groundwater extractions are conducted in the Basin in the vast majority of wells that are not categorized as de minimis use (e.g., domestic wells using less than 2 AFY). Measurement devices utilized by the municipal pumper members of the GSA consist of totalizer meters that record extractions. The GSA may seek pumping information from other non-municipal wells that are not de minimis users. The meters will be periodically checked for accuracy using the manufacturer's recommendations. If necessary, meters will be periodically calibrated according to the manufacturer's specifications. The meters will be read on at least a quarterly basis and the data collected will be recorded in gallons and converted to acre feet.

7.3.8.6 Subsidence Measurements

Subsidence monitoring will be conducted by utilizing the existing InSAR monitoring program and by monitoring elevations at selected benchmarks described previously. It should be noted that the monitoring program will detect both increases and decreases in land surface elevations over time. The following procedures will be followed:

- Download and review subsidence data collected by DWR and LACDPW in the Basin on an annual basis.
- Downloaded data will be stored in the DMS following QA/QC.
- Subsidence data will be downloaded when available from the various agencies and uploaded to the DMS.
- The elevation of selected benchmarks will be measured using a high-resolution GPS unit that will report elevations to the nearest centimeter or less. The data will be recorded in a logbook and entered into the DMS and checked against previous readings. If there are potentially anomalous readings, the unit will be recalibrated, and the elevation reading will be repeated.

7.3.8.7 Interconnected Surface Water Measurements

Groundwater levels measured at GDE monitoring locations, river flow (measured in cfs at the Old Road gage), and stream channel bottom (thalweg) elevation data will be collected using the procedures described previously. GDE monitoring wells will be equipped with transducers and data loggers and set for hourly data collection. Flow measurements at the Old Road gage will be downloaded from the USGS website on at least a weekly basis. During extended drought conditions when groundwater levels are approaching the trigger level at the I-5 Bridge, flow in the river will be visually observed at that location on at least a weekly basis to assess whether there is a potential for river flow to stop and impact sensitive aquatic species.

Data collected will be compiled and analyzed for QA/QC and entered into the DMS.

7.3.8.8 Representative Monitoring (§ 354.36)

RMS are defined in the SGMA regulations as a subset of monitoring sites that are representative of conditions in the Basin. All the monitoring sites in this section are considered RMSs, using methods of selection consistent with the BMPs described above under the groundwater level protocols. Groundwater level monitoring will be used to determine changes in groundwater storage. Change in storage cannot be directly measured; therefore, this sustainability indicator relies on groundwater elevation measurements as a proxy to calculate change in storage. As a result, groundwater level data will be used in conjunction with aquifer parameters and the groundwater model to compute changes in groundwater storage across the Basin. In the case of subsidence, the use of InSAR data that encompasses the entire Basin will be used.

7.3.8.9 Assessment and Improvement of Monitoring Network (§ 354.38)

The GSA does not anticipate that the data gaps will impact the Basin's ability to achieve sustainability and is committed to fill in data gaps as identified herein. As described in §354.38 of the SGMA regulations, the GSA is required to analyze the monitoring network for improvements as follows:

- Each GSA shall review the monitoring network and include an evaluation in the Plan and each 5-year assessment, including a determination of uncertainty and whether there are data gaps that could affect the ability of the Plan to achieve the sustainability goal for the basin.
- Each GSA shall identify data gaps wherever the basin does not contain enough monitoring sites, does not monitor sites at a sufficient frequency, or utilizes monitoring sites that are unreliable, including those that do not satisfy minimum standards of the monitoring network adopted by the GSA.
- If the monitoring network contains data gaps, the Plan shall include a description of the following:
  - The location and reason for data gaps in the monitoring network
  - Local issues and circumstances that limit or prevent monitoring
- Each GSA shall describe steps that will be taken to fill data gaps before the next 5-year assessment, including the location and purpose of newly added or installed monitoring sites.
- Each GSA shall adjust the monitoring frequency and distribution of monitoring sites to provide an adequate level of detail about site-specific surface water and groundwater conditions and to assess the effectiveness of management actions under circumstances that include the following:
  - Minimum threshold exceedances
  - Highly variable spatial or temporal conditions
  - Adverse impacts to beneficial uses and users of groundwater
  - The potential to adversely affect the ability of an adjacent basin to implement its Plan or impede achievement of sustainability goals in an adjacent basin

Review and Evaluation of the Monitoring Network

The monitoring networks described above for each of the applicable sustainability indicators will be evaluated on a yearly basis. This evaluation will involve a review of the described minimum thresholds and measurable objectives and their comparison to observed trends in the monitoring network. Furthermore, a more comprehensive review of the monitoring network will be conducted every 5 years as part of the GSP update. During this review, management actions and projects will be evaluated, and the monitoring network will be assessed for their efficacy in tracking progress based on the actions and projects. These evaluations and assessments also will highlight any additional data gaps and recommended changes to the monitoring networks.

Identification and Description of Data Gaps

Identification and description of data gaps for the monitoring network described above for each of the applicable sustainability indicators are described below.

Groundwater Elevation

Groundwater elevation data has been extensively collected within the Basin over the past several decades. However, despite this data collection effort, spatial data gaps still exist in some areas where groundwater development of the Saugus Formation has not occurred. Currently, those areas are not considered data gaps, however, the monitoring network will be expanded by including new Saugus wells that may be installed in the future.

Monitoring wells will need to be installed for the GDE area as shown on Figure 7-14. After these wells are installed, the actual measured water level will be correlated with the model predicted water level, which may require an adjustment of the trigger levels and measurable objective at each location.

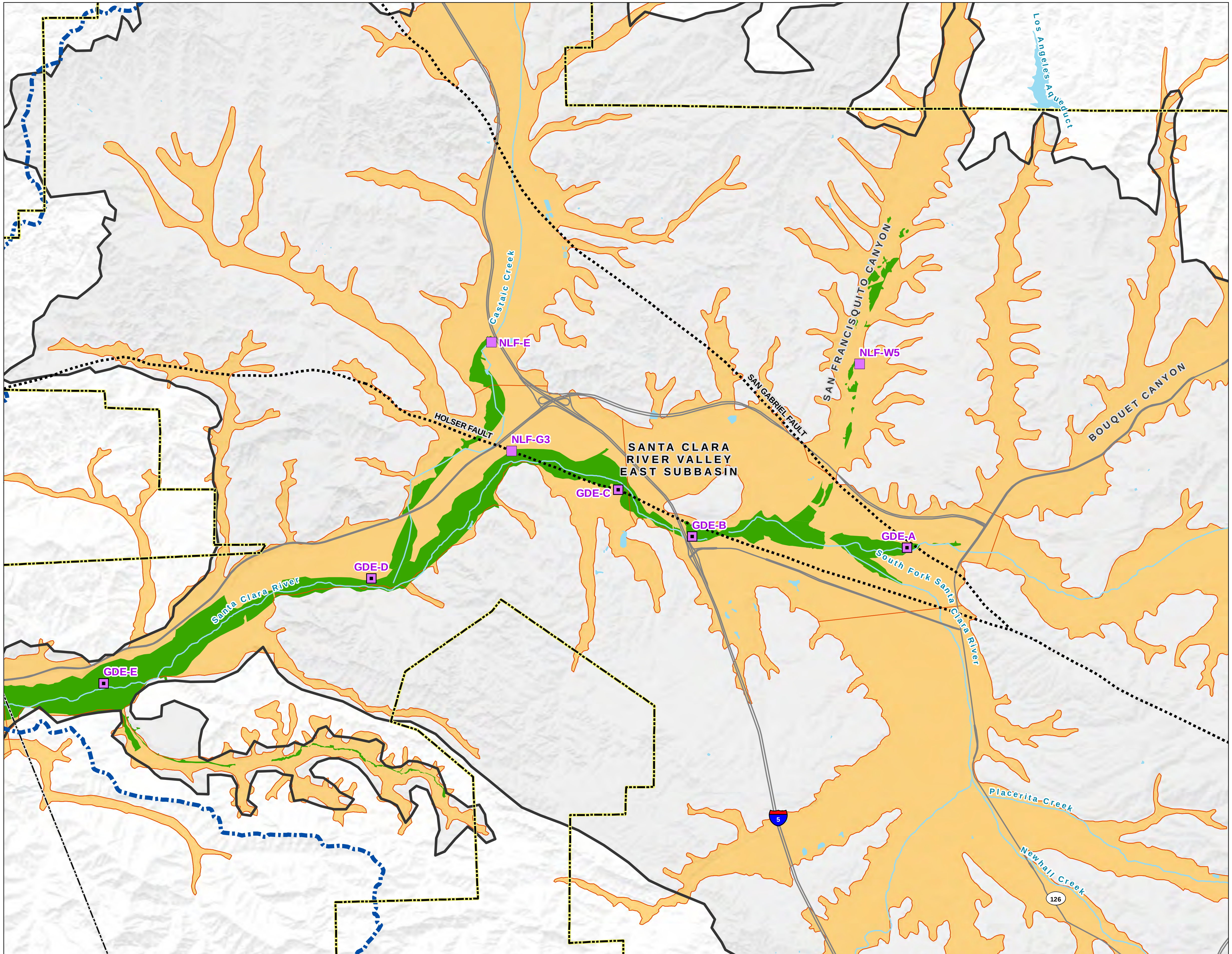


FIGURE 7-14

Groundwater Monitoring Network for GDEs

Santa Clara River Valley
East Groundwater Basin
Groundwater Sustainability Plan

LEGEND

GDE Monitoring Well in the Alluvial Aquifer

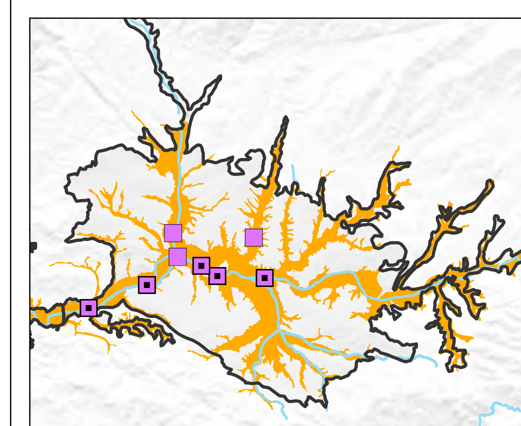
- Existing Observation Well
- New Observation Well (to be constructed)

Phreatophyte Locations

- Riparian Mixed Hardwood

All Other Features

- Santa Clara River Valley Groundwater Basin
- Alluvial Aquifer
- Watershed Boundary
- Service Area Boundary for SCV Water
- Major Road
- Watercourse
- Waterbody



NOTE

SCV Water: Santa Clarita Valley Water Agency

N

0 2,000 4,000 6,000
Feet

GSI Water Solutions, Inc.

Date: December 17, 2021
Data Sources: USGS, DWR Bulletin 118, ESA

Document Path: Y:\0420_CLWA\Source_Figures\019_EastSubbasinGSP\GSP\Section7\Figure7-14_GW_Monitoring_Network_GDEs.mxd, abarry

Groundwater Quality

Groundwater quality data is collected extensively throughout the Basin as a result of several existing monitoring programs. These programs provide a spatial distribution of data such that no data gaps currently occur in the Basin, other than for domestic wells. The GSA is proposing a process for identifying suitable domestic wells to be included in the water quality monitoring network in the projects and management actions section of the GSP. Similar to groundwater elevations above, should expanded use of the groundwater supplies from the Saugus Formation occur that is not currently envisioned, data gaps could arise.

Groundwater Storage

Groundwater storage data gaps are described in the groundwater elevation section, as water levels are being used as a proxy for groundwater storage.

Subsidence

The Basin has not experienced significant levels of subsidence, however, projections of groundwater level declines in the Saugus Formation in the central and western portions of the Basin have the potential to result in an increase in subsidence. The use of existing subsidence monitoring programs and annual monitoring of ground surface elevations by the GSA at selected LACDPW monitoring stations will help address any data gaps that SCV Water may have in monitoring of this sustainability indicator in the future during GSP implementation.

Interconnected Surface Water and GDEs

Data gaps currently exist in the monitoring of interconnected surface water and GDEs within the identified GDE area. These data gaps are due to the lack of monitoring wells adjacent to the Santa Clara River. The installation of shallow groundwater monitoring wells has been planned by the GSA as a proxy for surface water measurements. Access to locations upstream from the I-5 Bridge for installation of monitoring wells has been obtained from the City of Santa Clarita and the GSA has been coordinating with the landowner downstream of the I-5 Bridge.

Description of Steps to Remedy Data Gaps

Data gaps have been described above and the GSA will take the following steps, prior to the first 5-year GSP update in 2027 to address these data gaps:

- The GSA will install up to six new groundwater monitoring wells adjacent to the Santa Clara River and selected tributaries in the identified GDE area. These new wells will address the data gaps described for interconnected surface water and GDEs. Furthermore, these new wells will be added to the groundwater elevation monitoring networks in the Alluvial Aquifer to assess the temporal variability of stream-aquifer interactions.
- The GSA will review the well inventory in the DMS and to the extent reasonably practicable, conduct a survey to confirm the presence and type of active wells.
- As described in the Projects and Management Actions section of the GSP, the GSA will identify suitable domestic wells to be included in the water quality monitoring program. Sampling events will be coordinated with well owners to prevent pumping and access issues.

In addition to these steps, the monitoring network will be evaluated on a yearly and 5-year basis. If additional data gaps arise, the GSA will consider the implications of these gaps, associated costs, and importance to the continued implementation of the GSP, and take appropriate actions to address the gaps.

Description of Monitoring Frequency and Density of Sites

Monitoring frequency and density of sites for all sustainability indicators are described in previous sections of this plan.

7.4 Data Management System

This section presents the development of the DMS for the GSP. Specifically, this section presents the following:

- An inventory and evaluation of available data sources
- Identification of existing monitoring programs
- Recommendation of an appropriate DMS platform for GSP purposes
- Development of the DMS structure
- Populating the DMS
- Development of DMS documentation
- Identification and prioritization of existing data gaps
- An action plan to fill data gaps

The DMS developed as part of this GSP is intended to provide the GSA with a data management tool that, at a minimum, will store and produce data for use in GSP and related annual report submittals to DWR. In addition, this DMS will also have the capability to be linked to visualization tools for stakeholder outreach and can also be transitioned up to a larger-scale or enterprise-level database. The DMS stores data sets that have been used in the development of various aspects of this GSP and will be used for annual reports, including the following:

- Basin setting description
- Well location density maps
- Groundwater pumping distribution
- Sustainability indicator data (groundwater levels, groundwater quality, subsidence, groundwater dependent ecosystems)
- Water budget data used to support GSP numerical modeling development

The DMS stores data related to GSP development and also includes automated queries and report objects that format and output data into groundwater-level hydrographs (and other time-series plots as needed), and well location maps that will be useful in the presentation and interpretation of groundwater conditions in the Basin. For reporting purposes, exportable data summary tables are readily generated from the DMS for inclusion in plans and annual reports. Additional queries, as needed beyond the basic queries already established, can be developed to produce maps, figures, and hydrographs for the GSP. The DMS allows for direct input of future data collection efforts conducted as part of the GSP monitoring program and to produce maps of monitoring locations that will allow for the identification of areas of limited data (data gaps). These maps will help in the development of an implementation schedule for SCV Water to address data gaps for the sustainability indicators that have limited historical data sets, such as groundwater dependent ecosystems, streamflow (to assist in evaluating interconnected surface water), and others.

7.4.1 Inventory and Evaluation of Available Data Sources

The inventory and evaluation of the available data sources that were accessed is presented in Table 7-9. This table includes a list of the data sources, the types of data obtained from each source, and the relative quality of the data obtained from each source. Generally, the quality of the data from each source is of moderate to high quality; however, there was one data source for which the data could be improved with a field survey (i.e., the well location accuracy is of moderate to low quality for the data from the County of Los Angeles [LA County]). Most of the data incorporated into the DMS is groundwater and surface water data measured in the Santa Clarita Valley.

Table 7-9. DMS Data Sources

Data Source	Data Type	Data Quality Rank[1]
Santa Clarita Valley Water Agency (including Los Angeles County Waterworks District No. 36)	Groundwater Wells Groundwater Levels Groundwater Quality Groundwater Production Imported Water Precipitation	High to Moderate (L/E) Moderate (M/D) High High High High
California Department of Water Resources	Well Completion Reports Water Levels (CASGEM) Precipitation Castaic Reservoir Releases	Moderate (L) Varies by Original Source High High
Los Angeles County Department of Public Works including Pitchess Detention Center and LA County Flood Control District	Wells Groundwater Levels Groundwater Production Streamflow Discharge	Moderate to Low (L/E/A) Moderate/Unknown (M) Moderate/Unknown Moderate/Unknown (M)
FivePoint Holdings, LLC (formerly Newhall Land and Farming)	Wells Water Levels Production	Moderate (L/E/A) Moderate (M) Moderate (M)
Whittaker-Bermite	Wells Groundwater Levels Groundwater Quality	High High High
Regional Water Quality Control Board	Stream Water Quality	High
National Centers for Environmental Information	Precipitation	High
SWRCB Division of Drinking Water	Groundwater Wells Groundwater Quality	Moderate (L/E/A) High

Data Source	Data Type	Data Quality Rank[1]
SWRCB Geotracker	Wells Groundwater Levels Groundwater Quality	High to Moderate (A) High to Moderate (R) High
Los Angeles County Sanitation District	Wastewater Discharge	High
U.S. Geological Survey	Streamflow Discharge	High
Geosyntec	Groundwater Wells Groundwater Levels Groundwater Quality	Unknown (L/E/A) Unknown (M/R) Unknown (M/R)
UNAVCO - University NAVSTAR Consortium	Continuous GPS (Land Surface Elevation Monitoring)	High
Los Angeles County Department of Public Works	Land Surface Elevation Survey	High to Moderate

Note

[1] Moderate and Unknown Rankings are qualified with basis for imprecision and/or inaccuracy: Measurement Method (M), Date (D), Location Coordinates (L), Elevation (E), and Attribute Completeness(A), or Record Completeness (R).

SWRCB = State Water Resources Control Board

7.4.2 Identification of Existing Monitoring Programs

The following is a list of ongoing monitoring programs that are being conducted on an ongoing basis in the Basin:

- Division of Drinking Water for municipal water supply well groundwater quality monitoring
- SCV Water rainfall, groundwater level, and groundwater quality monitoring
- Whittaker-Bermite Monitoring for soil and groundwater quality
- CASGEM for annual monitoring of groundwater levels in the Basin
- NPDES for potable water discharge quality
- SCV Water Salt and Nutrient Management Plan monitoring
- Municipal Separate Stormwater System (MS4) monitoring
- LA County (Department of Public Works for streamflow monitoring, Flood Control District for groundwater levels, and Sanitation District for wastewater discharge monitoring)
- Regional Water Quality Control Board regulated sites (landfills and other sites with ongoing groundwater monitoring)
- UNAVCO continuous GPS monitoring of land surface elevation changes (subsidence)

7.4.3 Recommended Data Management System Platform for GSP Development

To ensure user flexibility, the database was designed using Microsoft® Access 2007–2016 and the *.accdb* database format. Access has the capacity to store related tables of data, up to a total of 2 gigabytes (GB) of data and can be transitioned to larger-scale database software as necessary.

The currently archived data occupy about 85 megabytes (MB), (or less than half) of the available storage capacity. Access is capable of importing data from, and exporting data to, other commercially available software programs for data visualization or to an enterprise-level database for multi-user needs. For geospatial data, a file geodatabase (SCVGSAgdb) has been constructed in ArcGIS using thematically grouped feature data sets. The geodatabase contains spatial data and is related to the DMS Access database to support the production of tables, figures, and maps for GSA planning and reporting purposes.

7.4.4 Development of DMS Structure

The database structure was designed to maximize the utility of the data by using a structure that is similar to the structure developed by DWR, USGS, and California Department of Public Health. Each data record entered into the database identifies the data source and has a unique identification number. Each site is uniquely identified by a Local Well Name, usually with a corresponding State Well Number, SiteID, or Source Name, and other related IDs from other monitoring programs. The main data tables and LOV (List of Values) tables included in the DMS are listed below. Further detailed descriptions of these tables, a visual depiction of these tables and their related fields, and examples of the data they contain are presented in Appendix J.

As a general overview, there are six main data tables related to the central T_WELL data table in the DMS and currently seven additional supporting LOV tables. The main data tables include the following:

1. T_WELL - groundwater well and monitoring point records; linked to the SCVwells data set in SCVGSAgdb by [WELL_NAME] field
2. T_WL –groundwater level records
3. T_WQ – ground and surface water quality data
4. T_PROD – groundwater production data
5. T_SWP –State Water Project and Imported Water data by Purveyor/Division
6. T_STREAM – streamflow discharge data
7. T_PRECIP – precipitation data

Supporting LOV tables include the following:

- T_LOV_WQ_AN – Water Quality Analyte
- T_LOV_SRC – Data/Record Source
- T_LOV_WL_QLFR – Water Level Measurement Qualifier
- T_LOV_WELLTYP – Well Type
- T_LOV_WL_MTHD – Water Level Measurement Method
- T_LOV_UOM – Unit of Measure

The DMS T_WELL table currently contains 1,206 entries that are a subset of the 2,082 records in the SCVwells data set as listed in the SCVGSAgdb. The wells in T_WELL have associated temporal water level, quality, or production data records in the other data tables of the DMS. The fields in the T_WELL table are carried over from the SCVwells data set in the SCVGSAgdb. The description of the SCVwells data set and the definition of these fields can be found in Appendix K.

7.4.5 Populating the DMS

The DMS currently contains 14 data/LOV tables that store all the data for a total number of more than 176,000 records. As mentioned above, the number of data records currently stored in the DMS is only 85 MB out of the 2-GB capacity. Future importing of data and information into the DMS should first include a review and formatting of the data into a format that is compatible with the existing data table formats in the DMS.

7.4.6 Development of DMS Documentation

Documentation of the DMS is ongoing as the DMS is further developed through the GSP process. Appendix K includes screen shots of the tables and existing queries that will be updated through the GSP development process.

7.4.7 Identify and Prioritize Existing Data Gaps

The identification and prioritization of data gaps has been developed primarily during the development of the Basin Setting, Water Budgets, and Monitoring Networks sections of this GSP. Described herein, is a preliminary identification and prioritization of data gaps that will be refined during the GSP development process. The identification of data gaps is a requirement of a GSP, with a focus on the six sustainability indicators listed below. The historical and spatial distribution of data that exist for the six sustainability indicators were evaluated and the data gaps for each indicator are listed below, along with an initial prioritization of high/medium/low.

Sustainability Indicators

Minimal Data Gaps:

- Reduction in Storage in Alluvial Aquifer (metric=extraction volume)
- Chronic Lowering of Groundwater Levels in the Alluvial Aquifer (metric=groundwater elevations)

Moderate Data Gaps:

- Water quality in domestic wells
- Extraction information from non de minimus wells other than municipal wells
- Subsidence: Land surface elevation benchmarks
- Elevation control for wells and monitoring locations

Pronounced Data Gap:

- Depletion of Interconnected Surface Water (including GDEs) as a result of a lack of monitoring locations for shallow groundwater occurrence in the GDE area.

Not Applicable:

- Seawater Intrusion

7.4.8 An Action Plan to Fill Data Gaps

The action plan to address data gaps has been developed and is described in Section 9. An implementation plan that includes the implementation schedule and estimated costs for addressing data gaps is presented in Section 10. The GSA plans to install shallow monitoring wells to collect shallow groundwater level data in areas likely to support GDEs and to evaluate the presence of interconnected surface water. It is expected that during the first 5 years following GSP adoption in 2022, the GSA will address the data gaps that are present in the Santa Clarita Valley.

7.5 References

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8. Sustainable Management Criteria

This section defines the criteria by which sustainability will be evaluated, defines conditions that constitute sustainable groundwater management, and discusses the process by which the Santa Clarita Valley Groundwater Sustainability Agency (SCV-GSA) will characterize undesirable results and how it established minimum thresholds and measurable objectives for each sustainability indicator in the Santa Clara River Valley Groundwater Basin, East Subbasin (Basin).

Defining sustainable management criteria (SMCs) requires significant analysis and scrutiny. This section presents the data and methods used to develop SMCs and demonstrates how these criteria influence beneficial uses and users. The SMCs presented in this section are based on currently available data and application of the best available science. As noted in this Santa Clara River Valley East Groundwater Basin Groundwater Sustainability Plan (GSP), data gaps exist in the hydrogeologic conceptual model and historical data. Uncertainty caused by these data gaps was considered when developing the SMCs. These SMCs are considered initial criteria and will be reevaluated and potentially modified in the future as new data become available.

The SMCs are grouped by sustainability indicator. The following five sustainability indicators are applicable in the Basin:

- Chronic lowering of groundwater levels
- Reduction in groundwater storage
- Degraded groundwater quality
- Land subsidence
- Depletion of interconnected surface water

The sixth SMC, seawater intrusion, is not applicable in the Basin.

To retain a consistent and organized approach, this section follows the same format for each sustainability indicator. The description of each SMC includes all the information required by § 354.22 et seq. of the Sustainable Groundwater Management Act (SGMA) regulations and outlined in the Sustainable Management Criteria Best Management Practice (BMP) guidance, including the following:

- How the definition of what might constitute significant and unreasonable conditions was developed
- How minimum thresholds were developed, including the following:
  - The information and methodology used to develop minimum thresholds (§ 354.28 (b)(1))
  - The relationship between minimum thresholds and each sustainability indicator (§ 354.28 (b)(2))
  - The effect of minimum thresholds on neighboring basins (§ 354.28 (b)(3))
  - The effect of minimum thresholds on beneficial uses and users (§ 354.28 (b)(4))
  - How minimum thresholds relate to relevant federal, state, or local standards (§ 354.28 (b)(5))
  - The method for quantitatively measuring minimum thresholds (§ 354.28 (b)(6))
- How measurable objectives were developed, including the following:
  - The methodology for setting measurable objectives (§ 354.30)
  - The methodology for setting interim milestones (§§ 354.30 (a), 354.30 (e), and 354.34 (g)(3))

- How undesirable results were developed, including the following:
  - The criteria defining when and where the potential effects on beneficial uses and users of groundwater (as described by the sustainability indicators) cause undesirable results (i.e., significant and unreasonable effects), based on a quantitative description of the combination of minimum threshold exceedances (§ 354.26 (b)(2))
  - The potential causes of undesirable results (§ 354.26 (b)(1))
  - The effects of these undesirable results on the beneficial users and uses (§ 354.26 (b)(3))

8.1 Definitions

The SGMA legislation and regulations include a number of new terms relevant to the SMCs. These terms are defined below using the definitions included in the SGMA regulations (§ 351, Article 2). Where appropriate, additional explanatory text is added in italics. This explanatory text is not part of the official definitions of these terms. To the extent possible, plain language, with only a limited use of highly technical terms and acronyms, was used to assist as broad an audience as possible in understanding the development process and implications of the SMCs.

- **Groundwater-dependent ecosystem (GDE)** refers to habitat, plant communities, and aquatic and terrestrial species that rely on surface or near surface water that is supported by groundwater.
- **Interconnected surface water** refers to surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer. Interconnected surface waters are parts of streams, lakes, or wetlands where the groundwater table is close enough to the ground surface to influence water in the lakes, streams, or wetlands or vice versa.
- **Interim milestone** refers to a target value representing measurable groundwater conditions, in increments of 5 years, set by a Groundwater Sustainability Agency (Agency) as part of a Groundwater Sustainability Plan (Plan or GSP). Interim milestones are targets such as groundwater levels that will be achieved every 5 years to demonstrate progress towards sustainability.
- **Management area (MA)** refers to an area within a basin for which the Plan may identify different minimum thresholds, measurable objectives, monitoring, or projects and management actions based on differences in water use sector, water source type, geology, aquifer characteristics, or other factors.
- **Measurable objectives (MO)** refer to specific, quantifiable goals for the maintenance or improvement of specified groundwater conditions that have been included in an adopted Plan to achieve the sustainability goal for the basin. Measurable objectives are goals that the Plan is designed to achieve.
- **Minimum thresholds (MT)** refer to numeric values for each sustainability indicator that are used to define undesirable results. Minimum thresholds are established at representative monitoring sites. Minimum thresholds are indicators of where an unreasonable condition might occur. For example, a particular groundwater level might be a minimum threshold if lower groundwater levels would result in a significant and unreasonable reduction in groundwater storage.
- **Representative monitoring site (RMS)** refers to a monitoring site within a broader network of sites that typifies one or more conditions within the basin or an area of the basin. This term is synonymous with representative well site.
- **Sustainability indicator** refers to the set of six conditions defined by the California Department of Water Resources (DWR) that may be present in a basin that may result in effects, when significant and unreasonable, that cause undesirable results (defined below), and impact sustainability of the basin as described in California Water Code Section 10721(x).

- **Uncertainty** refers to a lack of understanding of the basin setting that significantly affects the Agency's[46] ability to develop SMCs and appropriate projects and management actions in the Plan,[47] or to evaluate the efficacy of Plan implementation, and therefore may limit the ability to assess whether a basin is being sustainably managed.
- **Undesirable result** Section 10721 of SGMA states that:

  "Undesirable result" means one or more of the following effects caused by groundwater conditions occurring throughout the basin:

  (1) Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon. Overdraft during a period of drought is not sufficient to establish a chronic lowering of groundwater levels if extractions and groundwater recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods.

  (2) Significant and unreasonable reduction of groundwater storage.

  (3) Significant and unreasonable seawater intrusion.

  (4) Significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies.

  (5) Significant and unreasonable land subsidence that substantially interferes with surface land uses.

  (6) Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water.

  Section 354.26 of the SGMA regulations states that "The criteria used to define when and where the effects of the groundwater conditions cause undesirable results…shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin."

8.2 Sustainability Goal and Objectives

8.2.1 Sustainability Goal

Per § 354.24 of the SGMA regulations, the sustainability goal for the Basin has three parts:

- A description of the sustainability goal
- A discussion of the measures that will be implemented to ensure the Basin will be operated within sustainable yield
- An explanation of how the sustainability goal is likely to be achieved

The SCV-GSA's sustainability goal is to manage the groundwater resources of the Basin for current and future beneficial uses of groundwater, including the river environment, through an adaptive management approach that builds on robust science and monitoring and considers economic, social, and other objectives of a wide variety of stakeholders.

[46] The Santa Clarita Valley Groundwater Sustainability Agency (SCV-GSA) is the Agency referred to in this definition.
[47] The Santa Clara River Valley East Groundwater Basin Groundwater Sustainability Plan (SCV GSP) is the Plan referred to in this definition.

This plan has two main objectives, reflecting the values of the local community: (1) to maintain water supply for municipal, agricultural, and domestic uses in times of climate change and variability of imported supply, and (2) to protect GDEs from permanent harm caused by groundwater pumping.

The context for the sustainability goal is the recognition that no undesirable effects have occurred in the Basin to date. Groundwater levels have declined during dry periods, and the Basin has refilled in wet periods. But the *Groundwater Management Plan, Santa Clara River Valley Groundwater Basin, East Subbasin, Los Angeles County, California* (Basin Operating Plan) described in Section 6 contemplates groundwater levels lower than historical levels during dry years, to accommodate future buildout, conjunctive use operating strategies, and climate change (LSCE, 2003). The principal question examined in the Plan is whether these lower groundwater levels will cause undesirable results.

The groundwater model predicts that basin groundwater levels will continue to recover during wet years, even as groundwater levels are drawn down further in dry years. SGMA expressly allows for this result (Water Code §10721(x)(1)). Thus, undesirable results are unlikely to occur due to chronic lowering of groundwater levels or significant and unreasonable reduction of groundwater storage.

The other sustainability indicators will be closely monitored to ensure that lower groundwater levels do not cause unreasonable results (see Section 7). The GSA will take action to close data gaps. In the case of depletions of interconnected surface water, trigger levels are set to recognize potential undesirable results in time to address them. Because the precise nature of these potential undesirable results is unknown, the plan includes a variety of possible management actions, to preserve flexibility in adaptive management (see Section 9).

8.2.1.1 Information from Basin Setting used to Establish the Sustainability Goal

The sustainability goal is informed by the analyses of basin conditions presented in the GSP, Stakeholder input, Board of Directors' input and direction, and many specialized studies as presented in the appendices[48] for the GSP.

The Basin contains two aquifers providing municipal, domestic, agricultural, and other groundwater supply for the valley. Municipal providers utilize imported State Water Project (SWP) water, and banked water as necessary to conjunctively operate the Basin. Municipal water conservation efforts are effective and meet state goals. Local concerns with groundwater quality, such as with perchlorate contamination, and more recently per- and polyfluoroalkyl substances (PFAS), have not prevented municipal providers' ability to provide clean, safe water. The Santa Clarita Valley and surrounding areas are still developing in line with plans set by the City of Santa Clarita and County of Los Angeles (LA County). Accordingly, build out of the valley is expected by 2050 in line with these plans and between 2021 and 2050 a population increase of approximately 142,600 people is expected, with water demand increases from 66,630 acre-feet per year (AFY) to 101,000 AFY.

[48] Refer to the following: Appendix B, Hydrogeologic Conceptual Model: Geologic Framework and Principal Aquifers; Appendix C, Hydrogeologic Conceptual Model: Groundwater Conditions in the Santa Clara River Valley Groundwater Basin, East Subbasin; Appendix E, Considerations for Evaluating Effects to Groundwater Dependent Ecosystems in the Upper Santa Clara River Basin; and Appendix G, Development of a Numerical Groundwater Flow Model for the Santa Clara River Valley East Groundwater Subbasin.

Tributaries to the Santa Clara River in the steeper upland portions of the Basin in the east contain relatively thin alluvial aquifer materials. Lower tributary areas and the Santa Clara River contain thicker deposits of alluvium and provide important groundwater supply for the community. The deeper Saugus Aquifer provides an important source of groundwater to the community each year and is a particularly important groundwater source during drought. Groundwater in the Saugus Aquifer is generally unconfined in the upland areas, and to the west confining conditions are more prevalent.

Recent studies of local aquatic plant and animal species, groundwater-surface water interactions, and historical groundwater elevations have allowed the GSA to identify that groundwater dependent habitat has been resilient over time, including recovery after historic low water levels in drought. Data gaps exist with GDEs, future water levels may be lower than the historic water levels, and, as such, a GDE monitoring area and GDE evaluation process has been developed, triggered by historic low water levels (or 2 feet higher in some areas).

The Basin has not experienced chronic declines in groundwater levels and storage in the past. Groundwater is exchanged between the Alluvial Aquifer and Saugus Aquifer depending on local hydrology and groundwater conditions. Prior to urbanization, there were periods where dry weather (non-stormflow) surface water did not flow out of the Basin, but today sound groundwater management along with importation of SWP water and purchased and stored groundwater supplies (since the early 1980s) have produced perennial dry weather flows out of the Basin. Even accounting for climate change and some increased water use with development, dry weather flows out of the Basin are expected to continue into the future.

8.2.1.2 Discussion of Thresholds and Triggers

Minimum thresholds for chronic decline in water levels, chronic depletion in storage, depletion of interconnected surface water, degraded water quality, and subsidence, reflect the planned utilization of the Basin and groundwater consistent with the 2020 Santa Clarita Valley Urban Water Management Plan (UWMP) (KJ, 2021).

Minimum thresholds for chronic decline in water levels, chronic depletion in storage, and depletion of interconnected surface water that reflect chronic declines in water levels and depletions in storage are not anticipated during and after GSP implementation and the Basin will continue to be operated sustainably.

Minimum thresholds for degraded water quality reflect the current understanding of degraded water quality in some locations and the municipal agencies' ability to install wellhead treatment as needed, as well as the overarching authority of State regulatory agencies to direct investigations and cleanup of contamination. Further, the minimum thresholds for degraded water quality also include inorganic water quality criteria intended to maintain existing water quality in accordance with Salt and Nutrient Management planning efforts, so as not to jeopardize future use of recycled water.

Minimum thresholds for subsidence reflect the understanding of the Saugus Formation geology, historical land surface elevations, and simulated future low water levels. In some cases, future low water levels, which are temporary, will be 100 to 150 feet lower than in the past. Review of land surface elevation benchmark data from LA County do not clearly show that localized subsidence has occurred from past groundwater extraction and do suggest that tectonic forces play a large role in land surface elevations regionally. Minimum thresholds for subsidence reflect planned utilization of the Basin that will temporarily lower water levels more than in the past, and expanded monitoring is needed to fill data gaps.

GDEs are considered in the GSP by recognizing that even at historical low water levels, GDEs have been resilient and recovered following drought stress. Triggers for GDE evaluation are set at historical low levels, or 2 feet higher than historical low levels in one area upstream from the Interstate 5 (I-5) bridge where particularly sensitive species exist. If these triggers are met a GDE evaluation process will take place, and if it appears the GDEs may be impacted as a result of groundwater extraction, management actions will be implemented. With time, data gaps associated with GDE monitoring will be filled and criteria and management actions revised.

8.2.1.3 Discussion of Measures

The GSA has identified data gaps and a plan to fill them over time. Future work includes expanding water quality monitoring via a voluntary program to include domestic and private non-de-minimis wells where key data gaps exist. Piezometer installation and elevation surveys are planned for the GDE monitoring area. Subsidence monitoring will take place twice per year, and more frequently if water levels reach historic lows. The GSA will utilize LA County's existing benchmark locations for elevation monitoring. The GSA will also use InSAR satellite data to track ground surface elevation trends. Outreach for promoting water conservation is also planned for areas not currently covered by existing municipal water conservation programs in the Basin.

The GSA anticipates that if minimum thresholds are exceeded, the GSA will evaluate the cause. If that evaluation indicates the minimum thresholds were exceeded due to groundwater extraction and/or the trend of the data indicate undesirable results are imminent, then management actions would be called upon to mitigate the undesirable results within the 20-year implementation period. The GSA will consult with landowners before determining which management actions should be deployed, and how such management actions will be deployed to avoid undesirable results. The effect of the management actions will be reviewed annually, and additional management actions will be implemented as necessary. The absence of undesirable results, defined as significant and unreasonable effects of groundwater conditions throughout the planning horizon, will indicate that the sustainability goal has been achieved. The GSA will adaptively manage the Basin to ensure the GSP is effective and undesirable results are avoided.

If undesirable results are anticipated for chronic decline in water levels, chronic depletion in storage, depletion of interconnected surface water, or land subsidence, measures taken may include, but not be limited to the following:

- Redistribute pumping away from the affected area.
- Reduce pumping in nearby wells.
- Conduct additional releases from Castaic Lake.
- Bring in additional SWP water or other imported banked water to make up for reduced groundwater supply.
- Implement tiered water conservation measures for the Basin.
- Reduce pumping in the most affected aquifer.

If undesirable results are anticipated for degraded water quality, measures taken may include, but not be limited to:

- Review alternatives for improving groundwater quality in the affected area,
- Work with affected groundwater users to deploy well head treatment systems,
- Arrange for alternate water supply,
- Shift pumping to other locations, and/or
- Reduce or stop pumping near the affected area.

If the GDE trigger levels are reached, an evaluation program will take place that includes reviewing whether the low water levels and water level trends are caused by groundwater extraction and whether undesirable results to GDEs arising from groundwater extraction are anticipated to occur. If significant and unreasonable effects are anticipated from groundwater extraction, then any necessary management actions would be implemented in a timely manner as described below:

1. The GSA consultation with groundwater pumpers may assess the potential to do the following:

    - Shift pumping to another location to reduce impact on GDEs, and/or
    - Stop pumping in wells near the GDEs, and/or
    - Increase the quantity of imported water into the Basin.

    Should any of the above be a consideration, the groundwater flow model may also be used to determine optimum pumping locations/aquifer most likely to avoid undesirable results.

2. The GSA may coordinate with Santa Clarita Valley Water Agency (SCV Water) to consider implementing a mandatory water conservation program so that overall pumping in the Basin can be reduced.

3. If the evaluation shows that non municipal production wells are contributing to the problem, then the GSA will conduct outreach up to and including meetings with private well owners and stakeholders to discuss how to best respond to the concern.

4. If monitoring data and weather predictions indicate that undesirable results are likely to persist into the following year and the above actions are not likely to mitigate the impacts, then it may be necessary to develop additional projects designed to increase the amount of water in the river system as described in Section 9.6.3.

8.2.2 Human Right to Water

The DWR's Disadvantaged Community (DAC) Mapping tool (https://gis.water.ca.gov/app/dacs/) identifies three different types of DACs (Places, Tracts, and Block Groups) in the Upper Santa Clara River Basin.

As part of the Integrated Regional Water Management (IRWM) Disadvantaged Community Involvement Program Grant in the Greater Los Angeles IRWM Funding Area, outreach efforts have been underway to understand the needs of DACs. Outreach within the Upper Santa Clara River Basin includes the Water Talks Program. This program is a partnership between the City of Santa Clarita, College of the Canyons, California State University San Bernardino, and PLACEWORKS. The Program allows for community members to learn more about water issues in their community and provide input. Public input will continue to be gathered with this program well into 2022. At the completion of this public input stage, DAC needs within the Basin will be better understood. The next phase of this IRWM Grant includes provision of funding opportunities for selected projects in the DACs.

To date, the Water Talks outreach effort has not identified community areas within the Basin that do not have access to safe potable water. Much of the Basin is provided water service from SCV Water and LA County Waterworks District No. 36. Some areas of the Basin, generally in the tributary canyons, rely on private domestic wells for water supply. One area, Bouquet Canyon, has had a shortage of groundwater supply for several years due to administrative concerns with releasing water from the Bouquet Canyon Reservoir. In one case, a home for developmentally disabled adults needed to truck water in for its supply. The SCV Water has pursued grant funding to assist with installation of a potable water pipeline to bring water to two locations within Bouquet Canyon, including a home for developmentally disabled adults and a mobile home park.

The SCV-GSA's Project Manager for GSP Development is also the Chair of the Upper Santa Clara River IRWM group. Regular reports are provided to the SCV-GSA about IRWM activities, and the GSA anticipates this communication to continue through GSP development and implementation.

8.2.3 Qualitative Objectives for Meeting Sustainability Goals

Qualitative objectives are designed to help stakeholders understand the overall purpose (e.g., Avoid Chronic Lowering of Groundwater Levels) for sustainably managing groundwater resources and reflect the local economic, social, and environmental values within the Basin. A qualitative objective is often compared to a mission statement. The qualitative objectives for the Basin are the following:

- **Avoid Chronic Lowering of Groundwater Levels**
  - Maintain groundwater levels that continue to support current and future groundwater uses and a healthy river environment in the Basin
- **Avoid Chronic Reduction of Groundwater Storage**
  - Maintain sufficient groundwater volumes in storage to sustain current and planned groundwater use in prolonged drought conditions while avoiding permanent degradation of environmental values
- **Avoid Land Subsidence**
  - Reduce or prevent land subsidence that causes significant and unreasonable effects to groundwater supply, land uses, infrastructure, and property interests
- **Avoid Degraded Groundwater Quality**
  - Maintain access to drinking water supplies
  - Maintain access to agricultural water supplies
  - Maintain quality consistent with current ecosystem uses
- **Avoid Depletion of Interconnected Surface Water**
  - Avoid significant and unreasonable effects (i.e., undesirable results) on beneficial uses in the Basin, including GDEs, caused by groundwater extraction
  - Maintain sufficient groundwater levels and surface water flow in the river and pools to sustain aquatic habitat where unarmored three-spine stickleback (UTS) and other native fishes are present (e.g., at the I-5 Bridge[49]), to the extent such decreases are caused by groundwater extraction
- **Seawater Intrusion**
  - Not applicable due to the inland location of the Basin.

[49] Specifically, the Santa Clara River Bridge, herein referred to as the I-5 Bridge.

8.3 General Process for Establishing Sustainable Management Criteria

This section presents the process that was used to develop the SMCs for the Basin, how public input from local stakeholders was considered, the criteria used to define undesirable results, and how minimum thresholds and measurable objectives were established.

8.3.1 Public Input

The public input process was built on the GSA member agencies' long history of engaging local stakeholders and interested parties on water issues. This included the formation of the Stakeholder Advisory Committee (SAC), which has representatives from large, medium, and small pumpers; local residents; businesses; and environmental groups. The SMCs and beneficial uses presented in this section were developed using a combination of information from public input, public meetings, comment forms, hydrogeologic analysis, and meetings with SCV Water staff and SAC members.

The general process for establishing SMCs included the following:

- Holding a series of SAC meetings and workshops that outlined the GSP development process and introduced stakeholders to SMCs.
- Conducting public meetings to present initial conceptual minimum thresholds and measurable objectives and receive additional public input. Three meetings on SMCs were held within the boundaries of the Basin.[50]

8.3.2 Criteria for Defining Undesirable Results

In Section 8.2.3, the qualitative objectives for meeting sustainability goals were presented as ways of avoiding undesirable results for each of the sustainability indicators. The following are the general criteria used to define undesirable results in the Basin:

- Groundwater use must be causing significant and unreasonable effects in the Basin
- A minimum threshold is exceeded in a specified number of representative wells over a prescribed period
- Impacts to beneficial uses occur, including to GDEs and/or threatened or endangered species

These criteria may be refined during the 20-year GSP implementation period based on monitoring data and analysis.

8.3.3 Information and Methodology Used to Establish Minimum Thresholds and Measurable Objectives

The following information and data were used to establish minimum thresholds and measurable objectives for each of the sustainability indicators.

8.3.3.1 Avoid Chronic Lowering of Groundwater Levels

The information used for establishing the minimum thresholds and measurable objectives that pertain to chronic lowering of groundwater levels includes the following:

- Information gathered from the SMC public meetings about the public's perspective of significant and unreasonable conditions and preferred current and future groundwater levels
- Historical groundwater level data from wells monitored by SCV Water and other agencies

[50] See https://scvgsa.org/public-input for details on the meetings and workshops.

- Depths and locations of existing wells
- Maps of current and historical groundwater level data
- Mapping of the location and types of GDEs
- Groundwater modeling of future conditions (for groundwater pumping and natural hydrologic conditions) to estimate future groundwater levels at representative monitoring sites

The monitoring network and protocols that will be used to measure groundwater levels at the representative monitoring sites are presented in Section 7, Monitoring Networks. The data will be used to monitor groundwater levels as well as assess changes in groundwater storage as discussed below.

8.3.3.2 Avoid Chronic Reduction of Groundwater Storage

Representative groundwater levels can be used to assess changes in groundwater in storage and to evaluate whether basin-wide total groundwater withdrawals could lead to undesirable results. Therefore, the information that is used to establish minimum thresholds and measurable objectives for the chronic groundwater level decline sustainability indicator can also be used to avoid chronic reduction of groundwater storage.

8.3.3.3 Avoid Land Subsidence

Minimum thresholds for subsidence were established to protect groundwater supply, land uses, infrastructure, and property interests from substantial subsidence that may lead to undesirable results. Changes in ground surface elevation are measured using InSAR data available from the California Department of Water Resources (DWR) and using land surface elevations at benchmarks established in the region by Los Angeles County.

8.3.3.4 Avoid Degraded Groundwater Quality

The information used for assessing degraded groundwater quality thresholds includes the following:

- Historical groundwater quality data from production wells in the Basin
- Federal and state drinking water quality standards and water quality objectives (WQOs) presented in the *Water Quality Control Plan: Los Angeles Region Basin Plan for the Coastal Watershed of Los Angeles and Ventura Counties* (Basin Plan) (LARWQCB, 1994) and the *Final Salt and Nutrient Management Plan, Santa Clara River Valley East Subbasin* (SNMP) (GSSI, 2016)
- Feedback about significant and unreasonable conditions from SCV Water staff members and the public

The historical groundwater quality data used to establish thresholds are presented in Section 7.4.

Thresholds for contaminants (e.g., perchlorate, volatile organic compounds [VOCs]. and PFAS) are not proposed because assessment, source identification, and cleanup of these constituents of concern are regulated under the authority of state agencies, including the Regional Water Quality Control Board, LA Regional Water Quality Control Board (LARWQCB). The GSA does not have the responsibility nor the authority to manage these contaminants, which were present in groundwater prior to the enactment of SGMA in January 2015. However, it is important to avoid, to the extent practicable, increases in concentrations caused by pumping or by actions taken by the GSA. SCV Water, a member agency of the GSA and a municipal pumper, coordinates with regulatory agencies regarding monitoring for contaminants. As part of GSP implementation, the GSA will conduct outreach to private well operators and seek participants for a water quality monitoring program in addition to the existing municipal water quality monitoring. Water quality data will regularly be reviewed and analyzed consistent with the SMCs. If it is determined that increases in contaminant concentrations are being caused by pumping and leading to undesirable results, management actions would be initiated after consultation with municipal pumpers and applicable landowners. Elevated concentrations of salts and nutrients (e.g., total dissolved solids [TDS], sulfate, chloride, and nitrate) can impact beneficial uses, including drinking water and agricultural uses. Thus, minimum thresholds and measurable objectives are proposed for these constituents in accordance with the Basin Plan and SNMP.

8.3.3.5 Avoid Depletions of Interconnected Surface Water

The information used for establishing minimum thresholds and measurable objectives for depletions of interconnected surface water includes the following:

- Available surface water gaging data before and after importation of California SWP water and construction of the water reclamation facilities
- Water budget computations using the groundwater model that show estimated exchanges between surface water and groundwater at a number of river segments during historical and projected future time frames
- Groundwater modeling of historical and projected future conditions to estimate groundwater levels at locations that currently do not have wells but are proposed as new representative monitoring sites (RMSs) for the monitoring program
- Studies that identify the extent and distribution of GDEs

Historically, streamflows in the Basin have benefitted from increasing urbanization since the mid-1960s, when the two water reclamation plants (WRPs) in the Basin began operating and discharging treated water into the Santa Clara River. As shown in Figure 8-1, this historical augmentation of Santa Clara River streamflows is apparent from stream gaging data collected at the former County Line stream gage (U.S. Geological Survey [USGS] gage 11108500, located 0.75 miles downstream of the Basin) through water year 1996 and since then at the Piru stream gage (USGS gage 11109000, located 3.5 miles downstream of the Basin). Figure 8-1 also shows that the monthly streamflow volumes during the summer season (July through September) were nearly zero from 1959 through 1966, then increased from the late-1960s through the mid-1990s as discharge volumes from the two WRPs in the Basin increased steadily from year to year. Streamflows during the past decade (2010 through 2019) have been lower than before 2010 despite decreases in the amount of annual groundwater pumping occurring from the Basin during this period (see Figure 8-2). The reductions in summer-season streamflows at the Piru stream gage since 2010 likely have arisen from (1) WRP discharge reductions that have arisen from increased water conservation efforts in the Basin and (2) below-normal rainfall in the Basin, which has caused natural lowering of groundwater levels and therefore reduced the amount of groundwater discharge into the perennial reach of the river in the western portion of the Basin.

Future modeled flows largely match those occurring under current land use and water use conditions. As shown in Figure 8-3, the future land and water uses in the Basin are not expected (based on groundwater modeling analyses) to cause a return to the low-flow or zero-flow summer-season conditions that were observed in the river prior to urbanization. Figure 8-4 shows groundwater-model estimates of annual non-storm streamflows that would occur at the western basin boundary if current land and water uses were to persist into the future (purple line) and how those streamflows compare under the future projected full build-out condition for the Basin's land and water uses (green line). The current-condition and future-condition model simulations each project land and water use conditions onto a repeat of the historical rainfall conditions (natural hydrology) that occurred from water years 1940 through 2019 (without climate change).

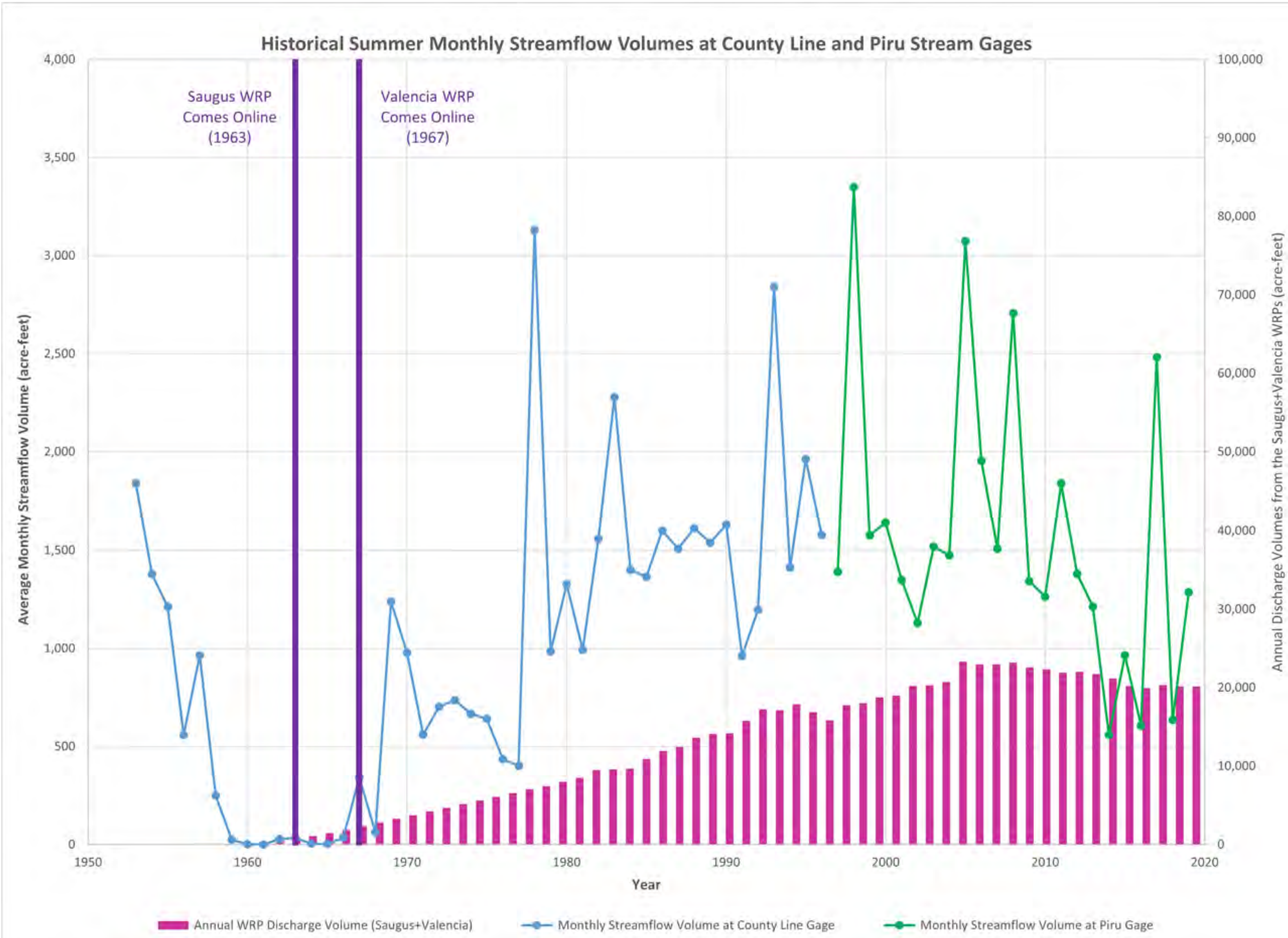

Figure 8-1. Historical Summer Monthly Streamflow Volumes at County Line and Piru Stream Gages with WRP Discharge Volumes

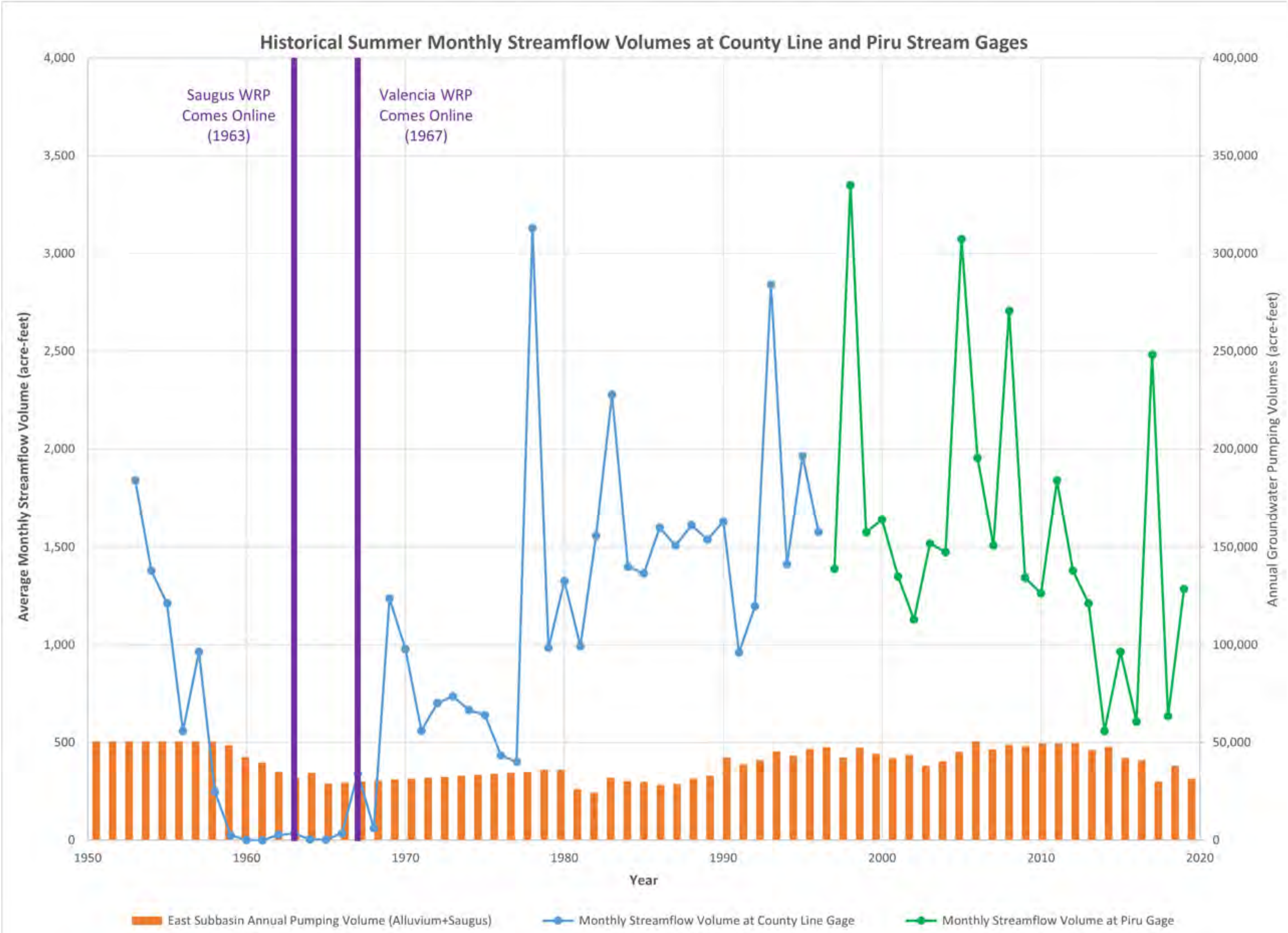

Figure 8-2. Historical Summer Monthly Streamflow Volumes at County Line and Piru Stream Gages with Saugus and Alluvium Pumping

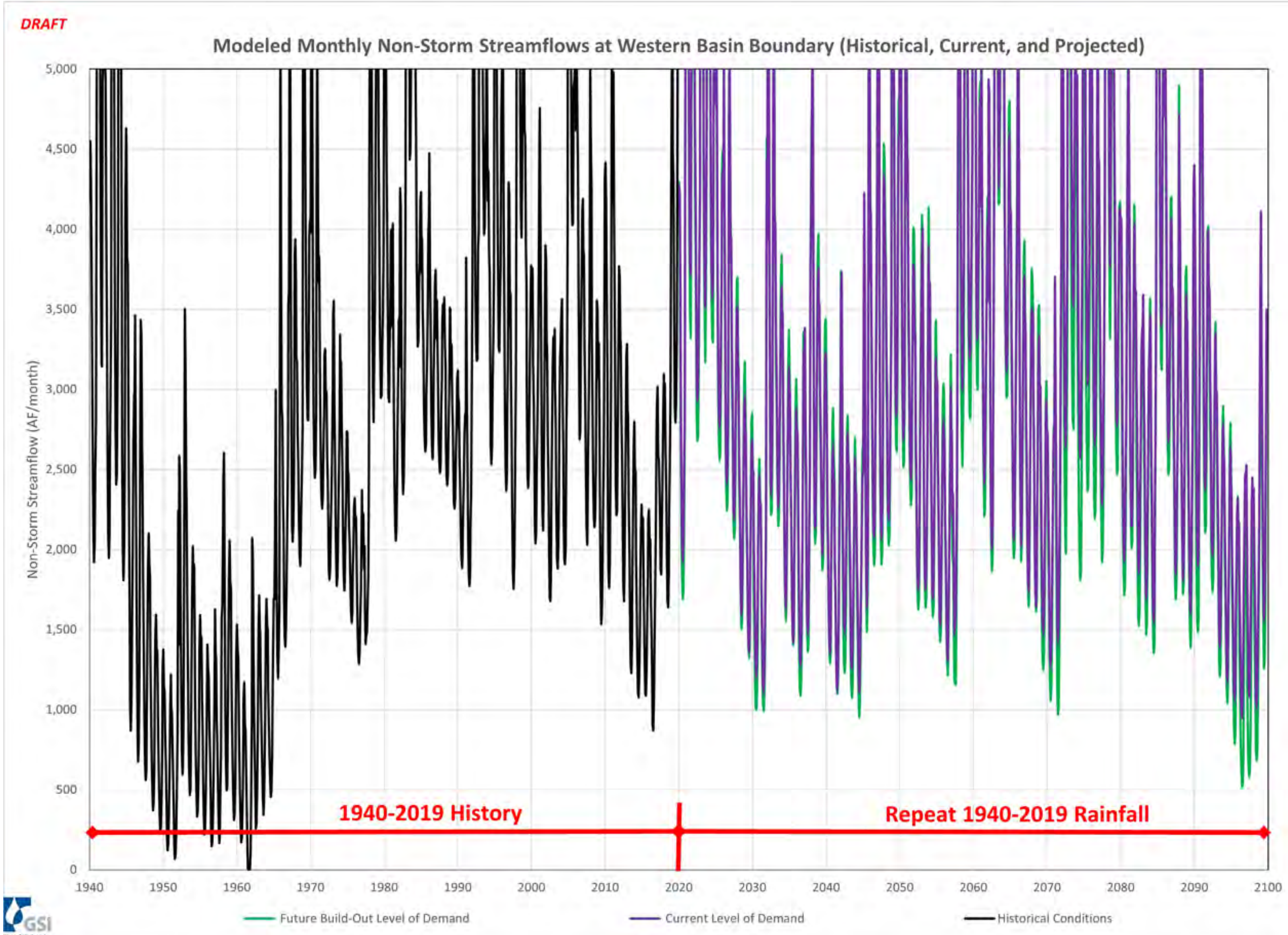

Figure 8-3. Modeled Monthly Non-Storm Streamflows at Western Basin Boundary for Historical, Current, and Projected Levels of Groundwater Use

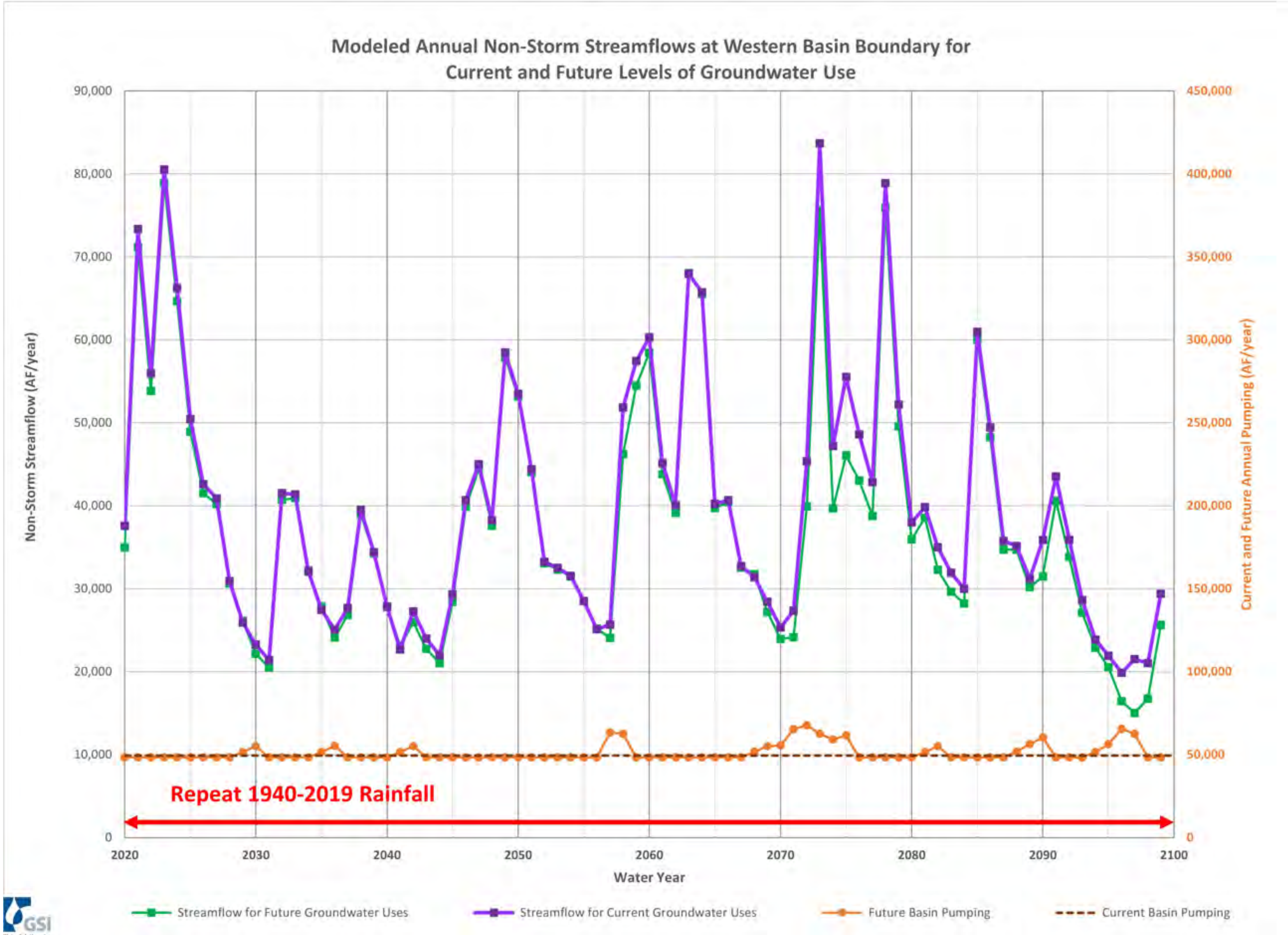

Figure 8-4. Modeled Annual Non-Storm Streamflows at Western Basin Boundary for Current and Projected Levels of Groundwater Use

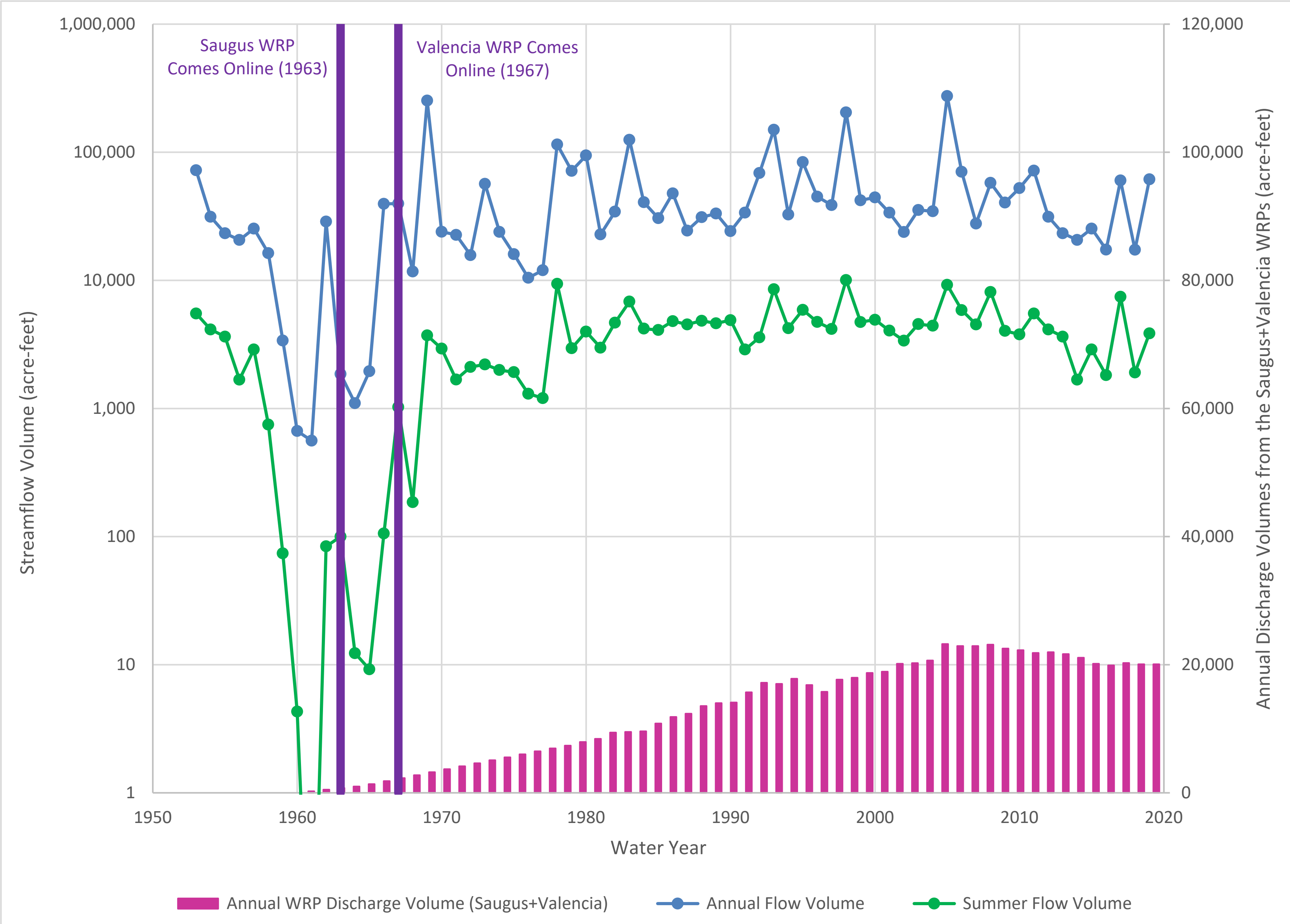

Figure 8-5. Historical Summer and Annual Flow Volumes measured in the Santa Clara River at County Line and Piru Stream Gauges

Together, Figures 8-3 and 8-4 illustrate that changes in non-storm flows leaving the Basin occur only at certain times, rather than at all times, which means that future pumping is expected to create only periodic, rather than chronic, depletion of streamflow. Furthermore, Figures 8-3 and 8-4 illustrate the effects of groundwater pumping on dry weather alone; not shown on these figures is the fact that historically measured stormwater flows during years of normal and above-normal rainfall are significantly higher than the historically measured dry-weather flows. Figure 8-5 demonstrates that, on an annual basis, total flows in the river (i.e., the sum of dry-weather flows and storm flows) historically have been one to two orders of magnitude greater than the dry-weather flows. Because only periodic depletions of dry-weather flows are expected to occur in the future (per Figures 8-3 and 8-4), the total flows in the river are expected to continue to be one to two orders of magnitude greater than the dry-weather flows. In summary, on an annual basis, any future changes in the total flow volume leaving the Basin are expected to be de minimis in magnitude, with the summer non-storm flows continuing to remain higher than historically occurred during the decades that preceded the onset of urbanization in the Basin (as shown in Figure 8-3).

8.3.4 Relationship between Individual Minimum Thresholds and Other Sustainability Indicators

Section 354.28 of the SGMA regulations requires that the description of all minimum thresholds include a discussion about the relationship between the minimum thresholds for each sustainability indicator. In its BMP guidance for SMCs (DWR, 2017), DWR has clarified this requirement. First, the GSP must describe the relationship between each sustainability indicator's minimum thresholds; in other words, describe why or how a groundwater level minimum threshold established at a particular RMS is similar to or different from groundwater level thresholds in nearby RMSs. Second, the GSP must describe the relationship between the selected minimum threshold and minimum thresholds for other sustainability indicators. For example, the GSP must describe how a groundwater level minimum threshold for chronic lowering of groundwater levels, if reached, would not trigger an undesirable result for land subsidence or other sustainability indicator.

8.4 Representative Monitoring Sites

To this point, the sustainability goals and the qualitative objectives for meeting these goals and the general process for establishing SMCs have been discussed and described. The following sections present descriptions of undesirable results and the development of minimum thresholds and measurable objectives for each of the sustainability indicators. These thresholds are established at monitoring sites (wells) that are deemed to be representative of local and basin-wide groundwater conditions. Representative wells were selected from a subset of the wells that have been monitored over time in the Basin and have the following characteristics:

- They have known well completion information and are screened exclusively within either the Alluvial Aquifer or the Saugus Formation.
- They have wide spatial distribution, so as to provide information across the majority of the Basin.
- They have a reasonably long record of data so that trends can be determined.
- They have signatures (groundwater levels or water quality trends) that are representative of wells in the surrounding area or management area if applicable.

The rationale for selecting RMS is discussed in Section 7 and is summarized here. The RMS network is shown in Figure 7-1 and consists of 17 wells (13 in the Alluvial Aquifer and 4 in the Saugus Formation) that will monitor for chronic reductions in groundwater levels and storage. Each of these 17 wells is already present in the Basin. A network of 8 additional shallow monitoring wells in the Alluvial Aquifer will be used to monitor for potential impacts to GDEs., Two of these wells are already present in the Basin and six additional GDE monitoring wells will be installed. The RMS network is considered an interim network because it relies on six yet-to-be constructed GDE monitoring wells and also relies at this time on a number of production wells, which are the wells with the longest history of water level data in the Basin. Over the course of the 20-year SGMA implementation horizon, SCV-GSA expects to transition from a monitoring network dominated by production wells to a monitoring network that has more non-pumping observation wells.

Representative monitoring sites—consisting of existing wells and planned future well sites where wells do not presently exist—were used in the modeling of groundwater level changes under historical and predicted future groundwater demand with and without climate change influences. Minimum thresholds and measurable objectives have been established using a combination of measured groundwater level data and the results of groundwater modeling. The results of this modeling indicate no significant and unreasonable impacts to beneficial uses of groundwater (by agriculture, recreation, businesses, and municipal and domestic users) are occurring presently or are anticipated in the future, under assumed climate conditions and complying with the Basin Operating Plan for the Basin as presented in the 2020 Santa Clarita Valley UWMP (see Section 6.5).

8.5 Summary of Sustainable Management Criteria

Table 8-1 summarizes the SMCs for the six groundwater sustainability indicators. Table 8-1 first describes the type(s) of potential undesirable results associated with each sustainability indicator, then describes the minimum thresholds and measurable objectives for each indicator. Detailed discussions of the SMCs for each groundwater sustainability indicator are provided in Sections 8.6 through 8.11.

Table 8-1. Summary of Sustainable Management Criteria

Potential Undesirable Results	Minimum Threshold	Measurable Objective	Other Notes
Chronic Lowering of Groundwater Levels			
Groundwater levels fall below minimum thresholds in 25 percent of representative wells in the Alluvial Aquifer or 50 percent of representative wells in the Saugus Formation throughout a 3-year period.	Lowest groundwater elevation from the 95-year future-conditions model or Lowest historically observed groundwater elevation in modern era (i.e., since 1980), whichever is lower (as shown in Table 8-2).	Average of the future modeled or historically observed groundwater elevations (using the same data set as for the minimum threshold as shown in Table 8-2).	An undesirable result occurs if the same group of representative monitoring sites experiences this condition throughout the 3-year period. Use static groundwater level measurements collected twice per year (in the spring and late summer).
Chronic Reduction of Groundwater in Storage			
Same as for chronic lowering of groundwater levels. An additional undesirable result is an inability to meet groundwater demands during a multi-year drought.	Same as for chronic lowering of groundwater levels.	Same as for chronic lowering of groundwater levels.	Same as for chronic lowering of groundwater levels.
Seawater Intrusion			
Not applicable (this is an inland basin)			
Degraded Groundwater Quality			
Degradation of groundwater quality beyond WQOs and assimilative capacities established in the SNMP in 20 percent of representative wells.	WQOs for TDS, chloride, nitrate, and sulfate or ambient water quality if it exceeds the WQO.	Prevent water quality degradation for salts and nutrients and for contaminants.	Minimum thresholds are not established for contaminants because state regulatory agencies have the responsibility and authority to regulate and direct actions that address contamination.
Land Subsidence			
Substantial interference with land uses, impacts on the use of critical infrastructure and roads, or subsidence greater than minimum thresholds at 10 percent of monitoring locations.	The subsidence measured between June of one year and June of the subsequent year shall be no more than an average of 0.1 foot in any single year and a cumulative 0.5 foot in any 5-year period observed at 10 percent or more monitoring locations.	Maintenance of current ground surface elevations trends.	Based on InSAR-measured subsidence during June of each year and LA County benchmark elevation monitoring twice per year.
Depletion of Interconnected Surface Water			
Permanent loss or significant degradation of existing native riparian or aquatic habitat due to lowered groundwater levels caused by groundwater pumping throughout the GDE area. In areas that currently provide essential habitat to UTS and native fishes (sensitive aquatic species in the vicinity of I-5 Bridge), cessation of surface flow and pools during low-flow conditions in the river channel caused by groundwater extraction is an undesirable result.	Surface water depletion caused by groundwater extraction as measured by groundwater levels falling below the lowest predicted future groundwater elevation measured at GDE-area monitoring wells.	Average of future modeled groundwater elevations (using the same data set as for the minimum threshold).	GDE trigger levels (see Table 8-6) that are at or above historical low elevations (as estimated from the model) will be used to initiate an assessment of GDE conditions caused by groundwater extraction and management actions that might be needed to protect GDEs.

Notes

GDE = groundwater-dependent ecosystem I-5 = Interstate 5 SNMP = Salt and Nutrient Management Plan
TDS = total dissolved solids UTS = unarmored three-spine stickleback WQO = water quality objective

8.6 Chronic Lowering of Groundwater Levels Sustainable Management Criterion

8.6.1 Undesirable Results

As noted above, the groundwater model of the Basin indicates that undesirable results from chronic lowering of groundwater levels and reduction of groundwater in storage are not expected to occur in the future. Undesirable results could occur if groundwater pumping exceeds recharge for a prolonged period either basin-wide or in a particular area of the Basin where lowering of water levels would cause an impact. Under certain circumstances, and in conjunction with other conditions or activities in the Basin, the following conditions may contribute to the occurrence of undesirable results:

- **Extended drought:** Drought periods that are longer in duration or more intense than anticipated in the plan.
- **A new normal for climate change:** Reductions in long-term recharge to the Basin beyond what is anticipated in the plan (i.e., less recharge during non-drought periods)
- **Emergency interruption of imported supplies:** Not being able to access imported or banked water supplies and thereby needing to pump for multiple years at annual volumes beyond those described in the Basin Operating Plan

Undesirable results are significant and unreasonable lowering of groundwater levels in the Basin that are characterized as follows:

- In the Alluvial Aquifer, groundwater levels (non-pumping water level elevations) drop below minimum thresholds (see Table 8-1) in the same 25 percent of representative wells throughout a 3-year period. Using this characterization minimizes the chance of misleading indications of an unsustainable condition in the Alluvial Aquifer while providing an indication of a potential undesirable result before it occurs. Three consecutive years was chosen because this time frame indicates that the condition is likely to be chronic and not a result of a single-year temporary effect. Three years indicates that there is a trend that is significant and unreasonable.
- In the Saugus Formation, groundwater levels (non-pumping water level elevations) drop below minimum thresholds (see Table 8-1) in the same 50 percent of representative wells throughout a 3-year period. The use of 50 percent of the representative wells in the Saugus Formation for this assessment (1) accounts for the confined nature of the Saugus Formation, which recognizes that changes in pumping can propagate over a larger area than occurs in the Alluvial Aquifer, and (2) minimizes the chance that localized changes in pumping operations could result in misleading indications of an unsustainable condition at an individual well while a larger group of representative Saugus Formation wells together shows no such unsustainable condition on an aquifer-wide basis. Three consecutive years was chosen because this time frame indicates that the condition is likely to be chronic and not a result of a single-year temporary effect. Three years indicates that there is a trend that is significant and unreasonable.
- In areas that currently provide essential habitat to UTS and native fishes (sensitive aquatic species), cessation of surface flow and pools during low-flow conditions in the river channel caused by groundwater extraction would also be considered a significant and unreasonable effect (see Section 8.11).

The water level monitoring that has been conducted to date and the groundwater modeling analyses that have been performed for the GSP together indicate that no chronic declines in groundwater levels or reductions of groundwater in storage have occurred in the past when following the current Basin Operating Plan (LSCE, 2003), which is described in Section 6. The model also indicates that undesirable results are not expected to occur in the future. Accordingly, the minimum thresholds are set based on predicted future water levels from the groundwater flow model simulation for the year 2042 water budget projection, which accounts for future full build-out of land uses and water uses, and which repeats the 95-year historical hydrologic (rainfall) record but with adjustments to rainfall and evapotranspiration to account for a year 2030 level of climate change. These minimum thresholds are described in the next section and are established for representative monitoring sites in different parts of the Basin, reflecting conditions in those areas. The minimum thresholds and measurable objectives are considered conservative and protective of the resource because undesirable results are not predicted to occur in the Basin under the Basin Operating Plan (LSCE, 2003). The actions that will be taken if minimum thresholds are reached are described in Section 9.5.4.1 for this sustainability indicator.

8.6.2 Minimum Thresholds

Section 354.28(c)(1) of the SGMA regulations states that “The minimum threshold for chronic lowering of groundwater levels shall be the groundwater elevation indicating a depletion of supply at a given location that may lead to undesirable results.” Table 8-2 includes the water level elevations for the minimum thresholds established for the Alluvial Aquifer and Saugus Formation. Appendix L of the GSP presents a well location map and hydrographs showing the minimum thresholds for each representative well that will be used to monitor for chronic lowering of groundwater levels.

Table 8-2. Chronic Lowering of Groundwater Level Minimum Thresholds and Measurable Objectives for the Alluvial Aquifer and the Saugus Formation

RMS Site ID[1] (Alt. ID)	Well Type	Minimum Threshold (MT) (feet NAVD 88)	Measurable Objective (MO) (feet NAVD 88)	Basis for MT and MO
Alluvial Aquifer				
NLF-B20	Existing Production Well	884	890	Future Model
Future VWD-C12[2]	Future Production Well	912	918	Future Model
VWD-E17	Existing Production Well	941	959	Future Model
VWD-D	Existing Production Well	978	1,005	Future Model
VWD-N	Existing Production Well	1,062	1,076	Future Model
VWD-Q2	Existing Production Well	1,105	1,126	Historical Data
VWD-U4	Existing Production Well	1,154	1,189	Historical Data
SCWD-North Oaks Central	Existing Production Well	1,286	1,335	Historical Data
SCWD-Sand Canyon	Existing Production Well	1,418	1,449	Historical Data
NWD-Pinetree 5	Existing Production Well	1,476	1,499	Historical Data
NWD-Castaic 4	Existing Observation Well	1,058	1,088	Future Model
VWD-W11	Existing Production Well	1,103	1,161	Future Model
SCWD-Guida	Existing Production Well	1,263	1,295	Historical Data
Saugus Formation				
VWD-160	Existing Production Well	833	934	Future Model
VWD-206	Existing Production Well	746	942	Future Model
Library-C	Existing Observation Well	902	968	Future Model
NC13-HSU5a	Existing Observation Well	885	1,002	Future Model

Notes

[1] Refer to Figure 7-1 in Section 7 and Appendix L for representative well locations.

[2] VWD-C12 is the tentative name for this well, which reflects that it will replace NLF-C12. A final name for this well will be selected during final planning for its installation.

NAVD 88 = North American Vertical Datum of 1988 RMS = representative monitoring site

8.6.2.1 Minimum Thresholds for the Alluvial Aquifer

As identified in Tables 8-1 and 8-2 for each representative monitoring site, the minimum threshold for the Alluvial Aquifer is based on either the lowest predicted future groundwater elevation or the lowest historically measured groundwater elevation, whichever is lower. Setting the minimum threshold at the lower of these two data sets provides a conservative basis for identifying a minimum threshold that describes the potential for a significant and unreasonable effect (i.e., an undesirable result) to occur; specifically, the minimum threshold values are conservative because the historical groundwater monitoring data, along with modeling of historical and future conditions, together indicate that chronic water level declines have not occurred historically and are not expected to occur in the future.

Future groundwater elevations are estimated from groundwater flow model simulations under future projected full build-out of land use and water use conditions in the Basin. The future groundwater levels that serve as minimum thresholds at certain wells were selected using the groundwater flow model simulation for the year 2042 water budget projection, which simulates the predicted future land use and water demands under 95 years of historical climate conditions that are adjusted for a 2030 level of climate change. Wells in the western and central portions of the Basin use the future modeled lowest groundwater elevation, while wells in the eastern portion of the Basin use the historically observed lowest groundwater elevation.

8.6.2.2 Initial Minimum Thresholds for the Saugus Formation

The minimum thresholds for the Saugus Formation are equal to the lowest future predicted groundwater level estimated to occur at each representative monitoring site in the Saugus Formation (see Table 8-2). These levels were selected using groundwater flow model simulations of the predicted future land use, water demand, and climatic conditions (with climate change) as simulated in the year 2042 water budget projection. Because historical groundwater monitoring data and water budget analyses show that chronic water level declines have not occurred historically and are not expected to occur in the future under assumed climate and groundwater pumping and groundwater use conditions, the opportunity may exist to sustain higher rates of pumping in the Saugus Formation to meet supply needs during prolonged droughts without causing undesirable results. Further evaluation will be conducted on this. Therefore, the current minimum thresholds established for the Saugus Formation RMSs are considered interim and subject to change.

8.6.2.3 Relationship between Individual Minimum Thresholds and Relationships to Other Sustainability Indicators

Groundwater level minimum thresholds can potentially influence other sustainability indicators, such as the following:

- **Avoid Chronic Reduction of Groundwater Storage.** Changes in groundwater levels reflect changes in the amount of groundwater in storage. The minimum thresholds for avoiding chronic reductions in groundwater levels by definition will maintain an adequate amount of groundwater in storage over extended periods of time when pumping does not exceed the basin yield on a long-term basis. Therefore, the minimum thresholds for avoiding chronic declines in groundwater levels will not result in long-term significant or unreasonable changes in groundwater storage. This relationship between chronic reductions in storage and groundwater levels also means that the groundwater levels which serve as minimum thresholds and measurable objectives for chronic reductions in groundwater levels can serve as proxies for chronic reductions of groundwater storage.

- **Avoid Land Subsidence.** A significant and unreasonable condition for subsidence is permanent pumping-induced subsidence that substantially interferes with surface land use. Subsidence can be caused by more than one factor, including tectonics and/or groundwater extraction. Subsidence can be caused by dewatering and compaction of clay-rich sediments in response to lowering groundwater levels caused by pumping. Very small amounts of ground surface elevation fluctuations have been reported across the Basin and are within the measurement margin of error, as described in Appendix C. The groundwater level minimum thresholds shown in Table 8-2 are set below existing and historical groundwater levels, which could induce additional subsidence. However, the local soils and geological conditions are less susceptible to compaction and subsidence because there are no known thick clay layers that extend across the full area where the Saugus Formation is present (although some clay layers are distinctly present in localized areas). Groundwater levels would likely have to be substantially lower than are predicted to occur in the future to produce significant subsidence. Should significant and unreasonable subsidence be observed from lowering groundwater levels, the groundwater level minimum thresholds will be raised to avoid this subsidence.
- **Avoid Degraded Groundwater Quality.** Protecting groundwater quality is critically important to all who depend upon the groundwater resource, particularly for drinking water and agricultural uses. Maintaining groundwater levels above minimum thresholds helps minimize the potential for experiencing degraded groundwater quality and helps avoid making water quality worse (since enactment of SGMA in 2015), or exceeding WQOs for constituents of concern in drinking water and agricultural wells. Groundwater quality could be affected through two processes:

    1. Low groundwater levels in an area could cause deeper, poor-quality groundwater to flow into existing supply wells. Groundwater level minimum thresholds are set below current groundwater levels, meaning a flow of deep, poor-quality groundwater could hypothetically occur in the future at or below minimum threshold levels. However, this is unlikely to occur because the Saugus Formation is a deep aquifer system with a substantial thickness (greater than 2,000 feet) of high-quality groundwater. Should groundwater quality data indicate that degradation is occurring due to lower groundwater levels related to pumping, the groundwater level minimum thresholds will be reviewed, and consideration will be given to changing pumping patterns if this result is found to be caused by pumping.
    2. Changes in groundwater levels arising from management actions implemented by the GSA to achieve sustainability could change groundwater gradients, which could cause poor-quality groundwater to flow towards supply wells that would not have otherwise been impacted. Examples of these actions may include installation of groundwater recharge facilities (e.g., gravity stormwater recharge or aquifer recharge with recharge wells). Because these kinds of projects are subject to review under the California Environmental Quality Act, concerns about the potential to move contaminant plumes would be evaluated before such a project could be implemented. Groundwater quality in the Basin has been impacted by perchlorate (and other constituents of concern) released from the Whittaker-Bermite Corporation (Whittaker-Bermite) facility over many decades. SCV Water and its predecessor agencies have responded to this contamination by proactively installing wellhead treatment and by operating downgradient wells in a manner to capture and treat contamination. These activities, and the normal seasonal and annual operational changes in pumping schedules that SCV Water conducts to meet groundwater demands, will continue in the future and may change groundwater gradients and flow directions in the aquifers. These operational activities are not considered "actions" that result in degradation of groundwater quality under SGMA. The GSA will continue to collaborate with state agencies and SCV Water to help address contamination and avoid further impacts to beneficial uses.

- **Avoid Depletion of Interconnected Surface Water.** As discussed in Section 8.11, a significant and unreasonable condition for depletion of surface water is groundwater pumping-induced reduction in river flow and depth to groundwater that impacts GDEs in the Basin. Section 8.11 also examines how groundwater levels below historical levels may have an impact on GDEs, including on sensitive aquatic species, such as UTS and other native fishes. Because the minimum thresholds for groundwater levels are lower than historically observed, trigger levels have been established that result in further evaluations that may lead to management actions. These trigger levels are intended to be protective of GDEs if the depth to groundwater falls below historical levels.
- **Avoid Seawater Intrusion.** This sustainability indicator is not applicable to the Basin.

The minimum thresholds set for chronic groundwater level decline are protective of all beneficial uses and do not result in significant and unreasonable effects (i.e., undesirable results) for the other sustainability indicators.

8.6.2.4 Effects of Minimum Thresholds on Neighboring Basins

The GSA for the neighboring Fillmore and Piru Subbasins is required to develop a GSP by 2022. These two subbasins are hydrologically downgradient of the Basin (groundwater flows from the Basin into the Piru Subbasin though a relatively thin layer of alluvium less than 10 feet thick).

The minimum thresholds in this GSP are consistent with the groundwater conditions identified in prior modeling studies of the Basin Operating Plan (CH2M HILL and LSCE, 2005; LSCE and GSI, 2009). The Basin Operating Plan was developed and refined through those studies and was developed with input from the United Water Conservation District (UWCD), a significant water provider in Ventura County, under an ongoing memorandum of understanding between SCV Water and UWCD that was executed in 2003. The Basin Operating Plan envisions groundwater extractions that are less than those that occurred prior to the conversion of agricultural lands to municipal uses and the importation of water (LCSE, 2003). Historical stream gaging data demonstrate how urbanization has increased the amount of streamflow in the Santa Clara River in the western portion of the Basin (particularly below the outfall for the Valencia WRP), which in turn has increased the amount of streamflow to the downstream adjacent basin (the Piru Subbasin). A significant and unreasonable effect (i.e., an undesirable result) is not expected to occur under the future pumping program for the Basin because the amount of dry-weather (non-storm) streamflow exiting the Basin will be more than was observed in the years preceding the onset of urbanization. Changes in dry-weather flows will be de minimis compared with total long-term flows leaving the Basin because stormwater flows are much higher than dry-weather flows and are expected to be unchanged by future groundwater pumping, [51] Lastly, it is anticipated that any physical solution involving the importation of water and/or the control of pumping to manage flows between the upper and lower basins would be reached between UWCD and SCV Water because of the common reliance of these agencies on the SWP and their responsibilities. The SCV-GSA has a cooperative working relationship with the downstream GSA, and the two GSA's will share technical data, develop cooperative monitoring programs, and identify sensitive issues.

[51] The estimated total flow into the Piru Subbasin fluctuates over a fairly limited range of volumes on a long-term basis (ranging between approximately 7,000 and 8,000 acre-feet per year [AFY]). This 1,000 AFY range is small compared with annual variations in pumping and the amount of annual climate-driven variation that occurs in several of the water budget terms in the Basin.

8.6.2.5 Effects of Minimum Thresholds on Beneficial Uses and Land Uses

The groundwater level minimum thresholds have been selected to protect beneficial uses in the Basin while providing a reliable and sustainable groundwater supply. Groundwater modeling results indicate that future pumping in the Basin during extended droughts could reduce groundwater elevations below historically measured levels without causing a chronic lowering of groundwater levels or a chronic reduction of groundwater in storage. There is a potential for lower groundwater levels to impact GDEs at some locations along the Santa Clara River corridor and tributaries. Appendix E presents a GDE monitoring and management program that includes triggers, evaluation, and management actions intended to prevent cessation of flow and loss of pools in areas where native fishes reside and permanent loss of GDEs. That report describes impacts to GDEs that include temporary acute loss of habitat in areas where sensitive species reside (e.g., the I-5 Bridge). Since that report was prepared, the GSA adopted more clear terminology in the GSP that refers to cessation of flow and loss of pools in areas where native fishes reside (e.g., near the I-5 Bridge).

8.6.2.6 Relevant Federal, State, or Local Standards

No federal, state, or local standards exist for chronic lowering of groundwater levels.

8.6.2.7 Methods for Quantitative Measurement of Minimum Thresholds

Groundwater level minimum thresholds will be directly measured from existing or new monitoring wells. The groundwater level monitoring program will be conducted in accordance with the monitoring plan outlined in Section 7 and will consist of collecting groundwater level measurements that reflect non-pumping conditions. The groundwater level monitoring program will be designed and conducted to meet the requirements of the technical and reporting standards included in the SGMA regulations. As discussed in Section 8.6.1, an exceedance of minimum thresholds will be deemed to have occurred if groundwater levels fall below minimum thresholds in 25 percent of representative wells in the Alluvial Aquifer or 50 percent of representative wells in the Saugus Formation throughout a 3-year period (see Table 8-1).

8.6.3 Measurable Objectives

The measurable objectives for chronic lowering of groundwater levels provide access to groundwater consistent with the Basin Operating Plan for historical dry hydrologic periods, such as the dry period from 2006 through 2016. Measurable objectives for chronic lowering of groundwater levels provide operational flexibility above minimum threshold levels to ensure that the Basin can be managed sustainably over a reasonable range of climate and hydrologic variability. Measurable objectives may change after GSP adoption, as new information and hydrologic data become available.

8.6.3.1 Methodology for Setting Measurable Objectives

Measurable objectives were established to meet the sustainability goal and were based on historical groundwater level data, future predicted water levels using the groundwater flow model, and input from the SAC. Table 8-2 includes the estimated elevations for the measurable objectives established for the Alluvial Aquifer and Saugus Formation. Appendix L presents hydrographs showing the measurable objectives.

8.6.3.2 Measurable Objectives for the Alluvial Aquifer

As identified in Tables 8-1 and 8-2, at each representative monitoring site the measurable objective for the Alluvial Aquifer is based on either the 95-year average predicted future groundwater elevation or the average of the historical groundwater elevations measured since 1980, whichever is lower. Future groundwater elevations are estimated from groundwater flow model simulations under future projected full build-out of land use and water use conditions in the Basin. The future groundwater levels that serve as measurable objectives at certain wells were selected using the groundwater flow model simulation for the year 2042 water budget projection, which simulates the predicted future land use and water demands under 95 years of historical climate conditions that are adjusted for a 2030 level of climate change. Wells in the western and central portions of the Basin use the future modeled average groundwater elevation, while wells in the eastern portion of the Basin use the average of the historical groundwater elevation measurements since 1980.

Groundwater modeling indicates that, under future land use, groundwater pumping, and climatic conditions (including climate change), it is possible that short-term reductions in groundwater levels below historical levels may occur. These reductions would be temporary, not chronic. During these short-term periods, there is a potential for lower groundwater levels to have an effect on GDEs at some locations along the Santa Clara River corridor and tributaries. Appendix E presents a GDE monitoring and management program, which includes triggers intended to prevent cessation of flow and loss of pools in areas where native fishes reside and permanent loss of GDEs (also see Sections 7.3.7 and 9.5.5).

8.6.3.3 Initial Measurable Objectives for the Saugus Formation

The measurable objectives for the Saugus Formation are equal to the long-term average future predicted groundwater levels that are estimated to occur at each representative monitoring site completed in the Saugus Formation (see Table 8-2). These levels were selected using groundwater flow model simulations of the predicted future land use, water demand, and climatic conditions (with climate change) as simulated in the year 2042 water budget projection. As shown in time-series plots in Appendix L, groundwater elevations under future conditions are expected to be lower than historical groundwater elevations at each of the representative monitoring sites completed in the Saugus Formation.

8.6.4 Interim Milestones

Interim milestones show how the GSA would move from current conditions to meeting the measurable objectives if undesirable results have been identified. For the Basin, there are no identified undesirable results at this time, and implementation of the GSP is expected to maintain a sustainable condition in the Basin throughout the planning and implementation horizon; therefore, no interim milestones are proposed. If new data identify undesirable results in the future, interim milestones may be proposed as part of a GSP update that is planned for every 5 years.

8.7 Reduction of Groundwater in Storage Sustainable Management Criterion

8.7.1 Undesirable Results

As noted above, the groundwater model of the Basin indicates that undesirable results from chronic lowering of groundwater levels and reduction of groundwater in storage are not expected to occur in the future. Conceptually, undesirable results could occur if groundwater pumping exceeds recharge for a prolonged period either across the Basin or in a particular area of the Basin where lowering of water levels would cause an impact. Under certain circumstances, and in conjunction with other conditions or activities in the Basin, the following conditions may contribute to the occurrence of undesirable results:

- **Extended drought:** Drought periods that are longer in duration or more intense than anticipated in the Basin Operating Plan.
- **A new normal for climate change:** Reductions in long-term recharge to the Basin beyond what is anticipated in the plan (i.e., less recharge during non-drought periods)
- **Emergency interruption of imported supplies:** Not being able to access imported or banked water supplies and thereby needing to pump for multiple years at annual volumes beyond those described in the Basin Operating Plan

Undesirable results are significant and unreasonable reductions in the quantity of groundwater in storage that are characterized as follows:

- In the Alluvial Aquifer, non-pumping groundwater levels (as a proxy for storage change) drop below the basin-wide minimum threshold value for decline in water levels in the same 25 percent of representative wells throughout a 3-year period, leading to long-term reduction in groundwater storage. Using this characterization minimizes the chance of misleading indications of an unsustainable condition in the Alluvial Aquifer while providing an indication of a potential undesirable result before it occurs. Three consecutive years was chosen because this time frame indicates that the condition is likely to be chronic and not a result of a single-year temporary effect. Three years indicates that there is a trend that is significant and unreasonable.
- In the Saugus Formation, groundwater levels (non-pumping water level elevations) drop below minimum thresholds (see Section 8.6.2) in the same 50 percent of representative wells throughout a 3-year period. The use of 50 percent of the representative wells in the Saugus Formation for this assessment (1) accounts for the confined nature of the Saugus Formation, which recognizes that changes in pumping can propagate over a larger area than occurs in an unconfined aquifer such as the Alluvial Aquifer, and (2) minimizes the chance that localized changes in pumping operations could result in false indications of an unsustainable condition at an individual well while a larger group of representative Saugus Formation wells together shows no such unsustainable condition on an aquifer-wide basis. Three consecutive years was chosen because this time frame indicates that the condition is likely to be chronic and not a result of a single-year temporary effect. Three years indicates that there is a trend that is significant and unreasonable.
- Reduction of groundwater in storage results in an inability to meet demand during a multi-year drought.

The practical effect of this GSP for protecting against undesirable results arising from a reduction in groundwater storage is that it encourages the maintenance of long-term stability in groundwater levels and storage during average hydrologic conditions and over multiple years and decades. Maintaining long-term stability in groundwater levels maintains long-term stability in groundwater storage and prevents chronic declines, thereby providing beneficial uses and users with access to groundwater on a long-term basis and preventing undesirable results associated with groundwater withdrawals. Pumping at the long-term sustainable yield during drought years would likely temporarily lower groundwater levels and reduce the amount of groundwater in storage. Such short-term impacts due to drought are anticipated in the SGMA regulations with recognition that management actions need sufficient flexibility to accommodate drought periods and ensure short-term impacts can be offset by increases in groundwater levels or storage during normal or wet periods. Prolonged reductions in the amount of groundwater in storage could lead to undesirable results affecting beneficial users and uses of groundwater. In particular, groundwater pumpers that rely on water from shallow wells (e.g., domestic wells) in the lower portion of the Basin may be temporarily impacted by temporary reductions in the amount of groundwater in storage and lower groundwater levels in their wells. Domestic wells located in the side canyons and in upland areas above the lower portion of the Basin are unlikely to be affected by pumping in the lower portion of the Basin. This is because groundwater present in the upland areas is at considerably higher elevations than groundwater present in the lower portion of the Basin. There is a lack of water level data for shallow domestic wells, which is a data gap to be addressed in the Management Actions and Projects section of this GSP.

8.7.2 Minimum Thresholds

Section 354.28(c)(2) of the SGMA regulations states that “The minimum threshold for reduction of groundwater storage shall be a total volume of groundwater that can be withdrawn from the basin without causing conditions that may lead to undesirable results. Minimum thresholds for reduction of groundwater storage shall be supported by the sustainable yield of the basin, calculated based on historical trends, water year type, and projected water use in the basin.”

The minimum threshold for reduction of groundwater in storage is established for the Basin as a whole, not for individual aquifers. Therefore, any reduction in storage that would cause an undesirable result in only a limited portion of the Basin, as determined through implementation of the groundwater monitoring plan, shall be addressed in that area or in areas where declining groundwater levels indicate management actions or projects will be effective.

In accordance with the SGMA regulation cited above, the minimum threshold metric is a volume of pumping per year, or an annual pumping rate. Conceptually, the sustainable yield is the total volume of groundwater that can be pumped annually from the Basin on a long-term (multi-year/multi-decadal) basis without leading to undesirable results. As discussed in Section 6, absent the addition of supplemental water, the future estimated long-term sustainable yield of the Basin under reasonable climate change assumptions is at least 52,200 AFY and is likely higher, given that water budget analyses of future conditions estimated to occur under year 2042 conditions (which consist of full build-out of land uses and water uses, plus future climate change) show an absence of chronic declines in groundwater levels and chronic reductions in groundwater in storage. Therefore, the minimum threshold is set at 52,200 AFY.

This GSP adopts changes in groundwater levels as a proxy for the change in groundwater storage metric. As allowed in § 354.36(b)(1) of the SGMA regulations, an average of the groundwater elevation data at the RMSs will be reported annually as a proxy to track changes in the amount of groundwater in storage.

Based on well-established hydrogeologic principles, maintaining long-term stability in groundwater levels above the minimum threshold for chronic lowering of groundwater levels will limit depletion of groundwater from storage. Therefore, using groundwater elevation levels as a proxy, the minimum threshold for chronic reduction of groundwater in storage at each RMS is defined by the minimum threshold for chronic lowering of groundwater levels.

8.7.2.1 Relationship between Individual Minimum Thresholds and Relationship to Other Sustainability Indicators

The minimum threshold for reduction of groundwater in storage is based on the groundwater level minimum thresholds established for chronic groundwater level decline at RMSs. Therefore, the concept of potential conflict between minimum thresholds at different locations in the Basin is not applicable.

The minimum threshold for reduction of groundwater in storage is similar to other sustainability indicators. The minimum threshold for reduction of groundwater in storage was selected to avoid undesirable results for other sustainability indicators, as outlined below.

- **Avoid Chronic Lowering of Groundwater Levels.** Because groundwater levels will be used as a proxy for estimating groundwater pumping and changes in groundwater storage, the reduction in groundwater storage would not cause undesirable results for this sustainability indicator.
- **Avoid Land Subsidence.** Future groundwater levels would likely have to be substantially lower than are predicted to occur in the future to produce significant subsidence. Should significant and unreasonable inelastic subsidence caused by groundwater extraction be observed from future groundwater levels, the groundwater level minimum thresholds for this sustainability indicator will be raised to avoid future subsidence.
- **Avoid Degraded Groundwater Quality.** The minimum threshold proxy of long-term stability in groundwater levels helps minimize the potential for experiencing degraded groundwater quality.
- **Avoid Depletion of Interconnected Surface Water.** As discussed for chronic reduction of groundwater levels, a significant and unreasonable condition for depletion of surface water is a pumping-induced reduction in river flows and groundwater levels that impacts GDEs in the Basin. As discussed in Section 8.11, groundwater levels that are below historical levels may have an impact on GDEs, including on sensitive aquatic species such as the UTS. Because the minimum thresholds for groundwater levels and storage are lower than historically observed, trigger levels have been established in the GDE monitoring area that, if exceeded, would result in further evaluations and, in turn, may lead to management actions. These trigger levels are intended to be protective of GDEs if groundwater levels fall below historical levels.
- **Avoid Seawater Intrusion.** This sustainability indicator is not applicable to the Basin.

8.7.2.2 Effects of Minimum Thresholds on Neighboring Basins

The water budget analyses presented in Section 6 of the GSP show that the Basin Operating Plan developed by SCV Water results in a water budget that is in balance, with no chronic long-term declines in groundwater levels and only short-term reductions in storage that do not result in significant and unreasonable effects. The minimum thresholds of this GSP, including thresholds which prevent long-term reductions in storage, further constrain future operation of the Basin. Modeling of water levels in the Basin with projected pumping in accord with these thresholds and the Basin Operating Plan demonstrates that flows out of the Basin will be similar to what has been observed in the recent past and not fall below the volumes that were occurring in the decades leading up to the onset of urbanization-driven water importation into the Basin. As a result, implementation of the minimum thresholds in the GSP will not significantly affect the Fillmore and Piru Subbasins.[52]

8.7.2.3 Effects on Beneficial Uses and Land Uses

The minimum thresholds for reduction in groundwater storage and lowering of groundwater levels have been established to avoid undesirable results. For this reason, groundwater serving beneficial uses (including GDEs and beneficial uses in downstream adjacent basins) and land uses will not be adversely affected.

8.7.2.4 Relevant Federal, State, or Local Standards

No federal, state, or local standards exist for reductions in groundwater storage.

8.7.2.5 Methods for Quantitative Measurement of Minimum Thresholds

The measurement program for evaluating the minimum thresholds for reductions in groundwater in storage will rely on the groundwater level data collection program described previously for chronic lowering of groundwater levels (see Section 8.6). Groundwater levels (as a proxy for storage change) that drop below the basin-wide minimum threshold value for decline in water levels throughout a 3-year period in 25 percent of the same representative wells in the Alluvial Aquifer or 50 percent of the same representative wells in the Saugus Formation may lead to long-term reduction of groundwater in storage (see Table 8-1). The actions that will be taken if minimum thresholds are reached are described in Table 8-2 and Section 9.5.4.1 for the chronic lowering of groundwater levels sustainability indicator, which is directly linked to the sustainability indicator for reduction of groundwater in storage.

8.7.3 Measurable Objectives

The sustainability indicators for avoiding chronic reductions of groundwater in storage use groundwater levels as a proxy. The minimum thresholds and measurable objectives that protect against significant and unreasonable reduction in groundwater storage are based on those used to protect against chronic lowering of groundwater levels. The measurable objective for chronic reduction in groundwater in storage, using the groundwater level proxy, is equivalent to the measurable objective for chronic lowering of groundwater levels, using average groundwater elevations at representative monitoring wells that are predicted for future full build-out of land use and water use conditions (which also accounts for climate change). Measurable objectives may change after GSP adoption, as new information and hydrologic data become available.

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[52] In addition, short-term reductions in groundwater in storage are not expected to result in significant and unreasonable changes in groundwater flow from the Basin to the Piru Subbasin because the thickness of the alluvium at the boundary between these two subbasins is small (less than 10 feet) and the estimated total flow into the Piru Subbasin fluctuates over a fairly limited range on a long-term basis (between approximately 7,000 and 8,000 AFY). This 1,000-AFY range is small compared with annual variations in pumping and the amount of annual climate-driven variation that occurs in several of the water budget terms in the Basin.

8.7.4 Interim Milestones

Interim milestones show how the GSA would move from current conditions to meeting the measurable objectives if undesirable results have been identified. For the Basin, there are no identified undesirable results at this time, and implementation of the GSP is expected to maintain a sustainable condition in the Basin throughout the planning and implementation horizon; therefore, no interim milestones are being proposed for reduction in groundwater storage. If new data identify undesirable results in the future, interim milestones may be proposed as part of a GSP update that is planned for every 5 years.

8.8 Seawater Intrusion Sustainable Management Criterion (Not an Issue)

The seawater intrusion sustainability indicator is not applicable to the Basin.

8.9 Degraded Groundwater Quality Sustainable Management Criterion

This sustainability indicator takes into consideration protection of municipal drinking water supplies, domestic uses, and agricultural uses of groundwater in the Basin. For municipal wells and drinking water supplied by domestic wells, basin standards established by LARWQCB were used to establish thresholds. For agricultural uses, thresholds were established using WQOs for the Basin and available assimilative capacities for salts and nutrients that are protective of beneficial uses, including agriculture. WQOs and assimilative capacity thresholds contained in the SNMP prepared for the Basin were used in this analysis (GSSI, 2016).

Groundwater quality in the Basin has been impacted by perchlorate (and other constituents of concern) released from the Whittaker-Bermite facility for many decades. SCV Water (and its predecessors) have worked with the LARWQCB, California Department of Toxic Substances Control (DTSC) and the Whittaker-Bermite Corporation to understand the nature and extent of historical releases of contaminants that have reached groundwater. SCV Water has made a concerted effort to actively monitor its supply wells for indications of contaminant migration and has installed wellhead treatment within areas of concern to make sure high-quality water is delivered to its customers. These activities, along with normal seasonal and annual operational changes in pumping schedules that SCV Water needs to make to meet demand, will continue in the future and may change groundwater gradients and flow directions in the aquifers.

Furthermore, the existence of contamination (perchlorate, VOCs) in the Basin pre-dates SGMA enactment (January 2015) and is not a result of pumping. While PFAS were detected after 2015 in a number of wells, it is likely that PFAS were present prior to 2015 but not detected until laboratory detection limits became lower. This preexisting contamination, as well as contamination that may be discovered in the future, is not the responsibility of the GSA to manage. It is the responsibility and authority of state regulatory agencies (e.g., LARWQCB and DTSC) to take actions that respond to the contamination. The GSA will continue to collaborate with state agencies and SCV Water to help address contamination and avoid further impacts to beneficial uses.

8.9.1 Undesirable Results

Conditions that are significant and unreasonable that may be an undesirable result include the following:

- **Water management actions** that interfere with existing groundwater remediation efforts or cause plume migration, creating permanent loss of groundwater supply.
- **Concentrations of regulated contaminants** in untreated groundwater water from private domestic or agricultural or municipal wells exceed regulatory thresholds.
- **Loss of municipal groundwater supply** due to migration of a contaminant plume and inability to pump and treat groundwater or reasonably secure an alternative water supply.
- **Groundwater pumping** that causes concentrations of TDS, chloride, nitrate, and sulfate to exceed WQOs or basin-wide assimilative capacity, described in the 2016 SNMP, or puts new state permits for distribution of recycled water at risk.
- **Interference with remediation activities.** Water management actions implemented under the GSP that interfere with existing remediation efforts creating permanent loss of groundwater supply.

8.9.2 Minimum Thresholds

Section 354.28(c)(2) of the SGMA regulations states that "The minimum threshold shall be based on the number of supply wells, a volume of water, or a location of an isocontour that exceeds concentrations of constituents determined by the Agency to be of concern for the basin." The purpose of the minimum thresholds for constituents of concern in the Basin is to avoid increased degradation of groundwater quality from baseline concentrations measured since enactment of SGMA in January 2015. Minimum thresholds established for contaminants and for salts and nutrients are presented in the following subsections. The actions that will be taken if minimum thresholds are reached are described in Section 9.5.4.2 for this sustainability indicator.

8.9.2.1 Contaminants

Minimum thresholds that pertain to contaminants measured in groundwater are as follows:

- No minimum thresholds have been established for contaminants because state regulatory agencies, including LARWQCB and DTSC, have the responsibility and authority to regulate and direct actions that address contamination.

As noted in Section 5.1.8, concentrations of several regulated constituents exceed Basin Plan limits in a number of municipal supply wells. The extent of the contamination is still being evaluated. SCV Water has taken wells out of service and built wellhead treatment facilities to meet groundwater quality standards for water served to its customers.

As has been the case thus far, if additional wells become impacted by contamination, SCV Water and the GSA will collaborate with LARWQCB and other regulatory agencies that have responsibility to investigate and regulate groundwater contaminants that could pose a risk to groundwater quality.

Groundwater quality data are not available for private domestic wells at this time. This is a data gap that is addressed as part of the Management Actions and Projects in Section 9 of this GSP. It is hoped that private domestic well owners will volunteer to be included in a monitoring program to establish an initial baseline water quality database for private domestic wells. The GSA will consult with landowners who wish to participate to facilitate cooperative data sharing procedures. Once a baseline is established, exceedance of water quality standards in the Basin Plan in 20 percent of the monitored private wells will be the basis for minimum thresholds for degraded groundwater quality at private domestic wells. It may be necessary to adjust the threshold for the percentage of wells exceeding the limit if there are many wells in a particular area that experience degraded groundwater quality, as observed from baseline testing. Table 8-3 presents regulatory standards for selected constituents of concern for drinking water listed in the Basin Plan and the 2020 SCV Water annual water quality report.

Table 8-3. Water Quality Standards for Selected Constituents of Concern for Private Drinking Water Wells

Constituent of Concern	Basin Plan Standard
Total Dissolved Solids[1]	700 – 1000 mg/L
Chloride[1]	100 – 150 mg/L
Sulfate[1]	150 – 350 mg/L
Nitrate (as Nitrogen) [1]	10 mg/L.
Perchlorate[1]	0.006 mg/L
Tetrachloroethylene (PCE) [2]	MCL of 5 µg/L
Trichloroethylene (TCE) [2]	MCL of 5 µg/L
PFAS (PFOS and PFOA) [2]	Response Level (RL) of 40 ng/L PFOS and 10 ng/L PFOA

Notes

[1] Source: Water Quality Control Plan: Los Angeles Region Basin Plan for the Coastal Watershed of Los Angeles and Ventura Counties Basin Plan Standards can vary by watershed management zone. Range shown where applicable.

[2] Source: SCV Water 2020 Water Quality Report

µg/L = micrograms per liter
MCL = maximum contaminant level
mg/L = milligrams per liter
ng/L = nanograms per liter
PFAS = per- and polyfluoroalkyl substances
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

8.9.2.2 Salts and Nutrients

Minimum thresholds pertaining to salts and nutrients measured in representative wells are as follows (see Table 8-1):

- Concentrations of TDS, chloride, nitrate, and sulfate that exceed WQOs and basin-wide assimilative capacity described in the 2016 SNMP in 20 percent of wells monitored in each management zone.

Recognizing that drinking water standards in the LARWQCB Basin Plan are not the only regulatory standard that must be met and that agricultural uses of water are sensitive to concentrations of salts and nutrients, the minimum thresholds for avoiding degradation of groundwater quality also relies on WQOs and assimilative capacities described in the 2016 SNMP (GSSI, 2016). The purpose of the SNMP was to determine the current (ambient) water quality conditions in the Basin and to ensure that all water management practices, including the use of recycled water, are consistent with the WQOs. The SNMP provides the initial framework for water management practices to ensure protection of beneficial uses and allow for the sustainability of groundwater resources consistent with the Basin Plan. The SNMP divides the Basin into six subunits known as management zones (see Figure 8-6):

- Management Zone 1 (MZ-1) - Santa Clara-Mint Canyon
- Management Zone 2 (MZ-2) - Placerita Canyon
- Management Zone 3 (MZ-1) - South Fork
- Management Zone 4 (MZ-4) - Santa Clara-Bouquet and San Francisquito Canyons
- Management Zone 5 (MZ-5) - Castaic Subunit
- Management Zone 6 (MZ-6) - Saugus Formation

Five of these subunits (Management Zones 1 through 5—Santa Clara-Mint Canyon Subunit, Placerita Canyon Subunit, South Fork Subunit, Santa Clara-Bouquet and San Francisquito Canyon Subunit, and Castaic Subunit) are shallow alluvial groundwater subunits, while the sixth subunit (Management Zone 6) consists of the Saugus Formation.

During the SNMP development process, ambient concentrations and assimilative capacities for TDS, chloride, nitrate, and sulfate were established for all six of the management zones shown in Figure 8-6.

Each of the management zones (except Management Zone 6) has established WQOs for TDS, chloride, nitrate, and sulfate. For Management Zone 6, the LARWQCB recommended the interim use of the most conservative basin objective of the alluvial management zones for the calculation of assimilative capacity for TDS, chloride, and nitrate. However, due to the lack of supporting historical data for sulfate, no decision has been made with regards to the WQO for sulfate in Management Zone 6.

Management Zone 1 was split into two zones to isolate a localized area that may be associated with point source contamination associated with the former Whittaker-Bermite site. The area in Management Zone 1 with elevated TDS and sulfate levels was designated as Management Zone 1a while the remaining area affected by the Whittaker-Bermite site was designated as Management Zone 1b. Average groundwater concentrations and assimilative capacities were calculated for each of these zones separately.

In the SNMP, the average TDS, chloride, nitrate, and sulfate concentrations for each management zone were determined by preparing concentration contours of the median concentration values from wells in each management zone. The average groundwater concentration values were determined based on the areal and vertical distribution of the median concentration contours. The average median concentration value for each constituent in each management zone was considered to be the ambient groundwater concentration. The ambient concentration for each constituent was subtracted from the specific WQO for that constituent and management zone to determine the available assimilative capacity.

Calculated ambient groundwater concentrations are provided in Table 8-4 below, along with each management zone's WQO presented in the SNMP. The WQOs for each constituent and management zone presented in this table are considered the minimum thresholds for salts and nutrients in each management zone. In cases where the ambient water quality exceeds the WQO, the ambient water quality is considered the minimum threshold.

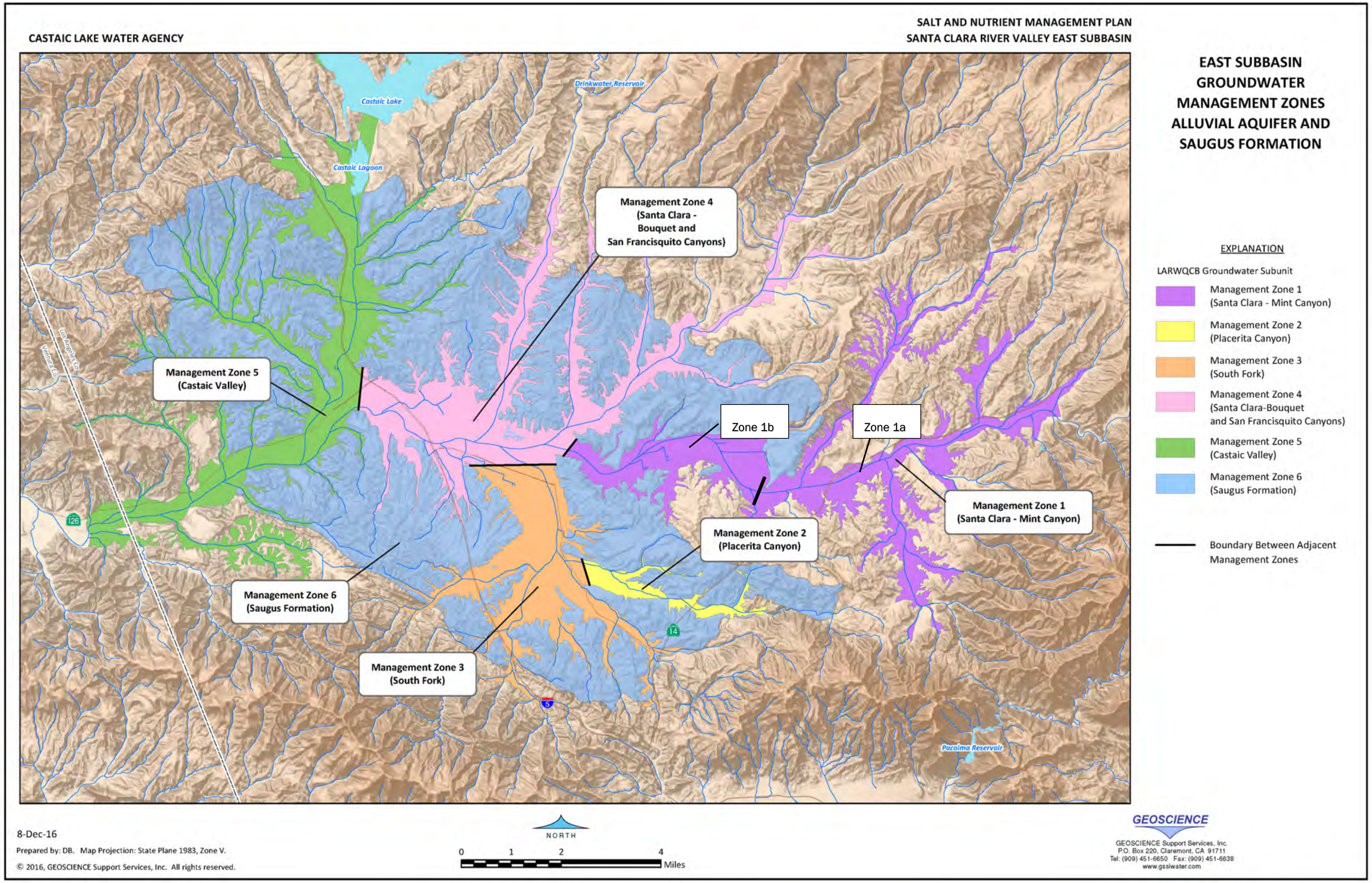


Figure 8-6. Management Zones from the Salt and Nutrient Management Plan

Table 8-4. Ambient Groundwater Concentrations and Basin Water Quality Objectives for Agricultural Beneficial Uses

Management Zone	Groundwater Subunit	Water Quality Status Comparison	TDS (mg/L)	Chloride (mg/L)	Nitrate (mg/L)	Sulfate (mg/L)
1a	Santa Clara-Mint Canyon	Water Quality Objective	800	150	45	150
		Ambient Water Quality	728	89	20	138
1b	Santa Clara-Mint Canyon	Water Quality Objective	800	150	45	150
		Ambient Water Quality	833	72	21	269
2	Placerita Canyon[1]	Water Quality Objective	700	100	45	150
		Ambient Water Quality	NA	NA	NA	NA
3	South Fork[1]	Water Quality Objective	700	100	45	200
		Ambient Water Quality	NA	NA	NA	NA
4	Santa Clara-Bouquet and San Francisquito Canyons	Water Quality Objective	700	100	45	250
		Ambient Water Quality	710	77	16	189
5	Castaic Valley	Water Quality Objective	1,000	150	45	350
		Ambient Water Quality	727	77	8	246
6	Saugus Formation[2]	Water Quality Objective	700	100	45	NA
		Ambient Water Quality	636	28	14	235

Notes

Source: Salt and Nutrient Management Plan Santa Clara River Valley East, Draft Final (GSSI, 2016)

Red values indicate exceedances of WQOs.

[1] Insufficient data to establish trend.

[2] WQOs have not been established for the Saugus Formation. Therefore, at the recommendation of the LARWQCB, the most conservative of the alluvial management zone WQOs was used for calculation of assimilative capacity for TDS, chloride, sulfate, and nitrate.

mg/L = milligrams per liter

LARWQCB = Los Angeles Regional Water Quality Control Board

TDS = total dissolved solids

WQO = water quality objective

8.9.2.3 Relationship between Individual Minimum Thresholds and Other Sustainability Indicators

The groundwater quality minimum thresholds were set based on regulatory standards and WQOs established by the Basin Plan and SNMP for protecting beneficial uses.

Because SGMA regulations do not require projects or actions to improve groundwater quality beyond what existed prior to January 1, 2015, or beyond that required by other regulatory agencies with clear jurisdiction over the matter, there will be no direct actions under the GSP associated with the groundwater quality minimum thresholds. Therefore, there are no actions that directly influence other sustainability indicators.

- **Avoid Chronic Lowering of Groundwater Levels.** Groundwater quality minimum thresholds could influence groundwater level minimum thresholds by limiting the types of water that can be used for recharge to raise groundwater levels. Water used for recharge cannot exceed any of the groundwater quality minimum thresholds.
- **Avoid Chronic Reduction in Groundwater Storage.** Nothing in the groundwater quality minimum thresholds promotes pumping in excess of the sustainable yield. Therefore, the groundwater quality minimum thresholds will not result in an exceedance of the groundwater storage minimum threshold.
- **Avoid Land Subsidence.** Nothing in the groundwater quality minimum thresholds promotes a condition that will lead to additional subsidence; therefore, the groundwater quality minimum thresholds will not result in a significant or unreasonable level of subsidence.
- **Avoid Depletion of Interconnected Surface Waters.** There is no information indicating that the groundwater quality minimum thresholds would have significant and unreasonable effects on interconnected surface waters. Nothing in the groundwater quality minimum thresholds promotes additional pumping or lower groundwater levels in areas where interconnected surface waters may exist. Therefore, the groundwater quality minimum thresholds will not result in a significant or unreasonable depletion of interconnected surface waters.
- **Seawater Intrusion.** This sustainability indicator is not applicable to the Basin.

8.9.2.4 Effects of Minimum Thresholds on Neighboring Basins

The Fillmore and Piru Subbasins are hydrologically downgradient of the Basin; thus, groundwater generally flows from the Basin into the Fillmore and Piru Subbasins. Hypothetically, poor groundwater quality in the Basin could flow into the Fillmore and Piru Subbasins, affecting the ability to achieve sustainability in those subbasins. The degraded groundwater quality minimum threshold is set to prevent unreasonable movement of poor-quality groundwater or further degrade groundwater quality that could impact overall beneficial uses of groundwater. Therefore, it is unlikely that the groundwater quality minimum thresholds established for the Basin will prevent the Fillmore and Piru Subbasins from achieving sustainability.

8.9.2.5 Effects of Minimum Thresholds on Beneficial Uses and Land Uses

- **Agricultural land uses and users.** The degraded groundwater quality minimum thresholds generally benefit the agricultural water users in the Basin. For example, setting the minimum threshold for salts and nutrients at the WQOs for each management zone in the Basin described in the SNMP ensures that a supply of usable groundwater will exist for beneficial agricultural use.
- **Urban land uses and users.** The degraded groundwater quality minimum thresholds generally benefit the urban water users in the Basin because there are existing regulatory programs and agencies that ensure there is an adequate supply of good quality groundwater for municipal use.

- **Domestic users.** The degraded groundwater quality minimum thresholds for municipal wells benefit the domestic water users in the Basin because these uses share the aquifer with municipal water supply wells. In addition, water quality standards for contaminants, salts, and nutrients are intended to be protective of drinking water uses.
- **Ecological land uses and users.** Although the degraded groundwater quality minimum thresholds do not directly benefit ecological uses, it can be inferred that the degraded groundwater quality minimum thresholds will not adversely impact ecological water uses in the Basin because concentrations of constituents of concern are not likely to increase substantially from what they are now, or prior to what they were when SGMA was enacted in January of 2015. This is because the Basin is not in overdraft; therefore, drawing poor quality water into the Basin from marine bedrock formations or from deeper zones is not anticipated. In addition, the thresholds are consistent with the SNMP water quality objectives. Preventing constituents of concern from migrating will prevent unwanted contaminants from impacting ecological groundwater uses.

8.9.2.6 Relevant Federal, State, or Local Standards

The degraded groundwater quality minimum thresholds specifically incorporate federal and state drinking water standards.

8.9.2.7 Methods for Quantitative Measurement of Minimum Thresholds

Degraded groundwater quality minimum thresholds will be directly measured from existing or new municipal, domestic (if landowners participate in monitoring), or agricultural supply wells included in the monitoring program. Exceedances of regulatory standards and WQOs presented in Tables 8-4 and 8-5 will be assessed on an annual basis in accordance with the monitoring program (see Section 7).

8.9.3 Measurable Objectives

8.9.3.1 Measurable Objectives Pertaining to Contaminants

Improving groundwater quality is not a requirement under SGMA; however, protecting it from getting worse is important to the beneficial users and uses of the resource in the Basin so that pumping can be maintained at desired levels. Thus, the measurable objective as it relates to contamination is to maintain pumping for beneficial uses consistent with volumes quantified in the applicable UWMP for wet, normal, dry, and multiple dry years. Non-municipal pumping—including private domestic, golf courses, agricultural users, and contaminant remediation pumping—will also be maintained at or above the pumping levels identified in Table 8-5 (from Table 4-6 in the 2020 UWMP).

The measurable objective pertaining to groundwater quality for private domestic and agricultural wells will be approximately equal to or better than baseline water quality established by the groundwater monitoring program for these wells (as discussed previously, a baseline does not exist; therefore, this is a data gap that must be filled).

8.9.3.2 Measurable Objectives Pertaining to Salts and Nutrients

The measurable objective pertaining to salts and nutrients is equivalent to basin-wide WQOs (as described by use type, i.e., agricultural, domestic, municipal) and basin-wide assimilative capacity as described in the Salt and Nutrient Management Plan. (Note, as discussed in Section 7, a data gap exists for private wells that needs to be filled consistent with the Salt and Nutrient Management Plan Monitoring Program.)

8.9.4 Interim Milestones

Interim milestones show how the GSA anticipates moving from current conditions to meeting the measurable objectives. For contaminants, the interim milestone for each 5-year GSP update will be a demonstration that municipal groundwater production is consistent with the UWMP quantities and operational flexibility is not unduly constrained. At the first 5-year GSP update, there will be a demonstration that a monitoring network for private domestic and agricultural wells has been established and baseline water quality has been obtained for these users. After the first 5-year update, there will be a demonstration that applicable water quality standards and WQOs are not exceeded in private domestic and agricultural wells due to pumping or GSA management actions.

Table 8-5. Projected Groundwater Production (Normal Year)

	Groundwater Pumping (AF)[1]					
	2025	2030	2035	2040	2045	2050
Purveyor						
Alluvium	21,430	28,050	30,790	30,790	30,790	30,790
Saugus Formation	17,450	9,900	9,900	9,900	9,900	9,900
Total Purveyor	38,380	37,950	40,690	40,690	40,690	40,690
Agricultural and Other[2]						
Alluvium	11,540	9,150	6,410	6,410	6,410	6,410
Saugus Formation	1,200	1,200	1,200	1,200	1,200	1,200
Total Agricultural and Other	12,740	10,350	7,610	7,610	7,610	7,610
Basin						
Alluvium	32,970	37,200	37,200	37,200	37,200	37,200
Saugus Formation	18,650	11,100	11,100	11,100	11,100	11,100
Total Basin	**51,620**	**48,300**	**48,300**	**48,300**	**48,300**	**48,300**

Notes

Source: 2020 Santa Clarita Valley Urban Water Management Plan, Final (KJ, 2021).

[1] Includes both existing and planned pumping. A breakdown of both existing and planned pumping by individual purveyors is shown in Appendix E of the UWMP. The distribution of pumping does not represent a formal allocation of water resources among the retail purveyors.

[2] Agricultural and other small private well pumping, including Newhall Land, Robinson Ranch Golf Course, Wayside Honor Rancho, Valencia Golf Course, and the Whittaker-Bermite Corporation facility. Values in Alluvium reflect reduction of up to 7,038 AF associated with the assumed development under the Newhall Ranch Specific Plan.

AF = acre-feet

AFY = acre-feet per year

Alluvium = Alluvial Aquifer

Basin = Santa Clara River Valley Groundwater Basin, East Subbasin

8.10 Land Subsidence Sustainable Management Criterion

8.10.1 Undesirable Results

Conditions that may lead to an undesirable result include a shift in pumping locations or substantial increase in pumping beyond what has been observed, which could lead to a substantial decline in groundwater levels that could potentially cause subsidence in excess of the minimum thresholds.

Significant and unreasonable rates of land subsidence in the Basin are those that lead to a permanent (inelastic) subsidence of ground surface elevations that impact groundwater supply, land uses, infrastructure, and property interests. For clarity, this SMC adopts two related concepts:

- **Land subsidence** is a gradual settling of the land surface caused by, among other processes, compaction of subsurface materials due to lowering of groundwater levels from groundwater pumping. Land subsidence from dewatering subsurface clay layers can be an inelastic process and the potential decline in land surface could be permanent.
- **Land surface fluctuation.** Land surface may rise or fall, elastically, in any one year. Land surface fluctuation may or may not indicate long-term permanent subsidence.

By regulation, the ground surface subsidence undesirable result caused by groundwater extraction is a quantitative combination of subsidence minimum threshold exceedances. For the Basin, no long-term subsidence that impacts groundwater supply, land uses, infrastructure, and property interests is acceptable. Therefore, the ground surface subsidence undesirable result includes the following:

- Substantially interferes with surface land uses.
- Land surface deformation that impacts the use of critical infrastructure and roads.
- Pumping results in land subsidence greater than minimum thresholds at 10 percent of monitoring locations.

Currently, ground surface elevation is being monitored at two continuous global positioning system sites in the Basin as reported by UNAVCO from its Data Archive Interface.[53] Since the beginning of data collection in the early 2000s, the net vertical displacement is positive (0.05 feet). This means that the land surface has actually risen (positive displacement) or stayed the same. The ground surface elevation change (less than 0.2 feet vertical change over the last 20 years) seen at the two UNAVCO stations cannot be correlated with groundwater extractions and is likely due to tectonic activity. In addition, InSAR data provided by DWR shows that meaningful land subsidence did not occur in the Basin during the period between June 2015 and June 2019. A review of LA County benchmark elevation data indicates that, since the 1980s, some locations in the Basin have risen while others have fallen. The available data suggest that tectonic activity is causing much of the elevation changes and the extent to which any change in land surface elevation has been caused by past pumping is unclear (see Appendix C for additional discussion of subsidence).

[53] The UNAVCO Data Archive Interface is available at http://www.unavco.org/data/data.html. (Accessed January 19, 2021.)

Should potential subsidence be observed, the GSA will first assess whether the subsidence may be due to (1) pumping, (2) tectonics, and (3) elastic processes (subsidence that will recover with rising groundwater). If inelastic subsidence is caused by groundwater extraction, the GSA will undertake a program to correlate the observed subsidence with measured groundwater elevations and identify areas that may be subject to differential subsidence that may cause damage to infrastructure or property. See Section 9.5.4.3 for further discussions of the actions that will be taken if minimum thresholds are reached for this sustainability indicator.

Staying above the minimum threshold (provided that subsidence was caused by groundwater extraction) will avoid the subsidence-related undesirable result and protect the beneficial uses and users from impacts to infrastructure and interference with surface land uses.

8.10.2 Minimum Thresholds

Section 354.28(c)(5) of the SGMA regulations states that “The minimum threshold for land subsidence shall be the rate and extent of subsidence that substantially interferes with surface land uses and may lead to undesirable results.”

The subsidence minimum threshold for subsidence is as follows:

- The subsidence measured between June of one year and June of the subsequent year shall be no more than an average of 0.1 foot in any single year and a cumulative 0.5 foot in any 5-year period observed at 10 percent or more monitoring locations.

As justification for this minimum threshold, a methodology was developed to approximately estimate the magnitude of subsidence that may occur in the planning and implementation period of the GSP (see Appendix C). There was a short period between the winter of 2015/2016 and the winter of 2018/2019 for which a comparison of observed land surface elevation from DWR’s InSAR Dataset could be compared to groundwater level declines in the area of the Basin where clay beds exist in the Saugus Formation and where the potential for future subsidence is the most probable as a result of increased pumping. As described in the *Subsidence Technical Memorandum* (Appendix C), the central portion of the Basin in the vicinity of well V-201 is where groundwater levels are predicted by the groundwater model to be lowest in the future. In this area, a groundwater level decline of 15 feet was measured between the winter of 2015/2016 and the winter of 2018/2019. The InSAR data showed a corresponding reduction in ground surface elevation of approximately 0.032 feet. If the change in ground surface elevation shown in the InSAR data is related to groundwater extraction, this equates to approximately 0.01 feet of subsidence per 5 feet of groundwater elevation decline. As stated previously, it is not known whether the observed reduction in ground surface elevation is related to pumping or to tectonics.

It is anticipated that groundwater elevations could be lower in the future as the Basin Operating Plan is implemented at full build out of the Basin to meet future demands during extended drought periods. The groundwater flow model was used to estimate future groundwater levels in the Basin. The approximate difference between long-term average historical groundwater levels observed in well V-201 and future projected groundwater levels is estimated to be on the order of 150 feet. When considering historical low groundwater levels (e.g., 1993) measured at well V-201, the difference between measured groundwater levels and the predicted lowest dry year/drought groundwater levels in the future is approximately 70 feet. Depending on which of the two water level differences is used, the approximate amount of subsidence that could occur in the future ranges from between 0.3 feet of subsidence for the 150 feet of groundwater level decline to approximately 0.14 feet for the 70 feet of decline. This estimate assumes that the InSAR measured reduction in land surface elevation used in the calculations is a direct result of groundwater extraction, which may not be the case. It is also not known the time frame over which this estimated subsidence might occur, as (1) it is understood that subsidence effects can be delayed and (2) because the rate of subsidence can be affected by the duration that groundwater levels are below the historical low.

Based on this evaluation, the minimum threshold for subsidence has been preliminarily set at a rate of 0.1 feet in any single year with a maximum subsidence of 0.5 feet over any 5-year period. Due to the considerable uncertainty associated with estimating subsidence rates in the Basin and the lack of a complete data set from which to estimate subsidence, the GSA plans to conduct robust subsidence monitoring as described in Section 7 and consider adjusting thresholds should monitoring data indicate that this is advisable and warranted.

8.10.2.1 Relationship between Individual Minimum Thresholds and Other Sustainability Indicators

Subsidence minimum thresholds have little or no impact on other minimum thresholds, as described below.

- **Avoid Chronic Lowering of Groundwater Levels.** Subsidence minimum thresholds will not result in significant or unreasonable groundwater levels.
- **Avoid Chronic Reduction of Groundwater Storage.** The subsidence minimum thresholds will not change the amount of pumping and will not result in a significant or unreasonable change in groundwater storage.
- **Avoid Degraded Groundwater Quality.** The subsidence minimum thresholds will not cause a change in groundwater flow directions or rates, and, therefore, will not result in a significant or unreasonable change in groundwater quality.
- **Avoid Depletion of Interconnected Surface Waters.** The groundwater level subsidence minimum thresholds will not change the amount or location of pumping and will not result in a significant or unreasonable depletion of interconnected surface waters.
- **Avoid Seawater Intrusion.** This sustainability indicator is not applicable in the Basin.

8.10.2.2 Effects of Minimum Thresholds on Neighboring Basins

The ground surface subsidence minimum thresholds are set to prevent any long-term subsidence that could harm groundwater supply, land uses, infrastructure, and property interests. Therefore, the subsidence minimum thresholds for the Basin will not prevent the downstream Fillmore and Piru Subbasins from achieving sustainability.

8.10.2.3 Effects of Minimum Thresholds on Beneficial Uses and Land Uses

The subsidence minimum thresholds are set to prevent subsidence that could harm groundwater supply, land uses, infrastructure, and property interests. Available data indicate that there is currently little to no groundwater pumping-caused subsidence occurring in the Basin that affects infrastructure and that local soils, geology, and predicted future groundwater level changes are unlikely to cause undesirable results or exceedance of minimum thresholds. Therefore, there is no likely negative impact on any beneficial user.

8.10.2.4 Relevant Federal, State, or Local Standards

There are no federal, state, or local regulations related to subsidence.

8.10.2.5 Methods for Quantitative Measurement of Minimum Thresholds

Minimum thresholds will be assessed using a combination of DWR-supplied InSAR data and subsidence monitoring stations (described in the monitoring plan, Section 7).

8.10.3 Measurable Objectives

8.10.3.1 Methodology for Setting Measurable Objectives

The measurable objectives are set based on maintaining current conditions and changes are measured by a combination of DWR-supplied InSAR data and subsidence monitoring stations.

8.10.3.2 Measurable Objectives for the Basin

The measurable objectives for subsidence represent target subsidence rates in the Basin. Available information does not suggest the occurrence of permanent subsidence in the Basin. Therefore, the measurable objective for subsidence is maintenance of current average ground surface elevations with the understanding that ground surface elevations have been observed to fluctuate up and down over time, depending on location.

8.10.4 Interim Milestones

Interim milestones show how the GSA anticipates moving from current conditions to meeting the measurable objectives. Interim milestones are set for each 5-year interval following GSP adoption.

Subsidence measurable objectives are set at the current condition of no long-term subsidence. Therefore, there is no change between current conditions and sustainable conditions. For this reason, the interim milestones are identical to the minimum thresholds and measurable objectives.

8.11 Depletion of Interconnected Surface Water Sustainable Management Criterion

8.11.1 Undesirable Results

As noted above, the groundwater model of the Basin indicates that undesirable results from chronic lowering of groundwater levels and reduction of groundwater in storage are not expected to occur in the future. Conceptually, undesirable results could occur if groundwater pumping exceeded recharge for a prolonged period either across the Basin or in a particular area of the Basin where lowering of water levels would cause an impact. In addition, conditions that could lead to undesirable results include the following:

- Drought periods that are longer in duration or more intense than simulated climate change factors provided by DWR.
- Reductions in long-term recharge to the Basin beyond what is anticipated in the plan (i.e., less recharge during non-drought periods).
- Reductions in the quantity of treated wastewater being discharged to the river, which could reduce river flow rates and the rate of recharge to the underlying Alluvial Aquifer.
- Based on emergency interruptions, not being able to access imported or banked water supplies and thereby needing to pump for multiple years at annual volumes beyond those described in the Basin Operating Plan.

Locally defined significant and unreasonable conditions for depletion of interconnected surface water were assessed using a number of resources:

- GDE identification work performed by ESA (see Section 5.2)
- Assessment of potential impacts to GDEs prepared by ESA (see Appendix E)

- Identification of interconnected surface water (see Section 7.6)
- Groundwater elevation monitoring data and results from the groundwater flow model that examined effects of future pumping, land use, hydrology, and climate change

Avoiding adverse impacts on beneficial uses of interconnected surface water present in the Basin and preserving existing habitat are the focus of this sustainability indicator. This is based on the following observations about basin conditions:

- Direct uses of surface water (for recreation, irrigation, or municipal purposes) are not present or expected as a future significant beneficial use in the Basin.
- As discussed in Section 8.3.3.5, historical data and modeling analyses show there is (and will continue to be) more water in the river than was the case under pre-urbanized conditions, which will continue to benefit the downstream Piru Subbasin.

In summary, (1) no future direct diversions of surface water are expected to occur in the Basin, (2) historical data show there is (and will continue to be) more water in the river than was the case under pre-urbanized conditions, and (3) significant and unreasonable surface water depletion arising from groundwater use in the Basin are not expected to occur within the Basin. Therefore, the sustainability criterion for depletion of interconnected surface water is focused on avoiding undesirable results consisting of significant and unreasonable effects on GDEs and sensitive species, which are the beneficial users of surface water in the Basin.

The California Department of Fish and Wildlife (CDFW) has published guidelines[54] for considering whether effects to GDEs and interconnected surface waters (ISWs) are significant. CDFW's approach suggests answering the following questions in the GSP:

Groundwater Dependent Ecosystems:

1. How will groundwater plans identify GDEs and address GDE protection?
2. How will GSAs determine if GDEs are being adversely impacted by groundwater management?
3. If GDEs are adversely impacted, how will groundwater plans facilitate appropriate and timely monitoring and management response actions?

Interconnected Surface Waters:

1. How will groundwater plans document the timing, quantity, and location of ISW depletions attributable to groundwater extraction and determine whether these depletions will impact fish and wildlife?
2. How will GSAs determine if fish and wildlife are being adversely impacted by groundwater management impacts on ISW?
3. If adverse impacts to ISW-dependent fish and wildlife are observed, how will GSAs facilitate appropriate and timely monitoring and management response actions?

CDFW has outlined specific Management Considerations to be integrated into the GSP:[55]

- ✓ Data Gaps and Conservative Decision-Making Under Uncertain Conditions
- ✓ Adaptive Management
- ✓ Prioritized Resource Allocation
- ✓ Multi-Benefit Approach

[54] *Fish & Wildlife Groundwater Planning Considerations*, CDFW, 2019.
[55] Groundwater Planning Considerations, CDFW, 2019.

The approach taken in this GSP takes into consideration the factors listed above. Section 5.3 discusses how GDEs were identified in the watershed, including both aquatic and riparian habitat types, Section 7 discusses the monitoring program for interconnected surface water and GDEs, and Section 9 discusses the possible measures that will be taken if undesirable results and adverse impacts have or may occur.

Although the GDE areas have experienced changing conditions, the existing condition supports significant habitat values. As detailed above, trigger levels have been established to inform the need for management actions and allow the SCV-GSA to determine if potential impacts are caused by groundwater extraction or other causes before a significant and unreasonable result occurs. Because of the presence of high-value GDEs in the Basin, the GSP classifies the following as an undesirable result that would occur in the form of a significant and unreasonable effect on GDEs:

- Permanent loss or significant degradation of existing native riparian or aquatic habitat due to lowered groundwater levels caused by groundwater extraction.
- In areas that currently provide essential habitat to UTS and native fishes (sensitive aquatic species in the vicinity of I-5 Bridge), cessation of surface flow and pools during low-flow conditions in the river channel caused by groundwater extraction.

It is possible that a sustained drop in groundwater levels below historic lows caused by groundwater extraction would cause loss of GDEs. Monitoring for groundwater levels will be conducted to avoid a long-term decline in the health of the vegetation and eventual permanent habitat loss caused by groundwater extraction. Monitoring of groundwater levels as a proxy to surface flows in these areas is considered important and will be conducted to avoid impacts to UTS and other sensitive aquatic species to the extent caused by groundwater extraction. The monitoring program, in conjunction with the groundwater flow model, will also be used to evaluate changes in groundwater levels that could arise if WRP discharges are reduced in the future (a condition over which the GSA has no control).

In losing reaches, groundwater levels have historically dropped below the river channel during the dry months and during droughts. In these areas, periodic cessation of surface flow in the river channel may not be a significant and unreasonable effect considering the history of past conditions. It should be noted that very low flow conditions have been observed during historical droughts near the I-5 Bridge where UTS and native fishes have been observed. Trigger levels established for this area are intended to result in actions that maintain sufficient flows to avoid impacting sensitive native fishes and UTS populations, if they are present, to the extent loss of surface flows is caused by groundwater extraction.

8.11.2 Minimum Thresholds

Section 354.28(c)(6) of the SGMA regulations states that "The minimum thresholds for depletion of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results."

During the longest simulated periods of increased pumping from the Saugus Formation, the groundwater model estimates that future depletion could range between 5,000 and 9,500 AFY, which is equivalent to a range of 420 to 790 acre-feet (AF) per month or 7 to 13 cfs. However, this occurs during only 7 years of the 95-year modeled period, based on the frequency and duration of future increased pumping periods that would be expected to occur as determined from DWR's most recent Delivery Capability Report for the SWP (DWR, 2020). During the remaining 88 years of the 95-year modeled future time period, the future depletion during periodic dry periods averages approximately 1,200 AFY, which is equivalent to 100 AF per month or 1.65 cfs.

In summary, future pumping is expected to create only periodic, rather than chronic, depletion of non-storm (i.e., dry-weather) streamflows and will not be significant and unreasonable in magnitude, especially when factoring in the additional amount of streamflow that arises from storm events. Additionally, direct uses of surface water for recreation, irrigation, or municipal purposes are not present or expected future significant beneficial uses of surface water in the Basin. The Santa Clara River flood plain is very broad in most of its reaches in the lower portions of the Basin and has a braided channel configuration. Surface water flow measurements are very difficult to obtain. In addition, this region is subject to high-flow events that scour out and significantly change the flood plain. This makes installation of additional stream gaging stations for measuring stream depletions technically infeasible. In our opinion, reliance on the County Line gage and the Old Road gage for measuring stream depletions and identifying conditions that could impact GDEs was considered insufficient. For these reasons, groundwater levels measured in multiple reaches and in proximity to the river and tributaries will be used as a proxy for assessing stream depletion in the future. Minimum thresholds have been established at the lowest predicted groundwater level that is estimated to occur at each representative monitoring site under future projected full build-out of land use and water use conditions in the Basin, consistent with the Basin Operating Plan described in Section 6. As with the minimum thresholds for chronic lowering of groundwater levels at other representative monitoring sites, the minimum thresholds for depletion of interconnected surface water are selected using the groundwater flow model simulation for the year 2042 water budget projection, which simulates the predicted future land use and water demands under 95 years of historical climate conditions that are adjusted for a 2030 level of climate change.

Because the minimum thresholds are based on future predicted water levels and are lower than historical levels, a data gap exists regarding the actual response of GDEs to a groundwater elevation that is at or below the historical low water level but above the minimum threshold for interconnected surface water. To provide greater assurance that significant and unreasonable effects on GDEs are avoided, groundwater trigger levels for GDEs are established that are higher in elevation than the minimum thresholds for depletion of interconnected surface water. The GDE trigger levels are incorporated into the monitoring program to provide active monitoring and timely evaluations that are designed to inform management actions that may be needed to avoid permanent loss of habitat or cessation of flow and loss of pools in areas where sensitive aquatic species (e.g., native fishes, including UTS) reside caused by groundwater extraction.

The trigger levels shown in Table 8-6 have been identified by SCV Water and the SCV-GSA as an important component of a GDE monitoring program because of the diverse and complex interaction that occurs between surface water and groundwater, which makes it difficult to distinguish between areas that are sustained primarily by surface water flows versus areas where the flows are partially or completely sustained by groundwater. Given that the current GDEs have survived through a recent drought that saw historical low groundwater levels in local wells, it can be inferred that GDEs are not adversely affected when groundwater levels are at or above those recent historical low levels. As a result, using trigger levels to evaluate groundwater elevation measurements (i.e., depth to groundwater) from existing and future monitoring wells (representative monitoring sites for GDEs) will provide an additional layer of protection for GDEs throughout the upper Santa Clara River and will allow the SCV-GSA to determine whether groundwater extraction is the cause of the potential impacts to GDEs as opposed to various other causes.

Trigger levels that require an evaluation of the GDE conditions are:

- Groundwater levels within GDE areas that are at the lowest historical (within previous 50 years) groundwater levels if caused by groundwater extraction.
- Groundwater levels that are 2 feet above the lowest historical (within previous 50 years) levels where UTS and other native fishes are present (e.g., I-5 Bridge area) that rely on surface flow and pools.

Based on this evaluation, management actions may be implemented as described in Section 9. A discussion of how GDEs were identified, how impacts to GDEs will be defined, trigger levels, and management actions if trigger levels are reached or approached is incorporated into the development of SMCs and is presented in Appendix E. The GSA will consult with applicable landowners to evaluate whether groundwater extraction contributes to possible impacts to GDEs and the nature and extent of possible management actions. See Section 9.5.5 for further discussions of the actions that will be taken if GDE trigger levels are reached.

Figure 8-7 is a map showing the locations of representative monitoring wells within the identified GDE area. There are no monitoring wells in several portions of the GDE area at this time, which is a data gap. For the purposes of setting GDE triggers at each well location in the GDE area, the calibrated groundwater model was used to estimate what the lowest historical groundwater levels were at each location between 1980 and 2019 (the modern-day period corresponding to formal groundwater elevation monitoring in the Basin). Appendix M of the GSP presents hydrographs showing the minimum thresholds and measurable objectives for depletion of interconnected surface water, along with the GDE trigger values (trigger levels) for each monitoring well that will be used to monitor depletion of interconnected surface water and GDEs. For each monitoring location, Table 8-6 lists the GDE trigger levels and the minimum thresholds and measurable objectives that are associated with depletion of interconnected surface water. Once new monitoring wells are installed near these locations, the minimum thresholds, measurable objectives, and trigger levels will be updated as needed to reflect actual groundwater level measurements at each location.

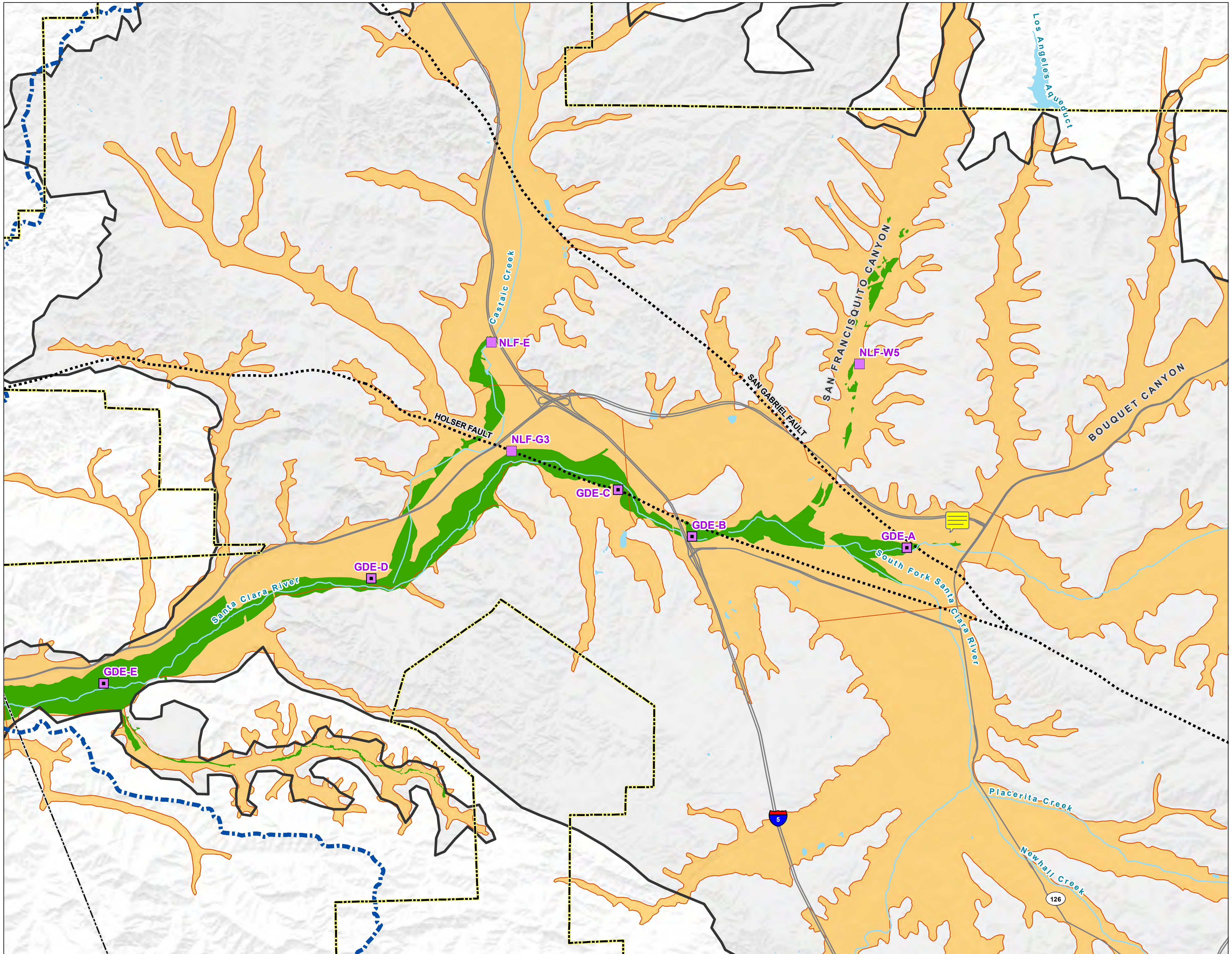


FIGURE 8-7

Groundwater Monitoring Network for GDEs

Santa Clara River Valley
East Groundwater Basin
Groundwater Sustainability Plan

LEGEND

GDE Monitoring Well in the Alluvial Aquifer

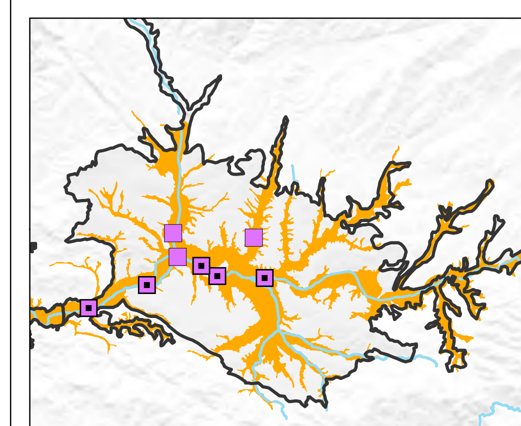
- Existing Observation Well
- New Observation Well (to be constructed)

Phreatophyte Locations

- Riparian Mixed Hardwood

All Other Features

- Santa Clara River Valley Groundwater Basin
- Alluvial Aquifer
- Watershed Boundary
- Service Area Boundary for SCV Water
- Major Road
- Watercourse
- Waterbody



NOTE

SCV Water: Santa Clarita Valley Water Agency

N

0 2,000 4,000 6,000
Feet

GSI Water Solutions, Inc.

Date: December 9, 2021
Data Sources: USGS, DWR Bulletin 118, ESA

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Table 8-6. Monitoring Locations, Minimum Thresholds, and Measurable Objectives for Depletion of Interconnected Surface Water and GDE Trigger Levels

Location Description	Well Name	Historical Low Depth to Groundwater[2] (feet bgs)	GDE Trigger Level[2] (feet NAVD 88)	Future Low Groundwater Elevation[2] (Minimum Threshold) (feet NAVD 88)	Future Average Groundwater Elevation[2] (Measurable Objective) (feet NAVD 88)
San Francisquito Canyon	NLF-W5[1]	42	1,108	1,087	1,119
Santa Clara River Below Mouth of Bouquet Canyon	GDE-A[1]	42	1,089	1,087	1,103
Santa Clara River at I-5 Bridge	GDE-B	-5	1,062	1,059	1,062
Santa Clara River Near Valencia WRP	GDE-C	8	1,027	1,024.5	1,035
Santa Clara River 1 Mile Downstream of Valencia WRP	NLF-G3	5	975	959	980
Santa Clara River Below Mouth of Castaic Creek	GDE-D	3	932	930	934
Santa Clara River at Mouth of Potrero Canyon	GDE-E	0	860	860	861
Castaic Creek in Lower Castaic Valley	NLF-E[1]	40	981	977	1,000

Notes

[1] May not be within a GDE area.

[2] Historical and future groundwater elevations shown in this table are from simulations conducted using the calibrated groundwater flow model. GDE trigger levels are equal to the historical low groundwater elevation, except at wells GDE-A and GDE-B, where they are set 2 feet higher to avoid loss of surface flow and pools. Native fishes are present at GDE-A and UTS are present at GDE-B (in the I-5 Bridge area).

bgs = below ground surface GDE = groundwater-dependent ecosystem I-5 = Interstate 5 NAVD 88 = North American Vertical Datum of 1988
UTS = unarmored three-spine stickleback WRP = water reclamation plant

8.11.2.1 Relationship between Individual Minimum Thresholds and Other Sustainability Indicators

Because of the interrelationship between groundwater levels, changes in storage, and interconnected surface water, it is possible that one set of thresholds could affect the other set of thresholds for these indicators. The relationship between the depletion of interconnected surface water and the other sustainability indicators is presented below.

- **Avoid Chronic Lowering of Groundwater Levels.** The minimum thresholds for depletion of interconnected surface water are numerically the same as would be calculated at each GDE monitoring location for chronic lowering of groundwater levels, as they are based on the predicted low groundwater elevation from the groundwater flow model simulation for the year 2042 water budget projection. The early-warning trigger levels (groundwater elevations) for evaluating potential effects on GDEs are higher than the minimum thresholds for depletion of interconnected surface water; this means that an evaluation of potentially significant and unreasonable effects on GDEs can be triggered before groundwater levels at the GDE monitoring locations become as low as the minimum threshold values (which are values for both chronic lowering of groundwater levels and depletion of interconnected surface).
- **Avoid Chronic Reduction of Groundwater Storage.** Nothing about the GDE trigger levels or the minimum thresholds for depletion of interconnected surface water promotes pumping in excess of the sustainable yield. Therefore, the minimum thresholds for depletion of interconnected surface water will not result in exceedances of the minimum thresholds for chronic reduction of groundwater storage.
- **Avoid Land Subsidence.** Nothing about the GDE trigger levels or the minimum thresholds for depletion of interconnected surface water promotes a condition that will lead to additional subsidence. Therefore, the minimum thresholds for depletion of interconnected surface water will not result in a significant or unreasonable level of subsidence.
- **Avoid Degraded Groundwater Quality.** The minimum thresholds for depletion of interconnected surface water will not change the groundwater flow directions or rates, and therefore will not result in a significant or unreasonable change in groundwater quality.
- **Avoid Seawater Intrusion.** This sustainability indicator is not applicable to the Basin.

8.11.2.2 Effects of Minimum Thresholds on Neighboring Basins

The Fillmore and Piru Subbasins are hydrologically downgradient of the Basin. Groundwater and surface water generally flow from the Basin into the Piru Subbasin, with the groundwater flowing from the Basin into the Piru Subbasin through a relatively thin layer of alluvium (less than 10 feet thick). The GDE triggers are set to protect habitat and sensitive species in the Basin, and the minimum thresholds are set to prevent significant and unreasonable depletion of interconnected surface water caused by groundwater extraction from occurring.

The minimum thresholds in this GSP are consistent with the groundwater conditions identified in prior modeling studies of the Basin Operating Plan (CH2M HILL and LSCE, 2005; LSCE and GSI, 2009). The Basin Operating Plan was developed and refined through those studies and was developed with input from the UWCD, a significant water provider in Ventura County, under an ongoing memorandum of understanding between SCV Water and UWCD that was executed in 2003. The Basin Operating Plan envisions groundwater extractions that are less than those that occurred prior to the conversion of agricultural lands to municipal uses and the importation of water (LCSE, 2003). Historical stream gaging data demonstrate how urbanization has increased the amount of streamflow in the Santa Clara River in the western portion of the

Basin (particularly below the outfall for the Valencia WRP), which in turn has increased the amount of streamflow to the downstream adjacent basin (the Piru Subbasin).[56]

Lastly, it is anticipated that any physical solution involving the importation of water and/or the control of pumping to manage flows between the upper and lower basins would be reached between UWCD and SCV Water because of the common reliance of these agencies on the SWP and their responsibilities. The SCV-GSA has a cooperative working relationship with the downstream GSA, and the two GSA's will share technical data, develop cooperative monitoring programs and identify sensitive issues.

8.11.2.3 Effects on Beneficial Uses and Land Uses

The GDE triggers levels, GDE evaluation process, and management actions have been selected to identify and evaluate potential impacts to GDEs in the Basin and implement management actions, if necessary, while providing a reliable and sustainable groundwater supply. Groundwater modeling results indicate that future pumping in the Basin during extended droughts could reduce groundwater levels below historically measured levels without causing chronic lowering of groundwater levels or chronic reduction of groundwater in storage. However, because there is a potential for future groundwater production to impact GDEs during extended drought conditions at some locations along the Santa Clara River corridor and in tributaries to the river within the Basin, the *Considerations for Evaluating Effects to Groundwater Dependent Ecosystems in the Upper Santa Clara River Basin* report was prepared. This report is included as Appendix E and presents a GDE monitoring and management program that includes triggers, evaluation, and management actions intended to prevent cessation of flow and loss of pools in areas where native fishes reside and permanent loss of GDEs. This report describes impacts to GDEs that include temporary acute loss of habitat in areas where sensitive species reside (e.g., the I-5 Bridge). Since this report was prepared, the GSA adopted more clear terminology in the GSP that refers to cessation of flow and loss of pools in areas where native fishes reside (e.g., near the I-5 Bridge).

8.11.2.4 Relevant Federal, State, or Local Standards

There are no federal, state, or local regulations related to interconnected surface water depletion other than those that are intended to protect aquatic and terrestrial threatened and endangered species. The GDE trigger levels described in this section and the projects and management actions described in Section 9 are intended to prevent impacts to these species and associated habitats.

8.11.2.5 Methods for Quantitative Measurement of Minimum Thresholds

As a proxy for surface water flow measurements, groundwater levels will be measured in monitoring wells in key locations within the GDE area shown on Figure 8-7. Details of this monitoring program are presented in Section 7.2.

8.11.3 Measurable Objectives

Measurable objectives for depletion of interconnected surface water, which are listed in Table 8-6, use groundwater levels as a proxy because of the lack of surface water gaging stations and because avoiding impacts to GDEs is the focus for this sustainability indicator. Because there is a lack of appropriately located monitoring wells within the GDE area shown on Figure 8-7, initial measurable objectives (in the form of

[56] The estimated total flow into the Piru Subbasin fluctuates over a fairly limited range of volumes on a long-term basis (ranging between approximately 7,000 and 8,000 acre-feet per year [AFY]). This 1,000 AFY range is small compared with annual variations in pumping and the amount of annual climate-driven variation that occurs in several of the water budget terms in the Basin.

groundwater levels) have been estimated at the monitoring sites shown on Figure 8-7 by using the calibrated groundwater flow model to estimate the future average groundwater levels at each monitoring location.

8.11.4 Interim Milestones

Interim milestones show how the GSA anticipates moving from current conditions to meeting the measurable objectives for depletion of interconnected surface water. Interim milestones are set for each 5-year interval following GSP adoption. For this sustainability indicator, there has been no known or documented significant or unreasonable surface water depletion, nor impacts to GDEs, to date, and none are anticipated. Thus, no interim milestones are proposed. The recent historical drought resulted in low groundwater levels and surface water flows. Most certainly, GDEs in the Basin were severely stressed and some trees died. However, the riparian vegetation and habitat in the GDE area has recovered and there is no indication that any impacts to GDEs were a result of groundwater extractions.

8.12 References

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9. Management Actions and Projects

9.1 Introduction

This section describes the management actions that will be developed and implemented in the Santa Clara River Valley Groundwater Basin, East Subbasin (Basin) to attain and maintain sustainability in accordance with §§ 354.42 and 354.44 of the Sustainable Groundwater Management Act (SGMA) regulations. Management actions described herein are intended to optimize local groundwater use to avoid undesirable results, consistent with SGMA regulations. The management actions described in this section include:

- Addressing data gaps
- Monitoring, reporting, and outreach
- Promoting best water use practices
- Actions if minimum thresholds are reached or undesirable results confirmed
- Actions if groundwater-dependent ecosystem (GDE) triggers are reached
- Other management actions to promote sustainable groundwater management

This section also describes other groundwater management actions and projects that are considered optional and in concept involve new or improved infrastructure to make new water supplies available to the Basin. These optional projects may be implemented to improve the resiliency of basin groundwater resources to extended drought. The optional projects are based on previous and ongoing feasibility studies conducted by the Santa Clarita Valley Water Agency (SCV Water) and its predecessor agencies or other GSA member agencies.

The need for the management actions that are discussed in this section is based on the following:

- Data gaps exist in the Basin, including groundwater levels within the GDE area, elevation control of well heads and river bottom, domestic well water quality, and subsidence benchmarks. Addressing data gaps will improve the understanding of the Basin and reduce uncertainty regarding decision making.
- Monitoring, in addition to existing programs, is necessary, including for domestic well water quality and water levels, groundwater levels supporting GDEs, subsidence, and non-de minimis pumping. This monitoring will improve the understanding of the Basin and reduce uncertainty regarding decision making.
- Best water use practices should be promoted for municipal, rural domestic, and agricultural groundwater users to reduce any waste and increase water use efficiency.
- Procedures are presented for evaluating and addressing conditions if minimum thresholds are reached.
- Procedures are presented for evaluating and responding to groundwater levels approaching and/or dropping below trigger levels in GDE areas.

Section 354.44 of the SGMA regulations requires that management actions described in a Groundwater Sustainability Plan (GSP) include a discussion about:

- Relevant measurable objectives that would be addressed by a management action or project
- The expected benefits of the action or project
- The circumstances under which management actions or projects will be implemented
- How public notice will be provided

- Relevant regulatory and permitting considerations
- Implementation schedules
- Legal authority required to take the actions
- Estimated costs and how they will be funded
- How pumping and recharge will be managed to ensure recovery of water levels from drought

Groundwater management actions are intended to improve the understanding of groundwater use in the Basin, improve monitoring of groundwater conditions, avoid undesirable results, and address all sustainability indicators described in Section 8. If groundwater levels are sustained without chronic decline, many of the associated undesirable results described in Section 8 will be avoided.

The management actions identified in this GSP will achieve groundwater sustainability by addressing undesirable results should they be observed. This GSP makes no determination of water rights. GSP management actions undertaken to achieve sustainability under SGMA will not result in or be construed as a forfeiture of or limitation on groundwater rights under common law.

9.2 Implementation Approach and Criteria for Management Actions

The amount of groundwater pumping in the Basin has not exceeded (and is not expected to exceed) the estimated sustainable yield of about 52,200 acre-feet per year (AFY) on a long-term (multi-decadal) basis (see Section 6), and groundwater levels have been and are expected to remain stable on a long-term basis. Accordingly, the Groundwater Sustainability Agency (GSA) intends to begin implementation of management actions soon after GSP adoption to ensure that data gaps are addressed and that the improved monitoring program continues to demonstrate that the Basin is being managed sustainably. The GSA will consult with applicable landowners before determining which management actions should be deployed, and how such management actions will be deployed to avoid undesirable results. The effect of the management actions will be reviewed annually, and additional management actions will be implemented as necessary.

The approach to funding implementation of the GSP and any optional actions will be developed by the GSA and its member agencies in accordance with all state laws and applicable public process requirements. Input from the public, interested stakeholders, and groundwater pumpers will be considered and incorporated into the decision-making process.

The GSA will periodically assess the need for required projects and other additional actions in the future should the potential for significant and unreasonable effects be identified. At a minimum, the reassessment process would be conducted as part of the 5-year GSP review and report.

9.3 Authorities Provided to the GSA

Using authorities outlined in §§ 10725 to 10726.9 of the California Water Code, the GSA will exercise local control and flexibility consistent with this GSP to commence management actions. The California Department of Water Resources (DWR) has provided broad authorities to GSAs to manage their respective groundwater basins. GSAs may use provided authorities to manage the basin and authorities include requiring well registration, installation of flowmeters, extraction reporting, paying of extraction fees, monitoring groundwater conditions, limitations on extractions. In addition, SCV Water, whose boundaries encompass most of the Basin, has authority to undertake management actions and projects under the Santa Clarita Valley Water Agency Act, including the power of eminent domain.

9.4 Current Understanding of Groundwater Well Operations

Municipal groundwater extractors include SCV Water and Los Angeles County Waterworks District Number 36. These extractors operate wells in the Alluvial Aquifer and Saugus Formation, and extractions from these wells varies, for example, in 2014 extractions are estimated at 70 percent of total annual groundwater extraction. In the future, it is anticipated that municipal groundwater extractions will increase relative to the total pumping as agricultural lands continue to be fallowed for urban development. The municipal entities measure and report extractions as required. Municipal entities conduct a significant amount of groundwater quality testing throughout each year.

Privately owned and operated wells include agricultural supply, irrigation (agricultural or other), and industrial use. Extractions from these wells varies, for example, in 2014 extractions are estimated at 29 percent total annual groundwater extraction. The GSA understands from well operators that, for the most part, extractions from these wells are metered and reported (for example, they are reported for SCV Water's Annual Water Report and/or to the State Water Resources Control Board [SWRCB]). Less is known about water quality testing from these well operators.

Privately owned and operated de minimis extractors (2 acre-feet [AF] or less groundwater extraction per year) are generally domestic wells. Extractions from these wells is estimated at 1 percent total annual groundwater extraction. The GSA believes that most de minimis extractors do not measure extraction volumes. Less is known about water quality testing from these well operators.

9.5 Basin-Wide Management Actions

The following subsections outline the various basin-wide management actions. The information in Sections 9.5.1 through 9.5.5 is required by § 354.44 of the SGMA regulations. Basin-wide management actions will be implemented that include:

- Addressing data gaps
- Monitoring, reporting, and outreach
- Promoting best water use practices
- Actions if minimum thresholds are reached or undesirable results confirmed
- Actions if GDE triggers are reached
- Other management actions and projects

9.5.1 Addressing Data Gaps

SGMA regulations require identification of data gaps and a plan for filling them (§ 354.38). Monitoring data will be collected and reported for each of the five sustainability indicators that are relevant to the Basin: chronic lowering of groundwater levels, reduction in groundwater storage, degraded water quality, land subsidence, and depletion of interconnected surface water. As noted in Section 7, the approach for establishing the monitoring networks was to leverage existing monitoring programs and, where data gaps existed, incorporate additional monitoring locations that have been made available by basin landowners and stakeholders. Data gaps that have been identified thus far include:

- Water levels within the GDE area
- Reference point elevation for all monitoring locations, including the riverbed in selected areas by GDE monitoring wells
- Domestic well water quality

- Subsidence benchmarks for monitoring land surface elevation
- Upland GDE verification and assessment

9.5.1.1 Installation of Piezometers within the GDE Area

As described in Section 7, GDE monitoring sites are needed within the GDE area (see Figure 8-7 in Section 8) to allow the GSA to monitor groundwater levels and assess whether groundwater pumping has or will cause impacts to GDEs related to lowered groundwater levels and depleted surface water. Eight GDE monitoring sites have been tentatively identified. These sites will consist of shallow (less than 50 feet deep) 2-inch diameter polyvinyl chloride (PVC) piezometers completed within the alluvium, with six of the piezometers located in proximity to the existing Santa Clara River channel, one existing alluvial well located along Castaic Creek, and one existing alluvial well located along San Francisquito Creek, as shown in Figure 8-2. These locations were selected to provide meaningful groundwater level data in reaches of the river and tributaries that are connected to surface water. Exact locations will be determined after consultation with landowners, the California Department of Fish and Wildlife (CDFW), and the Los Angeles County Flood Control District (LACFCD). Six of these locations along the Santa Clara River were previously identified by SCV Water, and funding for their installation has been provided by the 2017 Proposition 1 Sustainable Groundwater Planning Grant from DWR.

9.5.1.2 Reference Point Elevation Survey

A survey of the reference point elevations is needed for all existing and planned new wells that are part of the basin monitoring program. This is needed because not all wells in the program have been surveyed and because different datums have been used in the past. The planned reference point survey will ensure that all groundwater level data are referenced to the same vertical datum in the future. Further, some elevation surveys in the riverbed near GDE monitoring wells will be needed to better determine depth to groundwater beneath the riverbed.

9.5.1.3 Domestic Well Water Quality

Domestic wells are presently not included in existing groundwater quality monitoring programs. Because this group of groundwater users may be affected by groundwater management actions initiated by the GSA in some areas of the Basin, it will be necessary to establish (1) where there are domestic wells that could be affected by groundwater management actions and (2) a water quality sampling program for selected wells to establish a baseline data set for domestic well water quality. Once the baseline has been established, specific needs for future water quality sampling will be better understood.

The GSA will develop a plan that includes the following elements:

- Identifying general areas on a map where domestic wells may be located that could provide useful data and/or be affected by groundwater management actions,
- Outreach to landowners in these areas to solicit domestic well owner participation in the groundwater monitoring,
- Identification of domestic wells for the groundwater monitoring program that will be sampled,
- Selection of water quality constituents for testing,
- Conducting one round of sampling at the selected wells,
- Preparation of a summary report documenting the results, without disclosing specific sampling locations,
- Transmittal of laboratory testing results to individual well owners who participated in the program, and
- Any plan for future monitoring will be prepared with stakeholder input.

9.5.1.4 Subsidence Benchmarks

Section 7 describes the planned subsidence monitoring program for the Basin. A combination of Interferometric Synthetic Aperture Radar (InSAR) data and measured land surface elevation data at selected benchmarks comprise the monitoring locations. As described in Section 7, the GSA intends to use a set of benchmarks that have previously been used by the County of Los Angeles (LA County) to monitor land surface elevations in the Basin (previously at an approximately 6-year recurring survey cycle). The GSA intends to monitor subsidence twice annually at locations where future groundwater level declines could cause subsidence and damage critical infrastructure. Benchmark locations used by LA County will be identified for monitoring ground surface elevations at locations where the largest changes in groundwater levels are expected and where critical infrastructure exists (see Section 7). It will be necessary to work with LA County to determine which benchmarks are most suitable and to establish monitoring protocols that the GSA will follow. In addition, it will be necessary to correlate datums that have been used in the past by LA County with datums established by the GSA so that the two datasets are consistent.

9.5.1.5 Upland GDE Verification and Assessment

Potential GDEs were identified in upland areas (e.g., Placerita Canyon) outside the main Santa Clara River channel and tributaries (refer to Figure 3 in Appendix E). In response to comments from the Stakeholder Advisory Committee, this task includes additional field verification of these areas and assessment of groundwater elevations to assess whether these areas should be included in the ongoing GDE monitoring program.

9.5.1.6 Relevant Measurable Objectives

Addressing data gaps would help achieve measurable objectives for chronic decline in water levels, chronic depletion of storage, degradation of water quality, subsidence, and depletion of interconnected surface water by providing data needed by the GSA to track and monitor sustainability in the Basin so that undesirable results are avoided.

9.5.1.7 Expected Benefits and Evaluation of Benefits

The primary benefit of addressing data gaps is increasing the understanding of basin conditions and how basin management affects those conditions. Addressing the data gaps will result in (1) an improved understanding of groundwater levels in the GDE area, (2) improved accuracy in water level elevations and an improved ability to correlate measurements between measuring sites, (3) an improved understanding of domestic well water quality, (4) and improved monitoring of land surface elevations and subsequent identification of potential land subsidence that could result from groundwater pumping.

9.5.1.8 Circumstances for Implementation

Addressing data gaps will begin upon adoption of the GSP. No other triggers are necessary or required.

9.5.1.9 Public Noticing

Public noticing will not be required for addressing data gaps. Information associated with the monitoring program, which the elements relating to the data gaps are associated with, will be presented on the GSA website and in annual reports.

9.5.1.10 Permitting and Regulatory Process

Siting the GDE monitoring wells requires permission from landowners (the City of Santa Clarita [City] and FivePoint Holdings, LLC [FivePoint]). The GSA will consult with the CDFW to identify sites with the most efficient environmental permitting steps. An agreement has been signed between the City and SCV Water for installation of piezometers on City property. A permit has been granted by LACFCD for installation of piezometers within the floodway. The GSA is working with FivePoint regarding the siting and installation of piezometers on its property.

9.5.1.11 Implementation Schedule

Efforts to address data gaps will begin upon GSP adoption.

9.5.1.12 Legal Authority

The legal authority to address data gaps is included in SGMA. For example, Water Code § 10725.8 authorizes GSAs to require, through their GSPs, that the use of every groundwater extraction facility (except those operated by de minimis extractors) be measured. SGMA also requires that a monitoring program be implemented for each sustainability indicator. Addressing data gaps is integral to meeting this requirement.

9.5.1.13 Estimated Cost

The total estimated cost for addressing the data gaps described above for fiscal year (FY) 2021/22 and 2022/23 is described in Table 9-1.

Table 9-1. Cost Estimate for Addressing Data Gaps

	FY 2021/22	FY 2022/23
Consultant costs for elevation survey (wells and thalweg), domestic well sampling, establishing subsidence benchmarks, upland GDE assessment, and database maintenance[1]	$64,000	$0

Notes

[1] Costs for installation of piezometers and data loggers are included in the GSP development project under a Round 1 and 2 grant and are not included here. SCV Water administrative costs and labor associated with addressing data gaps are included in a separate budget.

FY = fiscal year GDE = groundwater-dependent ecosystem

9.5.2 Monitoring, Reporting, and Outreach

Monitoring, reporting, and outreach are core functions that the GSA will provide to comply with SGMA regulations. The GSA will direct the monitoring programs outlined in Section 7 to track basin conditions related to the five applicable sustainability indicators. Data from the monitoring programs will be routinely evaluated to ensure sustainability is maintained or progress is being made toward sustainability or to identify whether undesirable results are occurring. Data will be maintained in a Data Management System (DMS) operated by SCV Water. Data from the monitoring program will be used (1) by the GSA to guide decisions on management actions and to prepare annual reports to basin stakeholders and DWR, and (2) by individual entities to guide decision-makers. SGMA regulations require that (1) the reports comply with DWR forms and submittal requirements, and (2) all transmittals are signed by an authorized party. Data will be organized and available to the public to document basin conditions relative to sustainable management criteria (SMC) established for the Basin (see Section 8).

9.5.2.1 New Monitoring

As described in Section 7, monitoring of groundwater levels, water quality, and land subsidence has been conducted under several existing programs in the Basin. SCV Water is monitoring groundwater levels, pumping rates and volumes, and water quality at its municipal supply wells in accordance with requirements under existing California Division of Drinking Water programs. FivePoint is conducting monitoring at its agricultural irrigation wells and provides its annual pumping and water use volumes to the LA County Department of Regional Planning. FivePoint also provides its annual pumping volumes and its groundwater level measurement data to SCV Water on an annual basis. Monitoring that is necessary to comply with SGMA, but which is not being fully conducted under an existing program includes:

- Domestic water quality monitoring
- GDE monitoring
- Subsidence monitoring
- Receiving extraction data from non-de minimis well owners
- De Minimis Self-Certification Program

Domestic Well Water Quality Monitoring

As discussed previously, one round of groundwater sampling will be conducted at selected domestic wells in accordance with a domestic well selection and monitoring plan to establish a baseline water quality for these groundwater users. Future monitoring will be evaluated after the baseline data is reviewed.

GDE Monitoring

Monitoring of groundwater levels specifically for evaluating potential impacts to GDEs has not previously been conducted in the GDE area. Section 7 describes the proposed monitoring program for groundwater levels within the GDE area. In addition to groundwater level monitoring, Section 7 describes the ongoing evaluation of groundwater level data within the GDE area and describes the process for assessing the potential for impacts to occur to GDEs should minimum thresholds and trigger levels be approached in the future.

Subsidence Monitoring

Prior to development of this GSP, land subsidence data had not been compiled and evaluated to assess the effects of groundwater extraction on land surface elevations. Land surface elevation data are available from satellite-based data sources (i.e., InSAR) and from LA County for elevation benchmarks located in the Basin (see Section 5 for a discussion of these data). In the future, the GSA will conduct additional monitoring of land surface elevations at selected key locations on a bi-annual basis (see Section 7). InSAR data, land surface elevation data previously collected by LA County, and the additional subsidence benchmark data will be assessed annually for indications that subsidence is occurring.

Groundwater Extraction Reporting from Non-De Minimis Well Owners

For basin management purposes, it is necessary to measure the quantity of groundwater extractions that are occurring in the Basin. Municipal water providers and some private agricultural groundwater users have water meters and report metered information. Other users may employ electrical/pump performance tests to calculate pumping rates and report annual water use from wells. Non-de minimis users not already reporting extractions will need to be identified so that a metering or extraction reporting program can be implemented for these wells. For this reason, it will be necessary to inventory and categorize all active wells in the Basin.

Non-De Minimis Metering and Reporting Program. This GSP calls for a program that will require all non-de minimis extractors to report extractions annually and use a water-measuring method satisfactory to the GSA in accordance with Water Code § 10725.8. Non-de minimis extractors include, but may not be limited to agricultural wells, golf course wells, and other non-municipal supply wells. It is anticipated that the GSA will develop a policy to implement this program. The information collected will be used to account for pumping, to analyze projected basin conditions, and to complete annual reports and 5-year GSP assessment reports.

Groundwater Extraction Reporting from De Minimis Well Operators

Some well operators are considered de minimis extractors (meaning a person who extracts, for domestic purposes, 2 AF or less per year) and these wells may be excluded from extraction reporting in the Basin if the total number of wells and extraction does not become significant.

De Minimis Self-Certification Program. The number of de minimis extractors in the Basin are not known with a high degree of accuracy but are estimated to reflect approximately 500 AFY extraction. If the GSA determines additional information is needed for groundwater management from de minimis extractors, it may develop a self-certification program for de minimis extractors.

Annual Reports

Annual reports will be submitted to DWR starting on April 1, 2022, to provide required monitoring data, such as for water levels, water quality, extraction volumes and trend analysis. Annual reports will be available to basin stakeholders. Monitoring data also allows the GSA to evaluate trends, compare monitoring data to the SMC, and to report management actions and projects implemented to achieve sustainability. Annual reports allow promotion of best water use practices.

9.5.2.2 Five-Year GSP Updates and Amendments (SGMA Regulation § 356.2)

In accordance with SGMA regulatory requirements (§ 356.4), 5-year GSP assessment reports will be provided to DWR starting in 2027. The GSA will update the GSP at least every 5 years to assess whether it is achieving the sustainability goal in the Basin. The assessment will include a description of significant new information that has been made available since GSP adoption or amendment and whether the new information or understanding warrants changes to any aspect of the plan.

Although not required by SGMA regulations, the GSA may amend the GSP within any 5-year period through the 20-year planning horizon to integrate new information. Updates may include incorporating additional monitoring data, updating the SMC, documenting any projects that are being implemented, and facilitating adaptive management.

9.5.2.3 Relevant Measurable Objectives

Monitoring, reporting, and outreach will help achieve measurable objectives by improving the understanding of basin conditions and by keeping basin groundwater users informed so that actions can be taken to avoid undesirable results.

9.5.2.4 Expected Benefits and Evaluation of Benefits

The primary benefit from monitoring, reporting, and outreach is increasing the understanding of basin conditions and how basin management affects those conditions. Over time, data and analysis is expected to result in fine tuning of SMC including potential modifications to minimum thresholds and GDE triggers. Outreach, public education, and associated community wide increases in knowledge about groundwater sustainability will take place, but exact benefits are difficult to quantify.

Groundwater pumping will be measured directly through the metering and reporting program and recorded in the DMS. Changes in groundwater elevation will be measured with the groundwater level monitoring program. Ground surface elevations collected to monitoring for subsidence will be measured using InSAR data and the additional land surface elevation benchmarks. Changes in groundwater storage will be estimated using changes in groundwater levels (via proxy). Changes in depletion of interconnected surface water will be estimated using changes in groundwater levels (via proxy). Information about the monitoring programs is provided in Section 7. Isolating the effect of monitoring, reporting, and outreach on groundwater levels will be challenging because these additional monitoring programs together comprise only one of several management actions that may be implemented concurrently in the Basin.

9.5.2.5 Circumstances for Implementation

Monitoring, reporting, and outreach will begin upon adoption of the GSP. No other triggers are necessary or required.

9.5.2.6 Public Noticing

Monitoring information and annual reports will be posted on the GSA website to inform the groundwater pumpers and other stakeholders about basin conditions and the need to address undesirable results, if observed. On the GSA website and at regular GSA meetings, groundwater pumpers and interested stakeholders will have the opportunity to provide input and comments regarding how monitoring, reporting and outreach are being implemented in the Basin.

9.5.2.7 Permitting and Regulatory Process

If necessary for groundwater basin management, the GSA may adopt policies governing de minimis self-certification, and flowmeter and extraction reporting for non-de minimis extractors.

9.5.2.8 Implementation Schedule

Monitoring, reporting, and outreach efforts will begin upon GSP adoption.

9.5.2.9 Legal Authority

The legal authority to conduct monitoring, reporting, and outreach is included in SGMA. For example, Water Code § 10725.8 authorizes GSAs to require, through their GSPs, that the use of every groundwater extraction facility (except those operated by de minimis extractors) be measured.

9.5.2.10 Estimated Cost

The total estimated cost for monitoring, reporting, and outreach in FY 2021/22 and 2022/23 is described in Table 9-2.

Table 9-2. Cost Estimate for Monitoring, Reporting, and Outreach[1]

	FY 2021/22	FY 2022/23
Consultant costs for ongoing monitoring, surveying subsidence benchmarks, outreach planning, and database maintenance	$62,000	$93,000
Consultant costs for basin-wide monitoring evaluation, groundwater extraction documentation and reporting, annual report, additional GDE assessment (if needed), and database maintenance	$70,000	$90,000
Total	**$132,000**	**$183,000**

Notes

1 SCV Water administrative costs and labor associated with addressing monitoring, reporting, and outreach are included in a separate budget.

FY = fiscal year GDE = groundwater-dependent ecosystem SCV Water = Santa Clarita Valley Water Agency

9.5.3 Promoting Best Water Use Practices

Seventy percent of groundwater extraction in the Basin is by municipal agencies with strong preexisting conservation programs with clear metrics. The GSA's governing Board also includes seats for the two municipal pumper agencies. This GSP anticipates that the strong municipal water conservation programs already implemented by municipal agencies are sufficiently conservative so as not to require the GSA develop separate municipal water conservation programs. This is not to say however that the GSA Board of Directors would not encourage additional conservation from municipal agencies if the GSA Board of Directors determined it appropriate. Examples of existing municipal water conservation programs include community education and engagement, rebates and incentives, and regulatory mechanisms. In addition to its standing water conservation and water use efficiency communication efforts, SCV Water provides child and adult education supporting water quality, conservation, and water use efficiency practices. Further, SCV Water supports a water use efficiency program portfolio that includes, but is not limited to, rebates and incentives for turf conversion, smart irrigation controllers, irrigation distribution system efficiency upgrades, home and business check-ups, rebates for plumbing fixture upgrades, and water efficiency kits. As needed, SCV Water, through a recently enacted ordinance, may implement enforcement critical to curbing wasteful use of water practices.

Because municipal agencies do not have specific outreach to private well operators regarding water conservation, the GSA will work with private well operators to facilitate workshops or other programs designed to communicate best water use practices for private wells. This GSP calls for the GSA to encourage private pumpers to implement the most effective water use efficiency methods applicable, often referred to as best management practices (BMPs). Effective BMPs could include:

- Efficient irrigation practices in urban and rural areas.
- Implementation of a recycled water program to reduce reliance on groundwater for irrigation.
- Achievement of more optimal irrigation practices by monitoring crop water use with soil and plant monitoring devices and by tying monitoring data to evapotranspiration (ET) estimates.

SCV Water and private pumpers, such as agricultural users, already use BMPs, but improvements can be made. The goals for promoting BMPs are to (1) increase awareness of how water savings can maintain supplies to manage water use through droughts, and (2) broaden the application of BMPs to more groundwater users in the Basin.

De minimis groundwater users will be encouraged to use BMPs as well. Promoting BMPs will include broad outreach to groundwater pumpers in the Basin to emphasize the importance of utilizing BMPs and help groundwater pumpers understand the positive benefits of BMPs for water conservation to help with sustainability.

9.5.3.1 Relevant Measurable Objectives

Conservation programs and BMPs would help achieve the measurable objectives for groundwater elevation, groundwater storage, land subsidence, and interconnected surface water and reduce the potential to impact GDEs.

9.5.3.2 Expected Benefits and Evaluation of Benefits

The primary benefit from continuing conservation programs and initiating BMPs is water conservation which helps manage groundwater supplies so the Basin is better prepared for drought and to improve sustainability. Conservation metrics for municipal water use are well known and regularly reported by municipal agencies, it is unknown how much groundwater conservation will occur from promoting BMPs for private well operators. It is difficult to quantify the expected benefits for private well operators at this time.

Benefits associated with water conservation BMPs are already measured and reported by municipal users. Water conservation benefits from private well operators will be reported as BMPs are incorporated into private well operations.

Changes in groundwater elevation will be measured with the groundwater level monitoring program. Any subsidence will be measured with the satellite-based InSAR monitoring system and an on-the-ground land surface elevation monitoring network. Changes in groundwater storage, and depletion of interconnected surface water, will be estimated using the groundwater level proxy. Information about these monitoring programs is provided in Section 7. Isolating the effect of BMPs on groundwater levels will be challenging because the promotion of best water use practices is only one of several management actions that may be implemented concurrently in the Basin.

9.5.3.3 Circumstances for Implementation

BMPs and related outreach will be promoted soon after adoption of the GSP. No other triggers are necessary or required.

9.5.3.4 Public Noticing

Information about BMPs and programs designed to promote BMPs will be posted on the GSA website and included in mailers to inform groundwater users and pumpers and other stakeholders about basin conditions and the need for BMPs. Groundwater pumpers and interested stakeholders will have the opportunity to provide input and comments on how the BMPs are being implemented in the Basin through the website and at regular GSA meetings. The BMPs will also be promoted through annual GSP reports.

9.5.3.5 Permitting and Regulatory Process

No permitting or regulatory process is needed for promoting BMPs.

9.5.3.6 Implementation Schedule

The GSA envisions that BMPs will be promoted within a year of GSP adoption.

9.5.3.7 Legal Authority

No legal authority is needed to promote BMPs.

9.5.3.8 Estimated Cost

The estimated cost for promoting BMPs and understanding the extent to which they are being implemented in the Basin is primarily included in existing SCV Water programs. The GSA would do additional outreach regarding BMPs in line with its outreach budget.

Table 9-3. Cost Estimate for Promoting Best Management Practices

	FY 2021/22	FY 2022/23
Consultant costs for promoting best management practices for private well operators and database maintenance[1]	$11,000	$11,000

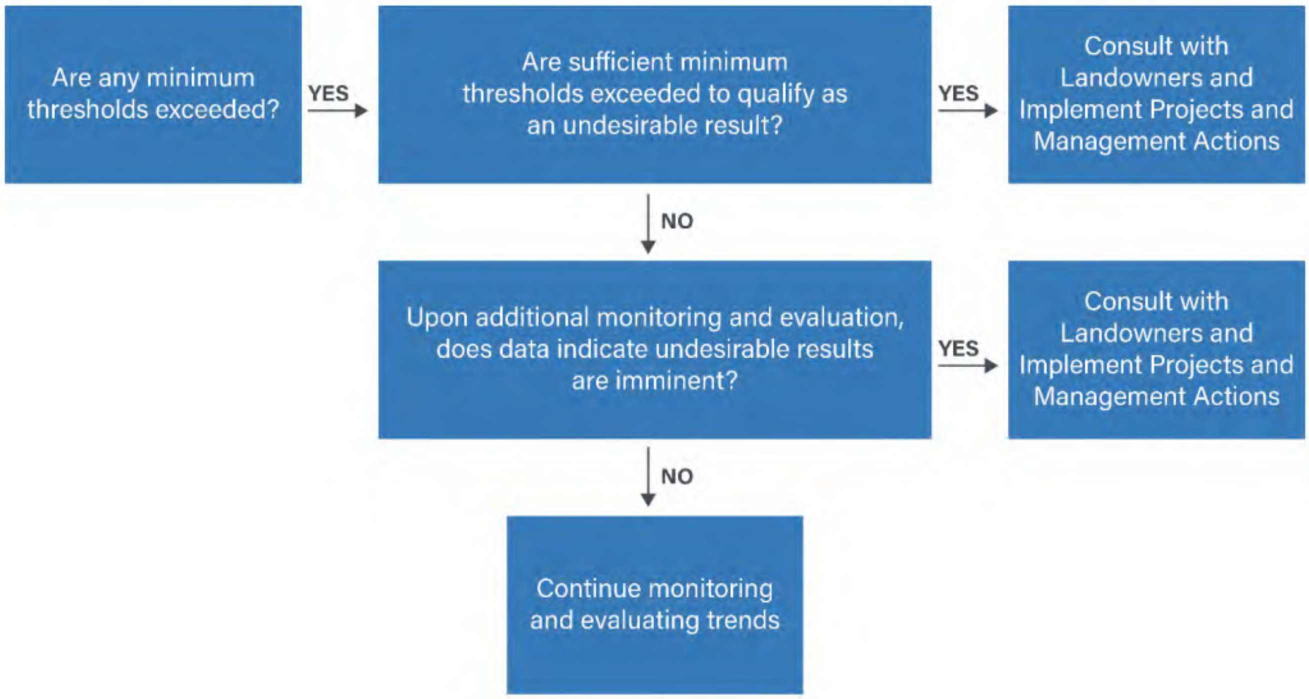
Notes

[1] SCV Water administrative costs and labor associated with promoting best management practices are included in a separate budget.

FY = fiscal year SCV Water = Santa Clarita Valley Water Agency

9.5.4 Actions If Minimum Thresholds Are Reached or Undesirable Results Confirmed

The GSA anticipates that if minimum thresholds are reached, the GSA will evaluate the cause. If that evaluation indicates the minimum thresholds were reached due to groundwater extraction and the trend of the data indicate that undesirable results arising out of groundwater extraction are imminent, then management actions would be called upon. If minimum thresholds are exceeded in the representative number of monitoring points over the specified conditions described in Section 8, then an undesirable result would be identified and, after consulting with applicable landowners, the GSA will take management actions as set forth in the diagram that follows.



9.5.4.1 Chronic Lowering of Groundwater Levels and/or Chronic Reduction in Storage

Because these two sustainability indicators are inter-related, the possible responses to reaching the minimum thresholds as well as evaluation of undesirable results are shared. If minimum thresholds are reached in a number of wells less than that required to make a determination of undesirable results, there still may be a potential for undesirable results and so evaluation may be necessary.

Undesirable results related to declining water levels may also be manifested for other indicators, including water quality degradation, depletion of interconnected surface water, and subsidence. For these reasons, the evaluation of what is significant and unreasonable for chronic lowering of groundwater levels and chronic reduction in storage should also consider these other indicators.

The evaluation of what may lead to an undesirable result if minimum thresholds are reached includes the following:

- **Evaluate whether the decline is due to pumping, drought, or both.** Pumping effects upon groundwater elevations should be evaluated in concert with considering if the cumulative departure from mean rainfall indicates a drought condition. Other evaluation steps may include conducting aquifer tests (by pumping or not pumping certain wells) and monitoring water level responses in adjacent wells to determine if the observed water level trend is primarily related to pumping. In addition, the groundwater model can be used to evaluate the relative influences of pumping versus drought conditions on observed water level declines.

- **Evaluate whether the declining water levels are likely to continue.** Historical water level monitoring has shown that water levels go up and down in response to annual and multi-year variations in rainfall across the Basin. This is particularly true in the Alluvial Aquifer. This step of the evaluation involves examining the rate at which water levels have declined compared with historical water levels and whether the trend will likely continue or get worse.
- **Evaluate whether other sustainability indicators are likely to be affected.** Monitoring data associated with the other sustainability indicators should be reviewed to assess whether declining water levels are also showing potential undesirable effects in the other indicators.

If after performing evaluations there is potential for an undesirable result if water levels decline below minimum thresholds, then one or more of the following management actions will be taken, following consultation with applicable landowners, until monitoring data indicate water levels have recovered so that undesirable results have been eliminated.

1. Redistribute pumping away from the affected area.
2. Reduce pumping in nearby wells.
3. Conduct additional releases from Castaic Lake if there is a benefit of doing so.
4. Bring in additional State Water Project water or other imported banked water to make up for reduced groundwater supply.
5. Implement tiered water conservation measures for the Basin.
6. Reduce pumping in the most affected aquifer.

9.5.4.2 Degraded Water Quality

If minimum thresholds for degraded water quality are reached in groundwater, the GSA will perform an evaluation to help determine the cause of degraded groundwater quality and whether it is likely to cause an unreasonable result. Evaluations may include:

1. Reviewing local land use information and activities (e.g., state records of groundwater contamination);
2. Evaluating groundwater extraction information to understand if it may cause migration of poor-quality groundwater associated with a contaminant plume or poor-quality groundwater residing in geologic formations toward other wells, This does not pertain to SCV Water pumping for water supply and SCV Water efforts to contain and treat identified contaminants in the aquifer;
3. Reviewing effect of drought and lower water elevations on water quality constituents;
4. Reviewing groundwater quality monitoring information, and or conducting additional groundwater quality analysis;
5. Considering the role of implementation of a recycled water program upon groundwater quality; or
6. Considering other water management actions not associated with the GSA (e.g., groundwater recharge projects developed by SCV Water, or others, that would have the potential to mobilize degraded groundwater).

The GSA will collaborate with the state regulatory agencies to determine the extent to which groundwater management actions, such as well head treatment, can be used to avoid unreasonable results. The GSA will also collaborate with the California Regional Water Quality Control Board (RWQCB) regarding implementation of the Salt and Nutrient Management Plan (SNMP) for the Basin to ensure that groundwater quality with respect to salts and nutrients does not jeopardize the future ability to use recycled water consistent with the SNMP.

If it is determined that GSA activities or basin pumping affect the groundwater quality degradation, the GSA may take one or more of the following steps to address the issue:

1. Review alternatives for improving groundwater quality in the affected area;
2. Work with affected groundwater users to deploy well head treatment systems;
3. Arrange for alternate water supply;
4. Shift pumping to other locations; and/or
5. Reduce or stop pumping near the affected area.

9.5.4.3 Subsidence

Minimum thresholds for subsidence have been established to avoid damage to critical infrastructure and land uses. As noted in Section 5, subsidence can be caused by activities stemming from groundwater pumping, tectonics, and oil and gas production. Each of these take place in the Basin. While significant and unreasonable subsidence caused from the whole of these activities has not been observed, groundwater pumping may temporarily cause groundwater level declines of up to 150 feet in the future. It is believed the geologic framework in this Basin has limited susceptibility to subsidence resulting from groundwater extraction, but there are data gaps. If the rate of subsidence and the total amount of subsidence exceed minimum thresholds in the future, then an evaluation will first be performed to assess the likely cause. Because reduced groundwater levels are one potential cause of subsidence, this evaluation will be similar to the evaluation described in Section 9.5.3.1 for chronic water level decline. If it is determined that groundwater pumping is the likely cause of the observation and there is likely to be an undesirable result (e.g., damage to critical infrastructure or land uses), then the management actions listed in Section 9.5.3.1 will be implemented until the rate of subsidence is reduced and additional undesirable results are minimized. These management actions may be directed to certain regions of the Basin that are most affected.

9.5.4.4 Depletion of Interconnected Surface Water

Because significant and unreasonable surface water depletion has not been observed within the Basin and no other beneficial uses of surface water other than GDEs exist in the Basin, the thresholds for avoiding depletion of interconnected surface water are set to avoid impacts to GDEs. As discussed in Section 8, the minimum threshold for this sustainability indicator has been established for a maximum allowable amount of surface water depletion that corresponds to the future predicted water level in GDE area monitoring wells completed in the Alluvial Aquifer near the Santa Clara River and in certain locations along Castaic Creek and in San Francisquito Canyon. It is not known if future groundwater levels below the historical low level could cause an impact to GDEs. For this reason, at each GDE monitoring well a trigger level has been established that is equal to the historical low groundwater level at the well site (as derived from historical data at two existing GDE monitoring well sites and from groundwater modeling analyses at the planned sites for six other GDE monitoring wells). The triggers, evaluations, and associated management actions (if needed to avoid undesirable results), will avoid impacts to GDEs. In the vicinity of the Interstate 5 (I-5) Bridge, a trigger level has been established using groundwater levels as a proxy that maintains surface water flow that is necessary to protect sensitive aquatic species in this area. Triggers specific to each area are shown in Table 8-6. The steps for evaluating whether future changes in observed groundwater levels within the GDE area are significant and unreasonable are described in the next section. Likewise, management actions that will be taken if undesirable results are likely to occur are also described in the next section.

9.5.5 Actions If GDE Triggers Are Reached or Approached

9.5.5.1 Evaluation Process When GDE Triggers Are Reached or Approached

Section 8 states that when a trigger is reached or approached, an evaluation process will be initiated to determine whether the lowered groundwater levels and possible surface water depletion are a result of pumping and could result in a significant and unreasonable effect to GDEs. The Monitoring Plan presented in Section 7 includes a process to report the trigger event to the GSA Board as needed with an accompanying Evaluation Report that evaluates the need for management actions to be implemented. Management actions would be implemented quickly (in some cases, in as little as 1 to 2 weeks after completing the evaluation process) if the lowering groundwater levels could result in permanent loss or significant degradation of existing native riparian or aquatic habitat due to groundwater extraction throughout the GDE area or temporary loss of essential habitat to unarmored three-spine stickleback (UTS) (sensitive aquatic species in the vicinity of I-5 Bridge) as a result of cessation of surface flow during low-flow conditions in the river channel caused by groundwater extraction. Several questions have been identified below that may shed light on the significance of lowered groundwater levels. Refer to Figure 7-13 in Section 7 for the locations of the river segments and GDE monitoring sites.

Questions that will be addressed as part of this evaluation process include, but are not limited to, the following:

1. **Is the affected river segment supported by surface flow from water reclamation plant (WRP) discharges? (Surface water may support habitats during temporary periods of lower-than-normal groundwater levels.)**

   Surface water is generally persistent from the Valencia WRP to the basin boundary. The Evaluation Report may document that streamflows are persistent even with lowered groundwater levels. If streamflows are not present downstream of the location of the Valencia WRP outfall, then the Evaluation Report would conclude that surface flows are not sustaining vegetation during the historically low groundwater period, and further evaluation of the following questions may lead to management actions.

2. **Is the historically low groundwater level already below the tree/shrub root depths? (If so, further declines in the same year may not affect GDEs.)**

   The Evaluation Report may rely on topographic data and depth-to-groundwater data from recent monitoring well readings to determine whether groundwater levels are below tree/shrub root depths. The existing vegetation may not be relying on groundwater in areas where temporary drawdowns of the water table to depths of 15 feet or more occur regularly. An elevation survey of the thalweg may be helpful to estimate root zone areas in the affected reach. In areas where groundwater is lowered more than 2 or 3 feet below historically low levels, GDEs may be disconnected from their water source to an unprecedented degree. In these areas, management actions may be warranted.

3. **Will the GDEs survive the temporary loss of access to groundwater? (Depending on the season, groundwater levels may be expected to rise above historically low levels within a month or two, avoiding permanent loss of habitat. When groundwater levels are restored sufficiently quickly in the winter months, effects to GDEs may not be significant.)**

   The Evaluation Report should provide a qualitative assessment of the duration that lower groundwater levels may occur during a specific season, if water levels will recover initially with cooler temperatures in the fall and then more substantially following rain events. If GDE triggers are reached early in the year, then the GDEs may experience more stress than if the triggers are reached late in the hot weather season. The Evaluation Report may recommend initiating vegetation monitoring to assess whether drought stress is visible in the river segment. If vegetation is showing signs of stress that are attributable to historically low groundwater levels, then the Evaluation Report will be updated, and management actions may be warranted. For the aquatic habitat where sensitive aquatic species are located in Segment 1 (e.g., UTS present near the I-5 Bridge), any temporary loss of surface flow is to be avoided with management actions before it occurs.

4. **Has the GDE trigger been reached often in recent years? Droughts that lower groundwater levels are a natural occurrence, but do not occur every year. To sustain GDEs over the long term, groundwater levels affected by drought conditions must recover sufficiently quickly and remain higher during most years in order to support healthy, sustainable habitats over the long term.**

   The Evaluation Report should report the frequency with which the GDE triggers have been reached. If the triggers have been reached more than two or three times within a 10-year period, the Evaluation Report may recommend initiating vegetation monitoring to assess for recurring stress and gradual degradation of habitat. If a gradual decline in habitat quality is seen because of pumping that may lead to undesirable results, then the Evaluation Report will be updated, and management actions may be warranted.

5. **Are the declines in groundwater levels resulting from pumping?**

   The analysis described in Section 9.5.3.1 will be performed to assess the effect of pumping versus drought conditions. Pumping data from wells that are known to be pumping in the Basin will be compiled. Historical pumping rates will be compared to current pumping rates recorded for the recent past (i.e., in previous months). If current pumping rates are less than or equal to historical pumping rates, then the Evaluation Report may conclude that further reductions in current pumping rates are not warranted because GDEs have survived during historical droughts when higher pumping rates and/or historically lower low water levels were observed. If unprecedented drought conditions or other changes in the water balance of the Basin are contributing to the condition, then the GSA may consider actions that could be taken to further ensure that undesirable results are avoided.

6. **Has new information been obtained that can be used to refine the trigger levels presented in Section 8?**

   The Evaluation Report should provide the context for developing recommendations on future evaluation, monitoring, and action items. If new information becomes available regarding the resilience or sensitivity of the GDEs and the special status species that rely on the habitat values, then the Evaluation Report should identify this updated information and recommend management actions as needed to avoid undesirable results. This may include refining the trigger level over time to better correlate with the potential for undesirable results.

9.5.5.2 Evaluation Report

The information gathered for Section 9.5.5.1 will be discussed in an Evaluation Report. The report will include recommendations for ongoing monitoring, or implementation of management actions and will include justification for the conclusions.

9.5.5.3 Presentation to the GSA Board

Evaluation Reports will be presented to the GSA Board quarterly, or more frequently if necessary.

9.5.5.4 Possible Management Actions If GDE Triggers Are Reached

The Evaluation Report may conclude that the lowered groundwater levels do not represent significant and unreasonable effects to GDEs in areas where GDEs are resilient and where sensitive species would be expected to persist during the drought and fully recover with the return of wet weather. However, there are priority areas in the river system (e.g., I-5 Bridge area where UTS may be found) that may not be resilient to future unprecedented drought conditions. If these areas are threatened with temporary loss of surface flows for any duration, then management actions would be necessary.

If during future unprecedented multi-year droughts that were not simulated during development of this GSP reduction of pumping does not avoid significant effects and impacts to GDEs, then the GSA will consult with the U.S. Fish and Wildlife Service (USFWS) and CDFW to develop emergency measures to avoid significant effects to sensitive species.

If significant and unreasonable effects are anticipated, then any necessary management actions would be implemented in a timely manner as described below:

1. The GSA in consultation with groundwater pumpers will implement one or more of the following measures:

   - Shift pumping to another location to reduce impact on GDEs, and/or
   - Stop pumping in wells near the GDEs, and/or
   - Increase the quantity of imported water into the Basin

   Should any of the above be a consideration, the groundwater flow model may also be used to determine optimum pumping locations/aquifer most likely to avoid undesirable results.

2. The GSA may coordinate with SCV Water to consider implementing a mandatory water conservation program so that overall pumping in the Basin can be reduced.

3. If the evaluation shows that non municipal production wells are contributing to the problem, then the GSA will conduct outreach up to and including meetings with private well owners and stakeholders to discuss how to best respond to the concern. Ideally, this would occur prior to the time when significant and unreasonable impacts to GDEs are observed. The GSA may request reductions in pumping from private (non-de minimis) wells owners.

4. If monitoring data and weather predictions indicate that undesirable results are likely to persist into the following year and the above actions are not likely to mitigate the impacts, then it may be necessary to develop additional projects designed to increase the amount of water in the river system as described in Section 9.6.3.

9.6 Other Groundwater Management Actions and Projects

Although not specifically funded or managed as part of implementing this GSP, several associated actions will be encouraged by the GSA as part of good groundwater management practices.

9.6.1 Agency Coordination

Groundwater resources within the Basin are an integral part of the upper Santa Clara River watershed and maintaining the health of the Santa Clara River is part of the GSAs Sustainability Goal. To effectively manage the groundwater resources within the Basin, there will be an ongoing need to coordinate with various state and local agencies that have authority over land use, water supply, and water quality in the watershed, including CDFW, the RWQCB, DWR, California Department of Transportation (Caltrans), the SWRCB, LA County, and the City (refer to Section 3.3 for more details). Other opportunities for coordination also exist between the GSA and the Upper Santa Clara River Integrated Regional Water Management process, and the GSAs role as a member of LA County's Safe Clean Water Program. It is anticipated that GSA staff and Board members will maintain regular communication with these entities to discuss issues affecting the watershed and groundwater resource quality and quantity.

9.6.2 Removal of Invasive Species

Invasive plant species, consisting primarily of *Arundo donax* (*Arundo*), have become established within the riparian area along the Santa Clara River and some of its tributaries. A literature review by The Nature Conservancy (TNC) (2019) identified 12 studies of water use by *Arundo*, which together provide water use estimates ranging between 1.8 and 48 AF/acre/year, with mean and median and mean values of 8.3 and 12.3 AF/acre/year, respectively. While not required, the GSA will continue to support efforts by others to raise money for invasive species removal projects.

9.6.3 Optional Managed Aquifer Recharge Projects

Principal aquifers in the groundwater basin are the Alluvial Aquifer and Saugus Formation. Each aquifer accepts natural groundwater recharge in different ways. The Alluvial Aquifer is exposed at the ground surface in the Santa Clara River and its tributaries, but alluvial sediments are also present outside of these areas (a.k.a. "off stream"). The Saugus aquifer is exposed throughout much of the valley where not covered by alluvial sediments. Existing groundwater recharge to these aquifers is provided naturally from precipitation, and from urban processes including dry weather runoff, irrigation, and water reclamation plant discharges.

Managed groundwater recharge can utilize water sources such as stormwater, excess imported water, and/or recycled water to meet multiple goals within the watershed including reducing stormwater runoff, increasing the use of recycled water, and augmenting groundwater supplies for drought. Recharge can be accomplished by distributing water to infiltration areas where it drains by gravity into the soils, or through injection wells where water is pumped to aquifer zones below. Efforts to characterize additional groundwater recharge opportunities in the Basin have been underway for many years and in recent years some field studies have been implemented to test areas for recharge capability.

In 2015, a Water Resources Reconnaissance Study was commissioned by Castaic Lake Water Agency and performed by Carollo Engineers. This study conducted screening of numerous potential recharge areas within the valley. It identified areas with geology suitable for additional groundwater recharge, and it also identified areas that did not have sufficient aquifer material to accept meaningful amounts of recharge.

Informed by this work, additional work has taken place ranging from defining initial concepts to looking at specific sites, conducting environmental review, test well installation, infiltration testing, and monitoring to develop a baseline.

Because undesirable results from groundwater extraction have not been identified, implementation of these kinds of projects is not required and thus are considered optional. A description of these optional projects is presented below.

9.6.3.1 Old Castaic School Site Recharge and/or Potential Eastern Recharge

In response to the findings in the Water Resources Reconnaissance Study, the former Newhall County Water District commissioned Geosyntec, Trussell Technologies, and GSI Water Solutions, Inc. to conduct a focused groundwater recharge feasibility studies in the eastern portion of the valley and near the Castaic Lagoon (completed in 2016/17). Based on the water quality and hydrogeological considerations presented in the feasibility studies, the reports concluded that groundwater recharge using surface spreading in the Upper Santa Clara River Watershed showed promise and warranted further field investigation. In July of 2019, SCV Water contracted GSI Water Solutions, Inc. to assess these potential recharge sites.

Work at the Castaic site to date includes a review for environmental contamination, infiltration testing, aquifer parameter estimates, installation of an observation well, data collection, and estimation of potential recharge amounts, and travel time of infiltrated water to a nearby well. Work in the eastern part of the Basin has included field reconnaissance, a review for environmental contamination, and review of "off stream" locations.

9.6.3.2 Recharge Using Potable Water in the Vicinity of the Placerita Nature Center

SCV Water operates a potable water supply line delivering water to residents in Placerita Canyon. This water supply is within the right of way of Placerita Canyon nearby Placerita Nature Center. Due to past concerns raised by stakeholders about drought stress and drought caused die-off of oak trees in a limited area of the Nature Center property, SCV Water is considering providing excess potable supply through a pipe and delivery structure to limited areas during drought to mitigate drought effects.

9.6.3.3 Off Stream Recharge Using Recycled Water

In 2016 Castaic Lake Water Agency prepared a draft Recycled Water Master Plan that among other things, considered use of recycled water for groundwater recharge at multiple locations within the valley. A number of sites adjacent to the Santa Clara River were evaluated, including off stream storage south of the river near Via Princessa, and further east in the Basin. The role of recharge with recycled water should continue to be evaluated.

9.6.3.4 Aquifer Storage and Recovery

Injection wells can be used to inject water into aquifers to help recharge aquifers, and also provide water for recovery at a later date. No such projects are under evaluation at this stage, but they may be evaluated in the future by municipal water suppliers. Water for injection could come from excess state water, or banked water.

9.6.3.5 Bouquet Canyon Creek Restoration

Historically, Bouquet Canyon Creek benefited from steady releases of water from the Bouquet Canyon Reservoir. Annually, the releases were approximately 2,000 AFY. This flow benefited creek habitat and groundwater recharge. Several years ago, a debris flow into the creek necessitated a reduction in discharges from the reservoir in order to avoid flooding the adjacent well-traveled road and creating a safety issue. As a result of these reduced discharges, approximately 11,000 AF of reservoir water has been withheld over time, reducing recharge that supplies shallow wells in the canyon and reducing basin recharge. LA County, along with state and federal regulatory agencies, have considered options to restore the creek and ultimately allow full reservoir releases to begin again, but a final solution remains to be arrived at. The GSA will cooperate with LA County, the City of Santa Clarita, CDFW, U.S. Forest Service, landowners, and other stakeholders to facilitate projects that seek the restoration of flows in Bouquet Creek.

9.6.4 Estimated Cost

Because these groundwater management actions and projects are considered optional at this time and have not been fully evaluated, detailed costs for planning, permitting, and development of any specific project are not provided at this time. However, the GSA may choose to investigate these management actions and projects during the next two fiscal years and so an initial budget for feasibility studies, California Environmental Quality Act (CEQA) analysis, preliminary design, and project development is provided in Table 9-4.

Table 9-4. Cost Estimate for Initial Project Development

	FY 2021/22	FY 2022/23
Budget for feasibility studies, CEQA analysis, preliminary design, and project development[1]	$75,000	$50,000

Notes

[1] SCV Water administrative costs and labor associated with initial project development are included in a separate budget.

CEQA = California Environmental Quality Act FY = fiscal year

9.7 Demonstrated Ability to Maintain Sustainability

To demonstrate the ability to maintain sustainability, the groundwater model was used to simulate future pumping, future land use at full build-out, and climate conditions (including climate change) through the years 2042 and 2072 (see Section 6). Based on this analysis, the modeling results demonstrated that undesirable results relating to chronic reduction in groundwater levels and chronic reduction of groundwater in storage have not occurred historically and are unlikely to occur in the future under the groundwater operating plan, given the current understanding and assumptions involving future land uses, the water demands for those land uses, and future climate. Groundwater modeling was not used to assess the potential for subsidence. While subsidence is not expected to be significant and unreasonable in the future, a subsidence monitoring program is included in this GSP.

Because the groundwater and river systems are highly interconnected, surface water depletion occurring because of groundwater levels in the Alluvial Aquifer falling below historical levels has the potential to impact GDEs in some areas. For these reasons, the GSP is implementing a robust GDE monitoring and assessment program. Should the monitoring and assessment program indicate that impacts to GDEs are imminent and could be significant, then a series of timely management actions are planned to avoid impacts.

9.8 Management of Groundwater Extractions and Recharge to Ensure Sustainability

This GSP has established processes for monitoring basin conditions, assessing whether potential impacts are significant and unreasonable, and establishing management actions that are intended to avoid undesirable results associated with each of the sustainability indicators. The GSP also identifies and proposes actions to address data gaps and related uncertainties that may affect decision-making. Addressing these data gaps and uncertainties over time will improve the current understanding of basin conditions and improve the basis for decision-making.

9.9 Reference

TNC. 2019. *Enhancing Water Supply through Invasive Plant Removal: A Literature Review of Evapotranspiration Studies on Arundo Donax*. Prepared by The Nature Conservancy (TNC). 6 pp. February 11, 2019. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_Arundo_ET_Literature_Review_Feb2019.pdf.

10. Groundwater Sustainability Plan Implementation

10.1 Introduction

This section provides a conceptual road map for efforts to implement the Santa Clara River Valley East Groundwater Subbasin Groundwater Sustainability Plan (GSP) during the first 5 years and discusses implementation effects in accordance with the Sustainable Groundwater Management Act (SGMA) regulations § 354.8(f)(2) and (3). A general schedule showing the major tasks and estimated timeline is provided as Figure 10-1. Specific regulations guiding the content of this section were not developed by the California Department of Water Resources (DWR).

This implementation plan is based on current understanding of the Santa Clara River Valley East Groundwater Subbasin (Basin) conditions and anticipated administrative considerations that affect the management actions described in Chapter 9. Understanding of basin conditions and administrative considerations will evolve over time based on future refinement of the hydrogeologic setting, groundwater flow conditions, and input from basin stakeholders.

Implementation of this GSP requires robust administrative and financing structures, with adequate staff and funding to ensure compliance with SGMA. The GSP calls for the Santa Clarita Valley Groundwater Sustainability Agency (GSA) to routinely provide information to the public about GSP implementation and progress towards sustainability and the need to use groundwater efficiently. The GSP calls for a website to be maintained as a communication tool for posting data, reports, and meeting information.

Section 9 presents a number of management actions to implement that will address data gaps and reduce uncertainty, improve understanding of basin conditions and how they may change over time, and actions intended to promote conservation and optimize water use in the Basin. New projects are not proposed at this time, only suggested as optional, because (1) the Basin is in balance and (1) no undesirable results have been observed and are not expected during the future planning horizon. The management actions that are proposed and are the subject of this implementation plan include the following:

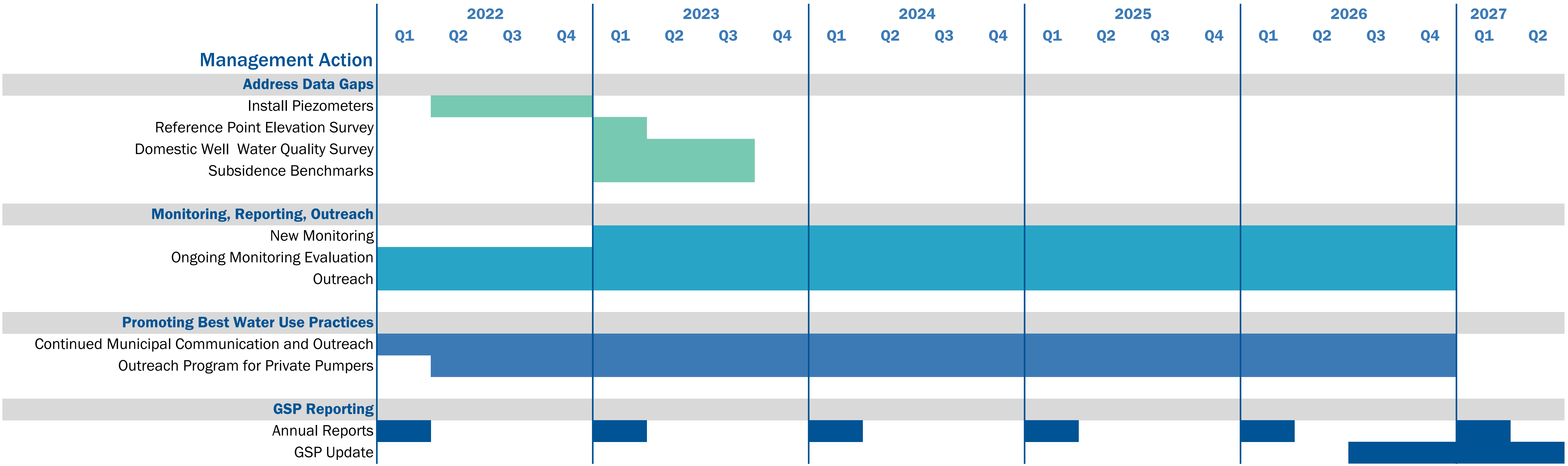
1. Addressing data gaps
2. Monitoring, reporting, and outreach
3. Promoting best water use practices
4. Initial feasibility studies

This section of the GSP describes how these management actions will be implemented, and includes descriptions of the following:

- Administrative approach and implementation timing
- Costs associated with implementing management actions and funding sources
- Effects on existing land uses
- Effects on water supply
- Effects on the local and regional economy

Each topic is discussed in the following sections.

Figure 10-1. Preliminary Schedule for GSP Implementation, Santa Clara River East Subbasin



10.2 Administrative Approach and Implementation Timing

The GSA will likely hire consultant(s), assign a member agency to conduct or manage the effort, and/or hire staff to implement the GSP. If consultants are hired, it is anticipated that qualified professionals will be identified and hired through a competitive selection process. It is also anticipated that the lead for a particular task will keep the GSA informed via periodic updates to the GSA Board and the public. As needed, the GSA would likely conduct specific studies and analyses necessary to improve understanding of basin conditions. The GSA would likely then use new information on basin conditions to identify, evaluate, and/or improve management actions to achieve sustainability. This GSP calls for actions considered by the GSA to be vetted through a public outreach process whereby groundwater pumpers and other stakeholders will have opportunities to provide input to the decision-making process.

The GSA intends to begin implementing the management actions upon adoption of the GSP. Figure 10-1 provides a preliminary schedule for implementing each management action over the next 5 years.

10.3 Costs Associated with Implementing Management Actions and Funding Sources

As summarized in Table 10-1, a conceptual planning-level cost of $282,000 for fiscal year (FY) 2021/2022 and $244,000 for FY 2022/2023 was estimated for planned activities during the first 2 years of implementation.

Table 10-1. Conceptual Planning-Level Cost Estimate for GSP Implementation

Activity	Fiscal Year	
	2021/2022	2022/2023
Address Data Gaps	$64,000	$0
Monitoring, Reporting, and Outreach	$132,000	$183,000
Best Management Practices	$11,000	$11,000
Initial Feasibility Studies, CEQA analysis, Preliminary Design, and Project Development[1]	$75,000	$50,000
TOTAL	**$282,000**	**$244,000**

Notes

[1] SCV Water administrative costs and labor associated with these implementation activities are included in a separate budget.

CEQA = California Environmental Quality Act

This cost estimate reflects consultant costs for addressing data gaps, monitoring, public outreach, promoting best management actions, and the basin-wide and area-specific management actions outlined in Section 9. Costs include contractor/lab costs, equipment costs, and labor costs associated with implementing the efforts.[57] The cost estimate does not include costs associated with complying with the California Environmental Quality Act, legal staff costs, costs for responding to DWR comments, nor does it include costs associated with any other projects undertaken by Santa Clarita Valley Water Agency (SCV Water). SCV Water costs associated with administration and implementation of management actions and projects are not included in this cost estimate and are included in separate GSA budget line items.

[57] For cost estimating purposes, it is assumed that SCV Water staff will manage the effort.

The GSP anticipates implementation will be covered under the terms of the existing Joint Exercise of Powers Agreement (JPA) and Administrative Services Agreement among the member agencies subject to any necessary agreement revisions. Consistent with current practice under the JPA, it is anticipated that an annual operating budget will be established and considered for approval by the GSA Board. The budget information and management action details may be used to conduct a fee study for purposes of developing a fee to cover the costs of implementing the programs described in the GSP.

California Water Code §10730 and § 10730.2 provide GSAs with the authority to impose certain fees, including fees on groundwater pumping. Any imposition of fees, taxes, or other charges would need to follow the applicable protocols outlined in the above sections and all applicable Constitutional requirements based on the nature of the fee. Such protocols would likely include public outreach, notification of all property owners, and at least one public hearing where the opinions and concerns of all parties are heard and considered before the GSA makes a determination to proceed with a fee or other charge. It is assumed that any fee structure adopted by the GSA would be adopted by resolution or ordinance. The GSA intends to apply for GSP implementation grants provided by the DWR and other funding sources (when they become available), to reduce the financial impact of implementation on member agencies and ratepayers.

10.4 Effects on Existing Land Uses

None of the proposed management actions will have an effect on existing land uses. Installation of shallow piezometers and temperature probes are planned in the groundwater dependent ecosystem area near the river. Potential impacts to existing habitat during installation of the piezometers and probes will be minimized and are considered de minimus.

10.5 Effects on Water Supply

The only management action that may have an effect on water supply is promoting best water use practices that will result in reduced water consumption and increase water supply over time. This management action continues the efforts by SCV Water to encourage water conservation through community education and engagement, rebates and incentives, and regulatory mechanisms. The GSA may implement enforcement that would be critical to curbing wasteful use of water practices.

The GSA plans to work with private well operators to facilitate workshops or other programs designed to communicate best water use practices for private well owners. This GSP calls for the GSA to encourage private pumpers to implement the most effective water use efficiency methods (often referred to as best management practices [BMPs]). Effective BMPs could include the following:

- Implementation of efficient irrigation practices in urban and rural areas.
- Implementation of a recycled water program to reduce reliance on groundwater for irrigation.
- Achievement of optimal irrigation practices by monitoring crop water use with soil and plant monitoring devices and by tying monitoring data to evapotranspiration estimates.

SCV Water and private pumpers such as agricultural users already use BMPs, but improvements may be able to be made. The goals for promoting BMPs are to (1) increase awareness of how water savings can maintain supplies to manage water use through droughts, and (2) broaden the application of BMPs to more groundwater users in the Basin.

10.6 Effects on the Local and Regional Economy

The sustainability goal for the Basin emphasizes the importance of managing the groundwater basin in a sustainable manner such that groundwater resources continue to provide a reliable long term water supply and the health of the Santa Clara and associated habitat is maintained. These goals are critical to maintaining and enhancing the livability and quality of life in the Basin. This also ensures that the local economy and businesses continue to thrive and contribute to the local and regional economies. All of the management actions that are contemplated as part of this plan support these values. None are expected to have a detrimental effect on the local or regional economies.

11. Notice and Communication [§ 354.10]

This section details the methods and tactics used to involve individuals and organizations that have a direct interest in management of the Santa Clara River Valley East Subbasin (Basin) in the development of a Groundwater Sustainability Plan (GSP).

Under the Sustainable Groundwater Management Act (SGMA), a critical part of the GSP development is communication with and involvement of the public and stakeholders, including private citizens, well owners, community organizations, environmental groups, tribal communities, and anyone with an interest in the prudent management of groundwater resources. Participation from a variety of stakeholders helps the Santa Clarita Valley Groundwater Sustainability Agency (SCV-GSA) make decisions that consider varying needs and interests in the Basin.

This section and Appendix N highlight opportunities for engagement, including the formation of a Stakeholder Advisory Committee (SAC) and specifying the decision-making process, key messages, and schedule for accomplishing communication outreach tasks related to this GSP.

Appendix O includes comment summaries from many meetings leading up to the 60-day public comment period. The appendix also includes a log of all the comments received on the Public Draft GSP as part of the 60-day public comment period from members of the public, California Department of Fish and Wildlife, various public interest groups and environmental organizations, and members of the SAC. Responses to each comment in this table, if warranted, and the location in the GSP where the comment was addressed are also presented.

11.1 Public and Stakeholder Engagement

11.1.1 SGMA Requirements

SGMA requires that the GSA encourage the active involvement of diverse social, cultural, and economic elements of the population in the groundwater basin. SGMA sets out numerous public notice requirements for both local GSAs and the state to accomplish this goal. The requirements include the following:

- Public notice and hearing before establishing a GSA, adopting or amending a GSP, or imposing or increasing a fee.
- Creation and use of an interested persons list for the basin or GSA.
- Participation of federally recognized Indian tribes sharing the interest of the sustainability of the groundwater agency (if tribes choose to participate).
- Development of a written statement describing the manner in which interested parties may participate in the development and implementation of the GSP.

SGMA requires that GSAs consider the interests of all beneficial uses and users of groundwater throughout the GSA and GSP development process. In addition, GSP regulations (§ 354.10) require a communications section to include the following:

- An explanation of the GSA's decision-making process.
- Identification of opportunities for public engagement and a discussion of how public input and response will be used.

- A description of how the GSA encourages the active involvement of diverse social, cultural, and economic elements of the population within the Basin.
- The method the GSA shall follow to inform the public about progress implementing the Plan, including the status of projects and actions.

11.2 SCV-GSA and Decision Making

The SCV-GSA is made up of Santa Clarita Valley Water Agency (SCV Water), City of Santa Clarita, County of Los Angeles (LA County) Department of Regional Planning, and LA County Waterworks District No. 36. Overall direction, funding, and approval for the GSA is made by its Board of Directors. The final GSP will be adopted by its Board of Directors. Meetings of the Board of Directors (Board) are noticed and open to the public.

Public and stakeholder communication is a vital part of the GSP development process. The SCV-GSA communicates with interested individuals and organizations (stakeholders) to share information and obtain input on GSP development. This includes, but is not limited to private citizens, well owners, community organizations, environmental groups, tribal communities, and anyone with an interest in the prudent management of groundwater resources.

Participation from a variety of stakeholders helps the SCV-GSA Board make decisions that consider varying needs and interests in the Basin.

11.3 Opportunities for Public Involvement and Engagement

SCV-GSA is committed to frequent and transparent communication with stakeholders and interested parties. The following opportunities outline the numerous ways SCV-GSA works to engage the public and provide updates in a timely manner.

11.3.1 Meeting Opportunities

Opportunities for public comment are provided at all SCV-GSA Board meetings, advisory group meetings, Board-appointed committee meetings and workshops. Meetings are also an opportunity for stakeholders to stay informed about what is happening with the GSA and the GSP process.

11.3.1.1 Public Notices

Advance notice of meetings has been, and will continue to be, posted on the GSA website.[58] A mailed notice was sent to the City and County prior to the public hearing on the GSP, in compliance with SGMA requirements.

11.3.1.2 Board Meetings and Hearings

The SCV-GSA Board of Directors met on the first Mondays of January, April, July, and October at 2:30 p.m. All meetings were open to the public. During most of 2020 and all of 2021, meetings were held online to comply with the Governor's order regarding COVID safeguards. These meetings were held using the Zoom platform and followed the same protocols used for in-person meetings. In-person meetings, when conducted, took place in the SCV Water Board Room, located at 27234 Bouquet Canyon Road, Santa Clarita, CA, 91350. All agendas and meeting minutes from past meetings are available on the SCV-GSA website.

[58] Available at https://scvgsa.org/. (Accessed July 15, 2021.)

11.3.1.3 Public Workshops

Public meeting and workshop dates, times, locations, and key information are communicated in advance of each meeting. Six public workshops were held during development of the GSP to inform stakeholders of key elements of the GSP and to solicit input on how sustainability criteria should be set, what constitutes undesirable results, and what projects and management actions should be employed to maintain sustainability in the Basin.

11.3.2 Collaborative Opportunities

11.3.2.1 Stakeholder Groups and Stakeholder Advisory Committee

There are a number of stakeholders and basin water users in the Basin, including the following:

- Large water pumpers
- Medium water pumpers
- Small water pumpers
- Environmental groups
- Businesses
- Residences
- Media
- SCV Water
- LA County
- LA County Waterworks District No. 36
- Local cities (i.e., the City of Santa Clarita)
- Agricultural water users

The SCV-GSA created the SAC made up of many of the stakeholders and basin water users listed above. Members of this group provide meaningful insight, support, and expertise from a variety of viewpoints for the SCV-GSA Board to consider. The SAC is strictly advisory and does not vote on Board items, but members represent a number of social, cultural, and economic backgrounds to bring the widest possible perspective.

The outreach consultant, CV Strategies, worked with SCV Water staff to identify potential committee members through local media, social media, and email to the stakeholder list. The SAC is made up of the following committee representatives with up to two members each:

- Two representatives of small pumpers (2 acre-feet or less per year)
- Two representatives of medium pumpers (over 2 and up to 25 acre-feet per year)
- Two representatives of large pumpers (more than 25 acre-feet per year)
- Two representatives of the business community
- Two representatives of environmental interests
- Two members at large

The selected representatives must reflect the interests of their group and be able to effectively communicate the group's opinions and feedback. The qualifications of the candidates were reviewed, and the SAC members were selected by stakeholders who applied for the special interest group they represent.

The members of the SAC were responsible for reviewing drafts of the various sections of the GSP, providing feedback on those drafts, reviewing presentations that were to delivered during workshops and Board meetings, and soliciting input from their respective stakeholders as the plan was being developed.

CV Strategies facilitated the SAC meetings; prepared agendas for the meetings; compiled questions, comments, and responses to comments made in the SAC meetings; prepared supporting materials; and maintained the GSA website. Accommodations were made to ensure the SAC complied with the Brown Act. A total of 29 SAC meetings were held during development of the GSP. The SAC provided input on Public Workshop presentations and collateral materials at regular meetings prior to each Public Workshop, a step that was integral to the creation of the Public Workshop materials. Then, SCV-GSA and the SAC garnered public input on the GSP during the Public Workshop series. And after each workshop, the SAC was debriefed on public feedback received and provided additional input on both the GSP and effectiveness of each Public Workshop.

The work of the SAC concluded in October 2021.

11.3.3 Communication with SCV-GSA

11.3.3.1 Opportunities for Tribal Communities

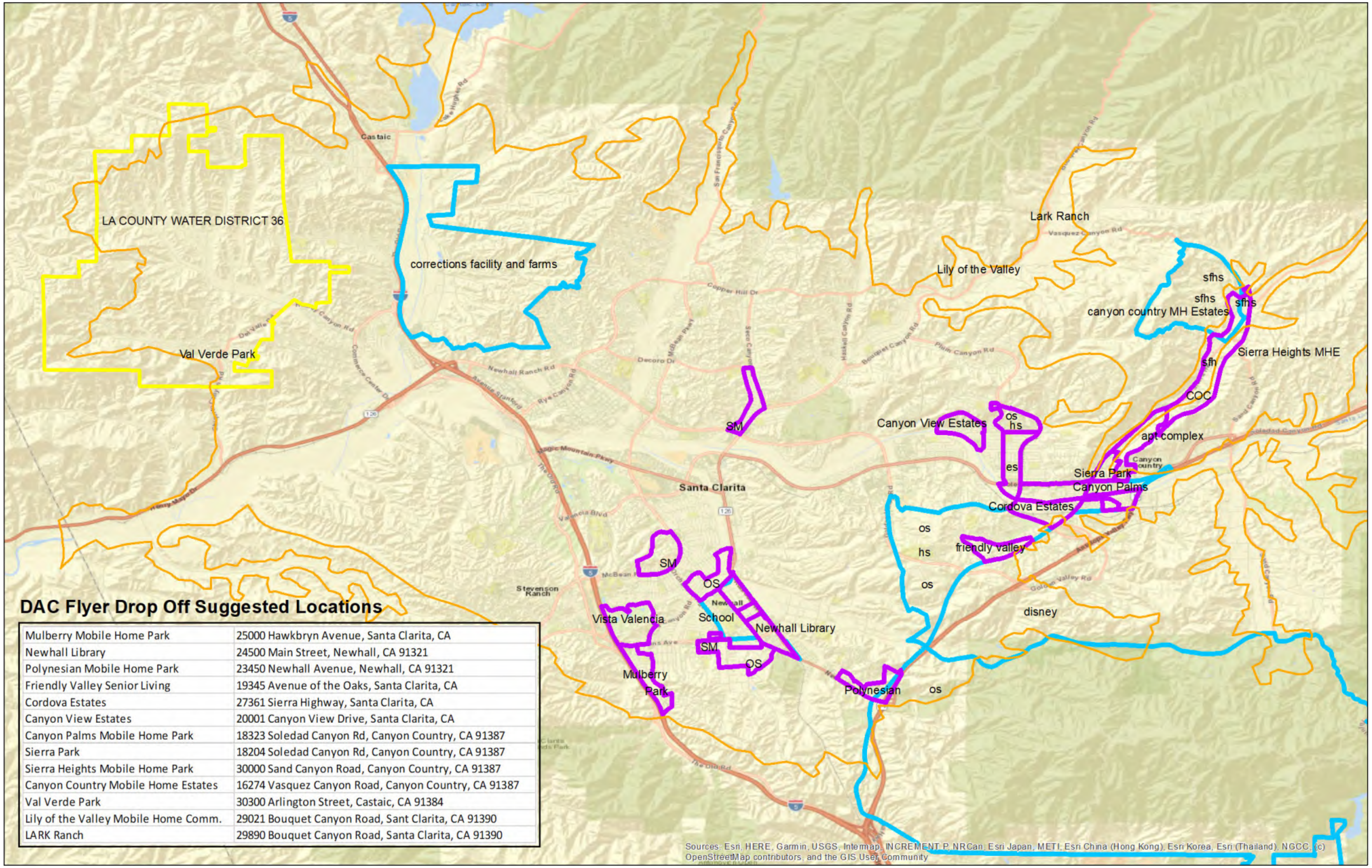
SCV-GSA invited participation of federally recognized Indian tribes sharing the interest of sustainability of the groundwater agency, as required by the SGMA, including the Fernandeño Tataviam Band of Mission Indians.

11.3.3.2 Opportunities for Disadvantaged Communities

There are no specific named disadvantaged communities (DACs) in the Basin with specific representatives; therefore, SCV-GSA and its member agencies (such as SCV Water and the City of Santa Clarita) continue broad outreach efforts and more specific outreach to reach DACs through the Proposition 1 Disadvantaged Community Involvement Program.

In addition to the broader outreach, a map of DACs was developed to identify these areas and to determine if they are served by a public water supply or by private wells. CV Strategies used the map to create handouts announcing the Public Draft GSP and upcoming meetings. Handouts were left at the addresses below, located in or around the identified DACs:

Von's, 24160 Lyons Avenue
Newhall Library
Polynesian Mobile Home Park
Stater Bros, 26900 Sierra Hwy
Cordova Estates
Canyon View Estates
Canyon Palms Mobile Home Park
Sierra Heights Mobile Home Park
Canyon Country Mobile Home Estates
Val Verde Park
Lily of the Valley Mobile Home Comm.
LARC Ranch
Canyon Country Jo Anne Darcy Library
Bodhi Leaf, 26910 Sierra Hwy
Canyon Country Community Center, 18410 Sierra Hwy



Mulberry Mobile Home Park	25000 Hawkbryn Avenue, Santa Clarita, CA
Newhall Library	24500 Main Street, Newhall, CA 91321
Polynesian Mobile Home Park	23450 Newhall Avenue, Newhall, CA 91321
Friendly Valley Senior Living	19345 Avenue of the Oaks, Santa Clarita, CA
Cordova Estates	27361 Sierra Highway, Santa Clarita, CA
Canyon View Estates	20001 Canyon View Drive, Santa Clarita, CA
Canyon Palms Mobile Home Park	18323 Soledad Canyon Rd, Canyon Country, CA 91387
Sierra Park	18204 Soledad Canyon Rd, Canyon Country, CA 91387
Sierra Heights Mobile Home Park	30000 Sand Canyon Road, Canyon Country, CA 91387
Canyon Country Mobile Home Estates	16274 Vasquez Canyon Road, Canyon Country, CA 91387
Val Verde Park	30300 Arlington Street, Castaic, CA 91384
Lily of the Valley Mobile Home Comm.	29021 Bouquet Canyon Road, Sant Clarita, CA 91390
LARK Ranch	29890 Bouquet Canyon Road, Santa Clarita, CA 91390

Figure 11-1. Disadvantaged Communities Map

11.3.4 Additional Outreach Efforts

Outreach included the following efforts:

- Media outreach
- Stakeholder email
- Online news and resources
- Collateral materials
- Social media
- Advertising
- Webpage development
- Video production

Media outreach included preparation of press releases in the local paper (*The Signal*), on Instagram and Twitter feeds, print ads in the local paper, digital banner ads, and emails to stakeholders. These activities and outreach statistics are presented below.

Table 11-1. Outreach Activities and Statistics

Activity	Outreach Statistic
Facebook engagement, including agency page and promos on *The Signal* local newspaper page (reach)	119,035
Instagram and Twitter (reach)	2,173
Email distribution (recipients of five emails)	59,601
GSA website visits	1,441
Press releases (five sent; published each time in three media outlets)	15
Print ads in *The Signal*	7
Digital banner ads through *The Signal* (impressions)	1,152,480

Note

Statistics reported as of July 16, 2021.

The basin stakeholder list was developed from a number of sources, including lists of SCV Water customers, City government representatives, members of environmental groups, and state and county agencies. Those on the email list received news and updates about the GSA process and details about stakeholder forums and workshops. Additional opportunities were sought during development of the GSP to grow and expand the email subscription list and the type of information distributed.

Substantial effort was put into maintaining the GSA website that provided Board meeting agendas, minutes, and materials presented at each meeting and workshop. The outreach effort also included collateral materials, such as descriptions of the GSP development process, draft sections of the GSP for review, fact sheets, and videos presenting easily understandable descriptions of groundwater-related concepts.

11.3.5 Communication about Progress Toward Implementing the Plan

The GSA intends to inform the public, including key stakeholder groups, about progress toward implementing the GSP, including monitoring results and the status of projects and actions. This information will be disseminated through several means, including the following:

- The GSA website.
- GSA Board meetings, where information will be presented, and the public will be invited to comment.
- Annual reports describing monitoring results and progress toward implementing the plan and meeting sustainability goals.
- GSP updates submitted to the California Department of Water Resources every 5 years. Basin stakeholders will be asked to review and comment on the update report.

In addition, the SCV-GSA will conduct public outreach and engagement throughout the implementation period to provide timely information to stakeholders about GSP implementation progress as well as monitored and modeled subbasin conditions.

To meet the requirements of SGMA, the GSA will communicate any potential changes in administration and management in a public process with stakeholders. The SCV-GSA website will be maintained as a communication tool for posting data, including reports, meeting information, technical updates, and data analyses. Other outreach will include regular meetings; government-to-government communication; focused stakeholder briefings; paid and earned media coverage; press releases; periodic newsletters; and email blasts.