Valley Water

2020

Urban Water Management Plan

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Santa Clara Valley Water District

2020 Urban Water Management Plan

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June 2021

Valley Water

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CHAPTER 1 – INTRODUCTION AND OVERVIEW

OVERVIEW

Every five years, urban water suppliers in California are required by State law to prepare an Urban Water Management Plan (UWMP). The plan is a water agency's long-term water resource planning document to ensure that adequate water supplies are available to meet existing and future water needs within its service area. The UWMP provides an overall picture of a water agency's current and future water conditions and management over the next 25 years.

Santa Clara Valley Water District (Valley Water) is a special district that provides water resources management for Santa Clara County. Valley Water manages 10 dams and surface water reservoirs, three water treatment plants, an advanced recycled water purification center, nearly 276 acres of groundwater recharge ponds, and more than 275 miles of streams. Santa Clara County's population is expected to increase from nearly 2 million in 2020 to nearly 2.7 million in 2045, which drives future water demands.

Understanding water demands and how they may change over time allows Valley Water to manage the county's water supply and appropriately plan infrastructure investments. Due to expected population increases and job growth, county-wide demands are projected to increase from 306,000 acre-feet per year (AFY) in 2020 to approximately 345,000 AFY in 2045. The 2045 demand, while higher than present demand, is still down from a peak in the 90s and 2000s owing to significant conservation efforts from Valley Water and the State.

Valley Water maintains diverse water supply sources to meet countywide demands, including local surface water and groundwater, imported water, and recycled water. Water conservation is also an important part of the water supply mix, helping to keep water rates lower while improving water supply reliability. Valley Water is considering investing in projects to help mitigate potential future supply reductions from climate change and new regulations. Valley Water's Water Supply Master Plan 2040 (WSMP) provides a strategy for meeting future water demands, and Valley Water continuously uses an annual Monitoring and Assessment Program (MAP) to track WSMP strategy implementation. With the phased implementation of planned future projects, Valley Water's available supplies are projected to increase over time. Valley Water's many supply sources are subject to hydrologic variability and additional constraints including regulatory constraints, climate change, and water quality variations.

Based on Valley Water's existing and planned sources of supply, Valley Water will be able to meet countywide demands through 2045 under normal, a single dry, and five consecutive dry year conditions. If a five-year drought were to occur in the next five years, Valley Water would employ a range of response actions, including water conservation, bringing back water stored in the Semitropic Groundwater Storage Bank in Kern County, imported water transfers and exchanges, and calling for short-term water use reduction.

As part of the UWMP, Valley Water developed a Water Shortage Contingency Plan (WSCP) to establish actions and procedures for managing water supplies and demands during water shortages due to droughts and other emergencies. Valley Water uses projected countywide end-of-year groundwater storage as an indicator of potential water shortages and a trigger for WSCP actions. In the event of prolonged droughts or other emergency situations, Valley Water considers all available tools for managing available water supplies, including public education and community outreach, coordinating response among the County's municipalities and retailers, augmenting supplies by investing in supplemental supply sources, calling for short-term water use reductions, and balancing demands for treatment plants and recharge facilities, to maximize the use of available supplies in order to meet

potential shortage. The WSCP also summarizes planning for natural disaster, drought-related revenue impacts, and Valley Water's legal authority to respond to water shortages.

Valley Water continues to be a leader in water conservation and has implemented a wide range of Demand Management Measures (DMMs) that help reduce water use. Valley Water's conservation programs include metering, public education and outreach, rebates for residential and commercial users, landscape rebates for lawn conversion, free water use audits and consultation, and many more. Collectively, conservation and stormwater capture accounted for about 75,000 AFY in 2020 in water savings over a 1992 baseline. Valley Water has a target to increase these savings to 110,000 AFY by 2040.

Valley Water's 2020 UWMP was adopted by its Board of Directors on June 9, 2021.

1.1 URBAN WATER MANAGEMENT PLAN

The Urban Water Management Planning Act (UWMP Act) (Division 6 Part 2.6 of California Water Code §10610 - 10656) requires all wholesale and retail urban water suppliers (those that directly or indirectly serve more than 3,000 customers or 3,000 acre-feet annually) to prepare an UWMP every five years. Since enacted in 1983, the UWMP Act has been amended numerous times by the State Legislature in response to droughts, water shortages, and the State's view on water supply reliability. The 2020 UWMP includes many additional requirements compared to the 2015 UWMP that were passed by the State Legislature, including:

- Five-year drought water reliability assessment
- Drought risk assessment
- Expanded Water Shortage Contingency Plan
- Reduced reliance on the Sacramento-San Joaquin Delta (Delta)
- Climate change impacts

The statutory deadline to submit the 2020 UWMP to the California Department of Water Resources (DWR) is July 1, 2021.

Valley Water meets the definition of an urban water wholesaler and has prepared UWMPs since 1985. Valley Water's 2020 UWMP documents current and projected water supplies and demands over the next 25 years during normal and drought years, as well as water shortage contingency planning and conservation efforts. The plan provides an overall picture of past, current, and future water conditions and management in Santa Clara County. The UWMP complements Valley Water's other planning efforts, including planning for annual operations, sustainable groundwater management, recycled water, integrated water resource management, and integrated regional water management. The 2020 UWMP updates and supersedes all previous UWMPs.

1.2 REPORT ORGANIZATION

Valley Water's 2020 UWMP was prepared in compliance with the requirements of the current UWMP Act and under the guidance provided by DWR. The UWMP follows the organization recommended by DWR:

- Chapter 1 – Introduction and Overview.

- Chapter 2 – Plan Preparation: Provides information on the process for developing the UWMP, including coordination and outreach efforts.

- Chapter 3 – System Description: Describes Valley Water's water system, including organizational structure and history, major infrastructure, and service area characterization.
- Chapter 4 – Water Demands: Describes and quantifies current and projected water demands in Santa Clara County.
- Chapter 5 – SBX7-7 Baseline, Targets, and 2020 Compliance: Describes Valley Water's efforts to support retailer efforts to achieve 2020 water use targets.
- Chapter 6 – System Supplies: Describes and quantifies Valley Water's current and projected sources of water.
- Chapter 7 – Water Service Reliability and Drought Risk Assessment: Evaluates the reliability of the water supply over the next 25 years for normal, single dry, and five consecutive dry years. Assesses risk associated with a five-year drought.
- Chapter 8 – Water Shortage Contingency Plan: Describes the development, actions, and implementation of Valley Water's WSCP.
- Chapter 9 – Demand Management Measures: Describes Valley Water's efforts to promote water conservation and reduce demand.
- Chapter 10 – Plan Adoption, Submittal, and Implementation: Describes the steps taken to adopt and submit the UWMP and make it publicly available, the plan to implement the UWMP, and DWR's Checklist.

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CHAPTER 2 – PLAN PREPARATION

Valley Water used DWR'S 2020 UWMP Guidebook as the basis for developing its UWMP. The UWMP was prepared in coordination with retailers, cities, the County, and other regional agencies. The UWMP was posted for public review and Valley Water incorporated inputs, as appropriate, that were received through internal and external review processes.

2.1 BASIS FOR PREPARING THE UWMP

Valley Water meets the definition of an urban water wholesaler under the UWMP Act and therefore is required to prepare an UWMP every five years. Valley Water's designated planning team prepared its 2020 UWMP following the guidance provided by DWR's 2020 UWMP Guidebook.

The UWMP Act requires use and submittal of standardized tables. DWR has developed standard tables for inclusion in the 2020 UWMP, and Valley Water used the standard tables for wholesale water suppliers throughout the plan. Valley Water is also the groundwater management agency for Santa Clara County and utilizes a conjunctive use strategy. This UWMP reflects the comprehensive nature of Valley Water's water management program. The tables in the main body of this plan reflect all the supplies and demands in Valley Water's service area, not all of which are managed by Valley Water. All the DWR-required tables are included in Appendix A.

2.2 INDIVIDUAL REPORTING

Valley Water actively engages in regional water supply planning and coordinates with regional partners such as San Francisco Bay Area Integrated Regional Water Management (IRWM), Pajaro IRWM, and Bay Area Regional Reliability (BARR) programs. However, this is an individual UWMP that reports on water demands and supplies in Santa Clara County (Table 2-1).

Table 2-1. Plan Identification

Select Only One	Type of Plan	
☑	**Individual UWMP**	
	☐	Water Supplier is also a member of a RUWMP
	☐	Water Supplier is also a member of Regional Alliance
☐	**Regional Urban Water Management Plan (RUWMP)**	

Similarly, Valley Water chose to report as an individual supplier for the purpose of determining and reporting its compliance with urban water use SBX7-7 baselines and targets as described in Chapter 5.

CHAPTER 2 – PLAN PREPARATION

2.3 REPORTING YEAR AND UNITS OF MEASURE

All information in this plan, unless otherwise noted, is reported on a calendar year basis. Water volumes are expressed in acre-feet (AF) (Table 2-2).

Table 2-2. Supplier Identification

Type of Supplier	
☑	Supplier is a wholesaler
☐	Supplier is a retailer
Fiscal or Calendar Year	
☑	UWMP Tables are in calendar years
☐	UWMP Tables are in fiscal years
Units of Measure Used in UWMP	
Unit	Acre Feet (AF)

2.4 COORDINATON AND OUTREACH

This UWMP was prepared in coordination with the 13 major water retailers in Santa Clara County, the cities in Santa Clara County, the County of Santa Clara (County), the San Francisco Public Utilities Commission (SFPUC), and the Bay Area Water Supply and Conservation Agency (BAWSCA). Valley Water's 13 retailers in Santa Clara County are: California Water Service Company, City of Gilroy, Great Oaks Water Company, City of Milpitas, City of Morgan Hill, City of Mountain View, City of Palo Alto, Purissima Hills Water District, San José Municipal Water System, San Jose Water Company, City of Santa Clara, Stanford University, and City of Sunnyvale.

Valley Water notified the land use agencies and water retailers of the updates of its UWMP by both email and letter dated December 14, 2020 (consistent with CWC 10621(b)). On March 22, 2021, Valley Water emailed its preliminary reliability analysis to its water retailers. Supplies were projected in five-year increments from 2025 through 2045 for normal, single dry, and five consecutive dry years (consistent with CWC 10631). On March 29, 2021, Valley Water provided the retailers with the draft UWMP and WSCP for review. Valley Water notified water retailers and the cities and County on May 17, 2021 of the time and date of the public hearing on the 2020 UWMP and provided information on how to review the UWMP and WSCP. Documentation of these efforts is included in Appendix B. In addition to these required coordination efforts, Valley Water had numerous group and individual communications with retailers and other agencies on issues related to demand and supply projections, reduced reliance on the Delta, reliability analyses, and the WSCP. Valley Water also provided regular updates at various committee meetings throughout the plan development.

CHAPTER 2 – PLAN PREPARATION

Prior to posting the UWMP and WSCP for public review, Valley Water incorporated input, as appropriate, that was received from agencies and retailers. The draft UWMP and WSCP were posted on Valley Water's website and made available for public review on May 17, 2021. The public hearing notice was published on ***San José Mercury News*** on May 18, 2021 and May 25, 2021 and ***Metro*** on May 19, 2021, in accordance with California Government Code 6066. A copy of the public notice is included in Appendix B. The public hearing was held on June 8 and June 9, 2021. Comments were received from several retailers and other parties as part of the public hearing. Additional information on the adoption of the UWMP and WSCP is provided in Chapter 10.

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CHAPTER 3 – SYSTEM DESCRIPTION

Valley Water is a special district that provides water resources management for all of Santa Clara County. Valley Water's water system includes local water from reservoirs, groundwater, imported water, and recycled water. These supplies are used to recharge local groundwater subbasins, treated at drinking water treatment plants, released to local creeks to meet environmental needs, or sent directly to water users. Climate change, new regulatory requirements, and population growth could affect county-wide water supply and demand in the future.

3.1 VALLEY WATER OVERVIEW

Valley Water is an independent special district that provides wholesale water supply, groundwater management, flood protection and stream stewardship in Santa Clara County. Valley Water's service area includes the entirety of Santa Clara County, which is located at the southern end of San Francisco Bay (Figure 3-1). The county encompasses approximately 1,300 square miles and includes 15 cities from Palo Alto in the north to Gilroy in the south. Most water use occurs on the valley floor between the Santa Cruz Mountains to the west and the Diablo Range to the east. Northern Santa Clara County is home to Silicon Valley and the valley floor is highly urbanized. Southern Santa Clara County has some urban development, but much of the land use is rural and agricultural.

Valley Water was formed in 1929 as the Santa Clara Valley Water Conservation District in response to groundwater overdraft and land subsidence. In 1954, Valley Water annexed the Central Santa Clara Valley Water District. In 1968, it merged with the countywide flood control district to form one agency to manage the water supply and flood programs for most of the county. The Gavilan Water District in southern Santa Clara County was annexed in 1987 and since then Valley Water has provided services for the entire county.

Valley Water is the Groundwater Sustainability Agency (GSA) for the Santa Clara and Llagas Subbasins, which are both identified as high priority basins by DWR. Valley Water sustainably manages local groundwater basins to support beneficial use by water retailers, private well users, and the environment. Valley Water is also the GSA for the small portion of the North San Benito Subbasin within Santa Clara County.

Valley Water is governed by an elected seven member Board of Directors following the District Act (https://www.valleywater.org/how-we-operate/about-valley-water/district-act) and its own Board Governance Policies (https://www.valleywater.org/how-we-operate/board-governance-policies).

CHAPTER 3 – SYSTEM DESCRIPTION

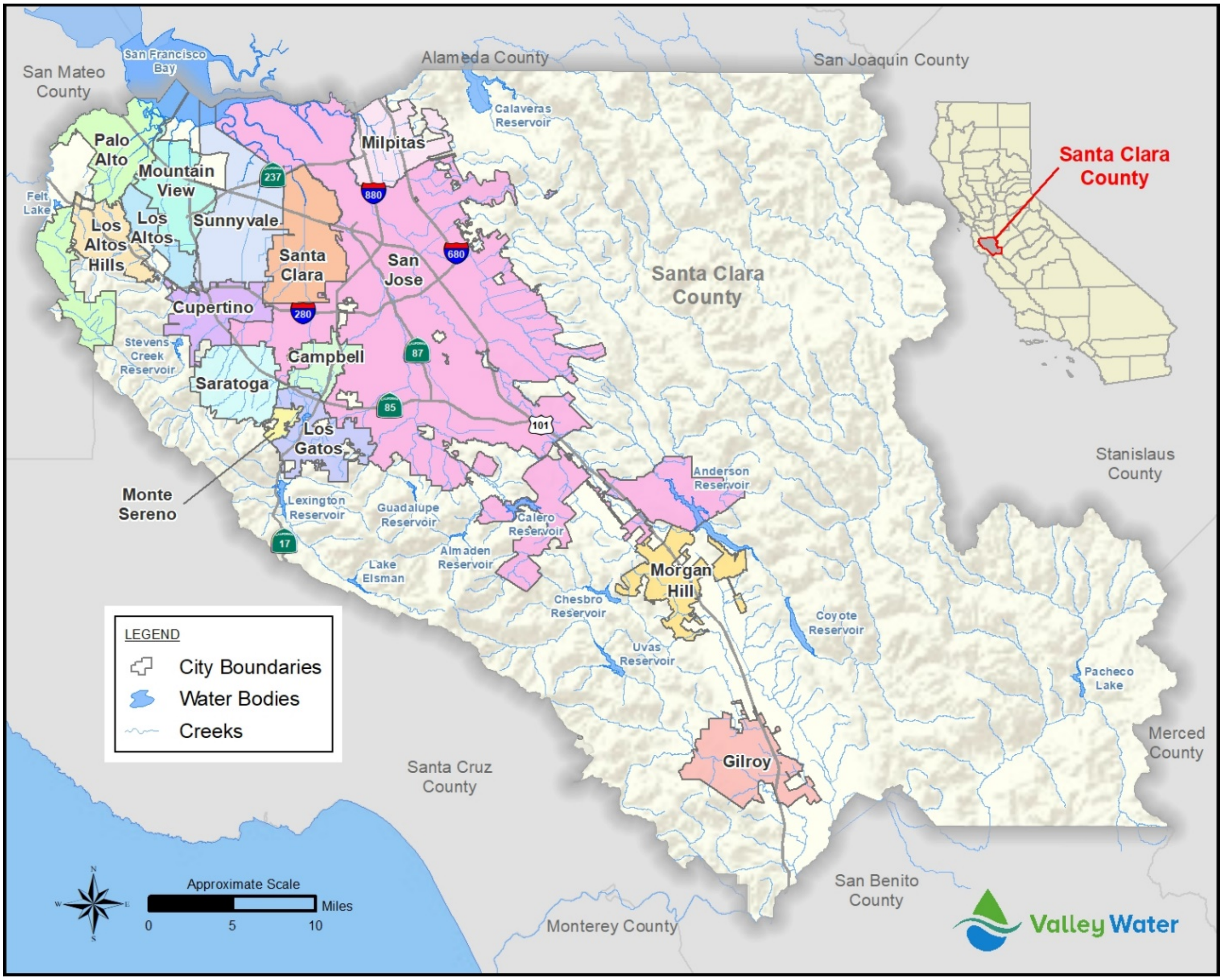

Figure 3-1. Santa Clara County

3.2 VALLEY WATER'S WATER SUPPLY SYSTEM

Valley Water manages an integrated water resources system to provide supply of clean, safe water, flood protection and stewardship of streams on behalf of Santa Clara County's nearly two million residents. Valley Water manages 10 dams and surface water reservoirs, three water treatment plants, an advanced recycled water purification center, a state-of-the-art water quality laboratory, 142 miles of raw and treated water pipelines, 101 groundwater recharge ponds covering 276 acres, and more than 275 miles of jurisdictional streams, including 91 miles suitable for in-stream recharge (Figure 3-2). Water supplies include local surface water and groundwater, imported water, and recycled water. Water conservation is also an important part of the of the water supply mix, which helps reduce water demands and improve reliability during droughts.

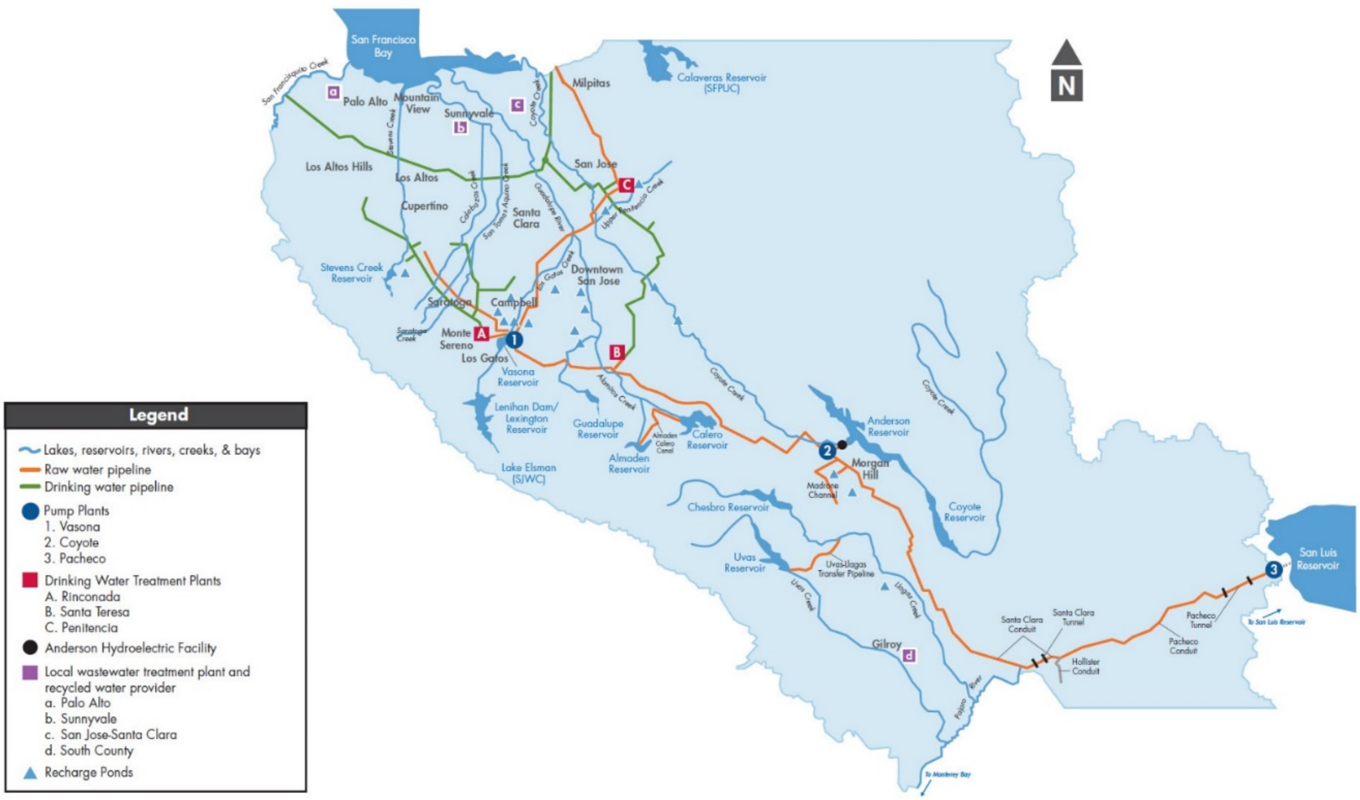

Figure 3-2. Water Supply System

Local water supplies make up about half of the county's water supply. Local sources include natural groundwater recharge and surface water supplies, including surface water rights held by Valley Water, San José Water Company, and Stanford University. A small but growing portion of local water supply is recycled water used for non-potable purposes. Imported water from the State Water Project (SWP), Central Valley Project (CVP), and supplies delivered by the San Francisco Public Utilities Commission (SFPUC) make up about another half of the county's supply. Valley Water's diverse supplies are used to recharge local groundwater subbasins, treated at drinking water treatment plants, released to local creeks to meet environmental needs, or sent directly to water users.

Valley Water has been a leader in conjunctive use in California for decades, utilizing imported and local surface water to supplement groundwater and to maintain reliability in dry years. Conjunctive use helps

protect local subbasins from overdraft, land subsidence, and saltwater intrusion and provides critical groundwater storage reserves for use during droughts or outages. After it was formed to address declining groundwater levels and land subsidence, Valley Water constructed reservoirs to capture local water. However, local supplies became insufficient to meet the needs of the county's growing population around the middle of the last century. In response, Valley Water began importing water from the Delta via the SWP in 1965 and from the CVP in 1987. These investments, along with investments in water recycling and conservation, have resulted in sustainable groundwater subbasins and reliable water supplies for the County. Figure 3-3 shows how Valley Water's conjunctive water management strategy has dramatically contributed to a sustainable water supply.

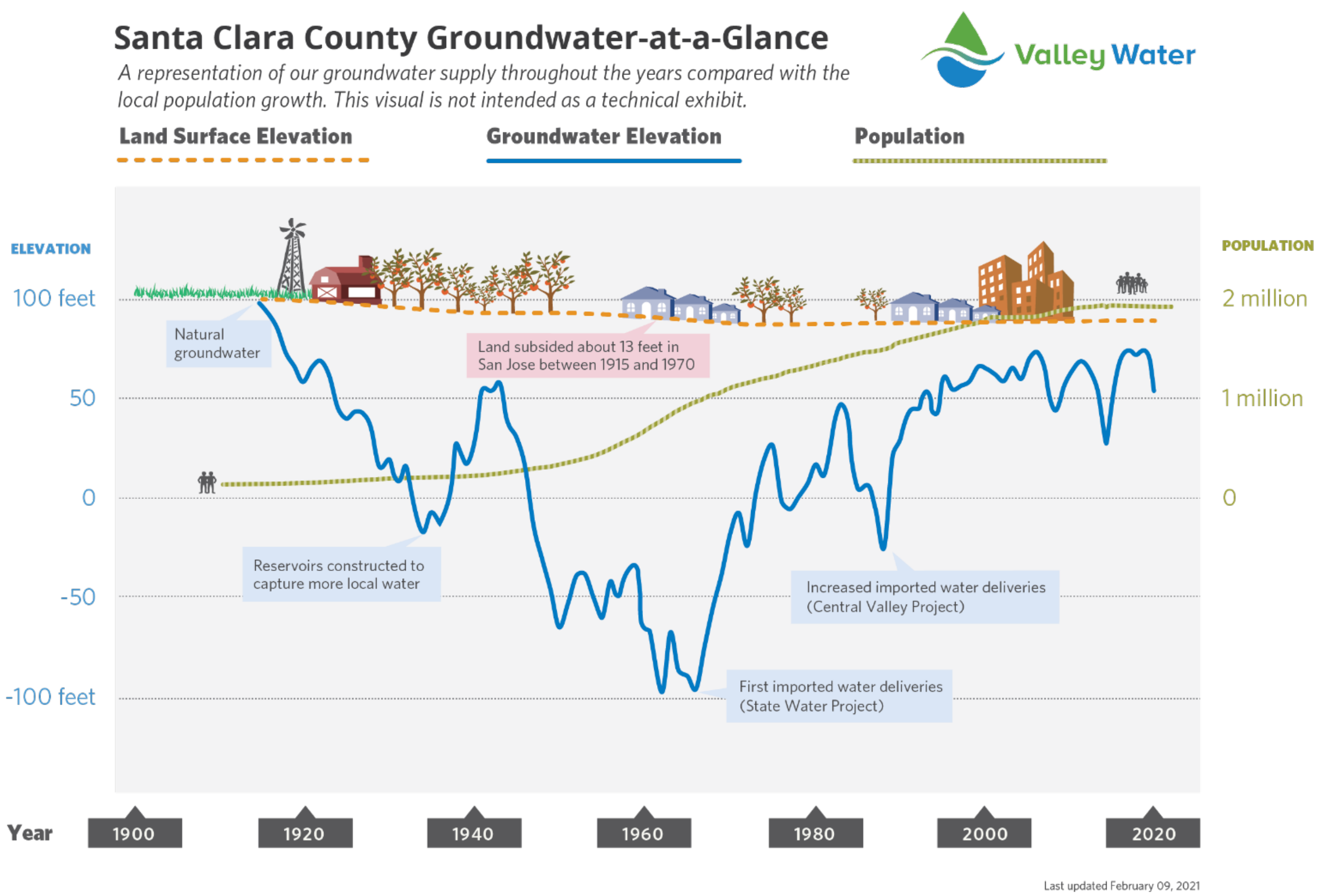

Figure 3-3. Historic Groundwater Conditions

3.3 SERVICE AREA CLIMATE

3.3.1 Historic Climate Data

Santa Clara County has a semi-arid, Mediterranean climate, with warm and dry weather lasting from late spring through early fall. Average annual precipitation ranges from about 15 inches on the valley floor to about 45 inches along the crest of the Santa Cruz Mountains. The average annual precipitation in Santa Clara County was 23.2 inches from 1950-2020, with most precipitation occurring between the months of November and April. The county's temperature is generally moderate. Maximum daily temperatures

averaged by month in the County range from 55.7°F to 83.4°F. The average annual evapotranspiration (ETo) is 49.6 inches (Table 3-1).

Table 3-1. Average Climate Data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Rainfall (inches)	4.7	4	3.6	1.8	0.6	0.1	0	0.1	0.2	1.1	2.7	4.2	**23.2**
Max. Daily Temp. (°F)	55.7	58.3	61.2	65.6	71.7	78.4	83.4	83.1	80.8	73.8	62.8	55.9	**69.2**
Min. Daily Temp. (°F)	37.9	39.7	40.9	42.8	47.4	52.2	56.6	56.4	54.5	49.2	42.3	37.9	**46.5**
Average ETo (inches)	1.5	1.9	3.5	5	6	6.8	7	6.3	4.8	3.5	1.9	1.4	**49.6**
NOTES: Rainfall and temperature from NOAA climate mapping for Santa Clara County. The 2015 plan used Valley Water Station 86 which represents rainfall in City of San José. ETo from California Irrigation Management Information System (Archived San Jose Station).													

Rainfall in Santa Clara County exhibits great interannual variability (Figure 3-4). Historical rainfall in Santa Clara County has ranged from 5.1 inches in 2013 to 46.7 inches in 1983. Valley Water's conjunctive water management strategy helps maintain groundwater levels and manage supply variability by capturing runoff in wet periods and using this water to recharge the groundwater subbasins for storage and use later.

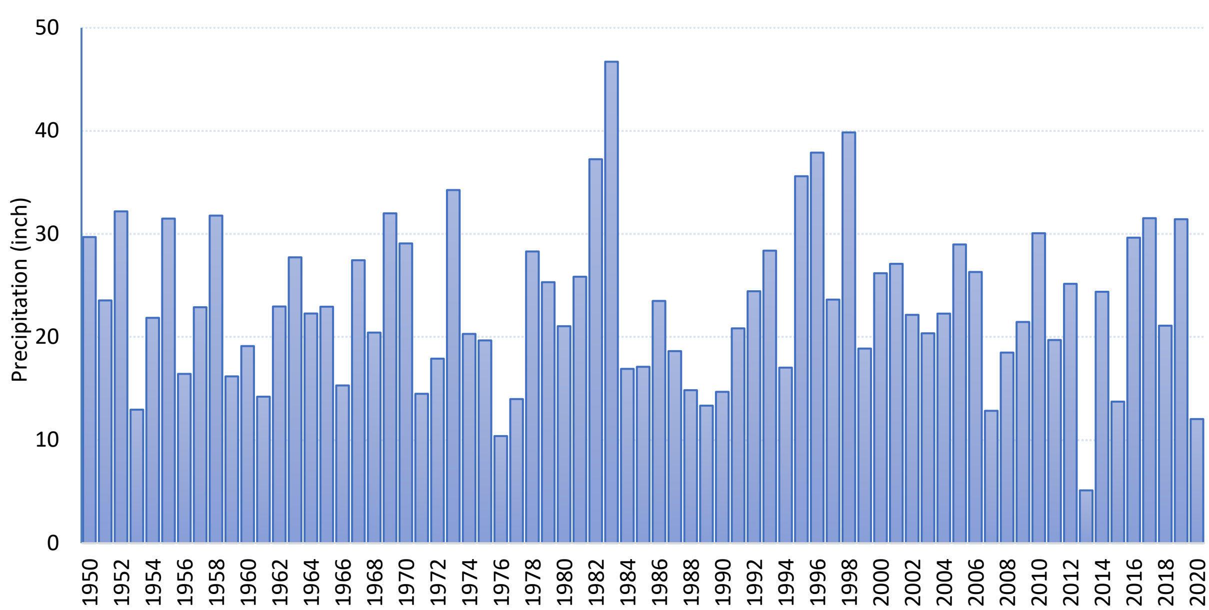

Figure 3-4. Historical Annual Rainfall in Santa Clara County

3.3.2 Climate Change

Climate change impacts such as warming temperatures, shrinking snowpack, increasing weather extremes, and prolonged droughts pose significant challenges in water resources management. Already, climate change impacts are being observed across California and in the San Francisco Bay Area, and climate modeling projections indicate that these impacts will continue or become more extreme. Locally, Santa Clara County is expected to see increasing temperatures, which could result in more extreme heat and drought events and increased demands. While future projections of precipitation are not consistent, some studies indicate that Valley Water could see altered hydrologic patterns and an increase in rainfall averages. Extreme weather events are projected to increase in intensity and droughts could be extended over historic conditions. More severe storms could result in increased flood risk and changes in surface runoff patterns that could challenge local water supply operations. Sea level rise increases the potential for flooding and could significantly affect imported water supplies.

Statewide and local changes in precipitation and temperature could impact Valley Water's water supplies and operations, the effectiveness of potential water supply investments, and water demand patterns. Recognizing the importance of managing climate change-related vulnerabilities and risks to fulfill its mission, Valley Water is developing a Climate Change Action Plan (CCAP), which will include a wide array of goals and strategies to adapt to climate change. Strategies for water supply adaptation will include promoting and increasing investments in recycled water and water conservation; increasing system flexibility; optimizing the use of existing supplies and infrastructure; and incorporating understanding of projected hydrology and sea level rise into project management and planning. In addition, Valley Water is developing a climate study to assess climate change impacts to its future water supply reliability. The study is expected to be completed in the next two years.

3.4 SERVICE AREA POPULATION AND DEMOGRAPHICS

Santa Clara County currently has a population of nearly 2 million. According to the Plan Bay Area projections in 2017, Santa Clara County's population is expected to increase by about 36% between 2020 and 2045, up to nearly 2.7 million in 2045 (Table 3-2). Projected population and job growth rates for Santa Clara County are higher than the nine-county Bay Area average. Total jobs are projected to increase an estimated 21% in the same period. However, job growth is not projected to be equal in all sectors. Agricultural jobs are projected to decrease, manufacturing jobs are projected to be stable, and other job sectors are projected to increase. The greatest projected increase is in health and education services.

Table 3-2. Santa Clara County Demographics from Plan Bay Area 2017 Projections

	2020	2025	2030	2035	2040	2045[1]
Population	1,986,340	2,098,695	2,217,750	2,387,165	2,538,320	2,699,046
Single-Family	409,395	409,280	411,725	418,715	422,960	427,248
Multi-Family	297,170	326,965	356,025	411,305	458,695	511,545
Households	679,425	718,565	757,690	815,980	860,810	908,103
Persons per Household	2.87	2.87	2.88	2.88	2.90	2.92
Total Jobs	1,120,420	1,159,110	1,198,370	1,231,000	1,289,870	1,351,555
[1]2045 values are calculated by increasing the 2040 values by the same rate of increase as 2035 to 2040 values.						

Santa Clara County has a racially diverse population that is Asian (37.6%), White (30.4%), Hispanic or Latino (25%), Black or African American (2.4 %), American Indian or Alaska Native (0.2%), Native Hawaiian or Other Pacific Islander (0.4%), with the remainder more than one race or some other race (U.S. Census Bureau, 2019). Santa Clara County is an economic center for high technology and home to Silicon Valley. It has a median household income of $116,178 (2018 dollars) and a poverty level of 7.3%.

3.5 SERVICE AREA LAND USES

Current land uses in Santa Clara County are depicted in Figure 3-5. Land use was derived and categorized from Santa Clara County's parcel data. Approximately half of the land area is open space (52%). Agriculture accounts for 25% of the land area, followed by residential land use (15%). The remaining area consists of commercial, industrial, and institutional use (7%) and transportation and utility use (1%).

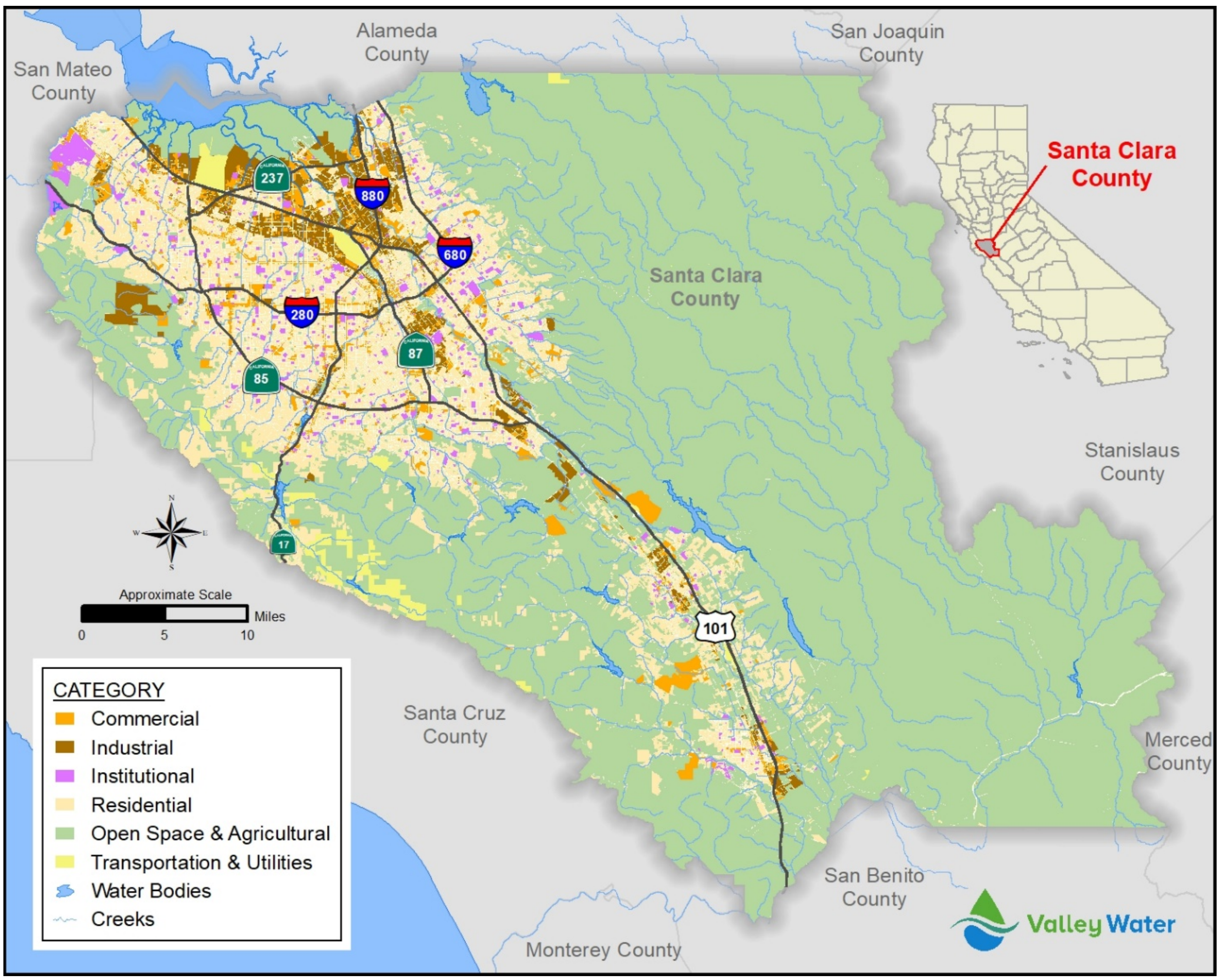

Figure 3-5. Santa Clara County Land Use

Housing growth is a major factor that impacts Valley Water's water demand projections. According to the most recent finalized plan, Plan Bay Area 2040, the number of households will increase in Santa Clara County by 38% between 2015 and 2040. San José, the largest city in the Bay Area, is projected to have the greatest proportion of household growth. The growth in the number of households in Santa Clara County represents the fastest projected growth rate of all counties in the Bay Area. The growth projected in the northern portion of the county is expected to be primarily in the multi-family sector and include redevelopment of built parcels, resulting in greater housing density. The growth projected in the southern portion of the county is expected to be primarily in the single family sector, and thus is expected to have lower housing density than in the northern portion of the County.

To address the County's expected growth in development, Valley Water joined a task force in 2015 to develop an ordinance to support water conservation in new development (Model Water Efficiency New Development Ordinance or MWENDO). The task force consisted of representatives from Santa Clara County, cities, and other stakeholders such as non-profit organizations. The MWENDO was completed in 2017 for consideration by Santa Clara County cities and towns. Valley Water is encouraging municipalities to adopt the ordinance to ensure new and retrofitted development meets strong water efficiency standards.

Plan Bay Area 2050 is a long-range plan currently being developed by the Association of Bay Area Governments (ABAG) and the Metropolitan Transportation Commission (MTC). It is expected to be completed in 2021. One of its main goals is to address the severe, longstanding housing crisis in the Bay Area with the development of strategies to spur housing production, as well as create new jobs. Because of this focus, the 2050 plan differs from previous ones, as it makes more assumptions about the adoption of new policies and strategies to promote housing. According to the draft plan, if the strategies in Plan Bay Area 2050 were implemented, the number of households in the County will increase 73% between 2015 and 2050, and jobs would increase by 46% during this period. Santa Clara County would have the greatest share of regional growth (33%) amongst the nine counties in the Bay Area. Similarly, Santa Clara County would experience the region's greatest share of job growth at 36%. These household and job projections are significantly higher than the projections from previous plans. Valley Water is closely following Plan Bay Area 2050 development to determine whether and how to use its projections to model future water demand.

CHAPTER 4 – WATER DEMANDS

Understanding water demands and the factors that influence them over time is an important first step for water resources planning and assessment. This chapter describes and quantifies Santa Clara County's current water use and water demand projections through the year 2045. Accurately tracking and reporting current water demands allows Valley Water to properly analyze the use of the county's water resources and conduct effective resource planning. Estimating future demand allows Valley Water to manage the county's water supply and appropriately plan infrastructure investments. Assessments of future growth and related water demand, done in coordination with local planning agencies and retailers, provide essential information for developing demand projections. Demand estimates were estimated by Valley Water's Demand Model that was developed based on local planning assumptions and growth projections. Valley Water coordinated with the water retailers and the local planning agencies on demand projections to the extent practicable.

4.1 HISTORICAL AND CURRENT WATER USE

Water use in Santa Clara County includes domestic, municipal, industrial, and agricultural use. Current countywide average annual water use was approximately 310,000 AFY. Actual water use changes from year to year and is influenced by a number of factors such as population growth, hydrology, water conservation, drought, and economic conditions (Figure 4-1). The countywide water use represents the total use of Valley Water supply, SFPUC Supply, and San José Water Company and Stanford University water rights. As a result of Valley Water's investments in water conservation since 1992, overall water use in the county has decreased for the past 15 years despite a 25% increase in population over the same period. The various significant decreases in water use are associated with the extended droughts of 1987-1992, 2007-2010, and 2012-2016. The 2007-2010 drought occurred during an economic recession, which can also depress water use. Currently, Valley Water's water use is still low and there is not likely to be a rebound to pre-drought water use.

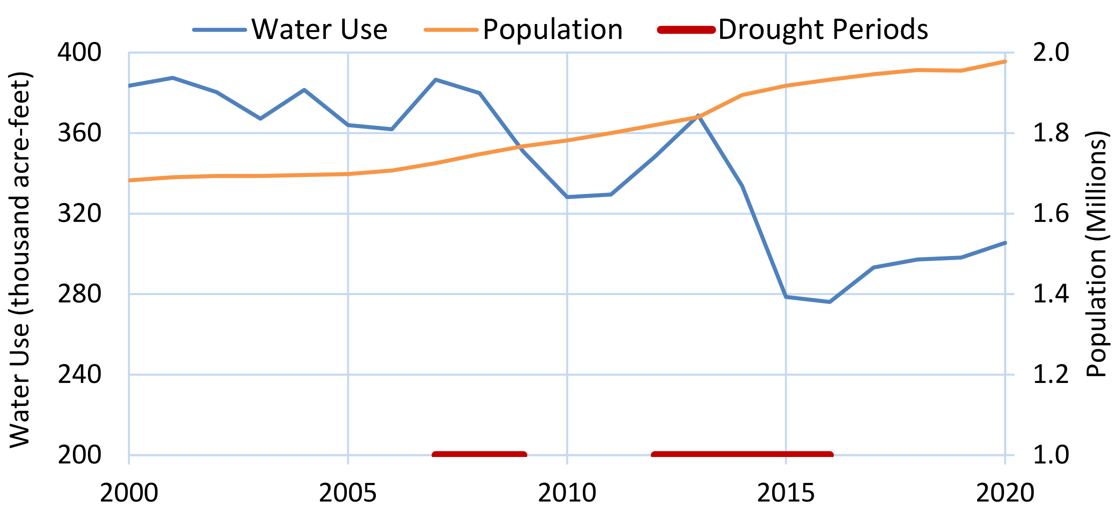

Figure 4-1. Historic Water Use and Population

Water use data from retailer billing information from 2018 were used to determine the approximate distribution of water use by sector (Figure 4-2). The chart represents data from only the retailers that track water use in these sectors. Since not all retailers track their use in all of these sectors, the chart does not represent the full countywide use. Nevertheless, it is still considered a relatively good picture of average water use distribution. Overall, more than half of water use is for residential, and CII sector

(Commercial, Industrial, and Institutional) represents 41% of use. Since agriculture is supported nearly entirely by independent groundwater pumping, that use (which is significant in South County) is not reflected in this figure.

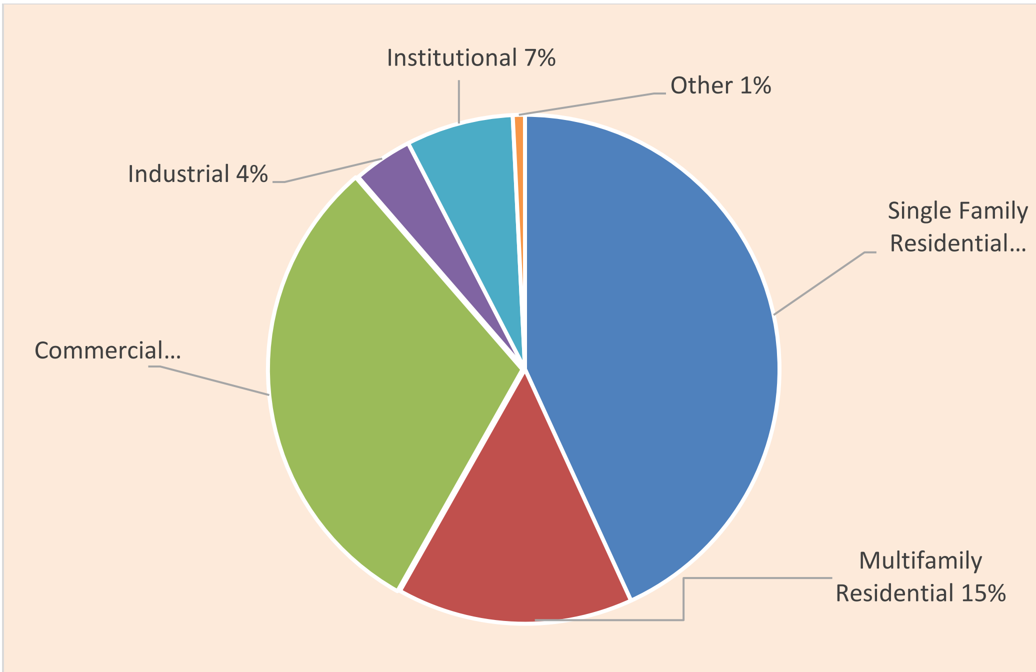

Figure 4-2. Water Use by Sector (2018)

Actual water use of Valley Water's supply in 2020 is estimated at approximately 306,000 AFY (Table 4-1). The current water use indicates a small rebound from the last drought of 2012-2016, indicating that Santa Clara County is "making conservation a way of life" and Valley Water's continued investment in water conservation measures may have contributed to potential overall decline in water use.

CHAPTER 4 – WATER DEMANDS

Table 4-1. Actual Water Use in 2020

Use Type	Water Use[1] (AF)
Treated Water and Groundwater	246,000
Agricultural Irrigation	25,000
Independent Groundwater Pumping	13,000
Recycled Water	17,000
Untreated Surface Water	2,000
Losses	3,000
Total	**306,000**

[1]All numbers are rounded to the nearest 1000 AF. The total water use represents countywide demand which is partially served by the SFPUC and surface water rights held by San Jose Water Company and Stanford University. SFPUC, San Jose Water Company, and Stanford supplies are accounted for in the Retailer Water Use.

4.2 PROJECTED WATER DEMANDS

Valley Water's long-term water supply level of service goal is to meet 100% of annual water demand during non-drought years and at least 80% of annual water demand in drought years. A reliable water demand forecast is critical in determining the level of investment necessary to meet this level of service goal. To meet its planning need for robust demand projections, Valley Water developed a statistical based Demand Model (Model) in 2020 (https://www.valleywater.org/your-water/water-supply-planning/water-demand-study) using recently available water use data and new housing and economic development forecasts. The Model provides forecasted demands in Santa Clara County out to 2045 and is described below.

4.2.1 Retailer Water Demands

Retailer demands represent the majority of countywide demands. The Model uses a statistically based analytical framework that is commonly referred to as an econometric approach to project future retailer demands. The Model is essentially a multivariate regression that defines the relationship between water use and forecasting variables. The forecasting variables used include housing information, median income, economic information, water rates, and weather. The Model is composed of sub-models (or regression equations) for differentiating rates of water use by retail agency, time of year, and water use sector to characterize temporal, geographical, and sectoral variations of water demands. Water use sectors included in the model are single family, multi-family, and commercial, industrial, and institutional (CII).

Historic data were collected to support model development from Valley Water and its water retailers, the US Census, Federal Reserve, and California Department of Finance (CDOF) (Table 4-2). Monthly sectoral water use data from local water retailers for 2000-2019 (although certain water retailers did not have data back to 2000) were used as observed data for model fitting.

Table 4-2. Forecasting Variables Used in the Demand Model

Forecasting Variable	Source
Water rates (by retailer and groundwater area, inflation adjusted)	Valley Water
Drought severity	Valley Water and retailers
Median income	US Census
Economic indices (e.g., unemployment)	Federal Reserve, Economic Cycle Research Institute
Housing density	Derived from US Census and CDOF
Persons per household	Derived from US Census and CDOF
Housing Units	ABAG
Sectoral employment	ABAG
Temperature and precipitation	PRISM (Parameter-elevation Relationships on Independent Slopes Model)

The Model was then used to forecast future demands using the projected forecasting variables with information from the Association of Bay Area Governments (ABAG), CDOF, and PRISM (Table 4-2). An important modeling assumption in forecasting water demand is related to defining a drought rebound. Historically after a drought, water use returns to pre-drought levels within a few years of the drought's end; this is the 'drought rebound'. Valley Water experienced a small rebound in 2017 and then demands remained relatively stable through 2018 and 2019. Therefore, the rebound has been relatively muted for Valley Water, and similar trends were also observed by most peer agencies. Historically demand rebounds have occurred (Figure 4-1), so Valley Water is conservatively assuming there will be a 50% drought rebound by 2025. This assumption will be reevaluated as more water use data become available in the next few years. The aggregated countywide demand projections for retailers are provided in Table 4-3.

Overall, the Model reflects Valley Water's current understanding of expected drought rebound and integrates water use data and sectoral growth forecasts. The Model can be used to evaluate potential future scenarios by adjusting the forecasting variables to help understand the uncertainty related to water demand forecasts. Valley Water will use the Model to support its long-range planning efforts including water supply master planning and the annual MAP.

4.2.2 Independent Groundwater Pumping

Independent groundwater pumping includes groundwater pumping by individual domestic well owners, small and mutual water companies, businesses, non-agricultural irrigation, and environmental cleanup. It includes all non-retailer groundwater pumping in the Municipal and Industrial (M&I) and domestic categories. Statistical analysis of historic data suggests that water use in this aggregated sector is mostly affected by drought, price, weather, and number of wells. Therefore, similar to retailer demand, the Model for this sector was developed that defines the relationship between water use and these factors (drought, price, weather, and number of wells). Historical regression fits for independent groundwater pumpers were performed on annual water use. The Model was fit based on the historic data and used to project future independent groundwater pumping out to 2045 (Table 4-3).

4.2.3 Agricultural Groundwater Pumping

Agricultural water use from groundwater pumping in Santa Clara County has been generally constant over the last twenty years at approximately 25,000 AFY (Figure 4-3). Historically, there is evidence that significant reductions in harvested acres and in agricultural water use had occurred prior to 2000s, and declines in the number of harvested acreage over time were the result of both increasing urban development and higher productivity. Current local land use plans and agricultural reports indicate that the amount of harvested acreage is likely in a stable state, with only minor declines due to increased urban development in the future. Given this, it is therefore assumed that average water use from the last 20 years would be an appropriate and conservative representation of future agricultural water use, which is held constant into the planning horizon as the projected agricultural pumping (Figure 4-3).

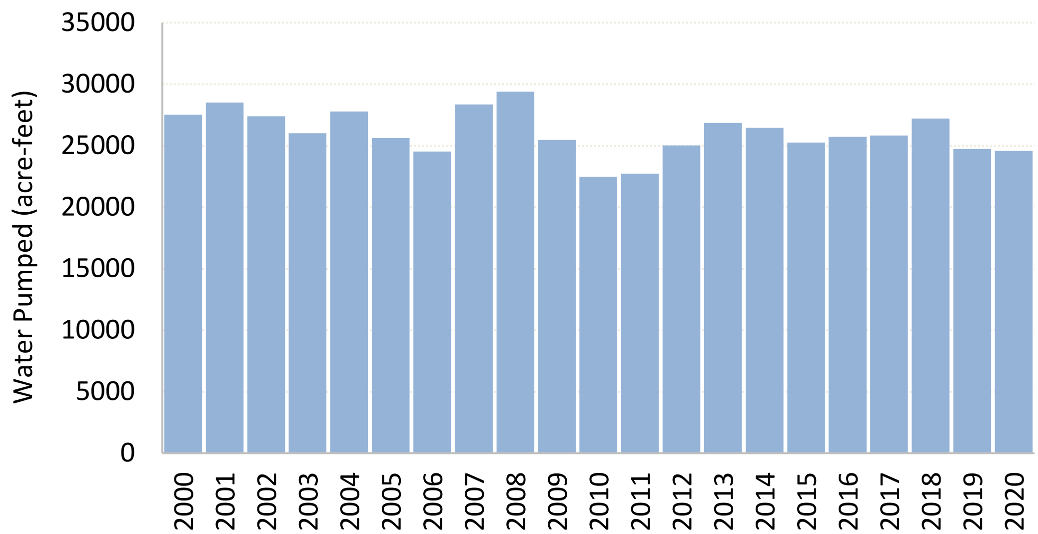

Figure 4-3. Historic Agricultural Groundwater Pumping

4.2.4 Untreated Surface Water

Untreated surface water is available to a limited number of surface water customers under Valley Water's Untreated Surface Water Program (Program). The Program was established in 1974 per Board adopted Resolution 74-28 and the Rules and Regulations for the Service of Surface Water (Rules). The water use is granted through Valley Water issued surface water permits and per the existing Rules, and can be used for landscaping, agricultural irrigation, and municipal and industrial uses. Untreated surface water service is interruptible and supply is not guaranteed. For future demands in this sector, the average of historic use was used and held at a constant rate for the planning horizon (Table 4-3). Valley Water is currently working on developing recommendations to update the Program and its Rules.

4.2.5 Distribution System Water Losses

Distribution system water losses (also known as "real losses") are the physical water losses from Valley Water's distribution system. As required by DWR, Valley Water quantified its treated water distribution system losses using the DWR Water Audit Method. The system losses are projected to increase slightly for the planning horizon with the increase of demand (Table 4-3). A copy of Valley Water's Fiscal Year 2020 Water Loss Audit is provided in Appendix C.

4.2.6 Estimated Future Water Savings

Valley Water, through a unique cooperative partnership with its retailers, has made significant investments in a variety of water conservation programs to permanently reduce water use in Santa Clara County. By taking the lead on implementing many demand management measures, Valley Water currently saves approximately 75,000 AFY from a 1992 baseline. Furthermore, modeling of Valley Water's current programs and implementation of existing regulations (referred to as passive water conservation measures) indicates Valley Water should achieve 99,000 AF water saving by 2030 from the baseline. An additional 10,000 AF of water conservation is forecasted to occur between 2030 and 2040 for a total of 109,000 AF by 2040. These planned water savings were deducted when calculating total countywide water use for the planning period. Valley Water's draft Water Conservation Strategic Plan estimates that passive savings will account for nearly 74,000 AF (75%) and more than 91,000 AF (84%) of all savings by 2030 and 2040, respectively. The adopted codes, plans, and other policies or laws that influence the calculated passive savings include the Energy Policy Act of 1992 and of 2005, the Water Research Foundation's 2016 "Residential End Uses of Water", California Assembly Bill 715 (AB 715), the California Plumbing Code, and the California Green Building Code.

4.2.7 Total Water Use

The countywide total water use is provided in Table 4-3. Overall, future water use is projected to increase over time with population growth, but will be well within the range of historic data (Figure 4-4).

Table 4-3. Projected Countywide Demand

Use Type	Projected Water Use (AF)				
	2025	**2030**	**2035**	**2040**	**2045**
Retailer Demand	288,000	280,000	285,000	290,000	299,000
Agricultural Irrigation	25,000	25,000	25,000	25,000	25,000
Independent Groundwater Pumping	14,000	14,000	14,000	14,000	14,000
Untreated Surface Water	2,000	2,000	2,000	2,000	2,000
Losses	3,000	3,000	3,000	3,000	3,000
TOTAL	**330,000**	**325,000**	**330,000**	**335,000**	**345,000**
NOTES: Total numbers are rounded to the nearest 5000 AF, and all other numbers are rounded to the nearest 1000 AF. The numbers represent countywide demands, which are partially served by the SFPUC, recycled water, and surface water rights held by San Jose Water Company and Stanford University.					

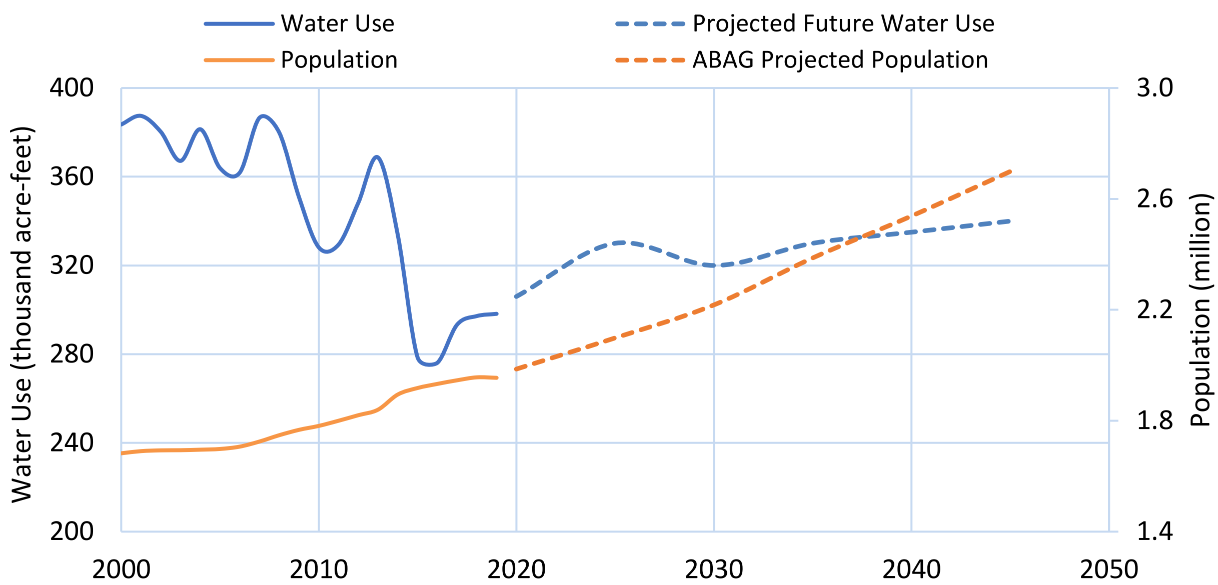

Figure 4-4. Historic and Project Future Water Use

4.3 COORDINATION WITH RETAILERS AND LAND USE PLANNING AGENCIES

Land use planning fundamentally influences future water use patterns and consequently water supply reliability. Therefore, it is in the best interest of Valley Water, land use agencies and the community that land use planning and water management be coordinated. The UWMP provides one such opportunity. Development of the water demand projections for this UWMP included coordination with water utilities and land use agencies, where feasible and appropriate. Valley Water's efforts in coordinating with retailers and planning agencies to understand data and assumptions for water demand projections are described below.

4.3.1 Water Retailer Coordination

Valley Water provides water to 13 water supply retailers of various sizes within its service area, which represent the majority of water use in Santa Clara County. Per UWMP requirements, 11 of Valley Water's retailers are required to prepare an UWMP, and therefore developed their own water demand forecasts to support their plan development. To understand retailer demands, Valley Water collected the information on retailers' water use projections for their service areas, growth assumptions, projection methodology, and associated planning documents. The review of retailer's demand methodologies showed that retailers used different land use planning assumptions in their demand models. Many derive their growth projections directly from population projections in city land use plans while others use ABAG projections, and some use a combination of local plans and known or historic growth considerations. Very few retailers showed their projected demands by water use sectors. The review was useful for providing Valley Water with more understanding about the differences between Valley Water's and retailers' underlying assumptions, which help explain the difference between their respective demand projections. Readers can review water retailer's UWMPs for their most recent demand projections, modeling efforts and assumptions.

The aggregated retailers' water use projections were compared to the countywide demands estimated by Valley Water's Model (Figure 4-5). The comparison shows that the two demand projections are within 1% (2025) to 10% (2045) of each other, with the difference increasing further into the future (Figure 4-5). There are many reasons that the demands may differ, including differences in base years, models, assumptions on growth, conservation factors, etc. Nevertheless, given the many ways models can differ and the general challenge of forecasting demands further into the future, the two projections within 5% of each other for all demand years except 2045. It indicates that the growth scenarios considered in the regional planning document, Plan Bay Area from ABAG, and those considered by the individual retailers have overall alignment in the countywide demand projection.

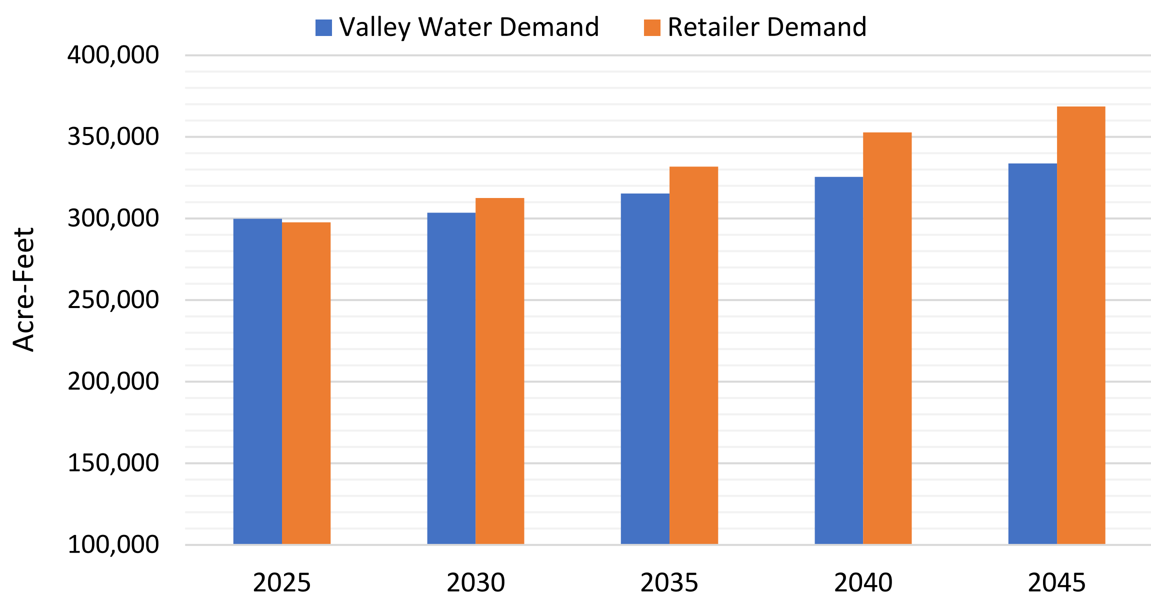

Figure 4-5. Comparison of Total Retailer and Valley Water Projected Demands

Coordination efforts also included collaboration and review of Valley Water's water use projections. In supporting the development of Valley Water's Model, retailers provided Valley Water with their historic water uses by sectors, which were used as observed data to determine the relationship between water use and forecasting variables. During Model development, Valley Water met individually with the retailers to discuss model inputs and assumptions and presented model development updates and results at Board committee and retailer sub-committee meetings. After the Model development was completed, Valley Water provided opportunities for retailers to review and understand the Model-forecasted demands.

While retailer demand forecasts are useful and have been used to inform Valley Water's prior UWMPs, including the most recent 2015 plan, Valley Water is using its custom demand model for planning and for this UWMP to ensure a consistent approach and set of assumptions are used across retailers. To ensure Valley Water continues to meet countywide water demands into the future, Valley Water will continue monitoring water uses in the county and coordinate with the water retailers and regional and statewide efforts to better understand water use patterns. As new information becomes available, Valley Water will adjust its demand projections as needed through the annual MAP process.

4.3.2 Regional Land Use Planning Coordination

Demand projections for this UWMP were based on ABAG's 2017 Plan Bay Area, a long-range regional transportation and land-use blueprint. ABAG's Plan Bay Area incorporates local and regional planning assumptions for population, housing, jobs, and transportation. Therefore, by using the ABAG growth data, regional and local planning and growth were factored into Valley Water's demand projections. In addition, Valley Water also conferred with South County land use planning documents, local County agricultural documents and the Santa Clara County Agricultural Commissioner in developing water use demand assumptions for the agricultural water use sector.

Valley Water has a history of coordinating with land use entities such as cities, ABAG, and MTC on various planning efforts (notably on Urban Water Management Plans every five years), water conservation programs, water supply projects, and the Model Water Efficient New Development Ordinance. Valley Water actively coordinates with land use entities to obtain current and projected development data to quantitatively model long-term water supply and demand projections to support long range water supply planning. Valley Water also participates in Santa Clara County Association of Planning Officials (SCCAPO) meetings to share and exchange information. Valley Water plans to continue building strong relationships with the various planning departments in Santa Clara County. Valley Water also plans to support legislative efforts to promote coordination, and Valley Water's 2021 Legislative Policy Proposals and Guiding Principles include "Support legislative efforts that improve integration of water agencies in land use decision-making processes."

4.4 CLIMATE CHANGE IMPACTS ON WATER DEMAND

Climate change impacts such as warming temperatures, shrinking snowpack, increasing weather extremes, and prolonged droughts pose significant challenges to water resources management. Already, climate change impacts are being observed across California and in the San Francisco Bay Area, and climate modeling projections indicate that these impacts will continue or become more extreme. Climate change has become an important factor in water resources planning in the State and region, although the extent and precise effects of climate change remain uncertain.

Climate change is expected to affect future water demands. While the effects of climate change on demand are not certain, it is anticipated that warmer temperatures and altered rainfall patterns associated with climate change could lead to greater water demands. According to a climate study conducted by Valley Water, average annual maximum temperature within Santa Clara County could increase by 2.0˚F by 2050 under the business as usual scenario, while precipitation in the county will continue to exhibit high year-to-year variability with very wet and very dry years. Projected future increases in temperature can lead to: 1) increased irrigation demands for outdoor landscape or agricultural; 2) increased water use in cooling towers; and 3) increased drought severity and/or length, which could increase the need to request drought-related water use reductions. Valley Water's Demand Model includes temperature and precipitation as forecasting variables and can simulate various climate change scenarios. Valley Water will continue to monitor the science of climate change and revise and update its planning assumptions as more climate studies and data and information become available.

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CHAPTER 5 – SBX7-7 BASELINE, TARGETS, AND 2020 COMPLIANCE

The State set a goal of reducing urban water use by 20% with the adoption of the Water Conservation Act of 2009, also known as SB X7-7. Each retail urban water supplier was required to calculate baseline water use for their baseline period and develop water use targets for the years 2015 and 2020 in order to help the State achieve the 20% reduction. Valley Water was very involved in this effort, including participating on the Urban Stakeholder Committee, meeting directly with local water retailers, offering technical and regional alliance support, and reviewing and proposing policies that support ways to meet the targets.

In response to the recent historic drought in California, Governor Brown issued an executive order titled "Making Water Conservation a California Way of Life." In 2018, Senate Bill (SB) 606 and Assembly Bill (AB) 1668 passed and state-wide implementation will follow in the next decade. Valley Water will continue to be involved with water conservation efforts, supporting local water retailers, and continuing to offer water conservation programs.

5.1 SUPPORT TO RETAILIERS

Under SB X7-7, wholesale water suppliers such as Valley Water are not required to establish and meet baseline and targets for daily per capita water use. However, wholesale agencies are required to provide an assessment of their present and proposed future measures, programs and policies that will help the retail water suppliers in their wholesale service area achieve their SB X7-7 water use reduction targets. This chapter describes the various ways Valley Water is involved and supportive.

5.1.1 Water Conservation Programs

Valley Water has been and continues to be a leader in water conservation with innovative, effective, and comprehensive-in-scope programs. This is consistent with Board Ends Policy E-2 that states Valley Water will "Maximize water use efficiency, water conservation and demand management opportunities." As one of the initial signatories to the California Urban Water Conservation Council's (CUWCC) 1991 Memorandum of Understanding Regarding Urban Water Conservation Best Management Practices (MOU), Valley Water is firmly committed to the implementation of the Best Management Practices (BMPs) and Demand Management Measures (DMMs). Valley Water and its major water retailers enjoy a special cooperative partnership in the regional implementation of a variety of water conservation programs, in an effort to permanently reduce water use in Santa Clara County. Chapter 9 of this plan details how Valley Water supports the water retailers with these programs.

5.1.2 Water Retailer Assistance

Valley Water meets regularly with the local water retailers to provide information, offer technical support, and assist with development of regional alliances.

5.1.3 Water Conservation Strategic Plan Development

Valley Water is in process of developing a Water Conservation Strategic Plan (Strategic Plan), which is intended to provide a blueprint for meeting Valley Water's established conservation policy objectives and targets. The Strategic Plan will evaluate and recommend water conservation measures and programs to meet policy objectives and targets for long-term water conservation and water shortage response; develop schedules for implementation; estimate costs; and identify protocols for monitoring and evaluating program performance over time. The Strategic Plan will also help local water retailers in achieving their water use reduction targets.

The Strategic Plan is also intended to be a tool and reference document to inform and support Valley Water's future conservation program marketing and design. Included in the Strategic Plan will be insights from a retail agency survey, historical participation trends analysis, geospatial participation density analysis, and participation trends by retail agency.

To achieve Valley Water's long-term conservation targets, the Strategic Plan will evaluate and estimate the necessary level of program implementation, an anticipated program schedule that considers device saturation and lifetimes, estimated costs of proposed programs with an emphasis on the most cost-effective programs, and compliance with State of California regulations.

5.1.4 Alternative Methods to Meet Targets

A small but growing source of water for Santa Clara County is recycled water. Using recycled water helps reduce potable water demands; provides a dependable, drought-resilient, locally-controlled water supply; and reduces reliance on imported water. Recycled water is currently about 5% of the county's supply and is distributed for non-potable uses such as landscape and agricultural irrigation, industrial cooling, and dual-plumbed facilities.

Valley Water has recently completed a countywide recycled water master plan, which outlines an approach to achieving its target for recycled water, including both non-potable and potable reuse, to make up 10% of the county's water supply by 2025. Refer to Chapter 6 for more information on Valley Water's recycled water efforts.

CHAPTER 6– SYSTEM SUPPLIES

Valley Water maintains diverse water supply sources to meet countywide demands. Major sources of supply for Valley Water include natural groundwater recharge, local surface water, imported water from the SWP and CVP, and recycled and purified water. In addition, the San Francisco Public Utilities Commission delivers water to eight retailers in the northern part of Santa Clara County, San José Water Company and Stanford have local surface water rights, and several retailers deliver recycled water to customers throughout the county. Potable reuse through groundwater augmentation is a planned future water supply for Valley Water. The projected water supply yields are based on implementing Valley Water's Water Supply Master Plan 2040 (WSMP) in Appendix D.

6.1 IMPORTED WATER

Much of Valley Water's current water supply comes from hundreds of miles away from natural runoff and releases from statewide reservoirs. This imported water is pumped out of the Delta and brought into the county through the complex infrastructure of the SWP and CVP. Valley Water holds contracts for 100,000 AFY from the SWP and for 152,500 AFY from the CVP. The actual amount of water delivered is typically less than these contractual amounts and depends on hydrology, conveyance limitations, and environmental regulations. In addition, supplemental imported water is acquired through transfers and exchanges as needed and available. The imported supplies are sent to Valley Water's three drinking water treatment plants, used for managed groundwater recharge, or stored in local and State and Federal reservoirs for use in subsequent years. Valley Water also stores some of its imported water in the Semitropic Groundwater Bank in the Central Valley for withdrawal during dry periods or as otherwise needed.

Eight retailers in the county have contracts with SFPUC to receive water from the SFPUC Regional Water System. The eight retailers, considered to be wholesale customers of SFPUC, are the cities of Palo Alto, Mountain View, Sunnyvale, Santa Clara, San José, and Milpitas; Purissima Hills Water District; and Stanford University. In addition, NASA-Ames is considered a retail customer of SFPUC. Valley Water does not control or administer SFPUC supplies in the county, but their supply meets some of the countywide demand.

6.1.1 Imported Water Supply Projections

Future SWP allocations are based on the State Water Project Delivery Capability Report (DCR), a biennial report that DWR issues to assist SWP contractors and local planners in assessing the near and long-term availability of supplies from the SWP. DWR issued its most recent update, the draft 2019 DWR State Water Project DCR in August 2020. In this update, DWR provides SWP supply estimates for SWP contractors to use in their planning efforts, including for use in their 2020 UWMPs. The 2019 DCR includes DWR's estimates of SWP water supply availability under both existing (2020) and future conditions (2040).

DWR's estimates of SWP deliveries are based on a computer model that simulates monthly operations of the SWP and CVP systems. Key inputs to the model include the facilities included in the system, hydrologic inflows to the system, regulatory and operational constraints on system operations, and contractor demands for SWP water. In conducting its model studies, DWR must make assumptions regarding each of these key inputs.

In the 2019 DCR for its model study under existing conditions, DWR assumed: existing facilities, hydrologic inflows to the model based on 82 years of historical inflows (1922 through 2003), current regulatory and operational constraints including 2018 Coordinated Operation Agreement Amendment, 2019 biological opinions and 2020 Incidental Take Permit, and contractor demands at maximum

Table A amounts. The long-term average allocation reported in the 2019 DCR for the existing conditions study provide appropriate estimate of the SWP water supply availability under current conditions, which Valley Water used as estimated imported supply for 2025.

To evaluate SWP supply availability under future conditions, the 2019 DCR included a model study representing hydrologic and sea level rise conditions at 2040. The future condition study used all of the same model assumptions as the study under existing conditions, but reflected changes expected to occur from climate change, specifically, projected temperature and precipitation changes centered around 2035 (2020 to 2049) and a 45 cm sea level rise. This future scenario did not include any projected changes to regulations and therefore, may overestimate future SWP and CVP deliveries. However, for the long-term planning purposes of this UWMP, the long-term average allocations reported in the future condition study from 2019 DCR is the only dataset currently available to estimate future SWP water supply availability. This future condition scenario was used to estimate future SWP and CVP supply availability to Valley Water from 2030 to 2045.

Consistent with Executive Order N-10-19, in early 2019, the state announced a new single tunnel project, which proposed a set of new diversion intakes along the Sacramento River in the north Delta for the SWP. In 2019, DWR initiated planning and environmental review for a single tunnel Delta Conveyance Project (DCP) to protect the reliability of SWP supplies from the effects of climate change and seismic events, among other risks. DWR's current schedule for the DCP environmental planning and permitting extends through the end of 2024. DCP will potentially be operational in 2040 following extensive planning, permitting and construction. Since the DCP is still in its early planning phase and costs and yields have not been determined, it is not included as a water supply in this UWMP.

Retailers with SFPUC contracts currently use less than their Individual Supply Guarantees and are projected to increase their use of this source of supply. The SFPUC normal year supply projection in Table 6-1 is based on projections by SFPUC wholesale customers. These projections do not account for potential decreases in supply allocations by the SFPUC during dry years. The total supply projection increases modestly through the planning horizon and remains below the sum of Individual Supply Guarantees for the county. If SFPUC supplies available to its wholesale customers are cut back significantly, the retailers with SFPUC contracts may request increase their use of Valley Water supplies or increase groundwater pumping.

Table 6-1. Projected SFPUC Normal Year Supplies (AF)

Service Area	2025	2030	2035	2040	2045
Milpitas	8,800	9,000	9,600	10,000	10,300
Mountain View	10,200	10,600	11,200	11,700	12,300
Palo Alto	11,300	11,400	11,500	11,800	12,100
Purissima Hills	1,900	1,800	1,800	1,700	1,700
San José Muni	5,000	5,000	5,000	5,000	5,000
Santa Clara	5,000	5,000	5,000	5,000	5,000
Stanford	2,300	2,400	2,600	2,800	3,000
Sunnyvale	10,300	10,400	12,000	12,800	13,600
Total	**55,000**	**56,000**	**59,000**	**61,000**	**63,000**
NOTES: Total numbers are rounded to the nearest 1000 AF. All other numbers are rounded to the nearest 100 AF.					

6.1.2 Constraints on Imported Water Supplies

Imported water supplies are subject to hydrologic variability. Local and out-of-county storage can help mitigate the impacts of hydrologic variability.

Valley Water's SWP and CVP water supplies are also subject to a number of additional constraints including regulatory requirements to protect fisheries and water quality in the Delta, and conveyance limitations. Delta-conveyed supplies are also at risk from Delta levee failures due to seismic threats and flooding, sea level rise and climate change, declining populations of protected fish species, and water quality variations (including algal blooms). Many water quality variations are addressed, by blending sources and/or switching sources to the drinking water treatment plants. Algae and disinfection byproduct precursors have been especially challenging during recent drought conditions. To address at least some of these constraints, Valley Water continues to evaluate the costs and benefits of participating in the Delta Conveyance Project relative to other water supply options such as developing additional local supplies, securing and optimizing Valley Water's existing water system, and expanding water conservation.

The Cities of San José and Santa Clara are temporary and interruptible customers of the SFPUC. The SFPUC is scheduled to decide whether to make them permanent customers by December 2028. If San José and Santa Clara SFPUC supplies are interrupted, the cities may need to increase their use of Valley Water supplies.

6.2 GROUNDWATER

Valley Water manages the Santa Clara and Llagas subbasins for the benefit of its groundwater customers and the county at large. Since the 1930s, Valley Water's water supply strategy has been to maximize conjunctive use of surface water and groundwater supplies to enhance water supply reliability and avoid land subsidence. Local groundwater resources make up the foundation of the county's water supply, but they need to be augmented by Valley Water's comprehensive water management activities to reliably meet the needs of county residents, businesses, agriculture, and the environment. These activities include managed recharge of imported and local supplies and in-lieu groundwater recharge through the provision of treated surface water and raw water, acquisition of supplemental water supplies, and water conservation and recycling. Valley Water does not directly deliver groundwater to customers but does have some limited emergency groundwater pumping capacity. Valley Water is the designated Groundwater Sustainability Agency (GSA) for the Santa Clara and Llagas groundwater subbasins under California's 2014 Sustainable Groundwater Management Act (SGMA) and has a DWR-approved Alternative to a Groundwater Sustainability Plan (GSP) in place for sustainably managing these subbasins. Valley Water is also the GSA for the small portion of the North San Benito Subbasin within Santa Clara County (most of the subbasin is in San Benito County). Valley Water is supporting efforts by the San Benito County Water District to develop a GSP for the entire North San Benito Subbasin. The area of the North San Benito Subbasin within Santa Clara County is very small and not addressed further in this UWMP.

6.2.1 Groundwater Basin Description

Santa Clara County includes portions of two groundwater basins as defined by DWR : the Santa Clara Valley Basin (Basin 2-009) and the Gilroy-Hollister Valley Basin (Basin 3-003). The two groundwater subbasins within Santa Clara County managed by Valley Water are the Santa Clara Subbasin (Subbasin 2-009.02) and the Llagas Subbasin (Subbasin 3-003.01), which cover a combined surface area of approximately 385 square miles. Due to different land use and management characteristics, Valley Water further delineates the Santa Clara Subbasin into two groundwater management areas: the Santa

Clara Plain and Coyote Valley. The groundwater subbasins are shown in Figure 6-1. The estimated operational storage capacity of the groundwater subbasins is up to 548,000 AF. Valley Water's managed recharge capacity is up to about 144,000 AFY.

The groundwater subbasins provide multiple benefits to residents, businesses, and the environment in Santa Clara County. Groundwater is pumped from the subbasins by retail water suppliers, agricultural users, and private well owners to support municipal, industrial, agricultural, and domestic uses. Although most of the groundwater pumped is a result of Valley Water managed recharge programs, the subbasins are also recharged by the infiltration of rainfall and natural seepage through local creeks and streams. In addition, the groundwater subbasins serve as an extensive conveyance network, allowing water to move from the recharge areas to individual groundwater wells. The groundwater subbasins provide some natural filtration of surface water as it flows through the soil and rock. Unlike surface water, most groundwater in the county can be served by water retailers without additional treatment beyond disinfection. Lastly, the groundwater subbasins provide water storage, allowing water to be carried over from the wet season to the dry season and even from wet years to dry years.

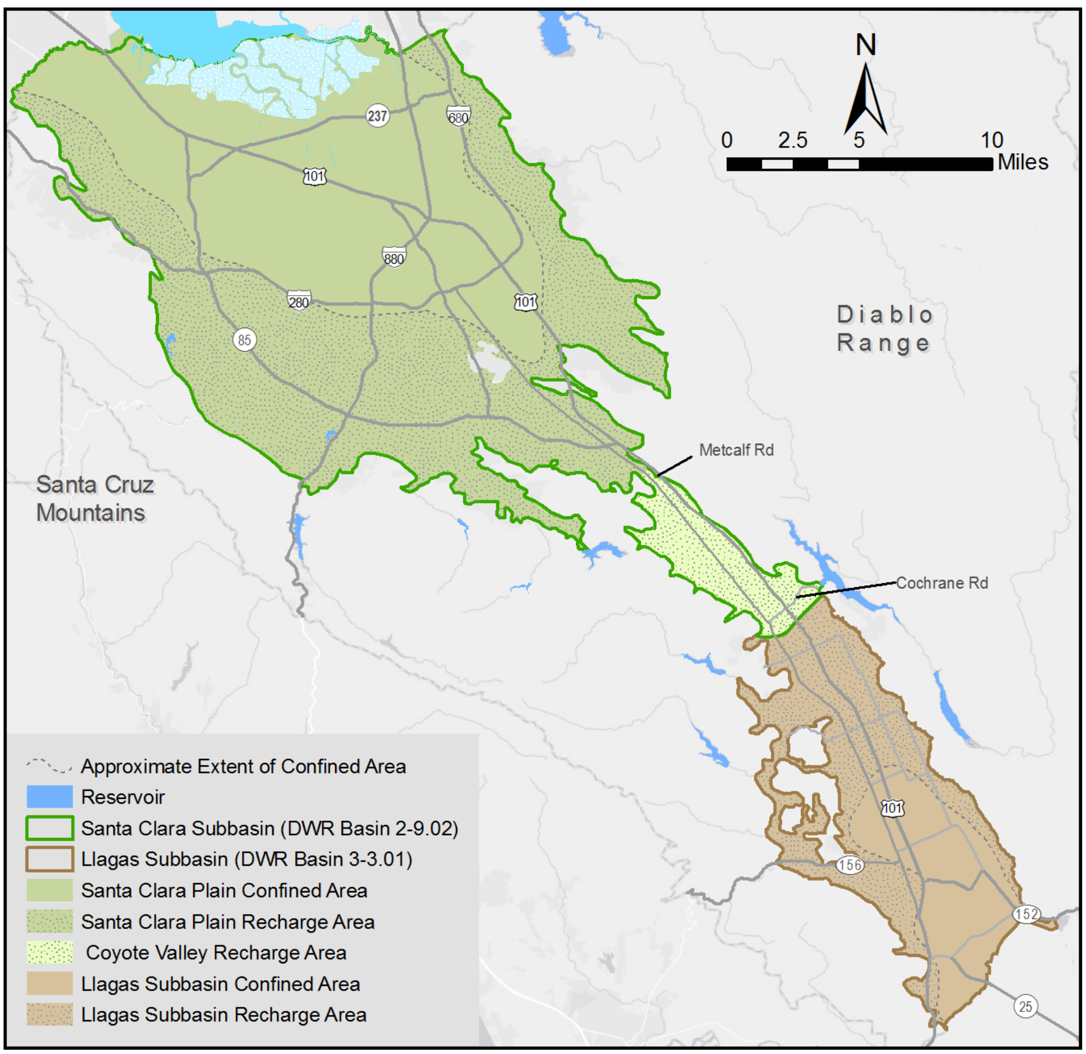

Figure 6-1. Santa Clara County Groundwater

6.2.2 Groundwater Management Plan

DWR has approved Valley Water's Groundwater Management Plan[1] as an Alternative to a GSP for SGMA compliance. The Groundwater Management Plan (included in Appendix E) identifies the following two basin management objectives (BMO):

- BMO 1: Groundwater supplies are managed to optimize water supply reliability and minimize land subsidence.
- BMO 2: Groundwater is protected from existing and potential contamination, including salt water intrusion.

These BMOs describe the overall goals of Valley Water's groundwater management program. Basin management strategies were developed to meet the BMOs. Many of these strategies have overlapping benefits to groundwater resources, acting to improve water supply reliability, minimize subsidence, and protect or improve groundwater quality. The strategies are listed below.

1. Manage groundwater in conjunction with surface water through direct and in-lieu recharge programs to sustain groundwater supplies and to minimize salt water intrusion and land subsidence.
2. Implement programs to protect or promote groundwater quality to support beneficial uses.
3. Maintain and develop adequate groundwater models and monitoring systems.
4. Work with regulatory and land use agencies to protect recharge areas, promote natural recharge, and prevent groundwater contamination.

Valley Water has implemented numerous programs to protect groundwater resources, including comprehensive monitoring programs related to groundwater levels, land subsidence, groundwater quality, recharge water quality, and surface water flow. In addition, Valley Water has developed the following outcome measures in the Groundwater Management Plan to gauge performance in meeting the basin management objectives:

1. Projected end of year groundwater storage is greater than 278,000 AF in the Santa Clara Plain, 5,000 AF in Coyote Valley, and 17,000 AF in the Llagas Subbasin.
2. Groundwater levels are above subsidence thresholds at the subsidence index wells.
3. At least 95% of countywide water supply wells meet primary drinking water standards and at least 90% of South County wells meet Basin Plan agricultural objectives.
4. At least 90% of wells have stable or decreasing concentrations of nitrate, chloride, and total dissolved solids.

Valley Water will update its Groundwater Management Plan in 2021 and submit it to DWR by January 2022 to meet SGMA requirements for five-year updates.

[1] https://www.valleywater.org/your-water/where-your-water-comes-from/groundwater/sustainable-groundwater-management

6.2.3 Current Conditions

DWR has identified both the Santa Clara and Llagas subbasins as high priority subbasins based on criteria that include overlying population, projected growth, number of wells, irrigation acreage, groundwater reliance, and groundwater impacts. Neither subbasin has been identified by DWR as being critically overdrafted.

Groundwater conditions throughout the county are sustainable, with managed and in-lieu recharge programs maintaining adequate storage to meet annual water supply needs and provide a buffer against drought or other shortages. Although groundwater levels declined during the recent (2012-2016) statewide drought, groundwater levels in the Santa Clara and Llagas subbasins quickly recovered after the drought due largely to Valley Water's proactive response and comprehensive water management activities. Valley Water monitors water levels and water quality at wells throughout the county. In addition, it evaluates data from local water suppliers to assess regional groundwater quality and identify potential threats so they can be appropriately addressed. Valley Water also monitors the quality of water used for groundwater recharge to ensure groundwater resources are protected.

Most wells in Santa Clara County produce high-quality water that meets drinking water standards without the need for treatment beyond disinfection. The primary exception is nitrate, which is elevated in many South County wells (primarily domestic wells) and continues to be a groundwater quality challenge. Cleanup is ongoing at a number of sites with industrial contaminants in groundwater, and elevated levels of perchlorate are still observed in a few South County wells. Though not currently regulated in drinking water, per- and polyfluoroalkyl substances (PFAS) are causing increased interest and prompting concern nationwide. Regional testing does not indicate widespread PFAS presence in groundwater, but one water retailer has removed ten wells from service out of an abundance of caution. Valley Water will continue to evaluate the threat posed by PFAS and other contaminants, and to work with other agencies, basin stakeholders, and the public to address these issues and ensure groundwater quality remains high.

Valley Water produces comprehensive groundwater monitoring reports that are available at https://www.valleywater.org/your-water/where-your-water-comes-from/groundwater/groundwater-monitoring.

6.2.4 Natural Groundwater Recharge Supply Projection

Valley Water includes natural groundwater recharge as a source of supply for long-term water supply planning purposes, because it contributes to the available groundwater supply. Natural recharge includes all uncontrolled recharge, including the deep percolation of rainfall, septic system and/or irrigation return flows, and natural seepage through creeks. Based on estimates from Valley Water's groundwater flow and Water Evaluation and Planning (WEAP) models, future average natural groundwater recharge is projected to be fairly constant over the planning horizon.

6.2.5 Constraints on Groundwater Supply

Groundwater supply is largely constrained by hydrologic variability and the estimated 548,000 AF of operational storage capacity within the subbasins. The inflows to the groundwater subbasins are constrained by Valley Water's managed aquifer recharge program and natural recharge. Valley Water has about 144,000 AFY of managed recharge capacity, including more than 90 miles of in-stream recharge and 102 off-stream recharge ponds. Maintaining Valley Water's managed recharge program requires ongoing operational planning for the distribution of local and imported water to recharge facilities; maintenance and operation of reservoirs, diversion facilities, distribution systems, and recharge ponds; and the maintenance of water supply contracts, water rights, and relevant environmental

clearance. Valley Water's managed recharge program is critical to maintaining groundwater supply, because natural recharge is insufficient to meet groundwater demands. However, protecting natural recharge capacity is also important. Valley Water's District Act and Board policy help preserve open space that supports agriculture and natural recharge capacity.

Groundwater quality can also be a constraint on groundwater supply. In general, the Santa Clara and Llagas Subbasins have high-quality groundwater, except for nitrate, which is elevated in some wells in the Coyote Valley and Llagas Subbasin from historic and ongoing sources including fertilizers, septic systems, and animal waste. However, nitrate concentrations are generally stable or declining and Valley Water has many programs to protect groundwater quality, including several targeted to improve nitrate in groundwater. Additional details about constraints on groundwater supply and quality and Valley Water's comprehensive groundwater management strategies are described in the 2016 Groundwater Management Plan: https://www.valleywater.org/your-water/where-your-water-comes-from/groundwater/sustainable-groundwater-management.

6.3 LOCAL SURFACE WATER

Valley Water currently has 20 appropriative water rights licenses and one filed water right permit with the State Water Resources Control Board totaling over 227,300 AFY. In addition, two of Valley Water's retailers, San José Water Company and Stanford University, have their own surface water rights that contribute to local surface water availability to their in-county customers. Local runoff is captured in Valley Water's 10 reservoirs, with a total storage capacity of about 166,000 acre-feet, though several are operating at restricted capacity due to seismic stability concerns (Table 6-2). Most of the reservoirs are sized for annual operations, storing water in winter for use in summer and fall. The exception is the Anderson-Coyote reservoir system, which provides valuable carryover of supplies from year to year. Supplies captured in local reservoirs are sent to drinking water treatment plants or diverted downstream for groundwater recharge and to maintain aquatic habitats.

Table 6-2. Existing Reservoir Capacities, Restrictions, and Water Supply Impacts from Restrictions

Reservoir	Reservoir Capacity (AF)	Restricted Capacity (AF)	Restricted Capacity (%)
Almaden	1,555	1,443	93%
Anderson	89,278	2,820	3% (deadpool)
Calero	9,738	4,414	45%
Coyote	22,541	11,843	53%
Guadalupe	3,320	2,134	64%
Stevens Creek	3,056	No restriction	–
Lexington	18,534	No restriction	–
Chesbro	7,967	No restriction	–
Uvas	9, 688	No restriction	–
Vasona	463	No restriction	–
TOTAL	**166,140**	**62,362**	–

6.3.1 Local Surface Water Supply Projection

Valley Water regularly exercises its water rights to ensure the availability of this resource into the future. Future average use of local surface water supply is projected to increase over the planning horizon as Valley Water's dams are seismically retrofitted, allowing operating capacity restrictions to be lifted. To increase the seismic stability of Anderson Dam, Valley Water drained Anderson Reservoir to deadpool (3% of capacity) in October 2020, the lowest level that can be reached through the existing outlet tunnel, to prepare for the reconstruction of the existing earthen Anderson Dam. The reconstruction is expected to last about 10 years and will allow Anderson Reservoir to return to its full operating capacity once completed.

Currently, four other reservoirs are also operating in restricted capacity (Table 6-2). The seismic retrofit is planned for three of them (Almaden, Calero, Guadalupe) to be completed around 2030 to 2035. These reservoirs will reassume their full operating capacity by that time.

6.3.2 Constraints on Local Water Supplies

Local surface water supplies are vulnerable to hydrologic variability, with most reservoirs sized for annual operations. In wetter years, Valley Water is challenged to capture all available supply due to reservoir capacity constraints and flood protection needs. In drier years, Valley Water is challenged to maintain its groundwater recharge program due to reduced storage in local reservoirs, reduced imported water allocations, and regulations and permit conditions that require Valley Water to maintain environmental stream flows.

Other factors can also impact Valley Water's reservoir operations and its use of surface water rights, including meeting reservoir operating rules designed to provide incidental flood protection, maintaining storage levels for environmental or recreation purposes, and dam safety requirements. In 1996, a water rights complaint was filed at the State Water Resources Control Board (SWRCB) challenging that Valley Water's annual operations on Coyote Creek, Guadalupe River, and Stevens Creek impact steelhead trout and Chinook salmon. In 1997, the Central California Coast Steelhead was listed as a threatened species under the Federal Endangered Species Act (ESA). To address the complaint and ESA issues, Valley Water, Guadalupe-Coyote Resource Conservation District (GCRCD), Trout Unlimited, the California Department of Fish and Wildlife (CDFW), U. S. Fish and Wildlife Service (USFWS), and National Marine Fisheries Service (NMFS), established the Fisheries and Aquatic Habitat Collaborative Effort (FAHCE) to develop a Settlement Agreement. The Settlement Agreement was initialed in 2003. Although GCRCD withdrew as a party to the Settlement Agreement, Valley Water continues with its implementation. In addition to several fish habitat improvements already completed as early FAHCE implementation, a key Settlement Agreement provision requires the development of a Fish Habitat Restoration Plan (Restoration Plan), which will implement changes in reservoir releases to continue its support of instream flow needs for salmonids, provide channel enhancements, and include monitoring and adaptive management.

6.4 STORMWATER

Valley Water's managed recharge program includes capturing local runoff in reservoirs and releasing it to groundwater recharge facilities or drinking water treatment plants. On average, about 50,000 AFY of local runoff is recharged through existing recharge facilities. Through its water supply master planning, Valley Water plans to increase stormwater capture and reuse capacity as part of its 'ensure sustainability strategy'. Valley Water's stormwater projects for the next 20 years are summarized below.

- **Green Stormwater Infrastructure (GSI)**. As part of its conservation program, Valley Water initiated a rebate program to incentivize the installation of rain barrels and cisterns, and the construction of rain gardens in residential and commercial landscapes.

- **Flood-Managed Aquifer Recharge (Flood-MAR)**. Valley Water is currently completing phase one of a feasibility study for capturing and recharging stormwater on open space in Santa Clara County, a process referred to as Flood-MAR. Phase one will determine if and where there may be potential areas suitable for Flood-MAR in Santa Clara County, identify technical approaches and related institutional requirements (e.g., permits, water rights, etc.) for installing Flood-MAR projects on lands identified as suitable, and determine potential program incentives. The first phase of the feasibility study is scheduled for completion in 2022.

- **Centralized Stormwater Capture Projects**. Centralized stormwater capture projects capture stormwater from multiple parcels for recharge in a single location and/or are municipal projects, including "green streets" projects. The Santa Clara Basin Storm Water Resources Plan completed in December 2018 identified potential projects throughout northern Santa Clara County. These projects would likely be partnerships with other jurisdictions and require outside funding, so their schedules are yet to be determined. Valley Water will continue to track project opportunities through its participation in the Santa Clara Valley Urban Runoff Pollution Prevention Program. In addition, Valley Water's WSMP includes the Upper Penitencia Creek flood protection project, which could include stormwater retention components.

- **South County Stormwater Resource Plan**. Valley Water developed a Stormwater Resource Plan (SWRP) in collaboration with stormwater permittees in South County (Gilroy, Morgan Hill, and County of Santa Clara) to identify and prioritize GSI opportunities that could be eligible for funding. The SWRP is a planning document that uses a map-based approach to identify and prioritize local and regional GSI projects that can be implemented to improve local surface-water quality through enhanced stormwater management. GSI reduces the quantity and improves the quality of water flowing into our creeks, while also providing other possible benefits, including groundwater infiltration, flood attenuation, aesthetics, reduction in heat islands, and other community benefits. The South County Stormwater Resource Plan is available here.

The greatest risk for implementing stormwater projects is finding willing partners for projects that are cost-effective for Valley Water's water supply program. This risk is somewhat mitigated by regulatory requirements for stormwater management and the availability of grants and other funding sources in support of green infrastructure projects that provide water supply benefits.

6.5 RECYCLED AND PURIFIED WATER

A growing source of water supply for Santa Clara County is recycled and purified water. Recycled water is wastewater that is cleaned through multiple levels of treatment. Purified water is highly treated water of wastewater origin that has passed through proven multistage, multibarrier processes (such as microfiltration, reverse osmosis, and ultraviolet disinfection) to produce water at the quality fit to supplement or provide supply for potable (drinking) water purposes, as verified through monitoring for its safety and as regulated by the State Water Resources Control Board Division of Drinking Water. Using recycled and purified water can help augment drinking water and groundwater supplies through in-lieu recharge; provides a reliable, drought-resilient, locally controlled water supply; and reduces reliance on imported water. Over the past decade, Valley Water has advanced water reuse in the County by leading water reuse planning efforts for the County, developing wholesale recycled water programs, and constructing new infrastructure. Currently, recycled water is about 5% (17,000 AFY, CY 2020) of the

county's water supply that is distributed for non-potable uses such as landscape irrigation, industrial cooling, and dual plumbed facilities. This recycled water is produced at the four wastewater treatment plants in the county - Palo Alto Regional Water Quality Control Plant, City of Sunnyvale Water Pollution Control Plant, San José -Santa Clara Regional Wastewater Facility, and South County Regional Wastewater Authority (SCRWA).

Valley Water constructed the Silicon Valley Advanced Water Purification Center (SVAWPC) as a demonstration facility to develop purified water. The SVAWPC can produce up to 8 million gallons of purified water per day, which is currently blended with tertiary treated water to improve the quality for non-potable use for use by a wider variety of customers. Since March 2014, the SVAWPC has demonstrated the effectiveness of advanced treatment technologies (microfiltration, reverse osmosis, ultraviolet light, and advanced oxidation) to produce purified water suitable for potable uses, and set the stage for Valley Water to begin a potable reuse program. Potable reuse will involve using advanced purified water to augment groundwater or surface water supplies.

Valley Water is working with the cities of Palo Alto and Mountain View on additional recycled water options within those cities. In December 2019, Valley Water executed an agreement with the cities of Palo Alto and Mountain View that defined cost-sharing and supply commitments related to future water reuse. A key provision of this agreement is construction of a local Salt Removal Facility in Palo Alto for enhanced Non-potable Reuse (NPR+), which is recycled water for non-potable reuse that has been blended with purified water to reduce concentration of salts and other dissolved solids to enable broader application of recycled water for non-potable end uses and to protect groundwater quality. Other key provisions of this agreement include a minimum commitment of approximately 11,000 AFY of wastewater effluent to Valley Water for purified water production at a future regional Advanced Water Purification Facility, and a water supply option for the cities of Palo Alto and Mountain View to request additional supply if needed.

Valley Water is also working with the cities of San José, Santa Clara, and Palo Alto on a location for a regional Advanced Water Purification Facility at the SVAWPC. The regional facility, to be located in either San José or Palo Alto, would produce up to 11,000 AFY of potable reuse supply by 2028 to replenish groundwater.

Valley Water completed a Countywide Water Reuse Master Plan (CoRe Plan) in 2021 to identify feasible opportunities to expand water reuse, improve water supply reliability, and increase regional self-reliance. The CoRe Plan outlines Valley Water's opportunities and strategies toward achieving up to 24,000 AFY for potable water reuse. The draft CoRe Plan is available at https://fta.valleywater.org/fl/XNyG7Fja6T#folder-link/.

6.5.1 Non-Potable Reuse

The City of San José operates the South Bay Water Recycling (SBWR) system and distributes recycled water generated by the San José/Santa Clara Regional Wastewater Facility. Treated wastewater is supplied to Valley Water's adjacent SVAWPC to be purified with advanced technologies. The SBWR Strategic and Master Plan, which discusses non-potable and potable reuse opportunities, is available at https://s3.us-west-2.amazonaws.com/assets.valleywater.org/South%20Bay%20Water%20Recycling%20-%20Final%20Report%202015.pdf.

Valley Water is a partner with the City of Sunnyvale on the Wolfe Road Recycled Water Facilities Project, which was completed in 2019 and supplies the Apple Park Headquarters with non-potable recycled water

for landscape irrigation, toilet flushing, and industrial cooling. By mutual agreement, Valley Water owns while Sunnyvale operates and maintains the Wolfe Road pipeline. Recycled water conveyed through this pipeline is owned by Valley Water and may be resold to other Sunnyvale customers fed from the pipeline, regardless of their location.

In South Santa Clara County, Valley Water partners with the SCRWA, City of Gilroy, and City of Morgan Hill on recycled water programs. Consistent with existing agreements, SCRWA is the recycled water producer, Valley Water is the recycled water wholesaler, and Gilroy and Morgan Hill are the retailers (although recycled water is not currently delivered to Morgan Hill). The 2015 South County Recycled Water Master Plan Update provides a blueprint to expand non-potable reuse infrastructure and is available at https://www.valleywater.org/your-water/recycled-and-purified-water.

6.5.2 Potable Reuse

Valley Water's WSMP includes developing 24,000 AFY of potable reuse capacity. The current plan is that treated wastewater would be purified at a new or expanded purification center in North County and then used to recharge the groundwater at Valley Water's Los Gatos Recharge ponds. Through the agreement with the cities of Palo Alto and Mountain View, Valley Water is evaluating an expanded and expedited potable reuse program that initially would include at least 11,000 AFY of potable reuse production capacity with the potential to increase to 14,000 AFY by 2028, depending on wastewater availability. Valley Water is still evaluating other approaches for securing wastewater supplies to develop a total of 24,000 AFY of potable reuse supplies.

6.5.3 Recycled Water Supply Projection

Valley Water's non-potable recycled water use in CY 2020 was approximately 17,000 AF and projected future use is summarized in Table 6-3. These projections are based on recycled water use estimates provided by the water retailers and increases over the planning horizon.

Valley Water's baseline potable reuse program goal of 11,000 AFY of production capacity for groundwater recharge is scheduled to be on-line by 2028. Based on water supply system modeling, the program will operate at full capacity in dry years, but not necessarily in wetter years or when groundwater levels are high. Average use will increase over time as demands on the groundwater subbasin increase. Additional capacity may be developed in future phases depending on water supply needs, new regulations provided for direct potable reuse, and reverse osmosis concentrate disposal capacity.

Table 6-3. Non-Potable Recycled Water Supply Projection (AF)

Service Area	2025	2030	2035	2040	2045
South Bay Water Recycling					
Milpitas	1200	1200	1200	1200	1200
San José Municipal Water System	4,800	5,500	6,300	7,400	7,400
San Jose Water Company	2,700	3,100	3,600	3,700	3,600
Santa Clara	4,600	5,500	6,600	7,900	9,500

Service Area	2025	2030	2035	2040	2045
Sunnyvale Water Pollution Control Plant					
California Water Service Company	100	100	100	100	100
Sunnyvale	1,000	1,000	1,100	1,200	1,600
Palo Alto Regional Water Quality Control Plant					
Mountain View	500	500	500	500	500
Palo Alto	300	300	300	300	300
South County Regional Wastewater Authority					
Morgan Hill	0	700	1,500	2,200	2,900
Gilroy	1,000	1,200	1,200	1,200	1,200
Total	**16,000**	**19,000**	**22,000**	**26,000**	**28,000**
NOTE: Total numbers are rounded to the nearest 1000 AF. All other numbers are rounded to the nearest 100 AF.					

6.5.4 Constraints on Recycled Water Supplies

The constraints on future SBWR deliveries to retailers include infrastructure capacity and the availability of recycled water (depending on the amount of potable reuse capacity Valley Water develops). Valley Water is including all retailer projections in this analysis because the amount of influent to the SBWR system is sufficient to meet the combined non-potable retailer demands (current and projected) and the assumed potable reuse demand. The CoRe Plan estimates higher use of NPR than Table 6-3, i.e., 39,100 to 42,000 AFY of recycled water by 2040 depending on Morgan Hill's conceptual buildout demands per the 2015 South County Recycled Water Master Plan Update.

Some of the potential constraints on the development of potable reuse include RO concentrate disposal, source water availability, public acceptance, permitting, hydrogeologic conditions, and cost. Once the program is implemented, the largest challenge will be maximizing the use of the available supply during wetter years when storage is full and/or other lower cost supplies are competing for use. These constraints are being addressed as part of the Purified Water Program.

6.6 DESALINATION

Valley Water is a partner in the Bay Area Regional Desalination Project (BARDP), which is evaluating purifying brackish water from Mallard Slough using Contra Costa Water District water rights. Partners include San Francisco Public Utility Commission, Zone 7 Water Agency, and Contra Costa Water District. Partners built a pilot plant in October 2008 and completed the pilot study in April 2009, which showed the project is feasible. Since the pilot study, the 2012-2016 drought showed that the water rights that would be exercised to divert flows to the plant may not be fully available during droughts. Partners are evaluating the water rights to determine how much water can be reliably produced by a desalination facility. In addition, partners are evaluating approaches for conveying project water to each partner agency.

While each of the partner agencies continues to evaluate its need for the project, the agencies are collectively embarking on a study to look more broadly at all the available opportunities to optimize the sharing of water resources across the region, referred to as the Bay Area Regional Reliability Project (BARR Project). BARR agencies include the BARDP partners, East Bay Municipal Utility District, and Alameda County Water District. Through BARR, the agencies will consider the use of existing supplies as well as new supplies through desalination. By taking a more holistic and regional approach to water supply planning, the agencies hope to make the best use of scarce resources to serve the future needs of the Bay Area. More information on the regional desalination project is available at https://regionaldesal.squarespace.com/. Currently, Valley Water is not including desalination in its projected water supplies.

6.7 WATER EXCHANGE AND TRANSFERS

Valley Water conducts short-term water transfers and exchanges as a part of its routine imported water operations. As a reference, Valley Water was able to secure over 13,400 AF of transfer supply in 2020. While Valley Water considers water exchange and transfers as one of the potential options to secure additional water during critical dry years through long-term agreements, there are considerable uncertainties with long term costs and ability to make transfers in critical dry years, during which water quality challenges, regulatory requirements, and pumping restrictions may affect the ability to convey transfer supplies across the Delta. Consequently, Valley Water is not including water transfers and exchanges in its projected water supplies in this plan, except in the Drought Risk Analysis.

6.8 RESERVES

Reserves include local groundwater storage and out of County storage in Semitropic Groundwater Bank and San Luis reservoir. Valley Water puts water into reserves when other supplies exceed demands and takes water out of reserves when other supplies are less than demands. Within a single year, Valley Water may put water into and take water out of reserves, depending on conditions at the time of year. Reserves play a critical role in Valley Water's overall water management strategy and its ability to meet demands during droughts.

One constraint on using local groundwater storage reserves is the need to maintain adequate groundwater levels to avoid land subsidence, maintaining adequate water levels to support pumping for beneficial use, and providing a reserve in case the subsequent year is dry. The use of local water carryover can be constrained by regulations governing instream flow requirements. Another constraint on reserves is finite storage capacity. In very wet years, Valley Water is challenged to find a place to use or store all its available supplies.

6.9 FUTURE WATER SUPPLY PROJECTS

Valley Water's WSMP identifies several projects and programs that will increase local water supply to meet future countywide demand. These projects are in the various stages of planning, design, and construction. These projects are summarized in Table 6-4 and their estimated yields are included in the supply projections in Table 6-5. The expansion of Pacheco Reservoir in southern Santa Clara County is one of the proposed future projects identified in the WSMP. Pacheco Reservoir would act as a surface bank for Valley Water's existing supplies and diversify its reserve storage by increasing the volume of locally banked reserves. In addition, by increasing locally available storage, Valley Water may be better positioned to respond to future water supply emergencies.

Table 6-4. Future Water Supply Projects

Project	Planned Operating Year	Expected Increase in Water Supply (AFY)
Dam Improvements/Seismic Retrofits		
Almaden	2035	17,440
Anderson	2030	
Calero	2035	
Guadalupe	2035	
Delta Conveyance Project	2040	TBD
Pacheco Reservoir Expansion	2035	–
Potable Reuse Program	2028	9,000[1]
Transfer Bethany Pipeline	2025	1,000
[1]Based on an 11,000 AF production capacity with 80% efficiency.		

6.10 SUMMARY OF EXISTING AND PROJECTED WATER SUPPLIES

Valley Water's existing and projected average water supplies are presented in Table 6-5. To forecast average available supplies, Valley Water uses its Water Evaluation and Planning (WEAP) model. The WEAP model simulates future demands, investments, and certain expected future regulations (e.g., local minimum stream flows) using the historic hydrology from 1922-2015 (94 years). Valley Water presents the average supply over 94-years of hydrology (1922 – 2015) in Table 6-5 for groundwater, local surface water, and CVP and SWP allocations, since their availability varies greatly from year to year with hydrologic cycles and there is not a single representative year. Available recycled water and potable reuse supplies are summed and do not significantly vary year to year in the WEAP model. A complete summary of assumptions used in the modeling for this plan is provided in Appendix F.

Actual availability of each supply during any given year depends on hydrology, groundwater recharge operations and conditions, and other factors. Groundwater storage shown assumes groundwater can be drawn down to the severe stage of the Water Shortage Contingency Plan. This does not represent a sustainable long-term groundwater condition, but these supplies represent water that may be needed to get through a prolonged drought. Imported water allocations are provided by DWR in their DCR 2019, which does not include any projected changes to future regulations nor the hydrologic sequence for the most recent 2012-2016 drought. However, through Valley Water's Monitoring and Assessment Program (MAP), Valley Water is conservatively planning for investments by considering severe droughts, such as the 2012-2016 drought, will occur in the future. Projects included in the supply projections include transfer Bethany pipeline (2025); Anderson dam seismic retrofit and potable reuse (2030); Guadalupe, Calero, and Almaden dam seismic retrofits and Pacheco Reservoir Expansion (2035); and an additional 35,000 AF of conservation (to reach Valley Water's goal of 109,000 AF by 2040 with a 1992 baseline).

In WEAP, SFPUC supplies decrease in some dry years and droughts, but in most years the amount available is the same as listed in Table 6-5. However, depending on the voluntary agreements for the Bay Delta Plan Phase 1 on the Tuolumne, SFPUC supplies may be significantly decreased in the future. At present, there is not sufficient understanding of how the Phase 1 will impact SFPUC supplies that is provided to Valley Water's retailers, so the potential impact of the voluntary agreements is not yet included in Valley Water's supply analysis. However, Valley Water is tracking this regulatory

development and proposing a conservative investment approach for the future to be able to respond to supply uncertainties such as this.

Table 6-5. Projected Average Water Supplies (AF)

Water Supply	2025	2030	2035	2040	2045
Surface water	30,000	70,000	185,000	185,000	185,000
Imported water	130,000	134,000	136,000	139,000	142,000
SFPUC Supply	55,000	56,000	59,000	61,000	63,000
Local groundwater storage	140,000	164,000	163,000	162,000	162,000
Out of County Storage	75,000	75,000	75,000	70,000	70,000
Recycled water (non-potable)	16,000	19,000	22,000	26,000	28,000
Total	**446,000**	**518,000**	**640,000**	**643,000**	**650,000**

NOTES: Recycled water, SFPUC supply, and groundwater storage are rounded to the nearest 1,000 AF. All other supplies are rounded to the nearest 5,000 AF. Supplies shown are based on modeled estimates of available supplies. Actual availability during any given year depends on hydrology, groundwater recharge operations and conditions, regulatory requirements, and other factors. Groundwater storage shown assumes groundwater can be drawn down to the severe stage of the Water Shortage Contingency Plan. This does not represent a sustainable long-term groundwater condition, but these supplies represent water that may be needed to get through a prolonged drought. Imported water allocations are provided by DWR in their Delivery Capability Report (DCR) 2019, which does not include any projected changes to future regulations nor the hydrologic sequence for the most recent 2012-2016 drought. For comparison, the lowest total annual imported delivery during the 1987-1992 drought in the DCR 2019 dataset is 83,200AF, while the actual lowest annual imported delivery during the 2012-2016 drought was 60,320 AF. However, through Valley Water's Monitoring and Assessment Program, Valley Water is conservatively planning for investments by considering severe droughts, such as the 2012-2016 drought, will occur in the future. Projects included in the supply projections include transfer Bethany pipeline (2025); Anderson dam seismic retrofit and potable reuse (2030); Guadalupe, Calero, and Almaden dam seismic retrofits and Pacheco Reservoir Expansion (2035); and an additional 35,000 AF of conservation (to reach Valley Water's goal of 109,000 AF by 2040 with a 1992 baseline).

6.11 CLIMATE CHANGE IMPACTS TO WATER SUPPLY

Climate change impacts such as warming temperatures, shrinking snowpack, increasing weather extremes, and prolonged droughts pose significant challenges in water resources management, potentially including Valley Water's operational flexibility and water supply availability. Already, climate change impacts are being observed across California and in the San Francisco Bay Area, and climate modeling projections indicate that these impacts will continue or become more extreme. Historic data show that average annual maximum temperatures in Santa Clara County have increased by 2.5°F since 1950. According to *California's Fourth Climate Change Assessment*, sea level has risen over 8 inches in the last 100 years, and the 2012-2016 drought led to a 1-in-500 year low in Sierra snowpack and $2.1 billion in economic losses statewide. The Bay Area will likely see a significant temperature increase by mid-century. Precipitation will continue to exhibit high year-to year variability, with very wet and very dry years. Average Sierra Nevada snowpack is projected to decline, up to 60% in mid-century under a business-as-usual greenhouse gas emissions scenario. Future increases in temperature will likely cause longer and deeper droughts.

CHAPTER 6 – SYSTEM SUPPLIES

Statewide and local changes in precipitation and temperature could significantly impact Valley Water's water supplies and operations, the effectiveness of potential water supply investments, and water demand patterns. Specifically, Valley Water's water supply vulnerabilities to climate change include:

- **Decreases in the quantity of imported water supplies**. Currently the Sierra snowpack acts as a reservoir that captures precipitation as snow in the winter and releases it as runoff through the spring and summer where it is captured by reservoirs in the SWP and CVP system. More precipitation falling as rain and earlier snowmelt in the Sierra may exceed the storage capabilities of the existing SWP and CVP reservoirs meaning much of this runoff would be lost as a water supply. Increases in temperature and evapotranspiration may also lead to a higher intensity of droughts, which can decrease imported water allocations. Rising air temperatures will also increase water temperatures in reservoirs and the Delta, which can lead to increased evaporation rates, a higher risk of harmful algal blooms, and negative impacts to fish and wildlife, all of which can impact the availability of imported water supplies for Valley Water. Sea level rise will also have negative impacts on imported water supplies, largely because of saltwater intrusion into the Delta. Saltwater intrusion can impact water supply allocations, as more fresh water will be needed to flow through the Delta and into San Francisco Bay to hold back saltwater, making it unavailable for CVP and SWP use.

- **Decreases in the ability to utilize local surface water supplies**. Shifts in the timing and intensity of rainfall and runoff could affect Valley Water's ability to capture and use local surface water supplies. It is difficult to capture rainfall when it comes in a few intense storms because reservoirs are more likely to fill and spill, or additional releases will be needed to make room for the storm flows. When it is wet, there are typically lower demands for water, so storm flows and releases to provide additional storage capacity are difficult to put to immediate use. Thus, even if average annual rainfall stays the same, the ability to utilize local supplies may decrease.

- **Increases in irrigation and cooling water demands**. Higher temperatures will increase irrigation demands for agricultural, residential, and commercial/institutional uses, which account for about 40% of water use in the county. Also, the county has several energy plants, multiple data centers, and facilities with cooling towers. Higher temperatures may also increase demands by these users.

- **Decreases in water quality**. Higher temperatures, wildfire, and changes in flow patterns could result in more algal blooms, and increased turbidity in imported and local surface water supplies. Sea level rise could also contribute to increased salinity in Delta conveyed supplies. At a minimum, changes in water quality require additional monitoring. Often, degrading in water quality requires changes to treatment processes, and sometimes, can result in the interruption of supplies from the CVP or SWP.

- **Increases in the severity and duration of droughts**. Droughts are already Valley Water's greatest water supply challenge. With increases in demands and potential reductions in supplies from climate change, this challenge will only grow. Without additional supplies and demand management measures, Valley Water would need to call for more frequent and severe water use reductions. These actions affect the economic and social well-being of the county. More severe and longer droughts will also affect the environmental well-being of the county. Valley Water needs to implement a water supply strategy that will adapt well to future climate change by managing demands, providing drought-resilient supplies, and increasing system flexibility in managing supplies and water quality.

Recognizing the challenges posed by climate change to water supply reliability, Valley Water has embarked on a number of efforts to understand and develop mitigation actions for climate change impacts. Through its annual MAP update and using the WEAP model, Valley Water is analyzing climate impacts to quantify the effect on Valley Water's existing and future local supply. In addition, since imported water represents a significant source in Valley Water's portfolio, Valley Water is in the process of developing a climate study that will use CalSim3 to quantify potential climate change and regulatory impacts to Valley Water's CVP and SWP allocations. Valley Water relies on its long-term master planning efforts to continually develop and improve resilient and adaptable water supplies and strategies. Valley Water's WSMP is reviewed annually and updated every five years to adapt to changing conditions. The most recent update was completed in 2019. The WSMP will continue to develop elements that adapt to future climate changes.

Furthermore, to address climate change impacts to ensure it can continue to provide a clean, reliable water supply, natural flood protection, and water resources stewardship in the future, Valley Water developed a Climate Change Action Plan (CCAP). The CCAP provides goals, strategies, and actions for each of Valley Water's mission areas, including water supply reliability, flood risk reduction, and water resources stewardship, as well as for emergency response. The goals and strategies developed through the CCAP planning process will guide the implementation of specific actions to address climate change. More information about the CCAP can be found at https://www.valleywater.org/your-water/water-supply-planning/climate-change-action-plan.

For the implementation actions, Valley Water is actively promoting water conservation and reuse to increase resilience and mitigate climate change impacts. Valley Water's long-term and comprehensive water conservation and demand management efforts are described in Chapter 9, while existing and future water reuse is detailed in Section 6.4.

6.12 ENERGY INTENSITY

Valley Water has a large network of water infrastructure that includes three water treatment plants, an advanced recycled water purification center, three pump stations, recharge facilities, and 142 miles of pipeline. This water infrastructure is used to pump, treat, convey, and deliver water to end users, and energy is consumed at each stage of the water supply process. Valley Water has an Energy Optimization Plan that guides its efforts to promote energy efficiency in all its operations by establishing Energy Optimization Measures (EOMs). EOMs call for replacement of outdated and inefficient equipment, retrofitting of facilities, and reliability improvements to ensure that Valley Water uses energy as efficiently as possible.

6.12.1 Raw Water Energy Intensity

Valley Water's energy consumption for each water supply process stage is shown in Table O-1C in Appendix A and described further below.

Extract and Divert

Valley Water has the option to use the Coyote Pumping Plant (CPP) to supplement water deliveries by pumping water from Anderson Reservoir to its treatment plants. When pumping from Anderson Reservoir, the energy is recorded by a separate utility meter rather than the CVP project-use meter. Since reservoir levels were lowered drastically in 2020 to prepare for the upcoming Anderson Dam Seismic Retrofit Project, the Extract and Divert energy consumption will likely be higher in 2020 than in future years.

Conveyance

Valley Water has operational control of the Pacheco Pumping Plant (PPP) and CPP. However, the two pumping plants are owned by the U.S. Bureau of Reclamation to provide CVP water deliveries to Santa Clara County. Since approximately 20.8% of the total water pumped at PPP is diverted to San Benito County, the energy data and water deliveries in Table O-1C excludes San Benito's share of the water deliveries and corresponding energy for the PPP. Valley Water used 26,369,000 Kilowatt-hour (kWH) in 2020 to convey water. In addition to Valley Water's share for pumping at the PPP, this total includes in-county pumping at CPP (approximately 405,000 kWH), and approximately 60,600 kWH related to SWP water deliveries. The energy intensity for Conveyance is 219 kWH/AF.

Treatment

Valley Water used 10,658,000 kWH to treat water in 2020 with an intensity of 104 kWH/AF. Energy to treat water is metered at Valley Water's three water treatment plants and includes metered utility data for offsite processes (i.e., drying beds) where applicable. Water pumped within each treatment plant to its treated water reservoir or to adjacent retailer reservoir is included in the Treatment process metered energy data and has been omitted from the Distribution process energy approximation. The Treatment water volume data is for water production which is slightly lower than the total raw water delivered to the water treatment plants (filter to waste, etc.). The estimated total treated water is 103,000 AF in 2020.

Distribution

Energy data to distribute treated water is not readily available. The distribution process energy data is approximated based on the total utility metered energy data for all Valley Water remote electrical services. To improve the approximation, easily identified raw water and safe/clean water sites (dams, South County turnouts, oxygenation trailers, small office buildings) were omitted from the provided Distribution energy data. However, some raw water sites are likely still included in the approximation. Valley Water also shares a treated water intertie facility with SFPUC that accounted for some supplemental treated water deliveries during planned treatment plant outages in 2020. The total energy consumed for Distribution is 215,600 kWH with an intensity of 2.1 kWH/AF.

Treated water is typically gravity-fed from the treatment plants to the retailers (although some power is used for controls, valving, monitoring, etc.). Some retailers have treated water reservoirs adjacent to Valley Water property. For the cases where water is pumped from within the treatment plant to a Valley Water reservoir (ready for distribution) or to an adjacent retailer reservoir, the energy was captured in the Treatment section of the table and not counted in Distribution to avoid double counting.

6.12.2 Recycled Water Energy Intensity

Valley Water manages the SVAWPC, the largest advanced water purification plant in Northern California, with a production capacity of 8 million gallons per day (8,960 AFY). The SVAWPC is creating a locally developed, new supply of water and produces about 4,200 AFY recycled water on average. The highly purified water is a drought-resilient source that can help ensure Silicon Valley has safe, sustainable water now and into the future. The energy consumption by the SVAWPC is 5,985,700 kWH (1230 kWH/AF) and provided in Table O-2 in Appendix A.

CHAPTER 7 – WATER SERVICE RELIABILITY AND DROUGHT RISK ASSESSMENT

Valley Water's diverse water supply portfolio can meet the County's future demands in normal, single dry, and five consecutive dry years, based on the projected demands and existing and planned supplies. The future supplies reflect the planned and phased implementation of WSMP projects over time. During a five-year drought under existing condition, the Drought Risk Analysis (DRA) indicates that Valley Water will be able to meet countywide demands with a combination of local and imported surface water, groundwater, supply from storage, and supplemental sources such as water transfers.

7.1 DEMAND AND SUPPLY ASSESSMENT

A reliable water demand forecast is critical in assessing Valley Water's water service reliability. In 2020, Valley Water developed a new statistically based Demand Model to meet its planning needs. The model provides forecasted Santa Clara County demands out to 2045. The Demand Model and forecasted demands are described in detail in chapter 4.

Valley Water maintains diverse water supply sources to meet countywide demands. Major sources of supply for Valley Water include natural groundwater recharge, local surface water, imported water from the State and Federal projects, and recycled and purified water. In addition, the SFPUC delivers water to eight retailers in the northern part of Santa Clara County. Chapter 6 describes in detail Valley Water's existing and projected sources of supplies and their constraints. Below is a summary of the constraints to Valley Water's water supply sources that are covered in Chapter 6.

- **Imported water –** Valley Water's SWP and CVP water supplies are subject to hydrologic variability and a number of additional constraints including regulatory constraints, seismic threats to the Delta levee system, sea level rise, climate change, and water quality variations.

- **Groundwater –** The groundwater supply is largely constrained by hydrologic variability and the estimated operational storage capacity within the subbasins. The inflows to the groundwater subbasins are constrained by Valley Water's managed aquifer recharge program and natural recharge. Groundwater quality can also be a constraint on groundwater supply.

- **Local surface water –** Local surface water supplies are vulnerable to hydrologic variability and constrained by environmental regulations and permit requirements. Climate change may cause decreases in the ability to utilize local surface water supplies.

- **Recycled and Purified Water –** The constraints on future recycled water deliveries include infrastructure capacity and the availability of recycled water. Some of the potential constraints on the development of potable reuse include reverse osmosis concentrate disposal, public acceptance, permitting, hydrogeologic conditions, wastewater availability from other agencies (Valley Water is not a wastewater agency), and cost.

7.2 SERVICE WATER RELIABILITY

Valley Water's water service reliability was assessed by comparing supplies and demands under three hydrologic conditions – an average year, a single dry year, and five consecutive dry years. The basis and data for these water years are provided in Table 7-1. Valley Water uses the WEAP model to evaluate water supply reliability under these conditions. Developed by the Stockholm Environment Institute, WEAP is a deterministic, integrated water resources management model that uses water demand and supply information and accounts for multiple and competing uses and priorities. Valley Water uses the WEAP model as a tool to support its long-term water supply planning. The WEAP model simulates Valley Water's water supply system comprised of facilities to recharge the county's groundwater subbasins,

operation of reservoirs and creeks, treatment and distribution facilities, and raw water conveyance facilities. The model also accounts for non-Valley Water sources and distribution, such as supplies from the SFPUC, non-potable recycled water, and local water developed by other agencies, such as the San Jose Water Company. In essence, the model was formulated to simulate the management of the current and future water resources within the county.

Table 7-1. Basis of Water Year Data for Reliability Assessment

Year Type	Base Year	Volume Available (AF)[1]	% of Average Supply
Average Year	1922-2015	444,600	100%
Single Dry Year	1977	354,700	80%
Consecutive Dry Years 1st Year	1988	344,900	78%
Consecutive Dry Years 2nd Year	1989	369,500	83%
Consecutive Dry Years 3rd Year	1990	340,200	77%
Consecutive Dry Years 4th Year	1991	347,100	78%
Consecutive Dry Years 5th Year	1992	341,400	77%

[1]Volumes available are based on supplies anticipated to be available in 2025. Supply availability will vary with the demand year.

Valley Water's WEAP water supply planning model operates on a monthly time-step that simulates the water supply and demand over 94 years, using the historic hydrologic sequence of 1922 through 2015. The model tracks water resources throughout the county and delivery of water to meet demands according to availability and priority. Average water supply reliability for average year, a single dry year, and five consecutive dry year sequence was based on the model results of the corresponding years in the 94-year model period. A complete summary of assumptions used in the modeling for this plan is provided in Appendix F.

7.2.1 Average Year Supply Reliability

Valley Water uses the average annual supply over the 94 modeled years to represent the average year condition. Under average conditions, Valley Water's projected water supplies exceed projected demand through 2045 in all demand years (Table 7-2). The increasing supplies reflect the planned and phased implementation of WSMP projects over time, which exceed Valley Water's level of service goal to be prudent given future uncertainties with demands and supplies.

For this analysis, imported water allocation is provided by DWR DCR 2019, which includes projected climate change impacts but does not include any projected changes to future regulations in the Delta watershed. The DWR DCR 2019 dataset was not available when Valley Water completed its WSMP 2040. Because the long-term operations of the SWP and CVP were undergoing re-consultation under the federal and State Endangered Species Acts (ESA and CESA) at the time Valley Water was conducting its WSMP 2040, in order to be conservative for planning purposes, the dataset used at that time included anticipated regulatory constraints with significantly reduced imported water supplies in comparison (25% less imported supplies). For comparison, the lowest total annual imported delivery during the 1987-1992 drought in the DCR 2019 dataset is 83,200AF, while the actual lowest annual imported delivery during the 2012-2016 drought was 60,320 AF. Those regulatory constraints did not materialize in the 2019 and 2020 ESA and CESA permits, and thus the DWR DCR 2019 dataset does not include any projected changes to future regulations.

The analysis also assumes that groundwater storage can be drawn down to the severe stage of the Water Shortage Contingency Plan. This does not represent a sustainable long-term groundwater condition, but these supplies represent water that may be needed to get through a prolonged drought.

Table 7-2. Average Year Supplies and Demands

Water Supply	2025	2030	2035	2040	2045
Supply Total	446,000	518,000	640,000	643,000	650,000
Demand Total	330,000	325,000	330,000	335,000	345,000
Difference	116,000	193,000	310,000	308,000	305,000

NOTES: Supplies are rounded to the nearest 1,000 AF and demand numbers to the nearest 5,000 AF. Supplies shown are based on modeled estimates of available supplies. Actual availability during any given year depends on hydrology, groundwater recharge operations and conditions, and other factors. Groundwater storage shown assumes groundwater can be drawn down to the severe stage of the Water Shortage Contingency Plan. This does not represent a sustainable long-term groundwater condition, but these supplies represent water that may be needed to get through a prolonged drought. Imported water allocations are provided by DWR in their Delivery Capability Report (DCR) 2019, which does not include projected future regulations nor the hydrologic sequence for the most recent 2012-2016 drought. For comparison, the lowest total annual imported delivery during the 1987-1992 drought in the DCR 2019 dataset is 83,200AF, while the actual lowest annual imported delivery during the 2012-2016 drought was 60,320 AF. However, through Valley Water's Monitoring and Assessment Program, Valley Water is conservatively planning for investments by considering severe droughts, such as the 2012-2016 drought, will occur in the future. Projects included in the supply projections include transfer Bethany pipeline (2025); Anderson dam seismic retrofit and potable reuse (2030); Guadalupe, Calero, and Almaden dam seismic retrofits and Pacheco Reservoir Expansion (2035); and an additional 35,000 AF of conservation (to reach Valley Water's goal of 109,000 AF by 2040 with a 1992 baseline).

7.2.2 Single Dry Year Supply Reliability

The single driest year in the 94 model years occurred in 1977, based on the historic hydrological record. Table 7-3 shows estimated supplies and demands for years 2025 through 2045. Supplies appear to be sufficient to meet demands during a single dry year through 2045. This assumes that reserves are at healthy levels at the beginning of the year and that the projects and programs identified in the WSMP are implemented. Supplies available for this single year drought represent water needed not only for that single drought year, but also water that may be needed for a prolonged drought. Valley Water would manage the supplies reported in the table assuming the drought may continue beyond a single year, and thus not all supplies are expected to be used by retailers during the single year drought.

Table 7-3. Single Dry Year Supplies and Demands (AF)

Water Supply	2025	2030	2035	2040	2045
Supply Total	355,000	373,000	497,000	503,000	505,000
Demand Total	330,000	325,000	330,000	335,000	345,000
Difference	25,000	48,000	167,000	168,000	160,000
NOTES: Supply numbers are rounded to the nearest 1,000 AF and demand numbers to the nearest 5,000 AF. The available groundwater is based on modeled estimates if the 1977 hydrology was repeated in the future. Supplies available for the single year drought represent water needed not only for that single drought year, but also water that may be needed for a prolonged drought. Valley Water would manage the supplies reported in the table assuming the drought may continue beyond a single year, and thus not all supplies are expected to be used by retailers during the single year drought. Imported water allocations are provided by DWR in their DCR 2019, which does not include projected future regulations nor the hydrologic sequence for the most recent 2012-2016 drought. For comparison, the lowest total annual imported delivery during the 1987-1992 drought in the DCR 2019 dataset is 83,200AF, while the actual lowest annual imported delivery during the 2012-2016 drought was 60,320 AF. However, through Valley Water's Monitoring and Assessment Program, Valley Water is conservatively planning for investments by considering severe droughts, such as the 2012-2016 drought, will occur in the future. Projects included in the supply projections include transfer Bethany pipeline (2025); Anderson dam seismic retrofit and potable reuse (2030); Guadalupe, Calero, and Almaden dam seismic retrofits and Pacheco Reservoir Expansion (2035); and an additional 35,000 AF of conservation.					

7.2.3 Five Dry Year Supply Reliability

The greatest challenge to Valley Water's water supply reliability is multiple dry years, such as those that occurred in 1988 through 1992 and in 2012 through 2016. The five dry-year period used in this analysis is 1988 to 1992, which was an extended drought within historic record and WEAP modeling period. The most recent 2012-2016 drought is more severe, but imported water allocations are not available from DWR DCR 2019 for the analysis. Estimated supplies and demands for the period, under different demand years, are shown in Table 7-4. The analysis indicates that with existing and planned projects' supplies, Valley Water's diverse water supplies are sufficient to meet demands throughout the full five-year drought in all demand years without having to call for short-term water use reductions.

Valley Water's basic water supply strategy to compensate for supply variability is to store excess wet year supplies in the groundwater basin, local reservoirs, San Luis Reservoir, and/or Semitropic Groundwater Bank, and draw on these reserve supplies during dry years to help meet demands. These reserves, along with existing and planned future projects in the WSMP, help Valley Water meet demands during a prolonged drought. Valley Water's Board updated its long-term water supply reliability level of service goal in January 2019. The goal is to develop supplies to meet 100% of annual water demand during non-drought years and at least 80% of annual water demand in drought years. Future projects and programs recommended in the WSMP, including additional long-term water conservation savings, water reuse, recharge capacity, storm water capture and reuse, and banking and storage, were developed in accordance with this policy to minimize the need to call for water use reductions greater than 20%. The WSMP's recommended projects exceeded Valley Water's level of service goal to be prudent given future uncertainties with demands and supplies, but also because these projects were developed with a significant higher (approximately 14%) demand projection. As part of the on-going master planning process to address future uncertainties with demands, existing supplies, and proposed projects, Valley Water now conducts annual evaluation of WSMP projects through the MAP process to

determine which projects should continue to be invested in to meet the level of service goal and potentially for other benefits such as operational flexibility, supply diversification, and resiliency to future uncertainties.

Table 7-4. Multiple Dry Years Supplies and Demands (AF)

		2025	2030	2035	2040	2045
First Year	Supply Totals	345,000	349,000	491,000	483,000	487,000
	Demand Totals	330,000	325,000	330,000	335,000	345,000
	Difference	15,000	24,000	161,000	148,000	142,000
Second Year	Supply Totals	370,000	376,000	477,000	482,000	501,000
	Demand Totals	330,000	325,000	330,000	335,000	345,000
	Difference	40,000	51,000	147,000	147,000	156,000
Third Year	Supply Totals	340,000	349,000	443,000	450,000	448,000
	Demand Totals	330,000	325,000	330,000	335,000	345,000
	Difference	10,000	24,000	113,000	115,000	103,000
Fourth Year	Supply Totals	347,000	341,000	416,000	421,000	429,000
	Demand Totals	330,000	325,000	330,000	335,000	345,000
	Difference	17,000	16,000	86,000	86,000	84,000
Fifth Year	Supply Totals	341,000	365,000	430,000	440,000	444,000
	Demand Totals	330,000	325,000	330,000	335,000	345,000
	Difference	11,000	40,000	100,000	105,000	99,000

NOTES: Supply numbers are rounded to the nearest 1,000 AF and demand numbers to the nearest 5,000 AF. Supplies shown are based on modeled estimates for hydrologic years 1988-1992. Imported water allocations are provided by DWR in their DCR 2019, which does not include projected future regulations nor the hydrologic sequence for the most recent 2012-2016 drought. For comparison, the lowest total annual imported delivery during the 1987-1992 drought in the DCR 2019 dataset is 83,200AF, while the actual lowest annual imported delivery during the 2012-2016 drought was 60,320 AF. However, through Valley Water's Monitoring and Assessment Program, Valley Water is conservatively planning for investments by considering severe droughts, such as the 2012-2016 drought, will occur in the future. Projects included in the supply projections include transfer Bethany pipeline (2025); Anderson dam seismic retrofit and potable reuse (2030); Guadalupe, Calero, and Almaden dam seismic retrofits and Pacheco Reservoir Expansion (2035); and an additional 35,000 AF of conservation.

7.3 DROUGHT RISK ASSESSMENT

Droughts, particularly prolonged droughts, remain the greatest challenge to Valley Water's water supply reliability. Assessing and understanding water service reliability and risk during an extended drought are critically important to Valley Water's short-term and long-term water management decisions. This section describes Valley Water's Drought Risk Analysis (DRA) under a drought period lasting for the next five consecutive years.

7.3.1 Data and Method for Drought Risk Analysis

7.3.1.1 DRA Data

Drought Risk Analysis involves comparing total water supply sources available to projected water use for a drought period starting in 2021 that lasts five consecutive years. The expected gross water use

(unconstrained demand) for the next five years is based on the interpolation between estimated 2021 water use and projected 2025 water use. A conservative estimate of approximately 320,000 AF was used for 2021, and the projected demand for 2025 is 330,000 AF.

For the sources of supply, the DRA considers all of Valley Water's water supply sources, including imported water (SWP and CVP contract water deliveries, banked supplies in Semitropic, sales, transfers, and carryover in San Luis Reservoir, and SFPUC deliveries), local surface water storage, recycled water, and local groundwater. The supply data for 2021 are from Valley Water's annual water supply and demand assessment, which plans water supply operations for the upcoming year and considers a dry water year scenario. For 2022-2025, WEAP model-estimated supplies under the 1989-1992 hydrologic conditions were used.

7.3.1.2 Basis for Water Shortage Condition

Valley Water's supply comes from a variety of sources. As such, many factors and events affect water supply availability in any given year. Valley Water manages its supplies each year to maintain sustainable groundwater conditions in local sub-basins. If analysis indicates that supplies available that year may not be able to maintain Valley Water's groundwater in the "normal stage," then Valley Water may augment supplies with imported water supply purchases and/or call on the community to make water use reductions. Valley Water has determined that projected end-of-year groundwater storage serves as a useful indicator to determine whether there may be a need to call for a water shortage contingency plan action. Currently, Valley Water uses five stages to categorize its water supply shortage, based on the end-of-year groundwater storage projections for the Santa Clara Subbasin, as summarized in Table 7-5. A crosswalk between Valley Water's shortage stages and DWR's standard stages is provided in Chapter 8.

Table 7-5. Valley Water's Water Shortage Stages and Water Use Reductions

Stage	Stage Title	Projected End-of-Year Groundwater Storage	Recommended Short-Term Water Use Reduction
Stage 1	Normal	Above 300,000 AF	None
Stage 2	Alert	250,000 – 300,000 AF	0 – 10%
Stage 3	Severe	200,000 – 250,000 AF	10 – 20%
Stage 4	Critical	150,000 – 200,000 AF	20 – 40%
Stage 5	Emergency	Below 150,000 AF	>40%

7.3.1.3 DRA Method

The DRA follows Valley Water's annual water supply and demand assessment procedure, which is a water balance approach to estimate supply available based on the previous year end-of-year groundwater storage, carryover supplies stored in San Luis reservoir, storage in local reservoir, non-potable recycled water production, and expected SWP and CVP contract allocations. For 2021, estimated supplies were developed using a combination of Valley Water's annual operations model and groundwater model. Estimated supplies were developed assuming critically dry local conditions (90% exceedance) and CVP and SWP allocation estimates from the USBR and DWR, respectively. For 2022-2025, WEAP model output from model years 1989-1992 was used to estimate supplies that may be available. Demands for the next five years is based on the interpolation between estimated 2021 water use and projected 2025 water use. A conservative estimate of approximately 320,000 AF was used for 2021, and the projected demand for 2025 is 330,000 AF.

7.3.2 Total Water Supply and Demand Comparison

The DRA indicates that Valley Water will be able to meet countywide demands with a combination of local and imported surface water, groundwater, banked supplies in Semitropic storage, and imported water transfer purchases (Table 7-6). In anticipating a potential drought and because Valley Water is required to maintain Anderson Reservoir at deadpool, Valley Water expects to secure at least 6,500 AF of water transfers for 2021. In case it is entering a drought, Valley Water wants to maintain local groundwater as high as possible, especially since Anderson Reservoir cannot be used. In the subsequent dry years, Valley Water will continue to use supplies stored in the local groundwater, local reservoirs, and Semitropic groundwater bank.

Table 7-6. Five-Year Drought Risk Assessment

2021	Total
Total Water Use	320,000
Total Supplies	343,500
Surplus/Shortfall w/o WSCP Action	23,500
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	6500
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	30,000
Resulting % Use Reduction from WSCP action	0%
2022	
Total Water Use	322,000
Total Supplies	362,000
Surplus/Shortfall w/o WSCP Action	40,000
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	40,000
Resulting % Use Reduction from WSCP action	0%
2023	
Total Water Use	325,000
Total Supplies	335,000
Surplus/Shortfall w/o WSCP Action	10,000

Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	10,000
Resulting % Use Reduction from WSCP action	0%
2024	
Total Water Use	327,000
Total Supplies	344,000
Surplus/Shortfall w/o WSCP Action	17,000
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	17,000
Resulting % Use Reduction from WSCP action	0%
2025	
Total Water Use	330,000
Total Supplies	341,000
Surplus/Shortfall w/o WSCP Action	11,000
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	11,000
Resulting % Use Reduction from WSCP action	0%
NOTE: WEAP model output for hydrologic years 1989-1992 was used to represent years 2 through 5 of the drought. Imported water allocations are provided by DWR in their DCR 2019, which does not include projected future regulations nor the hydrologic sequence for the most recent 2012-2016 drought. For comparison, the lowest total annual imported delivery during the 1987-1992 drought in the DCR 2019 dataset is 83,200AF, while the actual lowest annual imported delivery during the 2012-2016 drought was 60,320 AF. However, through Valley Water's Monitoring and Assessment Program, Valley Water is conservatively planning for investments by considering severe droughts, such as the 2012-2016 drought, will occur in the future.	

CHAPTER 8 – WATER SHORTAGE CONTINGENCY PLAN

This chapter describes the development, actions, and implementation of Valley Water's Water Shortage Contingency Plan (WSCP). The WSCP defines specific triggers, based on groundwater storage levels, when Valley Water will call on the public to reduce water demand, and what actions it will take in these circumstances. Water use reductions may be needed in response to drought conditions or an emergency that affects water supply. The WSCP also summarizes planning for natural disaster, drought-related revenue impacts, and Valley Water's legal authority to respond to water shortages. Where applicable, Valley Water's actions during the recent five-year drought are summarized for reference.

The WSCP was developed consistent with Valley Water's water shortage management objectives:

- To minimize the economic, social, and environmental hardship to the community caused by water shortages.
- To establish water use reduction targets and work closely with retailers and cities in developing efficient and effective demand reduction measures during water shortages that concentrate on eliminating non-essential uses first.
- To maintain and safeguard essential water supplies for public health and safety needs, including during acute catastrophic events.

8.1 WATER SUPPLY RELIABILITY ANALYSIS

Valley Water's basic water supply strategy to compensate for supply variability is to store excess wet year supplies in the groundwater subbasins, local reservoirs, San Luis Reservoir, and Semitropic Groundwater Bank, then to draw on these stored supplies during dry years to help meet demands. Based on projected demands, and Valley Water's existing and planned sources of supply, Valley Water will be able to meet countywide demands through 2045 under normal, a single dry, and five consecutive dry year conditions.

The DRA indicates that if a five-year drought were to occur under existing conditions, Valley Water will need to employ a range of response actions, including using supplies stored in the local groundwater, local reservoirs, and Semitropic groundwater bank, as well as augmenting supplies with supplemental sources such as water transfers and exchanges, to meet potential shortage. See Chapter 7 of the Urban Water Management Plan for details of Valley Water's supplies and demands in various years types.

8.2 ANNUAL WATER SUPPLY AND DEMAND ASSESSMENT PROCEDURES

Valley Water projects available water supplies on an annual basis. Water supply operations planning considers all of Valley Water's water supply system and sources, including imported water (deliveries, banking, sales, transfers, exchanges, carry-over), local surface water reservoirs, local water supply diversions, groundwater recharge systems, groundwater subbasins, and water treatment plants. A summary of available water resources is provided in Table 8-1. Because Valley Water's supply comes from a variety of sources, many factors and events affect water supply availability in any given year. Through its long- term practice, Valley Water has determined that projected end-of-year groundwater storage serves as the best indicator of potential water shortages and early warning signal, and therefore uses it to determine a potential water supply shortage.

CHAPTER 8 – WATER SHORTAGE CONTINGENCY PLAN

Table 8-1. Water Supply Sources

Source	Description
Central Valley Project (CVP)	Contract for 152,500 acre-feet per year (AFY). Actual allocations are based on availability of water supplies after meeting regulations to protect the environment, water quality, and other factors.
State Water Project (SWP)	Contract for 100,000 AFY. Actual allocations are based on availability of water supplies after meeting regulations to protect the environment, water quality, and other factors.
Natural Groundwater Recharge	Approximately 61,000 AF of precipitation and other natural flows are directly recharged to the groundwater basins in an average year. This amount varies with hydrologic conditions. Natural recharge differs from Valley Water's managed recharge program where precipitation is captured in reservoirs and purposely released for recharge in ponds and along managed creeks.
Local Surface Water	Valley Water has water rights to capture and use 223,000 AFY at the reservoirs and diversion structures. Currently, 53,000 AFY are used for water supply on average. This is expected to increase to an average of 83,000 AFY by 2040. The total volume used depends on rainfall and demands.
Recycled Water	Recycled water is produced by the County's four wastewater treatment plants for various non-drinking water (non-potable) purposes. In addition, Valley Water provides advanced treated purified water to South Bay Water Recycling to improve the quality of the non-potable supply. Recycled water use is projected to increase from approximately 17,000 AFY in 2025 to approximately 28,000 AFY by 2045.
San Francisco Public Utilities Commission (SFPUC)	SFPUC's Regional Water System provides water to some cities in the northern part of the County. On average about 55,000 AF is delivered to the County each year.
Semitropic Groundwater Bank	Valley Water has invested in 350,000 AF of out-of-county water storage capacity. Water is delivered to the groundwater bank when surplus supplies are available and withdrawn when supplies are limited. Valley Water's contract allows the withdraw between approximately 31,000 to 78,000 AF of banked water per year, depending on SWP allocation (larger withdrawals are permitted during larger allocation years).
Local Reservoirs	Valley Water operates 10 reservoirs in the County with a total capacity of approximately 166,000 AF that capture runoff from the watershed for release through the year to recharge the groundwater basins. Water captured at Anderson, Coyote, Almaden, and Calero Reservoirs can also be sent to the water treatment plants. Anderson Dam is currently undergoing a seismic retrofit and is not able to provide water storage. Valley Water expects the retrofit project to be completed in 2030.
Groundwater Storage	As the County's Groundwater Sustainability Agency, Valley Water manages the Santa Clara and Llagas subbasins and strives to maintain adequate storage in wet and average years to ensure water supply reliability during dry periods or shortages. The estimated operational storage capacity of the groundwater subbasins is up to 548,000 AF.

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Annual water supply operations planning begins each September for the upcoming year and considers water year scenarios that span from wet to very dry. This annual water supply planning considers current groundwater storage, treated water contracts, local water rights and storage, environmental restrictions, source water quality, planned facility maintenance, imported water carryover, imported water contract terms, stored water in carryover and the Semitropic Bank, and potential water transfers. Operations planning serves as the basis for daily operational decisions consistent with the annual strategy to manage water supplies and reserves. The process for annual water supply operations planning is depicted in Figure 8-1.

Figure 8-1. Annual Water Operations Planning

Water supply operations planning is dynamic, and rainfall data, imported water allocations, water supply projections, availability of supplemental supplies, and facility capacities are updated at least monthly to reflect current conditions. The projection of water supplies through the end of the year is based on assumed dry conditions (90% exceedance), median conditions (50% exceedance), and in some cases, critically dry conditions (99% exceedance). As assumptions and projections are updated through the year, Valley Water continues to update its end-of-year groundwater storage projections.

The state of the groundwater basins is reported monthly through a Groundwater Conditions Report (https://www.valleywater.org/your-water/where-your-water-comes-from/groundwater/groundwater-monitoring) and Water Tracker (https://www.valleywater.org/your-water/water-supply-planning/monthly-water-tracker). The Groundwater Conditions Report and Water Tracker contain a description and quantification of available water supplies including local reservoirs, imported water, treated water, recycled water, conserved water, and groundwater data, such as recent managed recharge, pumping,

and storage trends. The annual water supply operations planning process together with the monthly reports are how Valley Water tracks and reports its annual water supply, demands, and overall water supply reliability. Projected end-of-year groundwater supply is the indicator for determining a potential water supply shortage and is based on current hydrology and demands, infrastructure capabilities and constraints, and assumed dry and median hydrology scenarios through the rest of the year.

Staff provides the Valley Water Board of Directors (Board) updates on available water supplies, groundwater storage projections, and water demand projections as needed throughout the year and at least once a year, typically in April. Starting in 2022, this update will take the form of an Annual Water Supply and Demand Assessment (Annual Assessment). The Annual Assessment will provide an update on projected demands through the current year, a description and quantification of available water supplies considering dry hydrological and regulatory conditions through the remainder of the current year, and existing infrastructure capabilities and plausible constraints. The Assessment will also include a forecast of water supplies conditions assuming the following year is dry. The forecast for the following year is provided as an informational piece and to provide context of Valley Water's water supply reliability.

The Annual Assessment will include a recommendation if WSCP actions are needed. The recommendation on WSCP actions will be based on the end-of-current-year groundwater storage projection and the water storage stages presented in Section 8.3. The Annual Assessment will be brought to the Board for their information as part of the regular water supply update. If WSCP actions are recommended based on the WSCP, the Board will be asked to decide on taking water shortage actions. The Annual Assessment will be provided to the state annually by July 1. The steps and timeline of the WSCP Annual Assessment Procedure are summarized in Table 8-2.

Table 8-2. WCSC Annual Assessment Procedure

Action	Description	Lead	Timeline
Start water supply operations planning	The water supply operations planning process sets targets for use of available water supplies for the coming year.	Raw Water Operations Unit	September
Initial end-of-Year Groundwater Storage Projection	Modeling / calculation of initial projected groundwater storage for coming year.	Groundwater Management Unit	September
Updates to water supply operations planning	Water supply operations planning projections are updated at least monthly to reflect actual conditions, operations, and updated groundwater storage projections. Projections are made for both dry and median hydrology for the remainder of the year.	Raw Water Operations Unit Groundwater Management Unit	Monthly
Preparation of WSCP Annual Assessment	Based on updates to water supply operations planning and groundwater storage projections, the WSCP Annual Assessment is prepared to document available water supplies, projected demands, and projected end-of-current-year groundwater storage. Recommendations for WSCP actions are based on assumed dry conditions the	Water Supply Planning and Conservation Unit	March

Action	Description	Lead	Timeline
	remainder of the year. The Annual Assessment will also provide a forecast of water supply reliability should the following year be dry.		
Board review of WSCP Annual Assessment / Determination of WSCP shortage actions	The Assessment is presented to the Board for their information and discussion. If shortage actions are recommended by the WSCP, the Board will be asked to take water shortage actions.	Board of Directors	April (Calls for WSCP shortage actions can be brought to the Board at any time during extended droughts and emergencies.)
Finalization of WSCP Annual Assessment	The Annual Assessment is finalized based on feedback provided by the Board.	Water Supply Planning and Conservation Unit Chief Operating Officer	May
Submittal of WSCP Annual Assessment	The Annual Assessment is submitted to DWR.	Water Supply Planning and Conservation Unit	June

8.3 SIX STANDARD WATER SHORTAGE STAGES

Valley Water uses five stages to categorize its water supply shortage. The stages are based on projected countywide end-of-year groundwater storage and include a normal stage and four progressive levels of water shortage (Table 8-3), as described below.

Table 8-3. Valley Water's Shortage Stages and Recommended Water Use Reductions

Stage	Stage Title	Projected End-of-Year Groundwater Storage	Recommended Short-Term Water Use Reduction
Stage 1	Normal	Above 300,000 AF	None
Stage 2	Alert	250,000 – 300,000 AF	0 – 10%
Stage 3	Severe	200,000 – 250,000 AF	10 – 20%
Stage 4	Critical	150,000 – 200,000 AF	20 – 40%
Stage 5	Emergency	Below 150,000 AF	>40%

- Stage 1 is normal water supply availability when groundwater storage is substantially full and no water shortage actions are necessary.
- Stage 2 is the alert stage that is meant to warn the public that current water use is tapping groundwater reserves. This stage is triggered when groundwater storage is projected to drop below 300,000 AF and the Board may request the public and retailers reduce water use by up to 10%.

- Stage 3 is the severe stage. Shortage conditions are worsening, requiring close coordination with retailers and cities to enact ordinances and water use restrictions. This stage is triggered when groundwater storage falls below 250,000 AF. The Board may pass a resolution that requests the public and retailers to reduce water use by 20%.

- Stage 4 represents critical conditions. This is typically the most severe stage in a multi-year drought. This stage is triggered when groundwater storage is projected to fall below 200,000 AF. The Board may increase the demand reduction request up to 40%.

- Stage 5 is for emergency situations. It is meant to address an immediate crisis such as a major infrastructure failure when water supply may only be available to meet health and safety needs. Stage 5 can also be triggered in a deep drought when groundwater levels are projected to fall below 150,000 AF. Water reduction may need to exceed 40%.

Per the UWMP guidebook, Table 8-4 shows a crosswalk between Valley Water's five (5) stages and the standard six (6) stages as defined by the DWR.

Table 8-4. Crosswalk Between Valley Water's Stages and Standard Stages

Stage	Title	Projected Countywide End of Year Groundwater Storage (AF)	Suggested short-term reduction in water use	Stage	Standard water shortage levels
1	**Normal**	>300,000	None		
2	**Alert**	300,000 - 250,000	0-10%	1	Up to 10%
3	**Severe**	250,000 - 200,000	10-20%	2	10 to 20%
4	**Critical**	200,000 - 150,000	20-40%	3	20 to 30%
				4	30 to 40%
5	**Emergency**	<150,000	Over 40%	5	40 to 50%
				6	> 50%

8.4 SHORTAGE RESPONSE ACTIONS

Water supply shortages can occur for a variety of reasons including droughts; loss in ability to capture, divert, store, or utilize local supplies; and/or facility outages. As a wholesale agency, Valley Water does not have direct authority over retail rates and generally does not employ staff to enforce water restrictions. Therefore, Valley Water's water shortage response actions are focused mainly on public education and coordination with municipalities and retailers in the County. During droughts or shortages, Valley Water considers all available tools, including balancing demands for treatment plants and recharge facilities, incentives or requests for retailers to use either groundwater or treated water, and community outreach to maximize the use of available supplies. The collective response actions between Valley Water, residents, businesses, large landscapers, agriculture, municipalities, and retailers preceding and during a water supply shortage are described below (Table 8-5).

Table 8-5. Water Shortage Response Actions

Stage	Requested Short-Term Water Use Reduction	Actions
Stage 1 Normal	None	Valley Water continues ongoing outreach strategies aimed toward achieving long-term water conservation targets. Messages in this stage focus on services and rebate programs Valley Water provides to facilitate water use efficiency for residents, agriculture, and business. While other stages are more urgent, successful outcomes in Stage 1 are vital to long-term water supply reliability.
Stage 2 Alert	0 – 10%	This stage is meant to warn water users that current water use is tapping groundwater reserves. Work begins to coordinate ordinances with the County, cities and retailers to prepare for Stage 3. Additional communication tools are employed to augment Stage 1 efforts, promote immediate behavioral changes, and set the tone for the onset of shortages. Specific implementation plans are developed in preparation of a drought deepening such as identifying supplemental funding to augment budgeted efforts and initiation of discussions with local, state, and federal agencies to call on previously negotiated options, transfers, and exchanges.
Stage 3 Severe	10 – 20%	Shortage conditions are worsening, requiring close coordination with the County, cities, retailers, large landscapers, and agricultural users to implement ordinances and water use restrictions. Significant behavioral change is requested of water users. The intensity of communication efforts increases with the severity of the shortage. Messages are modified to reflect more dire circumstances. Water supplies are augmented through the implementation of options, transfers, exchanges, and withdrawals from groundwater banks.
Stage 4 Critical	20 – 40%	This is generally the most severe stage in a multi-year drought. Stage 3 activities are expanded, and Valley Water will encourage the County, cities, and retailers to increase enforcement of their water shortage contingency plans, which could include fines for repeated violations; and all water users to significantly reduce water use.
Stage 5 Emergency	40 to 50%	Stage 5 is meant to address an immediate crisis such as a major infrastructure failure but may also be needed in exceptional multi-year drought. Water supply may only be available to meet health and safety needs. Valley Water will encourage all water users to significantly reduce water use, activates its Emergency Operations Center, coordinates closely with municipalities and retailers, and provides daily updates on conditions.

8.4.1 Water Conservation

When the Board calls for short-term water use reductions, cities and water retailers consider implementing their WSCP actions to achieve the necessary water use reductions. Actions to achieve the desired shortage response may be different for each city/water retailer depending on their service area composition (commercial, industrial, residential) and source of water supplies. However, effort is made to make actions common to as many cities/water retailers as possible to provide for more consistent implementation and messaging.

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Reducing water consumption during a water shortage is generally achieved through increased education leading to behavioral changes (e.g., shutting off the water while brushing one's teeth) and water use restrictions (e.g., yard irrigation limited to specific days of the week). These water savings are considered short-term water use reductions and are distinct from long-term and on-going conservation programs described in Chapter 9.

The response to the 2012 to 2016 drought illustrates how Valley Water, cities, the County, and retailers coordinate to reduce water use during water shortages. On February 25, 2014, the Board approved a resolution setting a countywide water use reduction target equal to 20% of 2013 water use through December 31, 2014, and recommended that retail water agencies, cities, and the County implement mandatory measures as needed to achieve the 20% water use reduction target. The water use reduction achieved for calendar year 2014 was 13% compared to 2013 water use.

On March 24, 2015, as the drought continued, the Board called for 30% water use reductions and recommended that retail water agencies, cities and the County implement mandatory measures as needed to accomplish that target, including a two day per week outdoor irrigation schedule. To assist the retailers, cities, and the County achieve the water use reduction targets, Valley Water:

- Increased rebates for water-efficient landscape conversions, irrigation hardware upgrades, graywater laundry to landscape systems, and certain commercial fixtures.
- Created a Water Waste Reporting and Inspection Program.
- Increased staffing to support a water conservation call center.
- Developed several multimedia water conservation outreach campaigns, including "Brown is the New Green" and "Fight the Drought, Inside and Out".
- Hosted dozens of panels, forums, and presentations.
- Encouraged participation in conservation programs through direct mail letters.
- Reduced the amount of treated water that it supplied to retailers.

Valley Water and retailers coordinated very closely during the drought, with regular meetings and information exchange on water supply conditions, operations, and actions/messaging to achieve water use reduction. All retailers took actions to implement water use reduction requirements and many adopted a coordinated maximum two day per week watering schedule. Together these actions achieved a 28% demand reduction in 2015 over 2013 levels. In 2015, Valley Water held two summits, one with retailers and another with elected officials, to facilitate increased water use reductions and increase coordination to meet the 30% reduction target. A common theme of the summits was that messaging and policy development should be consistent and coordinated throughout the County to reduce confusion among residents, increase ease of implementation, and make compliance and enforcement easier.

The WSCP was developed in accordance with 2020 Urban Water Management Plan guidebook. It provides general guidance on recommended actions to address water supply shortages. Valley Water continuously seeks to improve its water shortage planning efforts, which may be reflected in future refinements to this WSCP. Under extraordinary circumstances and/or rapidly changing water supply

conditions, Valley Water may need to undertake water conservation measures that are stricter than those set forth in this WSCP.

8.4.2 Water Supply Augmentation

Valley Water works to maintain high groundwater storage in normal and wet years through a comprehensive managed recharge program and by providing treated water in lieu of groundwater pumping. Excess supplies are stored in the Semitropic Groundwater Bank, and Valley Water can carryover imported supplies in some years in San Luis Reservoir. During a dry year, Valley Water can use these stored supplies without having to call on the public to reduce demands. During an extended drought, Valley Water would need to pursue additional water shortage actions. Valley Water uses a combination of options to bring in additional water supplies to support local demands, including:

- Recovery and import of Valley Water's supplies stored in groundwater banking and exchange programs.
- Use of existing multi-year agreements between Valley Water and other water agencies that provide options to call on pre-negotiated transfer/exchange water.
- Collaboration with water agencies that have available resources to develop and implement agreements for the transfer/exchange of water to Valley Water.
- Participation in pooled water transfer programs with other SWP and CVP contractors.

The quantities of water available through these options are variable and depend on hydrology, pumping capacity, environmental restrictions, and demands from other agencies. These supplemental supplies help Valley Water mitigate the impact of a drought. For example, in 2015 Valley Water secured approximately 69,000 acre-feet in supplemental supplies through transfers, exchanges, public health and safety allocations, and Semitropic banking withdrawals, which helped mitigate the impact of the severely low imported water allocation that year.

8.4.3 Catastrophic Interruption Planning

This section describes planning that Valley Water has undertaken to prepare for catastrophic interruption of water supplies during a disaster.

Infrastructure Reliability Plan

Valley Water completed its first Infrastructure Reliability Plan (IRP) in 2005 and updated it in 2016. The IRP analyzes several outage scenarios for Valley Water's system, including an earthquake, extreme storm, Delta outage, and power outage. Valley Water and retailers agreed on a reliability target during an emergency that Valley Water should be able to restore treated water deliveries to meet the equivalent of a winter month's demand (i.e., February) within 30 days after a major disaster event. Modeling and analyses estimated service restoration time of Valley Water's existing system for minimum winter demands in each of the outage scenarios.

The worst-case outage scenario was a magnitude 7.9 earthquake on the San Andreas fault, which would result in an estimated 30-day outage time before Valley Water can provide minimum treated water demands to retailers. In the Delta outage scenario, modeling demonstrated Valley Water can continue limited service (at an assumed 20% demand reduction) for a 24-month period with no imported water supplies if it occurred in a normal hydrologic year and started with normal groundwater supplies. In a

regional power outage, Valley Water can operate facilities on backup fuel storage for an estimated 3 to 10 days, or longer given regular external fuel deliveries.

The 2016 IRP recommends efficient and targeted opportunities to improve system reliability and performance by either shortening Valley Water system outage time following an event or strengthening retailer capability to withstand Valley Water system outages. Important concepts that were incorporated into the identification of project opportunities and the analysis methodology are:

1. *Incorporate recent operational knowledge*: Planned and unplanned maintenance outages of Valley Water pipelines and treatment plants have allowed retailers to learn how to operate their systems without Valley Water treated water supplies. Retailers have operated with Valley Water treated water supply interruptions for up to eight weeks in some cases.

2. *Account for backup supply redundancy*: Most retailer service areas have adequate groundwater pumping capacity to serve as a backup to treated water deliveries and may not require large investments in additional reliability.

3. *Consider raw water and treated water system interdependencies*: Strengthening Valley Water's treated water pipeline system alone may not dramatically improve reliability in scenarios where raw water pipelines fail. The opposite also applies, as strengthening Valley Water's raw water pipeline system alone may not dramatically improve reliability in cases where treated water pipelines fail. Strengthening key portions of both the raw and treated water pipeline systems is needed to provide improved reliability. These improvements are being planned and recommended through the development of a distribution system master plan.

4. *Leverage existing investments*: Where possible and beneficial, leveraging existing assets is preferred, as Valley Water, retailers, and SFPUC have made significant investments in increasing system reliability and operational flexibility since the 2005 IRP.

5. *Favor frequently used assets*: Assets, particularly groundwater wells, which can be used more frequently to enhance daily operations or periodic maintenance operations, are preferred over assets that would be designated as standby for infrequent use only during major emergencies.

6. *Address specific vulnerable areas*: There are specific retailer service areas that are more vulnerable to outages of Valley Water treated water or managed recharge. Focusing on localized solutions to improve reliability in these specific areas may be more effective, with lower costs, than major infrastructure improvements.

Ultimately, Valley Water and retailers determined that targeting specific vulnerable areas for improvement will effectively address identified reliability needs. A total of 20 projects are identified in the 2016 IRP to improve reliability in these specific areas. Some projects were identified for retailer implementation, some for Valley Water implementation, and others for joint implementation. Valley Water has been working to complete the identified projects since 2016.

Local Hazard Mitigation Plan

Valley Water's 2017 Local Hazard Mitigation Plan (2017 LHMP) identifies capabilities, resources, information, and strategies for building resilience and reducing physical and social vulnerabilities to disasters. It also coordinates mitigation actions, providing essential guidance for Valley Water to reduce its vulnerability to disasters. Valley Water developed the 2017 LHMP to be consistent with current legislation, conditions, and best available science. This ensures that hazards are accurately profiled;

policies are consistent with current Valley Water standards and relevant federal, state, or regional regulations; and Valley Water has an updated LHMP consistent with Federal Emergency Management Agency (FEMA) Emergency Response Plan (ERP) requirements. The 2017 LHMP also includes strategies to reduce vulnerability to disaster through education and outreach programs, foster the development of partnerships, and implement risk reduction activities.

Emergency Operations Center

Valley Water's Emergency Services and Security Unit (ESSU) coordinates emergency response and recovery for Valley Water. During any emergency, Valley Water continues the primary missions of providing clean, safe water and flood protection to the people of Santa Clara County. ESSU maintains a full-time professional emergency management staff trained and equipped to respond quickly to support Valley Water's Emergency Operations Center (EOC) and field responders. The ESSU ensures that critical services are maintained, and emergency response is centralized.

The EOC is connected to other agencies and jurisdictions by an array of telecommunications, two-way radio, satellite telephone, and wireless messaging systems. In addition, two response vehicles with many of the same communications capabilities of the EOC enable staff to establish mobile emergency command posts just about anywhere field operations may require. Office of Emergency Services (OES) maintains communications with local, state, and national emergency management organizations and allied disaster preparedness and response agencies.

Milpitas Intertie

During an emergency, in addition to retailers relying on groundwater and their own supplies, Valley Water has a 40-million gallon per day intertie with the SFPUC located in the City of Milpitas, which allows the SFPUC and the East Pipeline systems to exchange water during emergencies and planned maintenance.

8.4.4 Delta-Conveyed Supply Interruption

A strategy was developed by DWR, the Army Corps of Engineers (Corps), Bureau of Reclamation, California Office of Emergency Services (Cal OES), and the State Water Contractors to provide water supply protections that would enable resumption of at least partial deliveries from the Delta in less than six months in the event of an outage.

Valley Water analyzed the impacts of a six-month Delta outage to determine the effect on service. The analysis assumed that all local infrastructure remains intact, as an earthquake or flood in the Delta is unlikely to badly damage local infrastructure. The analysis also assumed normal hydrologic conditions and starting storage conditions, rather than stacking disaster upon disaster (i.e., earthquake plus drought, etc.), access to SFPUC supplies, and implementation of water use reductions of 20%. The impacts of such an outage are largely operational as retailers would be required to use groundwater instead of their usual treated water supplies and Valley Water would actively manage the groundwater recharge program to meet countywide needs. Even with increased pumping, groundwater storage is estimated to remain in the normal (Stage 1) range. Thus, the impacts of a six-month Delta outage are manageable assuming a normal starting position. Valley Water would potentially need to call for more aggressive water use reductions if a Delta outage were to occur during or immediately following a drought.

The Delta Flood Emergency Management Plan (DWR, 2018) provides strategies for responses to Delta levee failures, including earthquake-induced numerous levee failures during dry conditions with multiple flooded islands and extensive saltwater intrusion, resulting in curtailment of export operations. Under

these severe conditions, an emergency freshwater pathway would be established from the central Delta along Middle River and Victoria Canal to the export pumps in the south Delta. The plan includes the pre-positioning of emergency construction materials at stockpile and warehouse sites in the Delta, and development of tactical modeling tools (DWR Emergency Response Tool) to predict levee repair logistics, timelines of levee repair, and suitable water quality to restore exports. Using pre-positioned materials, multiple earthquake-generated levee breaches and levee slumping along the freshwater pathway can be repaired in less than six months. Significant improvements to the central and south Delta levee systems along the emergency freshwater pathway began in 2010 and are continuing. Continued efforts under analysis strive to mitigate not only flood and earthquake risk but also meet future sea-level rise risk.

8.5 COMMUNICATION PROTOCOLS

When the Board calls for short-term water use reduction actions under the WSCP, the cities and water retailers consider implementation of their WSCP actions to achieve the necessary shortage response. Clear, consistent, and effective communication with the cities, retailers, and the public is essential to achieving desired results. Internally, Valley Water works with its Office of Government Relations to coordinate with external stakeholders.

Communication strategies include:

- Clear explanations to the public of the WSCP stages and triggers.
- Early and continuous coordination with retailers regarding response actions, use of groundwater versus treated water, and treated water quality concerns.
- Hosting drought summits with retailers and elected officials to develop coordinated response actions such as drought ordinances and enforcement of a day per week irrigation schedules.
- Providing a straightforward methodology for water use reporting by retailers.
- Allowing treated water contracts with retailers to be adjusted to avoid penalizing retailers for not taking contract amounts and support the use of groundwater and SFPUC for blending, if necessary.
- Working with the agricultural community on water conservation methods.

Valley Water provides communications to stakeholders with various frequencies depending on the WSCP stages. Valley Water's communication protocol are summarized in Table 8-6.

Table 8-6. Valley Water's Communication Protocol Under the WSCP Stages

Stage	Short-Term Water Use Reduction	Communication Strategies
Stage 1 Normal	None	• Ongoing public outreach aimed toward achieving long-term water conservation targets. • Quarterly meetings with retailers to discuss water supply issues.

Stage	Short-Term Water Use Reduction	Communication Strategies
		• Monthly Groundwater Conditions Report and Water Tracker posted on website. • Annual Assessment to Board.
Stage 2 Alert	0 – 10%	• All Stage 1 communications. • Coordinate potential ordinances with cities, County, and retailers to prepare for the potential of a worsening drought. • Additional public outreach to augment Stage 1 efforts, promote immediate behavioral changes, and set the tone for the onset of shortages. • Updates to the Board, Committees, and retailers on preparation for drought messaging.
Stage 3 Severe	10 – 20%	• All communications above. • Monthly coordination with cities, County, and retailers to discuss conditions and to enact and review the progress of ordinances and water use restrictions. • Extensive public outreach to specific user groups such as residential, businesses, large landscapers, and agriculture to support behavioral change of water users. • Work with the press to disseminate drought messages.
Stage 4 Critical	20 – 40%	• All communications above. • Outreach expanded further to support significant behavioral change of water users. • More frequent meetings with cities, County, and retailers to discuss conditions and update enforcement of ordinances and water use restrictions. • Workshops and summits with retailers, elected officials, and other water user groups. • Monthly updates to the Board on water supplies and demands. • Coordination with local, state, and federal emergency agencies.
Stage 5 Emergency	40 – 50%	• All communications above. • Activation of the Emergency Operations Center. • Weekly meetings with cities and retailers on shortage conditions and response. • Expanded coordination with local, state, and federal emergency agencies. • Weekly updates to the press and public on conditions.

8.6 COMPLIANCE AND ENFORCEMENT

In general, most water shortage compliance and enforcement actions occur at the retailer level and with city or County enforcement staff or law enforcement. Valley Water does not issue citations, fines, or surcharges to the public regarding water waste. Instead, Valley Water works with cities and retailers that have a direct relationship with water customers to develop ordinances and water use restrictions to prevent water waste and reduce demand during droughts.

8.7 LEGAL AUTHORITIES

This section describes Valley Water's Legal Authorities as required by Water Code § 10632(a)(7). Valley Water will coordinate with any city or the County to which it provides water supply services for the possible proclamation of a local emergency under California Government Code, California Emergency Services Act (Article 2, Section 8558).

8.7.1 Statutory Authority

Water Code Sections 350 and 375 et seq.

Sections 375 *et seq.* and 350 *et seq.* of the Water Code authorize Valley Water, a wholesale urban water supplier and special district, to, upon appropriate factual findings, implement a water conservation program and/or declare a water shortage emergency by resolution or ordinance and adopt and enforce related conservation measures. If appropriate, Valley Water can reduce the amount of treated water it supplies to local retailers and/or impose water reduction measures.

Santa Clara Valley Water District Act

One source of statutory authority that empowers Valley Water to implement or enforce water shortage response actions is its District Act (The Santa Clara Valley Water District Act, Chapter 1405 of Statutes 1951 of the State of California, Water Code Appendix, Chapter 60). Sections 4 and 5 of the District Act grant Valley Water power to conserve waters within its jurisdiction (as well as import and distribute water).

Specifically, section 4(c) of the District Act authorizes Valley Water to:

- provide for the conservation and management of floodwater, stormwater, or recycled water, or other water from any sources within or outside the watershed in which the district is located for beneficial and useful purposes.
- protect, save, store, recycle, distribute, transfer, exchange, manage, and conserve in any manner any of the waters.
- prevent the waste or diminution of the water supply in the district.
- retain, protect ... drainage, stormwater, floodwater, or treated wastewater, or other water from any sources, within or outside the watershed ....

(District Act, §4 [Objects and purposes], subd. (c)(3), (4), (5) & (6).)

District Act Section 5, paragraph 5, similarly provides that Valley Water may:

... store water in surface or underground reservoirs within or outside of the district ... conserve, reclaim, recycle, distribute, store, and manage water for present and future use within the district; [and]

appropriate and acquire water and water rights, and import water into the district and to conserve within or outside the district, water for any purpose useful to the district ....

Valley Water does, though, charge a groundwater extraction fee on reported extractions and requires all significant groundwater extraction facilities to be metered and extractions reported on either a monthly, semi-annual, or annual basis.

Statutory Groundwater Sustainability Agency Powers

In addition to the District Act and Water Code §§ 350 and 375 et seq., Valley Water is the designated Groundwater Sustainability Agency (GSA) for the Santa Clara and Llagas groundwater subbasins under the Sustainable Groundwater Management Act (SGMA) and has a DWR-approved Alternative to a Groundwater Sustainability Plan (GSP) in place for managing these subbasins. Although Valley Water does not currently restrict groundwater pumping or impose extraction allocations upon owners or operators of groundwater extraction facilities and is not planning to do so, it has the power to do this, if necessary (See Water Code § 10726.4(a)). In February 2018, the Board adopted Resolution 18-04, which describes the fundamental approach to respond to worsening basin conditions, including the steps that Valley Water would take in coordination with stakeholders prior to implementing SGMA authorities to regulate pumping.

8.7.2 Past Valley Water Resolutions

In response to past droughts, Valley Water's Board has passed resolutions calling for reductions in water use. Valley Water passed water conservation related resolutions in April 1988, March 1989, April 1990, March 1992, June 2007, March 2009, July 2010, September 2010, January 2014, February 2014, November 2014, March 2015, November 2015, and June 2016.

Resolutions prior to 2014 generally called for either "voluntary" or "mandatory" reductions in water use. Since 2014, Valley Water has generally avoided use of these words and instead passed resolutions with language identical to, or substantially similar to, the following:

> NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of the Santa Clara Valley Water District that a water use reduction target equal to [e.g., 20] percent of [e.g., 2013] water use is called for through _______________ [future date], and it is further recommended that retail water agencies, local municipalities and the County of Santa Clara implement mandatory measures as needed to achieve the [e.g., 20] percent water use reduction target.

Some Valley Water resolutions have also included language calling for "*a restriction on outdoor watering of ornamental landscapes or lawns with potable water to* [e.g., 4] *days a week through* _________ [future date]."

8.7.3 Contractual Authority

In addition to its statutory authority, Valley Water has contractual authority to reduce the amount of potable, treated water it provides to its retail customers.

Article C, Section 4(c) of Valley Water's standard-form treated water contract with its retailers provides that, if the Board passes a resolution providing for a reduction in water use by more than 10%, it shall reduce the amount of potable treated water it provides to retailers by this same amount, minus 10%. Thus, if the Board calls for a 30% reduction in water use during a drought, it will reduce treated water

supplies to its retailers by 20% (a call for a 20% reduction would result in a 10% reduction in treated water supplies, etc.).

Additionally, under Valley Water's standard-form treated water contract, retailers may purchase "non-contract" water above their monthly purchase commitment when additional supplies are available. In the past, in conjunction with a resolution reducing contractual treated water supplies, while Valley Water has continued to allow retailers to purchase "non-contract" treated water, it has increased the price of such "non-contract" water to discourage overuse. Valley Water has the authority to eliminate non-contract water sales altogether if necessary. Although Valley Water's contractual authority relates only to treated water deliveries, not to groundwater extraction, the contracts give Valley Water the ability to adjust treated water pricing to incentivize the use of either treated water or groundwater by its water retailer customers, depending on what best supports local water supply needs and operations.

8.8 FINANCIAL CONSEQUENCES OF WSCP

Under a water shortage scenario, Valley Water expenses are anticipated to increase due to actions to augment water supply and encourage demand reduction. At the same time, revenue would decrease because of a reduction in water sales. Table 8-7 outlines financial consequences and anticipated mitigation actions for each shortage response action stage.

Table 8-7. Valley Water's Financial Consequences and Anticipated Mitigation Actions for Each WSCP Stage

Stage	Stage Title	Requested Short-Term Water Use Reduction	Financial Consequences	Anticipated Mitigation Actions
Stage 1	Normal	None	None	Funding provided for supplemental water supply reserve.
Stage 2	Alert	0 – 10%	Potential increase in operating and maintenance (O&M) expenses and mild to moderate reduction in revenue.	Identify supplemental funding options and reductions to O&M expenses.
Stage 3	Severe	10 – 20%	Moderate to significant increase to O&M expenses and decrease in revenue.	Stage 2 actions plus identify supplement(s) to water rate revenue (likely incremental rate adjustment) and deferral of capital expenditures; use of reserves if necessary.
Stage 4	Critical	20 – 40%	Significant increases to O&M expenses, including supplemental water purchases, and decreases in revenue.	Stage 3 plus short- and long-term O&M budget reductions.
Stage 5	Emergency	40 to 50%	Likely a greater degree of Stage 4.	Stage 4 plus operations limited to core business only.

During past droughts, increased expenses and reduced revenue put upward pressure on future water rates. Valley Water incurred significant costs from actions taken in response to the previous drought (2012 to 2016) and water charges were increased to cover those costs. To minimize rate impacts, Valley Water maintains supplemental funds in its financial reserves to help pay for increased expenditures to remedy shortages. The FY 2021 budget for the supplemental water supply reserve is $15.5M and is projected to grow to roughly $19.5M by FY 2031. The minimum for this reserve is 20% of the annual water purchase budget. The Board may adjust its adopted groundwater production charges midway through the fiscal year, which provides an opportunity to react to unanticipated changes in expenditures or revenue in a timely fashion. Following a drought and the use of the supplemental water supply reserve, funds need to be replenished in subsequent years through groundwater production and treated water charges.

8.9 MONITORING AND REPORTING

This section does not apply to wholesale agencies such as Valley Water.

8.10 WSCP REFINEMENT PROCEDURES

To ensure timely actions are taken per the WSCP during shortages, Valley Water increases its monitoring of its supplies and demands including:

- Groundwater subbasin and land subsidence conditions
- Reservoir storage
- Monthly and season-to-date rainfall at four rainfall stations within the County
- Monthly recycled water deliveries
- Monthly and year-to-date water use for each water retailer in the County
- Current retailer water use compared to a desired decrease in use

Not all water use data is available monthly and there is a time-lag from when water is used and reported. A small percentage of all water use, primarily private well owners, is unmetered and is estimated based on standard tables. Finally, Valley Water does not have access to individual water use account data for water users that purchase water from Valley Water's water retailers. Therefore, Valley Water cannot determine reductions by customer class or by customer unit (per household, for example). This data is only available to the direct retailers.

After a water shortage event is over, Valley Water will conduct an internal 'lessons learned' to determine if the WSCP performed as desired and identify changes to the WSCP if needed. Valley Water holds quarterly meetings with its retailers that allow an opportunity for any retailer to raise issues with the WSCP. In addition, Valley Water develops its MAP report annually as part of its WSMP. The MAP allows the public to raise water supply planning concerns such as the WSCP. Any changes to the WSCP would be prepared by staff and brought to the Board for adoption and amendment to the WSCP.

This WSCP is an independent document separate from the UWMP and may be updated separately at any time. Amendments to this WSCP outside of the UWMP five-year update process will be brought to the Water Conservation and Demand Management Board Committee meetings for public review and comment and to the Board for a public hearing and approval. Valley Water will provide notice to its retailers, cities, and County, and publish this notice on its website, at the start of an amendment process to provide stakeholders an opportunity to participate. Notice will also be provided to retailers, cities, and County at least 30 days prior to a public hearing before the Board that includes the time and place of the hearing.

Amendments approved by the Board will be provided to retailers, cities, County, DWR, and the California State Library within 30 days of approval.

8.11 SPECIAL WATER FEATURE DISTINCTION

Since Valley Water is not a water retailer, it does not make distinctions for special water features such as pools, spas, and decorative water features.

8.12 PLAN ADOPTION, SUBMITTAL, AND AVAILABILITY

Valley Water's Board of Directors set the time and place for the WSCP public hearing for June 8, 2021 at an online meeting. Valley Water notified the water retailers and the cities and County of Santa Clara on May 17, 2021 of the time and date of the public hearing. The draft WSCP was posted on Valley Water's web site (https://www.valleywater.org/your-water/water-supply-planning/urban-water-management-plan) and made available for public review on May 17, 2021. The public hearing notice was published in ***San José Mercury News*** on May 18, 2021 and May 25, 2021 and ***Metro*** on May 19, 2021. Documentation of noticing of the public hearing is included in Appendix B.

Valley Water's Board held the public hearing on June 8 and June 9, 2021 and adopted the WSCP on June 9, 2021. A copy of the conformed Board agenda package for both public hearing and adoption, including the adoption resolution, is in Appendix G. The final WSCP will be posted on Valley Water's website within 30 days of adoption. Paper copies will be made available at the same time the WSCP is posted on the web site for public review during normal business hours.

Within 30 days of Board adoption and prior to July 1, 2021, the adopted WSCP will be submitted electronically to DWR via its Water Use Efficiency data online submittal portal (WUEdata). Electronic copies of the WSCP will also be provided to the cities and County within 30 days of adoption.

CHAPTER 9 – DEMAND MANAGEMENT MEASURES

Valley Water has made significant investments to manage demands for water, and water savings from conservation and stormwater capture were about 75,000 acre-feet per year (AFY) in 2020. Valley Water's Water Supply Master Plan 2040 establishes the target to increase these savings to 99,000 AFY by 2030 and to 110,000 AFY by 2040.

Valley Water develops water supplies and infrastructure to meet the County's water needs and achieve Valley Water Board's Ends Policies for water supply reliability, water conservation, and water recycling. These policies, in conjunction with Valley Water's Water Supply Master Plan 2040, establish broad water supply objectives:

- There is a reliable, clean water supply for current and future generations.
- Water supplies meet at least 100 percent (%) of average annual water demands in non-drought years and water use reductions greater than 20% are not called for during drought years.

9.1 DEMAND MANAGEMENT MEASURES FOR WHOLESALE AGENCIES

This section describes Valley Water's implementation of required Demand Management Measures (DMMs) for wholesale agencies – metering, public education and outreach, water conservation program coordination and staffing, other demand management measures, and asset management. The other measures that Valley Water implements to reduce demands and assist retailers are described in Section 9.2.

9.1.1 Metering

On a monthly basis, Valley Water meters and bills all its retail agency potable water supply deliveries by volume of use. All municipal and industrial water users in the county are currently metered. Valley Water operates an aggressive water measurement program for both treated water deliveries and groundwater users. The current water measurement system measures 100% of all treated water deliveries, 95% of untreated surface water deliveries, and 95% of all groundwater pumping. The remaining 5% of untreated surface water may be used for landscaping, agricultural irrigation, and municipal and industrial uses through Valley Water-issued surface water permits. The remaining 5% (by volume) of groundwater pumping is done by small water users such as residential well owners. Although these residential wells are not metered, an estimate of water pumping or usage is made to determine groundwater production charges. Meters have not been installed on these wells because the cost of installing and reading the meters exceeds the revenue generated by these wells.

Valley Water launched an AMI (Advanced Metering Infrastructure) meter cost-sharing program in 2019. This cost sharing program, for residential and commercial meters, is offered to water retailers in Valley Water's service area. To encourage the installation of these meters, Valley Water will cost share up to $70 per installed AMI meter, and will fund 50% of the cost of the software linked to AMI, when combined with water use reports. Since launched, Valley Water has entered into an agreement with the City of Morgan Hill to share costs for funding the installation of nearly 15,000 AMI meters, as well as home water use reports associated with those meters. Valley Water is in the process of working with other retailers to continue sharing costs for AMI meter installation.

In addition, Valley Water offers rebates for the installation of submeters (since 2008) as well as switching from a mixed-use meter to a dedicated landscape meter (since 2012). The submeter rebate program provides $150 per submeter installed at multi-family housing complexes, such as mobile home parks and condominium complexes. In 2015, the program was expanded to include individual well owners and

homes on a shared well. Valley Water plans to continue these programs to meet the region's long-term water conservation goals. Additional program details are in Section 9.2.2.5.

9.1.2 Public Outreach and School Education Programs

9.1.2.1 Public Outreach Programs

Valley Water participates in outreach activities which include multi-media marketing campaigns directed at the diverse county population, website development and maintenance, social media, publications, public meetings, staff participation at community events, interagency partnerships, corporate environmental fairs, professional trade shows, water conservation workshops and seminars, and a speaker's bureau. Outreach efforts focus on supporting customers and key stakeholders to minimize adverse impacts resulting from drought conditions, as well as advancing community knowledge, awareness, and understanding of the conservation and water supply services provided by Valley Water.

Valley Water implemented broad-based advertising programs, participated in community events, collaborated with water retailers to develop their own outreach materials, and reached non-English speaking residents to ensure they were informed about water issues. Valley Water's multi-ethnic outreach expanded beyond translating existing outreach materials to targeting media stories, coverage, and paid advertisements specifically to their communities.

Valley Water's public outreach efforts also include social media and updates to its water conservation program website (www.watersavings.org). The website is updated throughout the year to include the latest program information, new reports/studies, and updates on our workshops. In addition, Valley Water produced and distributed collateral material, including program flyers, free shower timers and other conservation devices, posters, yard and garden signs, restaurant signs for only serving water upon request, and hotel signs encouraging the occupant to reuse their linens.

The most recent outreach campaign that Valley Water promoted ("Yards Have Evolved") focused on encouraging residents to take out their high-water using plants and replace them with low-water using plants. This campaign, which was developed in 2019, featured ads in English, Spanish, Vietnamese and Chinese and included print, online/mobile, social media and radio ads.

In the spring of 2018, Valley Water embarked on an effort to establish a Community-Based Social Marketing strategy to supplement the Conservation campaign. Community-Based Social Marketing, or CBSM for short, is a strategy designed by behavioral scientists (sociologists, psychologists, etc.) to obtain behavior change by removing barriers and establishing social norms. CBSM was initially designed to enhance sustainable and environmentally conscious behaviors. Valley Water's Conservation CBSM Campaign had two objectives: to increase the number of participants in the Landscape Rebate Program and specifically increase lawn conversions; and to increase the number of Graywater Rebate Program participants. Valley Water employed a variety of outreach methods. An evaluation of these methods is expected to be completed in 2021.

Landscape Summit

Starting in 2016, Valley Water has annually held the Landscape Summit, an event developed through Valley Water's Landscape Committee as a forum for landscape professionals to learn about water issues in the county and California as a whole, and how water relates to the landscaping industry. It is also an opportunity for Valley Water to get valuable feedback from landscape professionals, and for attendees

to collaborate and exchange ideas. The 6th Annual Landscape Summit was held virtually on February 25, 2021.

Nursery Program
To increase the public's awareness of water-efficient gardening techniques, Valley Water developed the Nursery Program in 1995. This program distributes, at least quarterly, a series of educational materials to nurseries, irrigation supply stores, and box store retailers throughout the county. To display the materials, the program includes literature racks offering free informational materials about water-wise gardening, efficient irrigation techniques, drought-resistant plants, drip irrigation, and Valley Water's water conservation programs. In future program years, the literature racks may ultimately be replaced or supplemented with digital resources that would not need to be replenished as regularly. The Nursery Program literature is currently being distributed to and displayed at more than 30 participating nurseries and vendors. The display, however, has been placed on a temporary hold due to COVID-19 restrictions.

Watershed Approach to Landscaping
Valley Water is partnering with a vendor to develop a comprehensive sustainable landscaping guide, *Watershed Approach to Landscaping*, that is targeted toward residential audiences, landscapers, and irrigation professionals new to sustainable landscape practices. This guide will be ready in early 2021 and will cover how-to and best practice information on building a healthy living soil, selecting local, climate-appropriate, water-wise plants, upgrading to high-efficiency irrigation equipment, capturing rainwater, and reusing graywater.

Demonstration Gardens
Demonstration gardens can inspire community members to incorporate sustainable, ecological, or water-wise plants and techniques into their landscaping. Valley Water has maintained a list of water-wise and California-native plant demonstration gardens to help guide community members in converting their own gardens to be more water-efficient. In 2017, Valley Water created an interactive map that is regularly maintained. This map allows anyone to find demonstration gardens near their home or work by entering an address.

In 2013, Valley Water converted all rotors and sprinklers to in-line drip as part of an on-site demonstration garden on Valley Water's campus. This garden includes plant signs informing the public of the species name and water requirements of the plants on campus. An interactive map, which geotags the labeled plants, was also created for Valley Water's demonstration garden. Visitors can use the interactive map while doing a self-guided walking tour of Valley Water's campus. In the future, Valley Water plans to launch an upgrade of its current demonstration garden to emphasize water-wise, California-native plants and rainwater capture techniques, in addition to efficient irrigation on site.

Workshops
Over the last five years, Valley Water promoted water conservation through workshops and trainings throughout the community. Examples of these include Graywater Laundry to Landscape workshops and presentations to schools, local universities, industry association gatherings, nursery staff, community gardens, native plant society members, corporate events, local Master Gardeners, PG&E's Water Conservation Showcase, and many more. On average, Valley Water conservation staff give about thirty presentations each year.

Because so many sustainable landscaping events take place throughout Santa Clara County and are sponsored by multiple agencies, Valley Water was instrumental in developing and administering the *South Bay Green Gardens* website (www.southbaygreengardens.org). This site was started as a place

where all of the public agencies and organizations in the county could promote their events, workshops, etc. The page has become a one-stop shop for information not just on these events, but on all aspects of sustainable landscaping such as pest management, rainwater management, soils and composting, and much more. Valley Water helps fund this site and co-chairs the committee which manages it. The committee includes information about multiple benefits in the site, such as pesticide reduction, water conservation, waste reduction through composting, and stormwater management, in order to show integration of these issues. Additionally, Valley Water staff update the site and make sure the events pages are current.

Bay Area Qualified Water Efficient Landscaper Trainings

In 2019, Valley Water joined with a number of other Bay Area water agencies and the California Water Efficiency Partnership (CalWEP) to create the Bay Area Qualified Water Efficient Landscaper Training (BayQWEL). This regional effort is a professional certification program designed for landscape designers, landscape supervisors, maintenance and irrigation technicians, and park maintenance staff with a focus on water-saving sustainable landscaping techniques. The trainings were initially offered in-person from 2019 to early 2020 in English and Spanish, then adapted to an online curriculum following COVID-19 Shelter-in-Place restrictions later in 2020. Those who become QWEL certified by passing the exam and completing the irrigation audit will be listed as an industry pro on the QWEL website. A total of four online trainings have been offered in 2020, with two more scheduled for early 2021. Additional classes will be scheduled throughout 2021, including the first online Spanish version in March.

Going Native Garden Tour

To showcase exemplary native plant gardens, Valley Water has been a sponsor of the Going Native Garden Tour every spring since 2003. Each year, thousands of participants visit upwards of 60 gardens. These native plant gardens demonstrate the beauty and efficiency of well-maintained native gardens to residents of Santa Clara and San Mateo counties. In addition to showcasing native plants, at least one garden offers native plants for sale each year. In 2020, the tour went completely online, with live garden tours which subsequently were posted as videos online.

Community Events

Each year, Valley Water staffs education booths and activities at public events, libraries and STEAM (Science, Technology, Engineering, the Arts and Mathematics) fairs, providing water education to over 12,800 members of the public. During 2020, Valley Water's Education Outreach program developed a series of virtual presentations and transformed 10 hands-on programs into distance-learning presentations. This has enabled Valley Water to continue to engage with public audiences and deliver water education during the COVID-19 pandemic.

9.1.2.2 School Education Program

Valley Water's Education Outreach program was established in 1995 and has a team of two full-time and 4 part-time staff and student interns that develop and implement water education programs. Education Outreach (EO) provides free grade-level appropriate classroom presentations, puppet shows, and tours of Valley Water facilities to schools, visitor groups and residents within Santa Clara County. The objective is to educate pre-school through college students and residents about water with a focus on water conservation, water supply, watershed stewardship, pollution reduction, flood preparedness, and careers in the water field. EO also provides free education materials to educators, including workbooks and videos, as well as providing hands-on water education training. These educator trainings include both Project WET (Water Education for Teachers) and EO programs that enable educators to lead their own classroom activities to inform their students on water-related topics.

Over the last five years, Valley Water's EO program has reached an average of 15,000 students per year, engaging a total of 75,698 students between 2016 – 2020. EO has supported over 2,900 educators through classroom presentations and tours and provided 20 educator trainings that focus on hands-on water-based science. Students from over 2,300 classrooms have participated in hands-on, Next Generation Science Standards-aligned programs and tours of Valley Water's Outdoor Classrooms and facilities. Examples include lessons using puppet shows and storytelling for pre-K and early elementary students and using hands-on science activities and career development information for middle school, high school, and college students.

9.1.3 Conservation Coordinator

Valley Water established the position of Water Conservation Coordinator in 1990. The current Water Conservation Coordinator is:

Name: Metra Angelica Richert
Title: Unit Manager – Water Supply Planning and Conservation Unit
Address: 5750 Almaden Expressway, San Jose, CA 95118
Phone: (408) 630-2978
Email: mrichert@valleywater.org

There are four full-time staff members in the Water Conservation Program, typically four part-time temporary staff, and up to six student interns (number varies depending on season and program needs). Staff includes one senior water conservation specialist and three water conservation specialists. The FY 21 water conservation budget is $6.1 million, with funding from water charges, cost-share agreements, and grants.

9.1.4 Other Demand Management Issues

In 2012, voters in Santa Clara County approved the Safe, Clean Water and Natural Flood Protection Program. This enables Valley Water to provide up to $1,000,000 in grant funding for a Water Conservation Innovative Research Grant Program (Grant Program). The goal of the Grant Program was to identify new, innovative technologies that could potentially be incorporated into Valley Water's long-term conservation programs. To date, Valley Water has awarded 14 grants through this program, including grants for several AMI pilots and other water-conserving technologies. In 2020, voters approved a renewal of the Safe, Clean Water and Natural Flood Protection Program, with funds for additional water conservation programs, which will start in FY 21-22.

9.1.5 Asset Management

Valley Water initiated its Asset Management Program in 2002 to ensure continued, reliable services at the level its customers require, at the lowest possible cost. The program includes maintaining an asset registry and a formal, ongoing condition assessment program that monitors risks and maintains a long-term funding model to identify when future asset investments are expected. Valley Water uses this information to develop annual maintenance work plans and make renewal and replacement decisions for its $7.5 billion in water utility assets. In the short term, Valley Water's Asset Management Program seeks to reduce unplanned asset failures or service outages, and the economic, social, or environmental consequences of these failures. For the long-term, the program seeks to minimize operating and capital costs of owning these assets and improve financial planning. Valley Water's Asset Management Planning Model is illustrated in Figure 9-1. Master plans, such as this one, must work hand in hand with Asset Management plans and reports. Typically, the Asset Management Program is focused on meeting existing levels of service. Master plans may propose an increased level of service and/or infrastructure

improvements to meet future demands. Recommendations from master plans can influence alternative management strategies and their respective costs in future Asset Management Plans.

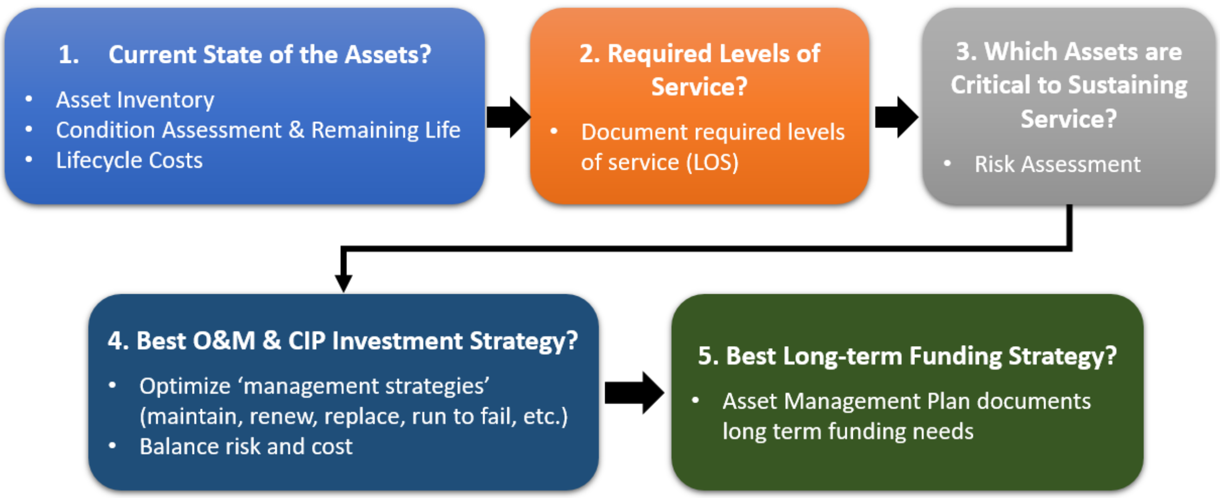

Figure 9-1. Asset Management Planning Model

9.2 PROGRAMMATIC DMMs

Valley Water and its major water retailers enjoy a special cooperative partnership in the regional implementation of a variety of water conservation programs. As the water wholesaler for Santa Clara County, Valley Water is responsible for the implementation of the DMMs.

Participation in all programs listed below is tracked on a monthly basis and by retailer. Furthermore, many water retailers participate in cost sharing agreements maintained by Valley Water. These cost sharing agreements benefit all parties through economies of scale. In FY21, Valley Water is involved in roughly $3.3 million in cost-sharing agreements with the local cities, water retailers, and nonprofit organizations for a variety of water conservation programs.

Additionally, Valley Water regularly sends out customer surveys to determine overall satisfaction with programs and how programs may be improved. Valley Water will continue to work with its water retailers to implement the programs that best meet the public's needs while achieving local, regional, and statewide goals.

9.2.1 Water Waste Prevention Ordinances

Valley Water collaborates with local agencies to develop model water use restrictions that will assist the water retailers and cities in the development of their water waste ordinances. For instance, Valley Water collaborated with local cities and water retailers to develop a model Drought Response and Water Waste Ordinance in 2009 and to develop a model Drought Contingency Plan in 2010. During the last drought, Valley Water collaborated with the water retailers to adopt a consistent two-day per week watering restriction for the majority of the county. After the last drought, Valley Water has continued a 20% voluntary call for conservation with a recommended 3-day per week watering restriction.

CHAPTER 9 – DEMAND MANAGEMENT MEASURES

In 2014, as part of Valley Water's response to the last drought from 2012 to 2016, Valley Water initiated a Water Waste Inspector Program (Water Waste Program). The Water Waste Program facilitates and responds to reports of water waste and violations of local water use restrictions. It also provides an opportunity to educate homeowners and businesses on water conservation as well as the various rebate and technical assistance programs Valley Water offers. In the first two years of the Water Waste Program, nearly 10,000 water waste reports were received and responded to. As of 2020, Valley Water has responded to 11,746 water waste reports.

To facilitate the community's ability to report water waste, four reporting options were developed: email, a water waste hotline, a portal on Valley Water's website, and a mobile application developed for iPhone and Android users. In 2021, the mobile application will be updated as part of a new customer relationship management software. It is expected this tool will improve the effectiveness and efficiency of responding to water waste reports. It will also improve how Valley Water collaborates with local cities and water retailers in resolving water waste countywide.

9.2.2 Residential Programs

9.2.2.1 Water Use Reports

Water use reports have been shown to be effective at encouraging residents to save water and when combined with Advanced Metering Infrastructure, can inform residents about water leaks quickly. In Fiscal Year 2013-14, Valley Water started a program to share costs with the local water retailers City of Palo Alto Utilities Department, City of Santa Clara Water Department, City of Morgan Hill, Gilroy Community Services Department, and San José Municipal Water System on home water use reports. Since the start of this cost sharing program, over 620,000 sites have received water use reports. Valley Water plans to continue to share in the cost of various programs that benefit customers.

9.2.2.2 Residential Surveys

Water Wise House Call Program

As the administrator of this program, Valley Water developed and implemented a strategy to target and market water-use surveys to single-family and multi-family residential customers throughout Santa Clara County, except for the service area of San Jose Water Company (SJWC) as they administer their own program. Between 1998 and 2017, Valley Water performed more than 46,456 residential audits through the Water Wise House Call Program (Table 9-1).

Table 9-1. Residential Program Participation Between FY 2015-16 and FY 2019-20

Residential Programs	Last 5 Years	To-Date
Water Wise House Call Program	5,956	46,465
Water Wise Outdoor Surveys	658	658
DIY Water Wise Survey Kits	1,439	1,439
Fixture Distribution	35,125	375,448
High-Efficiency Clothes Washers	8,924	177,202
High-Efficiency Toilets (HETs)	1,190	26,414
Home Water Use Reports[1]	620,956	620,956

Residential Programs	Last 5 Years	To-Date
Submeters	889	7,172
Graywater	111	124
Total Participation	**675,248**	**1,255,878**
[1]Includes number of sites that receive Home Water Use Reports.		

Valley Water's program included educating the customer on how to read a water meter; checking flow rates of showerheads, faucet aerators, and toilets; installing low-flow showerheads, faucet aerators and toilet flappers if necessary; checking for leaks; checking the irrigation system for efficiency (including leaks); measuring landscaped area; developing an efficient irrigation schedule for different seasons; and providing the customer with evaluation results, water savings recommendations, and other educational materials. In 2004, Valley Water began programming a homeowner's controllers as well (i.e., if allowed by the homeowner, the surveyor will input the recommended schedules into the controller). Valley Water increased program efficiency and participation by using landscape measurements from this program as an initial qualifying step for the Landscape Rebate Program (Sections 9.2.4.3 and 9.2.4.4 for those who chose to participate in both programs

Valley Water's largest retailer, SJWC, offers free water audits to its customers. The audits are performed at customer request, typically in response to a high-water bill concern and/or in response to SJWC or Valley Water marketing efforts. Audits are performed for both residential and commercial customers. Valley Water supports SJWC's water audit program by providing free water conservation supplies, such as showerheads and faucet aerators. SJWC began performing water audits at the end of 1991 and completes about 2,300 per year with approximately 1,700 completed in 2020.

In 2017, Valley Water's free water audit program was replaced by a two-part program, the Water Wise Survey Program. The two-part program offers in-person Water Wise Outdoor Surveys and Do-It-Yourself Water Wise Indoor Surveys, as described below.

Water Wise Survey Program

The outdoor portion of the Water Wise Survey Program is similar in concept to the Water Wise House Call Program's outdoor water audit. Water Wise Outdoor Survey Program offers a free, comprehensive consultation from a trained irrigation professional to single-family and small multi-family sites (under ½ acre of landscape area) in Santa Clara County with a working irrigation system (excluding SJWC customers). The consultation includes evaluating the irrigation system, flagging issues onsite, identifying rebate programs for which participants may also qualify, and creating a custom report detailing the survey findings. Since it launched in 2017, Valley Water performed more than 650 residential Water Wise Outdoor Surveys (Table 9-1).

The Do-It-Yourself (DIY) Water Wise Indoor Surveys Program offers free showerheads, aerators, and toilet flappers to anyone who completes a companion survey form. A physical kit is available in English, Spanish, Chinese, and Vietnamese; additionally, a virtual kit is available. Companion videos are offered

to guide customers through the DIY survey steps. Customers must first share their current fixtures that are high water use before Valley Water sends them a free low-flow device. Due to low response rates, Valley Water may cease this requirement to encourage greater participation in this program. The DIY kits are available to single-family and multi-family residential properties throughout Santa Clara County. More than 1,430 kits have been distributed since 2017 (Table 9-1).

Fixture Distribution

Valley Water also distributes high-quality, low-flow showerheads and faucet aerators to community members through water retailers and public events. Since program inception in 1992, more than 375,000 low-flow showerheads and aerators have been distributed throughout the county, including over 35,000 in the last 5 years (Table 9-1).

Valley Water plans to continue offering free showerheads and aerators through its DIY Water Wise Indoor Surveys, its water retailers, and various outreach events to meet the region's long-term water conservation goals.

9.2.2.3 High-Efficiency Clothes Washers

Valley Water offered a residential high-efficiency washer rebate between July 1995 and December 2016. In October 2001, Valley Water began participating in the regional Bay Area Water Utility Clothes Washer Rebate Program, which has been successfully partnering with PG&E between January 2008 and December 2016. To address concerns for local water quality, washers that utilized silver-ion technology did not qualify for this program regardless of their efficiency. In mid-2014, a multi-tiered combined rebate was implemented to transition program participants to more stringent fixture standards:

- Purchasing Energy Star Most Efficient (ESME) washers resulted in the combined rebate increasing to $200 ($125 of which was from Valley Water).
- Purchasing the Consortium for Energy Efficiency's (CEE's) Tier 3 washers received a reduced Valley Water contribution of only $50 with the goal of promoting washers that qualify for the more efficient standard.

In January 2015, qualifying standards were adjusted to streamline requirements to only rebate for qualifying ESME washers at a combined rebate of $150 ($100 of which was from Valley Water) until the program ended on December 31, 2016.

Valley Water approved more than 177,000 rebates during the program's history. In the final 18 months of the program, nearly 9,000 rebates were approved. The program ended in response to the vast improvement of federal Energy Star program's efficiency standards over the years. By the end of the program, Valley Water's Water Conservation Savings Model estimated nearly 60% of all single-family homes had efficient clothes washers within its service area.

9.2.2.4 High-Efficiency Toilets

Valley Water had provided incentives for the retrofit of approximately 244,000 residential toilets from 1992 through June 2003. In 2004, Valley Water shifted to a high-efficiency toilet (HET) program, and between 2004 (the first year of the program) and 2013, Valley Water rebated approximately 16,000 HETs. In response to the State of California's new requirement that all toilets sold or installed in the state flush at 1.28 gallons per flush (gpf) or less, January 2014 marked the beginning of Valley Water's strictest standard yet for HETs to qualify for the rebate program - only Premium HETs would

qualify for the $125 rebate. Premium HETs save nearly 15% more water than the state standard of 1.28 gpf by using only 1.1 gpf with superior flush performance (at least 600 grams per flush as evaluated by an independent group under standardized conditions).

Between 2004 and 2016, Valley Water issued over 26,400 HET rebates in total since this iteration of Valley Water's high-efficiency toilet rebate began in 2004 (Table 9-1). The program was phased out in 2016 to reprioritize funds to other programs with greater opportunities for water savings.

9.2.2.5 Submeter Rebate Program

Beginning as a pilot in 2001 and extended in 2008, this program provides a rebate (in FY16, the rebate amount increased from $100 to $150) for every submeter installed at multi-family housing complexes, such as mobile home parks and condominium complexes. Individual well owners and homes on a shared well also qualify.

Water use records from participating mobile home parks showed an average water savings of 23% per mobile home in a pilot study. This program has issued over 7,170 rebates to date (Table 9-1). Valley Water plans to continue to offer this program in the future to reach the region's long-term water conservation goals.

9.2.2.6 Graywater Laundry to Landscape Programs

In the last 5 years, Valley Water issued 40 graywater rebates (launched in 2014) and funded the direct installation of 71 graywater systems (launched in 2019). Since the program launched, 124 total graywater systems have been installed (Table 9-1).

Valley Water's Graywater Laundry to Landscape (L2L) Rebate Program rebate amount started at $100 in 2014, and in response to the drought, increased to $200 a few months later. The Cities of Cupertino and Morgan Hill and San José Municipal Water cost-share with this program to increase the rebate to $400 total. In addition to providing a rebate for properly connecting a clothes washer to a laundry-to-landscape system, the graywater program also provides information, resources, and workshops on graywater. Resources include maintenance steps, detergent information, finding contractors, increasing awareness of local nonprofit organizations that specialize in graywater, and educating constituents on important factors to consider with more complicated graywater systems (e.g., branched-drain graywater and whole house graywater systems) even though rebates for those options are not currently offered.

Graywater use in irrigated landscapes decreases potable water use by approximately 17 gallons per person per day or 14,565 gallons per household (on average), depending on the site and system design. California Plumbing Code (CPC) does not require a permit for installing an L2L system. However, the CPC is specific as to how L2L systems can be installed, and Valley Water's rebate's eligibility requirements are framed to meet those specifications. Additionally, to protect public health and safety, prior to giving project approval, Valley Water checks each applicant's property's depth to groundwater. At post inspections, applicants must demonstrate adherence to the CPC's specifications to help ensure graywater does not pool or drain to their neighbors' properties.

CHAPTER 9 – DEMAND MANAGEMENT MEASURES

In 2019, Valley Water in partnership with a local non-profit organization, Ecology Action, launched a training program for landscape professionals and a Graywater Direct Installation Program for underserved community members, including low-income individuals, people 60 years or older, U.S. veterans, and people with disabilities. The Green Gardener Graywater Installer Certification Program trained 20 professionals to install L2L graywater systems. Between June 2019 and June 2020, the direct installation service assessed 307 properties and installed 71 L2L graywater systems. Over 31,660 square feet of medium- and high-water use landscapes were converted from potable irrigation to graywater.

9.2.3 Commercial Programs

9.2.3.1 Water Efficient Technology Rebate Program

The Water Efficient Technology Rebate (WET Rebate or WET Program; formerly known as the Custom/Measured Rebate Program) provides rebates for process, technology, and equipment retrofits that save water. To encourage all commercial and industrial businesses to implement permanent water reduction measures, unique projects that meet program requirements are eligible for a rebate of either $4 per hundred cubic feet (CCF) of water saved or 50% of equipment costs excluding taxes and labor, whichever is less, up to $50,000. Projects must save at least 100 cubic feet of water annually. Examples of such projects are generally unique to specific industries such as ozone laundry systems or technologies to reduce potable water use when maintaining ice rinks, with myriad other examples. In January 2014, these rebates were temporarily increased to $8 per CCF to promote participation during the drought before returning to $4 per CCF. Cost sharing agreements increase the rate and maximum rebate in some areas.

To date, Valley Water has funded 110 projects, saving approximately 680,663 CCF/year (1,563 AFY) (Table 9-2). Since 2015, the WET Rebate has helped save over 28,440 CCF per year from 12 completed projects. In 2021, Valley Water will adjust the program so that the rebate will be based on either the lesser of $4 per CCF or up to 100% of equipment costs excluding taxes and labor, up to $100,000. This doubles the potential proportion of equipment costs covered by the rebate in addition to doubling the maximum rebate. The WET Rebate continues to be one of Valley Water's most cost-effective programs in meeting the region's long-term water conservation goals.

Table 9-2. Commercial Program Participation Between FY 2015-16 to FY 2019-20

Commercial Programs	Last 5 Years	To-Date
WET Rebates (CCF/Year)[1]	28,440	680,663
WET Rebates	12	110
High-Efficiency Toilet Rebates & Direct Installation (MFD & CII)	7,321	35,052
Urinal Rebates & Direct Installation	464	2,581
Commercial Washer Program	266	4,913
Faucet Aerator Distribution	18,143	26,793
Pre-Rinse Spray Valves	360	4,949
Total Participation	**26,566**	**74,398**

[1]Excludes CCF/Year from WET Rebates.

9.2.3.2 Commercial Toilet and Urinal Programs

Valley Water has been replacing inefficient toilets in commercial, industrial, and institutional (CII) sites since 1994. The CII toilet rebate programs have frequently been offered in tandem with various iterations of high-efficiency urinal (HEU) programs, HET and HEU direct install programs, and retrofit programs for urinal valve installation. Since July 2015, over 7,300 HETs were installed or rebated (Table 9-3). Additionally, since 2005, Valley Water has had a program to replace urinal flush valves of old, inefficient 1.0 gpf or more urinals with a flush valve that uses only a 0.5 gallon per flush. Since the program was started, approximately 2,580 urinals had been retrofitted or rebated, with 464 installed in the last five years (Table 9-3).

In order to increase efficiency and cost effectiveness, Valley Water created a successful pilot program in 2020 which replaced fifty-nine (59) 1.6 gpf toilets with 0.8 gpf toilets in a low-income apartment complex. This pilot will serve as the basis for a new Fixture Replacement Program to launch in 2021 to replace or retrofit toilets, urinals, and more for multi-family residences and commercial, industrial, and institutional properties.

9.2.3.3 Commercial Faucet Aerator Program

Since 2010, Valley Water has offered free 0.5 gallon per minute faucet aerators to qualifying businesses and schools. Nearly 26,800 faucet aerators have been distributed through this program, with 18,143 being distributed during the last five years. Much of the recent distribution is due to a direct distribution program called WaterLink, which was administered by a local non-profit organization, Ecology Action, and focused on water and energy efficiency direct installation measures (see 9.2.3.6).

9.2.3.4 Pre-Rinse Spray Valve Program

Pre-rinse spray valves are designed to remove food waste from dishes prior to dishwashing, and are often used in commercial kitchens. In previous years, Valley Water partnered with other agencies to offer a direct installation program for high-efficiency pre-rinse spray valves (PRSVs). In 2010 Valley Water purchased a quantity of PRSVs with a flow rate of 1.15 gallons per minute for distribution to commercial sites, especially those identified through Valley Water's previous CII Water Survey Program. Since July 2015, nearly 360 pre-rinse spray valves were retrofitted, and nearly 4,950 have been installed since Valley Water began promoting these devices in 2003 (Table 9-3). Valley Water plans to continue distributing these devices to meet the region's long-term water conservation goals.

9.2.3.5 WaterLink Program

In collaboration with Ecology Action, Valley Water funded a program called WaterLink, a water/energy savings program that provided turnkey water/energy upgrades to residents, businesses, schools, and public agencies throughout Santa Clara County. Efforts were focused within Disadvantaged Community Census tracts (defined by scoring 76% and above using California Environmental Screening Tools version 2.0). To achieve significant water and energy savings, the WaterLink program delivered a suite of direct installation projects that produced persistent water/energy savings and tangible economic benefits by reducing utility bills. Direct installation equipment included efficient showerheads and aerators, clothes washers, pre-rinse spray valves, and ozone laundry systems. Additionally, the program included replacing turfgrass with low-water using landscape. The WaterLink program has concluded and totals for these programs are included in Table 9-3.

9.2.4 Landscape Programs

9.2.4.1 Large Landscape Surveys

Analogous to Water Wise Outdoor Surveys offered through the landscape portion of the Water Wise Survey Program, Valley Water has offered and provided large landscape water surveys in the county since 1994. Landscape managers have been provided water-use analyses, scheduling information, in-depth irrigation evaluation, a site-specific water budget, and recommendations for affordable irrigation upgrades. Each site received a detailed report upon completion of the survey. An annual report is produced to recap the previous year's efforts. Previously a stand-alone program, starting in 2015 the program was offered through the Large Landscape Program (described below).

This highly successful and well-received program has conducted nearly 1,820 surveys through 2020. Participants from this program are encouraged to participate in the Landscape Rebate Program (see 9.2.4.3). Valley Water plans to continue to offer and expand this program in the future to reach the region's long-term water conservation goals.

9.2.4.2 Large Landscape Program

The Large Landscape Program (formerly known as the Landscape Water Use Evaluation Program or LWUEP) launched in May 2014. All sites enrolled in the program receive a monthly water usage report. The reports provide an objective evaluation of a site's water use at a glance for every billing period. Various data inputs, including irrigated area, vegetation types, type of irrigation system, and daily weather (evapotranspiration minus effective rainfall) are included in a detailed calculation to develop the water budgets. Sites are encouraged to share the monthly reports with everyone involved in landscape decision making at the site, including the bill payer, site manager, landscape contractor and board members. Sites are also eligible to receive a complimentary on-site landscape field survey by an irrigation expert and receive a thorough investigation of the site's irrigation issues.

A total of 557 sites were enrolled in the program at its outset from the following water retailer service areas: Cities of Gilroy, Mountain View, Palo Alto, Sunnyvale, and Santa Clara. By the end of mid-2015, 1,050 sites were active in this program. In 2020, there are 3,000 active sites that include both potable and recycled water landscapes (Table 9-3). Representing 91% of Valley Water's service area, the full list of participating water retailers includes the original five service areas mentioned above as well as the Cities of Milpitas and Morgan Hill, San José Municipal Water, and San José Water Company. Nearly 122,000 water-use reports and monthly budgets have been distributed. Valley Water's vendor works closely with participating water retailers to market and leverage the services offered through this program for participating sites.

Table 9-3. Commercial Program Participation Between FY 2015-16 to FY 2019-20

Landscape Programs	Last 5 Years	To-Date
Large Landscape Surveys	162	1,816
Large Landscape Program[1]	2,213	3,000
Turf Conversion (square feet)[2]	8,629,926	12,975,063
Irrigation Equipment[3]	313,010	362,160
WBICs[4]	3,960	6,726
In-Line Drip Conversion (square feet)	166,461	166,461

Landscape Programs	Last 5 Years	To-Date
Rain Barrels (number of units)	110	110
Cisterns (gallons)	32,745	32,745
Rain Gardens (square footage of roof area diverted)	12,389	12,389
Landscape Maintenance Program	715	715
Total Participation[5]	**320,170**	**374,527**

[1]Represents total active sites in program. The "Last 5 Years" shows the number of sites added, and "To Date" shows total active sites.
[2]Includes pilot programs and partnership with Our City Forest; square footage estimated up to 2011.
[3]Excludes WBICs.
[4]Includes pilot programs and participation from residential and CII sites.
[5]Total excludes square footage from Turf Conversion, In-Line Drip Conversion, Rain Gardens and total gallons from cisterns.

As of the end of 2019, the sites enrolled in Valley Water program were saving 31% on irrigation usage compared to 2013 usage. Valley Water will continue to offer and expand this program in the future to reach the region's long-term water conservation goals, particularly with regards to opportunities for this program to assist compliance with elements of AB 1668/SB 606.

9.2.4.3 Landscape Rebate Program

Conversion Rebates

Valley Water began to focus on water efficient landscapes by launching a version of the program in early 2005. The original program offered rebates to residential and commercial sites for the replacement of approved high-water using landscape with low-water use plants, mulch and permeable hardscape. Participants could receive up to $0.75 per square foot of irrigated turf grass with a maximum rebate of $1,000 and $10,000 for residential and commercial sites respectively. In an effort to expedite program participation, Valley Water's Board approved doubling the maximum rebate from $1,000 to $2,000 for residents and from $10,000 to $20,000 for commercial sites in March 2009. The rebate cap for commercial, institutional, and multi-family (5 or more units) sites was then increased to $50,000 on January 1, 2020. Cost sharing agreements increase the rate per square foot and rebate cap in some areas.

Currently, any qualified property in Santa Clara County with qualifying high-water using landscape can receive rebates for converting to qualifying low water using landscape with a minimum of 50% qualifying plant coverage; 2 to 3 inches of mulch; and a conversion from overhead irrigation to drip, micro spray, bubbler, or no irrigation. In January 2014, the Landscape Conversion rebate was increased from $0.75 per square foot (sq ft.) to $1.00 per sq ft. However, in April of 2014 in direct response to the drought, Valley Water's Board approved adding funding to the program to support a rebate of $2.00 per sq. ft. with no maximum rebate. On July 1, 2016, the rebate rate returned to $1/sq ft and the rebate caps were reinstituted.

Valley Water continued to experience unprecedented increases in terms of rebate amounts as well as participation and interest from the community through the end of the drought and into FY2020. From July 2015 to June 2020, over $14.3 million dollars was rebated for approximately 8.3 million square feet of conversion. Through June 2020, Valley Water has rebated for over 12.7 million square feet of

landscape conversion (Table 9-4). Valley Water plans to continue to offer this rebate in the future in order to reach the region's long-term water conservation goals.

In January of 2019, Valley Water added Rainwater Capture Rebates to the Landscape Rebate Program. Customers now have the opportunity to receive rebates for the installation of rain barrels, cisterns, and rain gardens. Since the start of the Rainwater Capture Rebates, rainwater has been diverted from nearly 20,000 square feet of roof area into qualifying rain gardens, 165 rain barrels have been installed, and cisterns with a total combined capacity of over 33,000 gallons have received a rebate.

Lawn Busters Program

In September 2015, Valley Water executed an Agreement with Our City Forest (OCF), a local non-profit organization, to provide $340,000 to fund OCF's Lawn Conversion Program (Lawn Busters Program). Lawn Busters Program is designed to provide a low cost, expedient option for low-income, elderly, disabled or veteran homeowners and institutions within disadvantaged communities throughout Santa Clara County who wish to convert their lawns to low-water using landscape. In targeting these hard-to-reach sectors, the Lawn Busters Program is intended to help Valley Water meet its short-term drought response goals as well as its long-term water conservation goals. By partnering with OCF, Valley Water combines resources and implements the program more cost-effectively than would be possible otherwise.

Since the start of the Lawn Busters Program, Valley Water added $110,000 to the contract, for a total of $450,000, and OCF has converted roughly 200,000 square feet of lawn to low-water using landscape.

9.2.4.4 Landscape Rebate Program – Irrigation Equipment Rebates

Valley Water provides rebates for the following pieces of irrigation equipment as summarized in Table 9-4.

Table 9-4. Landscape Rebate Program Irrigation Equipment Rebates

Qualifying Hardware and Rainwater Capture Projects	Maximum Rebate Amount per Unit
Rain Sensors	$50
High-Efficiency Nozzles	$5
Rotor Sprinklers or Spray Bodies equipped with Pressure Regulation or Check Valves	$20
Dedicated Landscape Meters, Flow Sensors, or Hydrometers	$1,000
WBICs, 1-12 Stations	$300
WBICs, 13-24 Stations	$1,000
WBICs, 25+ Stations	$2,000
In-Line Drip Irrigation[1] (converting from sprinklers in existing shrub, perennial, or annual planting beds)	$0.25 per square foot
Rain Barrel (40-199 gallons)	$35 per barrel
Cisterns (200 gallons or more)	$0.50 per gallon
Rain Gardens	$1 per square foot of roof area converted[2]
[1]Converts sprinklers in existing shrub, perennial, or annual planting beds. [2]Up to $300 per site.	

Similar to landscape conversion, Valley Water's Board of Directors approved adding funding to the program during the drought to support higher rebate amounts for many of the items listed above. Due to these higher rebate amounts as well as the effects of the drought, Valley Water experienced unprecedented increases in interest and participation from the community over the last few years. While participation rates have slowed compared to the height of the drought years, FY19 and FY20 combined still show over 48,000 irrigation equipment pieces upgraded compared to pre-drought FY12 and FY13 combined numbers of 8,236, a more than 500% increase.

Additionally, nearly 4,000 Weather-Based Irrigation Controllers (WBICs) have been installed during FY15-FY20. Sometimes referred to as "smart controllers", WBICs utilize the principles of evapotranspiration or "ET" to automatically calculate a site-specific irrigation schedule based on several factors, including plants and soil type. The controller then adjusts the irrigation schedule as local weather changes to regulate unnecessary irrigation, saving up to 20% of irrigation water use when used properly. Valley Water plans to continue to offer rebates for WBICs in the future in order to reach the region's long-term water conservation goals.

9.2.4.5 Landscape Maintenance Consultation Program

The Landscape Maintenance Consultation Program, started in May of 2018, was developed based on recommendations from Valley Water's Landscape Committee as a way to help Landscape Rebate Program participants learn how to properly maintain their newly converted low water use gardens. To date, 715 residential rebate customers have participated in the program (Table 9-3). During the free, one-hour consultation, the customer has an opportunity to walk through their garden with a landscape professional, reviewing site specific recommendations for plant maintenance and pruning, soil health, pest management, and irrigation scheduling and maintenance. The Landscape Maintenance Consultation Program will continue to be offered to new rebate program participants whose gardens are at least one year established.

9.3 CONCLUSION

Valley Water, through a unique cooperative partnership with its retailers, offers regional implementation of a variety of water conservation programs in an effort to permanently reduce water use in Santa Clara County. While Valley Water is only responsible for implementation of the DMMs, it continues to collaborate with its water retailers to implement various water conservation programs on a regional basis. By taking the lead in implementing many of the various DMM components, Valley Water is ensuring its long-term water supply reliability goals are met as well as assisting its water retailers in meeting their goals. The goal of Valley Water's DMM components is to save approximately 99,000 AFY by the year 2030 and 110,000 AFY by 2040, using 1992 as a base year. In 2021, Valley Water will update its Water Conservation Strategic Plan to identify new or improved strategies to reach our savings goals as well as future Water Use Objectives required by AB 1668 and SB 606.

CHAPTER 10 – PLAN ADOPTION, SUBMITTAL, AND IMPLEMENTATION

This section describes the adoption, submittal, and implementation of this 2020 UWMP. A checklist is also provided to facilitate DWR's review of the 2020 UWMP.

10.1 PLAN ADOPTION, SUBMITTAL, AND IMPLEMENTATION

Valley Water's Board of Directors set the time and place for the 2020 UWMP public hearing for June 8, 2021. Valley Water notified the water retailers and the cities and County of Santa Clara on May 17, 2021 of the time and date of the public hearing. The draft UWMP was posted on Valley Water's web site (https://www.valleywater.org/your-water/water-supply-planning/urban-water-management-plan) and made available for public review on May 17, 2021. The public hearing notice was published on ***San José Mercury News*** on May 18, 2021 and May 25, 2021 and ***Metro*** on May 19, 2021. Documentation of noticing of the public hearing is included in Appendix B.

Valley Water's Board held the public hearing on June 8 and June 9, 2021 and adopted the UWMP on June 9, 2021. A copy of the conformed Board agenda package for both public hearing and adoption, including the adoption resolution, is in Appendix G. The final 2020 UWMP will be posted on Valley Water's website within 30 days of adoption. Paper copies will be made available at the same time the 2020 UWMP is posted on the web site for public review during normal business hours.

Within 30 days of Board adoption and prior to July 1, 2021, the adopted 2020 UWMP will be submitted electronically to DWR via its Water Use Efficiency data online submittal portal (WUEdata). Electronic copies of the 2020 UWMP will also be provided to the cities and County within 30 days of adoption. Valley Water will implement this adopted 2020 UWMP in accordance with the California Urban Water Management Planning Act.

Following adoption, Valley Water will continue to implement water supply planning programs and projects identified in this 2020 UWMP to meet its level of service goal. As part of the on-going master planning process to address future uncertainties with demands, existing supplies, and proposed projects, Valley Water conducts annual evaluation of water supply projects through the MAP process to maintain a diverse water supply portfolio to provide safe and clean water for current and future generations in Santa Clara County.

10.2 UWMP CHECKLIST

The following checklist is provided to facilitate DWR's review of the completeness of this document and is organized by subject matter. In addition, a complete set of standardized tables prescribed by DWR is provided in Appendix A.

Water Code Section	Summary as Applies to UWMP	2020 UWMP Location (Optional column for Agency Review use)
10615	A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, reclamation and demand management activities.	Overview of Chapter 1
10630.5	Each plan shall include a simple description of the supplier's plan including water availability, future requirements, a strategy for meeting needs, and other pertinent information. Additionally, a supplier may also choose to include a simple description at the beginning of each chapter.	Chapter 1

CHAPTER 10 – PLAN ADOPTION, SUBMITTAL, AND IMPLEMENTATION

Water Code Section	Summary as Applies to UWMP	2020 UWMP Location (Optional column for Agency Review use)
10620(b)	Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.	Section 2.1
10620(d)(2)	Coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.	Section 2.4, 4.4 and Appendix B
10642	Provide supporting documentation that the water supplier has encouraged active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan and contingency plan.	Section 2.4, 10.1 and Appendix B
10631(h)	Retail suppliers will include documentation that they have provided their wholesale supplier(s) - if any - with water use projections from that source.	Not applicable to Valley Water as a Wholesale Supplier.
10631(h)	Wholesale suppliers will include documentation that they have provided their urban water suppliers with identification and quantification of the existing and planned sources of water available from the wholesale to the urban supplier during various water year types.	Section 2.4 and Appendix B
10631(a)	Describe the water supplier service area.	Section 3.1
10631(a)	Describe the climate of the service area of the supplier.	Section 3.3
10631(a)	Provide population projections for 2025, 2030, 2035, 2040 and optionally 2045.	Section 3.4
10631(a)	Describe other social, economic, and demographic factors affecting the supplier's water management planning.	Section 3.4
10631(a)	Indicate the current population of the service area.	Section 3.4
10631(a)	Describe the land uses within the service area.	Section 3.5
10631(d)(1)	Quantify past, current, and projected water use, identifying the uses among water use sectors.	Section 4.2
10631(d)(3)(C)	Retail suppliers shall provide data to show the distribution loss standards were met.	Section 4.2.5 and Appendix C
10631(d)(4)(A)	In projected water use, include estimates of water savings from adopted codes, plans, and other policies or laws.	Section 4.2.6
10631(d)(4)(B)	Provide citations of codes, standards, ordinances, or plans used to make water use projections.	Section 4.2.6

CHAPTER 10 – PLAN ADOPTION, SUBMITTAL, AND IMPLEMENTATION

Water Code Section	Summary as Applies to UWMP	2020 UWMP Location (Optional column for Agency Review use)
10631(d)(3)(A)	Report the distribution system water loss for each of the 5 years preceding the plan update.	Optional - Not provided.
10631.1(a)	Include projected water use needed for lower income housing projected in the service area of the supplier.	Does not apply to Valley Water as a Wholesale Supplier.
10635(b)	Demands under climate change considerations must be included as part of the drought risk assessment.	Sections 4.1, 4.4 and 7.3
10608.20(e)	Retail suppliers shall provide baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.	Does not apply to Valley Water as a Wholesale Supplier.
10608.24(a)	Retail suppliers shall meet their water use target by December 31, 2020.	Does not apply to Valley Water as a Wholesale Supplier.
10608.36	Wholesale suppliers shall include an assessment of present and proposed future measures, programs, and policies to help their retail water suppliers achieve targeted water use reductions.	Section 5.1
10608.24(d)(2)	If the retail supplier adjusts its compliance GPCD using weather normalization, economic adjustment, or extraordinary events, it shall provide the basis for, and data supporting the adjustment.	Does not apply to Valley Water as a Wholesale Supplier.
10608.22	Retail suppliers' per capita daily water use reduction shall be no less than 5 percent of base daily per capita water use of the 5-year baseline. This does not apply if the suppliers base GPCD is at or below 100.	Does not apply to Valley Water as a Wholesale Supplier.
10608.4	Retail suppliers shall report on their compliance in meeting their water use targets. The data shall be reported using a standardized form in the SBX7-7 2020 Compliance Form.	Does not apply to Valley Water as a Wholesale Supplier.
10631(b)(1)	Provide a discussion of anticipated supply availability under a normal, single dry year, and a drought lasting five years, as well as more frequent and severe periods of drought.	Sections 6.10 and 7.2
10631(b)(1)	Provide a discussion of anticipated supply availability under a normal, single dry year, and a drought lasting five years, as well as more frequent and severe periods of drought, *including changes in supply due to climate change.*	Section 6.11
10631(b)(2)	When multiple sources of water supply are identified, describe the management of each supply in relationship to other identified supplies.	Chapter 6
10631(b)(3)	Describe measures taken to acquire and develop planned sources of water.	Sections 6.1 - 6.10

CHAPTER 10 – PLAN ADOPTION, SUBMITTAL, AND IMPLEMENTATION

Water Code Section	Summary as Applies to UWMP	2020 UWMP Location (Optional column for Agency Review use)
10631(b)	Identify and quantify the existing and planned sources of water available for 2020, 2025, 2030, 2035, 2040 and optionally 2045.	Section 6.10
10631(b)	Indicate whether groundwater is an existing or planned source of water available to the supplier.	Section 6.2
10631(b)(4)(A)	Indicate whether a groundwater sustainability plan or groundwater management plan has been adopted by the water supplier or if there is any other specific authorization for groundwater management. Include a copy of the plan or authorization.	Section 6.2
10631(b)(4)(B)	Describe the groundwater basin.	Section 6.2
10631(b)(4)(B)	Indicate if the basin has been adjudicated and include a copy of the court order or decree and a description of the amount of water the supplier has the legal right to pump.	Section 6.2
10631(b)(4)(B)	For unadjudicated basins, indicate whether or not the department has identified the basin as a high or medium priority. Describe efforts by the supplier to coordinate with sustainability or groundwater agencies to achieve sustainable groundwater conditions.	Valley Water serves as the Groundwater Sustainability Agency.
10631(b)(4)(C)	Provide a detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years	Section 6.2
10631(b)(4)(D)	Provide a detailed description and analysis of the amount and location of groundwater that is projected to be pumped.	Section 6.2
10631(c)	Describe the opportunities for exchanges or transfers of water on a short-term or long- term basis.	Section 6.7
10633(b)	Describe the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.	Not applicable. Valley Water does not treat wastewater.
10633(c)	Describe the recycled water currently being used in the supplier's service area.	Section 6.5
10633(d)	Describe and quantify the potential uses of recycled water and provide a determination of the technical and economic feasibility of those uses.	Section 6.5
10633(e)	Describe the projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected.	Section 6.5

CHAPTER 10 – PLAN ADOPTION, SUBMITTAL, AND IMPLEMENTATION

Water Code Section	Summary as Applies to UWMP	2020 UWMP Location (Optional column for Agency Review use)
10633(f)	Describe the actions which may be taken to encourage the use of recycled water and the projected results of these actions in terms of acre-feet of recycled water used per year.	Section 6.5
10633(g)	Provide a plan for optimizing the use of recycled water in the supplier's service area.	Section 6.5
10631(g)	Describe desalinated water project opportunities for long-term supply.	Section 6.6
10633(a)	Describe the wastewater collection and treatment systems in the supplier’s service area with quantified amount of collection and treatment and the disposal methods.	Not applicable. Valley Water does not treat wastewater.
10631(f)	Describe the expected future water supply projects and programs that may be undertaken by the water supplier to address water supply reliability in average, single-dry, and for a period of drought lasting 5 consecutive water years.	Section 6.9 and Chapter 7
10631.2(a)	The UWMP must include energy information, as stated in the code, that a supplier can readily obtain.	Section 6.12 and Tables O
10634	Provide information on the quality of existing sources of water available to the supplier and the manner in which water quality affects water management strategies and supply reliability	Chapter 7
10620(f)	Describe water management tools and options to maximize resources and minimize the need to import water from other regions.	Sections 7.1, 7.3 and 8.2, and Chapter 9
10635(a)	Service Reliability Assessment: Assess the water supply reliability during normal, dry, and a drought lasting five consecutive water years by comparing the total water supply sources available to the water supplier with the total projected water use over the next 20 years.	Section 7.2
10635(b)	Provide a drought risk assessment as part of information considered in developing the demand management measures and water supply projects.	Section 7.3
10635(b)(1)	Include a description of the data, methodology, and basis for one or more supply shortage conditions that are necessary to conduct a drought risk assessment for a drought period that lasts 5 consecutive years.	Section 7.3
10635(b)(2)	Include a determination of the reliability of each source of supply under a variety of water shortage conditions.	Section 7.1
10635(b)(3)	Include a comparison of the total water supply sources available to the water supplier with the total projected water use for the drought period.	Section 7.3

CHAPTER 10 – PLAN ADOPTION, SUBMITTAL, AND IMPLEMENTATION

Water Code Section	Summary as Applies to UWMP	2020 UWMP Location (Optional column for Agency Review use)
10635(b)(4)	Include considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria.	Sections 7.1 - 7.3
10632(a)	Provide a water shortage contingency plan (WSCP) with specified elements below.	Chapter 8
10632(a)(1)	Provide the analysis of water supply reliability (from Chapter 7 of Guidebook) in the WSCP	Section 8.1 and Chapter 7
10632(a)(10)	Describe reevaluation and improvement procedures for monitoring and evaluation the water shortage contingency plan to ensure risk tolerance is adequate and appropriate water shortage mitigation strategies are implemented.	Section 8.10
10632(a)(2)(A)	Provide the written decision- making process and other methods that the supplier will use each year to determine its water reliability.	Section 8.2
10632(a)(2)(B)	Provide data and methodology to evaluate the supplier's water reliability for the current year and one dry year pursuant to factors in the code.	Section 8.2
10632(a)(3)(A)	Define six standard water shortage levels of 10, 20, 30, 40, 50 percent shortage and greater than 50 percent shortage. These levels shall be based on supply conditions, including percent reductions in supply, changes in groundwater levels, changes in surface elevation, or other conditions. The shortage levels shall also apply to a catastrophic interruption of supply.	Section 8.3
10632(a)(3)(B)	Suppliers with an existing water shortage contingency plan that uses different water shortage levels must cross reference their categories with the six standard categories.	Section 8.3
10632(a)(4)(A)	Suppliers with water shortage contingency plans that align with the defined shortage levels must specify locally appropriate supply augmentation actions.	Section 8.4
10632(a)(4)(B)	Specify locally appropriate demand reduction actions to adequately respond to shortages.	Section 8.4
10632(a)(4)(C)	Specify locally appropriate operational changes.	Section 8.4
10632(a)(4)(D)	Specify additional mandatory prohibitions against specific water use practices that are in addition to state-mandated prohibitions are appropriate to local conditions.	As a Wholesale Supplier, we cannot set 'mandatory prohibitions'.
10632(a)(4)(E)	Estimate the extent to which the gap between supplies and demand will be reduced by implementation of the action.	As a Wholesale Supplier, we cannot set 'mandatory prohibitions'.

CHAPTER 10 – PLAN ADOPTION, SUBMITTAL, AND IMPLEMENTATION

Water Code Section	Summary as Applies to UWMP	2020 UWMP Location (Optional column for Agency Review use)
10632.5	The plan shall include a seismic risk assessment and mitigation plan.	Sections 8.4.3
10632(a)(5)(A)	Suppliers must describe that they will inform customers, the public and others regarding any current or predicted water shortages.	Sections 8.4 and 8.5
10632(a)(5)(B) 10632(a)(5)(C)	Suppliers must describe that they will inform customers, the public and others regarding any shortage response actions triggered or anticipated to be triggered and other relevant communications.	Sections 8.4 and 8.5
10632(a)(6)	Retail supplier must describe how it will ensure compliance with and enforce provisions of the WSCP.	Does not apply to Valley Water as a Wholesale Supplier.
10632(a)(7)(A)	Describe the legal authority that empowers the supplier to enforce shortage response actions.	Section 8.7
10632(a)(7)(B)	Provide a statement that the supplier will declare a water shortage emergency Water Code Chapter 3.	Section 8.7
10632(a)(7)(C)	Provide a statement that the supplier will coordinate with any city or county within which it provides water for the possible proclamation of a local emergency.	Section 8.7
10632(a)(8)(A)	Describe the potential revenue reductions and expense increases associated with activated shortage response actions.	Section 8.8
10632(a)(8)(B)	Provide a description of mitigation actions needed to address revenue reductions and expense increases associated with activated shortage response actions.	Section 8.8
10632(a)(8)(C)	Retail suppliers must describe the cost of compliance with Water Code Chapter 3.3: Excessive Residential Water Use During Drought.	Not applicable to Valley Water as a Wholesale Supplier.
10632(a)(9)	Retail suppliers must describe the monitoring and reporting requirements and procedures that ensure appropriate data is collected, tracked, and analyzed for purposes of monitoring customer compliance.	Not applicable to Valley Water as a Wholesale Supplier.
10632(b)	Analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas.	Not applicable to Valley Water as a Wholesale Supplier.
10635(c)	Provide supporting documentation that Water Shortage Contingency Plan has been, or will be, provided to any city or county within which it provides water, no later than 30 days after the submission of the plan to DWR.	Sections 8.12, Chapter 10 and Appendix B
10632(c)	Make available the Water Shortage Contingency Plan to customers and any city or county where it provides water within 30 after adopted the plan.	Section 10.1

CHAPTER 10 – PLAN ADOPTION, SUBMITTAL, AND IMPLEMENTATION

Water Code Section	Summary as Applies to UWMP	2020 UWMP Location (Optional column for Agency Review use)
10631(e)(2)	Wholesale suppliers shall describe specific demand management measures listed in code, their distribution system asset management program, and supplier assistance program.	Sections 9.1 and 9.2
10631(e)(1)	Retail suppliers shall provide a description of the nature and extent of each demand management measure implemented over the past five years. The description will address specific measures listed in code.	Not applicable to Valley Water as a Wholesale Supplier.
10608.26(a)	Retail suppliers shall conduct a public hearing to discuss adoption, implementation, and economic impact of water use targets (recommended to discuss compliance).	Not applicable to Valley Water as a Wholesale Supplier.
10621(b)	Notify, at least 60 days prior to the public hearing, any city or county within which the supplier provides water that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. Reported in Table 10-1.	Section 10.1
10621(f)	Each urban water supplier shall update and submit its 2020 plan to the department by July 1, 2021.	Section 10.1
10642	Provide supporting documentation that the urban water supplier made the plan and contingency plan available for public inspection, published notice of the public hearing, and held a public hearing about the plan and contingency plan.	Section 10.1 and Appendices B and G
10642	The water supplier is to provide the time and place of the hearing to any city or county within which the supplier provides water.	Section 10.1
10642	Provide supporting documentation that the plan and contingency plan has been adopted as prepared or modified.	Section 10.1 and Appendix G
10644(a)	Provide supporting documentation that the urban water supplier has submitted this UWMP to the California State Library.	Section 10.1 and Appendix G
10644(a)(1)	Provide supporting documentation that the urban water supplier has submitted this UWMP to any city or county within which the supplier provides water no later than 30 days after adoption.	Section 10.1 and Appendix G
10644(a)(2)	The plan, or amendments to the plan, submitted to the department shall be submitted electronically.	Section 10.1
10645(a)	Provide supporting documentation that, not later than 30 days after filing a copy of its plan with the department, the supplier has or will make the plan available for public review during normal business hours.	Section 10.1 and Appendix G

CHAPTER 10 – PLAN ADOPTION, SUBMITTAL, AND IMPLEMENTATION

Water Code Section	Summary as Applies to UWMP	2020 UWMP Location (Optional column for Agency Review use)
10645(b)	Provide supporting documentation that, not later than 30 days after filing a copy of its water shortage contingency plan with the department, the supplier has or will make the plan available for public review during normal business hours.	Section 10.1
10621(c)	If supplier is regulated by the Public Utilities Commission, include its plan and contingency plan as part of its general rate case filings.	Not applicable to Valley Water.
10644(b)	If revised, submit a copy of the water shortage contingency plan to DWR within 30 days of adoption.	Section 8.10

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APPENDIX A

DWR Standardized Tables for Wholesalers

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Submittal Table 2-2: Plan Identification

Select Only One		Type of Plan	Name of RUWMP or Regional Alliance *if applicable* (select from drop down list)
☑	**Individual UWMP**		
	☐	Water Supplier is also a member of a RUWMP	
	☐	Water Supplier is also a member of a Regional Alliance	
☐	**Regional Urban Water Management Plan (RUWMP)**		

NOTES:

Submittal Table 2-3: Supplier Identification	
Type of Supplier (select one or both)	
☑	Supplier is a wholesaler
☐	Supplier is a retailer
Fiscal or Calendar Year (select one)	
☑	UWMP Tables are in calendar years
☐	UWMP Tables are in fiscal years
If using fiscal years provide month and date that the fiscal year begins (mm/dd)	
Units of measure used in UWMP * (select from drop down)	
Unit	AF
***Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*	
NOTES:	

Submittal Table 2-4 Wholesale: Water Supplier Information Exchange (select one)	
☑	Supplier has informed more than 10 other water suppliers of water supplies available in accordance with Water Code Section 10631. Completion of the table below is optional. If not completed, include a list of the water suppliers that were informed.
5	**Provide page number for location of the list.**
☐	Supplier has informed 10 or fewer other water suppliers of water supplies available in accordance with Water Code Section 10631. **Complete the table below.**
Water Supplier Name	
Add additional rows as needed	
NOTES: See Chapter 2 and Appendix B.	

Submittal Table 3-1 Wholesale: Population - Current and Projected						
Population Served	2020	2025	2030	2035	2040	2045*(opt)*
	1,986,340	2,098,695	2,217,750	2,387,165	2,538,320	2,699,046*
NOTES: Source: Santa Clara County Demographics from Association of Bay Area Governments (ABAG) Projections 2017. * 2045 values are calculated by increasing the 2040 value by the same rate of increase as 2035 to 2040 values.						

Submittal Table 4-1 Wholesale: Demands for Potable and Non-Potable[1] Water - Actual

Use Type	2020 Actual		
Drop down list May select each use multiple times These are the only use types that will be recognized by the WUE data online submittal tool	Additional Description (as needed)	Level of Treatment When Delivered Drop down list	Volume[2]
Add additional rows as needed			
Sales to other agencies	Ground water production and Treated Water	Drinking Water	196,469
Agricultural irrigation		Drinking Water	24,587
Other	Independent GW Pumping	Drinking Water	12,944
Other	Untreated Surface water	Raw Water	2,200
Losses		Drinking Water	600
Other Potable	SFPUC, San Jose Water right	Drinking Water	52,700
		TOTAL	289,500

[1] *Recycled water demands are NOT reported in this table. Recycled water demands are reported in Table 6-4.*
[2] *Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES: Sales to agencies and raw water taken from 2021-2022 Report on the Protection and Augmentation of Water Supplies, Figure 1-1.1 and Figure 1-3.1. Losses from Water Loss Audit (Appendix C). Agricultural irrigation and independent groundwater pumping: Semi-annual reporting pumping data from the second half of CY2019 is assumed for the second half of CY2020 due to incomplete or partial second half CY2020 data.

Submittal Table 4-2 Wholesale: Use for Potable and Raw Water [1] - Projected						
Use Type	Additional Description (as needed)	**Projected Water Use [2]** Report To the Extent that Records are Available				
Drop down list May select each use multiple times These are the only Use Types that will be recognized by the WUEdata online submittal tool.		2025	2030	2035	2040	2045 (opt)
Add additional rows as needed						
Sales to other agencies	Groundwater and Treated Water	215,000	203,000	201,000	201,000	205,000
Agricultural irrigation	Groundwater pumping	25,000	25,000	25,000	25,000	25,000
Losses		3,000	3,000	3,000	3,000	3,000
Other Non-Potable	Untreated Surface water	2,000	2,000	2,000	2,000	2,000
Other	Non-Ag independent pumpers	14,000	14,000	14,000	14,000	14,000
Other Potable	SFPUC	55,000	56,000	59,000	61,000	63,000
Other Potable	San Jose Water Co, Stanford	1,700	1,700	1,700	1,700	1,700
	TOTAL	315,700	304,700	305,700	307,700	313,700

[1] Recycled water demands are NOT reported in this table. Recycled water demands are reported in Table 6-4. [2] Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.

NOTES: Numbers are rounded to the nearest 1,000 AF. The numbers represent countywide demands which are partially served by the SFPUC and surface water rights held by San Jose Water Company and Stanford University.

Submittal Table 4-3 Wholesale: Total Water Use (Potable and Non-Potable)						
	2020	2025	2030	2035	2040	2045 (opt)
Potable and Raw Water From Tables 4-1W and 4-2W	289,500	315,700	304,700	305,700	307,700	313,700
Recycled Water Demand* From Table 6-4W	16,800	16,200	19,100	22,400	25,700	28,300
TOTAL WATER DEMAND	306,300	331,900	323,800	328,100	333,400	342,000

**Recycled water demand fields will be blank until Table 6-4 is complete.*

NOTES: Numbers are rounded to the nearest 100 AF. The numbers represent countywide demands which are partially served by the SFPUC and surface water rights held by San Jose Water Company and Stanford University.

Submittal Table 6-1 Wholesale: Groundwater Volume Pumped						
☑	Supplier does not pump groundwater. The supplier will not complete the table below.					
☐	All or part of the groundwater described below is desalinated.					
Groundwater Type ***Drop Down List*** *May use each category multiple times*	Location or Basin Name	2016*	2017*	2018*	2019*	2020*
Add additional rows as needed						
	TOTAL	0	0	0	0	0
**** Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*						
NOTES: SCVWD has one well field for emergency use, which has not been used during the reporting period.						

Submittal Table 6-3 Wholesale: Wastewater Treatment and Discharge Within Service Area in 2020											
✓	Wholesale Supplier neither distributes nor provides supplemental treatment to recycled water. The Supplier will not complete the table below.										
Wastewater Treatment Plant Name	Discharge Location Name or Identifier	Discharge Location Description	Wastewater Discharge ID Number *(optional)* [2]	Method of Disposal ***Drop down list***	Does This Plant Treat Wastewater Generated Outside the Service Area? ***Drop down list***	Treatment Level ***Drop down list***	2020 volumes [1]				
							Wastewater Treated	Discharged Treated Wastewater	Recycled Within Service Area	Recycled Outside of Service Area	Instream Flow Permit Requirement
Add additional rows as needed											
						Total	0	0	0	0	0

[1] **Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.
[2] If the **Wastewater Discharge ID Number** is not available to the UWMP preparer, access the SWRCB CIWQS regulated facility website at https://ciwqs.waterboards.ca.gov/ciwqs/readOnly/CiwqsReportServlet?inCommand=reset&reportName=RegulatedFacility

NOTES: Valley Water provides supplemental treatment to recycled water but based on page M-18 of the DWR's UWMP Guidebook Appendix, is not required to complete this table since it does not distribute that water.

Submittal Table 6-4 Wholesale: Current and Projected Retailers Provided Recycled Water Within Service Area							
☐	Recycled water is not directly treated or distributed by the Supplier. The Supplier will not complete the table below.						
Name of Receiving Supplier or Direct Use by Wholesaler	Level of Treatment *Drop down list*	2020*	2025*	2030*	2035*	2040*	2045* *(opt)*
Add additional rows as needed							
South Bay Water Recycling Plant	Tertiary	12,300	13,300	15,300	17,700	20,200	21,700
Sunnyvale Water Pollution Control Plant	Tertiary	400	1,100	1,100	1,200	1,300	1,700
South County Regional Wastewater Authority	Tertiary	2,200	1,000	1,900	2,700	3,400	4,100
Palo Alto Regional Water Quality Control Plant	Tertiary	1,900	800	800	800	800	800
	Total	16,800	16,200	19,100	22,400	25,700	28,300
*** Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.							
NOTES: Valley Water uses recycled water to help augment drinking water and groundwater supplies through in-lieu recharge. Currently, recycled water is distributed for non-potable uses such as landscape irrigation, industrial cooling, and dual plumbed facilities. Numbers are rounded to the nearest 100 AF.							

Submittal Table 6-5 Wholesale: 2015 UWMP Recycled Water Use Projection Compared to 2020 Actual		
☐	Recycled water was not used or distributed by the supplier in 2015, nor projected for use or distribution in 2020. The wholesale supplier will not complete the table below.	
Name of Receiving Supplier or Direct Use by Wholesaler	2015 Projection for 2020*	2020 Actual Use*
Add additional rows as needed		
South Bay Water Recycling Plant	17,400	12,322
Sunnyvale Water Pollution Control Plant	2,000	379
South County Regional Wastewater Authority	1,900	2,199
Palo Alto Regional Water Quality Control Plant	2,600	1,894
Total	23,900	16,794
***Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*		
NOTES: Valley Water uses recycled water to help augment drinking water and groundwater supplies through in-lieu recharge. Currently, recycled water is distributed for non-potable uses such as landscape irrigation, industrial cooling, and dual plumbed facilities.		

Submittal Table 6-7 Wholesale: Expected Future Water Supply Projects or Programs						
☐	No expected future water supply projects or programs that provide a quantifiable increase to the agency's water supply. Supplier will not complete the table below.					
☐	Some or all of the supplier's future water supply projects or programs are not compatible with this table and are described in a narrative format.					
42	Provide page location of narrative in the UWMP					
Name of Future Projects or Programs	Joint Project with other suppliers?		Description *(if needed)*	Planned Implementation Year	Planned for Use in Year Type *Drop Down list*	Expected Increase in Water Supply to Supplier*
	Drop Down Menu	*If Yes, Supplier Name*				
Add additional rows as needed						
Dam Improvements / Seismic Retrofits	*No*			2035	All Year Types	17,440
Delta Conveyance Project	*Yes*	Numerous		2040	All Year Types	TBD
Pacheco Reservoir Expansion	*Yes*			2035	All Year Types	TBD
Potable Reuse Program	*Yes*	Cities of Palo Alto and Mountain View, and potentially others.		2028	All Year Types	9000*

Transfer Bethany Pipeline	*Yes*	Contra Costa Water District, EBMUD, Alameda County Water District, Zone 7, SFPUC, BAWSCA, San Luis Delta Mendota		2025	Average Year	1,000
***Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*						
NOTES: From Chapter 6 Table 6-4. *Potable reuse program is based on an 11,000 AF production capacity with 80% efficiency.						

Submittal Table 6-8 Wholesale: Water Supplies — Actual				
Water Supply	Additional Detail on Water Supply	2020		
Drop down list May use each category multiple times.These are the only water supply categories that will be recognized by the WUEdata online submittal tool		Actual Volume*	Water Quality Drop Down List	Total Right or Safe Yield* (optional)
Add additional rows as needed				
Purchased or Imported Water		139,000	Other Non-Potable Water	
Surface water (not desalinated)		56,000	Other Non-Potable Water	
Other	Natural Groundwater Recharge	39,000	Other Non-Potable Water	
Other	SFPUC	49,000	Drinking Water	
Other	Local supplies	4,000	Drinking Water	
Recycled Water		17,000	Recycled Water	
	Total	304,000		0
***Units of measure (AF, CCF, MG)** *must remain consistent throughout the UWMP as reported in Table 2-3.*				
NOTES: From 2021-2022 Report on the Protection and Augmentation of Water Supplies (PAWS). Numbers are rounded to the nearest 1,000 AF.				

Submittal Table 6-9 Wholesale: Water Supplies — Projected											
Water Supply	Additional Detail on Water Supply	Projected Water Supply* Report To the Extent Practicable									
		2025		2030		2035		2040		2045 (opt)	
Drop down list May use each category multiple times. These are the only water supply categories that will be recognized by the WUEdata online submittal tool		Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)
Add additional rows as needed											
Surface water (not desalinated)	Includes supplies in surface storage	30,000		70,000		185,000		185,000		185,000	
Recycled Water	non-potable	16,000		19,000		22,000		26,000		28,000	
Purchased or Imported Water	SFPUC Supply, Treated water supply	185,000		190,000		195,000		200,000		205,000	
Groundwater (not desalinated)	Local groundwater storage (includes recharged local surface, advanced purified, and imported water supplies)	140,000		164,000		163,000		162,000		162,000	
Supply from Storage	Imported supplies in San Luis Reservoir and Semitropic Bank	75,000		75,000		75,000		70,000		70,000	
	Total	446,000	0	518,000	0	640,000	0	643,000	0	650,000	0

Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.
NOTES: Recycled water and groundwater supply are rounded to the nearest 1,000 AF. All other supplies are rounded to the nearest 5,000 AF. Supplies shown are based on modeled estimates of available supplies. Actual availability during any given year depends on hydrology, groundwater recharge operations and conditions, and other factors. Groundwater storage shown assumes groundwater can be drawn down to the severe stage of the Water Shortage Contingency Plan. This does not represent a sustainable long-term groundwater condition, but these supplies represent water that may be needed to get through a prolonged drought. Imported water allocations are provided by DWR in their Delivery Capability Report (DCR) 2019, which does not include any projected changes to future regulations nor the hydrologic sequence for the most recent 2012-2016 drought. For comparison, the lowest total annual imported delivery during the 1987-1992 drought in the DCR 2019 dataset is 83,200AF, while the actual lowest annual imported delivery during the 2012-2016 drought was 60,320 AF. However, through Valley Water's Monitoring and Assessment Program, Valley Water is conservatively planning for investments by considering severe droughts, such as the 2012-2016 drought, will occur in the future. Projects included in the supply projections include transfer Bethany pipeline (2025); Anderson dam seismic retrofit and potable reuse (2030); Guadalupe, Calero, and Almaden dam seismic retrofits and Pacheco Reservoir Expansion (2035); and an additional 35,000 AF of conservation (to reach Valley Water's goal of 109,000 AF by 2040 with a 1992 baseline).

Urban Water Supplier: *Santa Clara Valley Water District*

Table O-1C: Recommended Energy Reporting - Multiple Water Delivery Products				
Enter Start Date for Reporting Period	1/1/2020			
End Date	12/30/2020			
		☐ Is upstream embedded in the values reported?	Wat	
			Extract and Divert	Place into Storage
Water Volume Units	*Total Volume of Water Entering Process (volume units)*		*41078*	*0*
AF		*Retail Potable Deliveries (%)*	*0%*	*0%*
		Retail Non-Potable Deliveries (%)	*0%*	*0%*
		Wholesale Potable Deliveries(%)	*0%*	*0%*
		Wholesale Non-Potable Deliveries (%)	*0%*	*0%*
		Agricultural Deliveries (%)	*0%*	*0%*
		Environmental Deliveries (%)	*0%*	*0%*
		Other (%)	*0%*	*0%*
		Total Percentage [must equal 100%]	*0%*	*0%*
		Energy Consumed (kWh)	*2817108*	*0*
		Energy Intensity (kWh/volume units)	*68.6*	*0.0*

Water Delivery Type			*Production Volume (volume units defined above)*	*Total Utility (kWh/volume)*
		Retail Potable Deliveries	*0*	*0.0*
		Retail Non-Potable Deliveries	*0*	*0.0*
		Wholesale Potable Deliveries	*102930*	*320.8*
		Wholesale Non-Potable Deliveries	*0*	*0.0*
		Agricultural Deliveries	*0*	*0.0*
		Environmental Deliveries	*0*	*0.0*
		Other	*58780*	*71.8*
		All Water Delivery Types	*161710*	*230.3*

Quantity of Self-Generated Renewable Energy

0 kWh

Data Quality *(Estimate, Metered Data, Combination of Estimates and Metered Data)*

Combination of Estimates and Metered Data

Data Quality Narrative:

Narrative:

See Section 6.12 for additional information on this table.

Urban Water Supplier Operational Control

...er Management Process				Non-Consequential Hydropower (if applicable)	
Conveyance	Treatment	Distribution	Total Utility	Hydropower	Net Utility
120632	*103000*	*102930*	*N/A*	*0*	*N/A*
0%	*0%*	*0%*		*0%*	
0%	*0%*	*0%*		*0%*	
84%	*100%*	*100%*		*0%*	
0%	*0%*	*0%*		*0%*	
0%	*0%*	*0%*		*0%*	
0%	*0%*	*0%*		*0%*	
16%	*0%*	*0%*		*0%*	
100%	*100%*	*100%*	*N/A*	*0%*	*N/A*
26368678	*10658045*	*215582*	*40059413*	*0*	*40059413*
218.6	*103.5*	*2.1*	*N/A*	*0.0*	*N/A*

Net Utility (kWh/volume)
0.0
0.0
320.8
0.0
0.0
0.0
71.8
230.3

Urban Water Supplier: *Santa Clara Valley Water District*

Table O-2: Recommended Energy Reporting - Wastewater & Recycled Water						
Enter Start Date for Reporting Period	1/1/2020	**Urban Water Supplier Operational Control**				
End Date	12/30/2020					
		Water Management Process				
☐ Is upstream embedded in the values reported?		Collection / Conveyance	Treatment	Discharge / Distribution	Total	
Volume of Water Units Used						
Volume of Wastewater Entering Process (volume units selected above)		*0*	*0*	*0*	*0*	
Wastewater Energy Consumed (kWh)		*0*	*0*	*0*	*0*	
Wastewater Energy Intensity (kWh/volume)		*0.0*	*0.0*	*0.0*	*0.0*	
Volume of Recycled Water Entering Process (volume units selected above)		*0*	*4864*	*0*	*0*	
Recycled Water Energy Consumed (kWh)		*0*	*5985726*	*0*	*5985726*	
Recycled Water Energy Intensity (kWh/volume)		*0.0*	*1230.6*	*0.0*	*0.0*	

Quantity of Self-Generated Renewable Energy related to recycled water and wastewater operations

0 kWh

Data Quality *(Estimate, Metered Data, Combination of Estimates and Metered Data)*

Metered Data

Data Quality Narrative:

Energy data is from metered utility data. Volume of water is based on production data (plant output) using flow meter totalizer.

Narrative:

Valley Water operates one purified water facility and manages Treatment but does not manage Conveyance or Distribution.

Submittal Table 7-1 Wholesale: Basis of Water Year Data (Reliability Assessment)			
Year Type	**Base Year** If not using a calendar year, type in the last year of the fiscal, water year, or range of years, for example, water year 1999-2000, use 2000	**Available Supplies if Year Type Repeats**	
		☐ Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP. Location ______________________________	
		☑ Quantification of available supplies is provided in this table as either volume only, percent only, or both.	
		Volume Available *	**% of Average Supply**
Average Year	1922-2015	444600	100%
Single-Dry Year	1977	354700	80%
Consecutive Dry Years 1st Year	1988	344900	78%
Consecutive Dry Years 2nd Year	1989	369500	83%
Consecutive Dry Years 3rd Year	1990	340200	77%
Consecutive Dry Years 4th Year	1991	347100	78%
Consecutive Dry Years 5th Year	1992	341400	77%

Supplier may use multiple versions of Table 7-1 if different water sources have different base years and the supplier chooses to report the base years for each water source separately. If a supplier uses multiple versions of Table 7-1, in the "Note" section of each table, state that multiple versions of Table 7-1 are being used and identify the particular water source that is being reported in each table. Suppliers may create an additional worksheet for the additional tables.

***Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES:

Submittal Table 7-2 Wholesale: Normal Year Supply and Demand Comparison					
	2025	2030	2035	2040	2045 *(Opt)*
Supply totals *(autofill from Table 6-9)*	446,000	518,000	640,000	643,000	650,000
Demand totals *(autofill fm Table 4-3)*	331,900	323,800	328,100	333,400	342,000
Difference	114,100	194,200	311,900	309,600	308,000
NOTES: Supplies shown are based on modeled estimates of available supplies. Actual availability during any given year depends on hydrology, groundwater recharge operations and conditions, and other factors. Groundwater storage shown assumes groundwater can be drawn down to the severe stage of the Water Shortage Contingency Plan. This does not represent a sustainable long-term groundwater condition, but these supplies represent water that may be needed to get through a prolonged drought. Imported water allocations are provided by DWR in their Delivery Capability Report (DCR) 2019, which does not include projected future regulations nor the hydrologic sequence for the most recent 2012-2016 drought. For comparison, the lowest total annual imported delivery during the 1987-1992 drought in the DCR 2019 dataset is 83,200AF, while the actual lowest annual imported delivery during the 2012-2016 drought was 60,320 AF. However, through Valley Water's Monitoring and Assessment Program, Valley Water is conservatively planning for investments by considering severe droughts, such as the 2012-2016 drought, will occur in the future. Projects included in the supply projections include transfer Bethany pipeline (2025); Anderson dam seismic retrofit and potable reuse (2030); Guadalupe, Calero, and Almaden dam seismic retrofits and Pacheco Reservoir Expansion (2035); and an additional 35,000 AF of conservation (to reach Valley Water's goal of 109,000 AF by 2040 with a 1992 baseline).					

Submittal Table 7-3 Wholesale: Single Dry Year Supply and Demand Comparison					
	2025	2030	2035	2040	2045 (Opt)
Supply totals*	355,000	373,000	497,000	503,000	505,000
Demand totals*	330,000	325,000	330,000	335,000	345,000
Difference	25,000	48,000	167,000	168,000	160,000
***Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*					
NOTES: Demand totals are rounded to the nearest 5,000 AF and supply totals are rounded to the 1,000 AF. The available groundwater is based on modeled estimates if the 1977 hydrology was repeated in the future. Supplies available for the single year drought represent water needed not only for that single drought year, but also water that may be needed for a prolonged drought. Valley Water would manage the supplies reported in the table assuming the drought may continue beyond a single year, and thus not all supplies are expected to be used by retailers during the single year drought. Imported water allocations are provided by DWR in their DCR 2019, which does not include projected future regulations nor the hydrologic sequence for the most recent 2012-2016 drought. For comparison, the lowest total annual imported delivery during the 1987-1992 drought in the DCR 2019 dataset is 83,200AF, while the actual lowest annual imported delivery during the 2012-2016 drought was 60,320 AF. However, through Valley Water's Monitoring and Assessment Program, Valley Water is conservatively planning for investments by considering severe droughts, such as the 2012-2016 drought, will occur in the future. Projects included in the supply projections include transfer Bethany pipeline (2025); Anderson dam seismic retrofit and potable reuse (2030); Guadalupe, Calero, and Almaden dam seismic retrofits and Pacheco Reservoir Expansion (2035); and an additional 35,000 AF of conservation.					

Submittal Table 7-4 Wholesale: Multiple Dry Years Supply and Demand Comparison						
		2025*	2030*	2035*	2040*	2045* (Opt)
First year	Supply totals	345,000	349,000	491,000	483,000	487,000
	Demand totals	330,000	325,000	330,000	335,000	345,000
	Difference	15,000	24,000	161,000	148,000	142,000
Second year	Supply totals	370,000	376,000	477,000	482,000	501,000
	Demand totals	330,000	325,000	330,000	335,000	345,000
	Difference	40,000	51,000	147,000	147,000	156,000
Third year	Supply totals	340,000	349,000	443,000	450,000	448,000
	Demand totals	330,000	325,000	330,000	335,000	345,000
	Difference	10,000	24,000	113,000	115,000	103,000
Fourth year	Supply totals	347,000	341,000	416,000	421,000	429,000
	Demand totals	330,000	325,000	330,000	335,000	345,000
	Difference	17,000	16,000	86,000	86,000	84,000
Fifth year	Supply totals	341,000	365,000	430,000	440,000	444,000
	Demand totals	330,000	325,000	330,000	335,000	345,000
	Difference	11,000	40,000	100,000	105,000	99,000
Sixth year *(optional)*	Supply totals					
	Demand totals					
	Difference	0	0	0	0	0

***Units of measure (AF, CCF, MG) m**ust remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES: Demand totals are rounded to the nearest 5,000 AF and supply totals are rounded to the 1,000 AF. Supplies shown are based on modeled estimates for hydrologic years 1988-1992. Imported water allocations are provided by DWR in their DCR 2019, which does not include projected future regulations nor the hydrologic sequence for the most recent 2012-2016 drought. For comparison, the lowest total annual imported delivery during the 1987-1992 drought in the DCR 2019 dataset is 83,200AF, while the actual lowest annual imported delivery during the 2012-2016 drought was 60,320 AF. However, through Valley Water's Monitoring and Assessment Program, Valley Water is conservatively planning for investments by considering severe droughts, such as the 2012-2016 drought, will occur in the future. Projects included in the supply projections include transfer Bethany pipeline (2025); Anderson dam seismic retrofit and potable reuse (2030); Guadalupe, Calero, and Almaden dam seismic retrofits and Pacheco Reservoir Expansion (2035); and an additional 35,000 AF of conservation.

Submittal Table 7-5: Five-Year Drought Risk Assessment Tables to address Water Code Section 10635(b)

2021	Total
Total Water Use	320,000
Total Supplies	343,500
Surplus/Shortfall w/o WSCP Action	23,500
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	6500
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	30,000
Resulting % Use Reduction from WSCP action	0%

2022	Total
Total Water Use	322,000
Total Supplies	362,000
Surplus/Shortfall w/o WSCP Action	40,000
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	40,000
Resulting % Use Reduction from WSCP action	0%

2023	Total
Total Water Use	325,000
Total Supplies	335,000
Surplus/Shortfall w/o WSCP Action	10,000
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	10,000
Resulting % Use Reduction from WSCP action	0%

2024	Total
Total Water Use	327,000
Total Supplies	344,000
Surplus/Shortfall w/o WSCP Action	17,000
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0

Revised Surplus/(shortfall)	17,000
Resulting % Use Reduction from WSCP action	0%

2025	Total
Total Water Use	330,000
Total Supplies	341,000
Surplus/Shortfall w/o WSCP Action	11,000
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	11,000
Resulting % Use Reduction from WSCP action	0%

NOTE: WEAP model output for hydrologic years 1989-1992 was used to represent years 2 through 5 of the drought. Imported water allocations are provided by DWR in their DCR 2019, which does not include projected future regulations nor the hydrologic sequence for the most recent 2012-2016 drought. For comparison, the lowest total annual imported delivery during the 1987-1992 drought in the DCR 2019 dataset is 83,200AF, while the actual lowest annual imported delivery during the 2012-2016 drought was 60,320 AF. However, through Valley Water's Monitoring and Assessment Program, Valley Water is conservatively planning for investments by considering severe droughts, such as the 2012-2016 drought, will occur in the future.

Submittal Table 8-1 Water Shortage Contingency Plan Levels		
Shortage Level	**Percent Shortage Range**	**Shortage Response Actions** **(*Narrative description)***
1	Up to 10%	(This is Stage 2 "Alert" of Valley Water's Shortage Stages – see Crosswalk in Table 8-4 of the UWMP). This stage is meant to warn water users that current water use is tapping groundwater reserves. Work begins to coordinate ordinances with the County, cities, and retailers to prepare for Stage 2. Additional communication tools are employed to augment normal efforts, promote immediate behavioral changes, and set the tone for the onset of shortages. Specific implementation plans are developed in preparation of a drought deepening such as identifying supplemental funding to augment budgeted efforts and initiation of discussions with local, state, and federal agencies to call on previously negotiated options, transfers, and exchanges.
2	10% to 20%	(This is Stage 3 "Severe" of Valley Water's Shortage Stages – see Crosswalk in Table 8-4 of the UWMP). Shortage conditions are worsening, requiring close coordination with the County, cities, retailers, large landscapers, and agricultural users to implement ordinances and water use restrictions. Significant behavioral change is requested of water users. The intensity of communication efforts increases with the severity of the shortage. Messages are modified to reflect more dire circumstances. Water supplies are augmented through the implementation of options, transfers, exchanges, and withdrawals from groundwater banks.
3	20% to 30%	(This is Stage 4 "Critical" of Valley Water's Shortage Stages – see Crosswalk in Table 8-4 of the UWMP). This is generally the most severe stage in a multi-year drought. Stage 2 activities are expanded, and Valley Water will encourage the County, cities, and retailers to increase enforcement of their water shortage contingency plans, which could include fines for repeated violations; and all water users to significantly reduce water use.
4	30% to 40%	(This is a continuation of Stage 4 "Critical" of Valley Water's Shortage Stages – see Crosswalk in Table 8-4 of the UWMP). This is generally the most severe stage in a multi-year drought. Stage 2/3 activities are expanded, and Valley Water will encourage the County, cities, and retailers to increase enforcement of their water shortage contingency plans, which could include fines for repeated violations; and all water users to significantly reduce water use.
5	40% to 50%	(This is Stage 5 "Emergency" of Valley Water's Shortage Stages – see Crosswalk in Table 8-4 of the UWMP). This stage is meant to address an immediate crisis such as a major infrastructure failure but may also be needed in exceptional multi-year drought. Water supply may only be available to meet health and safety needs. Valley Water will encourage all water users to significantly reduce water use, activates its Emergency Operations Center, coordinates closely with municipalities and retailers, and provides daily updates on conditions.
6	At least 50%	(This is the extreme end of Stage 5 "Emergency" of Valley Water's Shortage Stages – see Crosswalk in Table 8-4 of the UWMP). This stage is meant to address an immediate crisis such as a major infrastructure failure but may also be needed in exceptional multi-year drought. Water supply may only be available to meet health and safety needs. Valley Water will encourage all water users to significantly reduce water use, activates its Emergency Operations Center, coordinates closely with municipalities and retailers, and provides daily updates on conditions.
NOTES: The crosswalk between Valley Water's stages and DWR's stages is in Table 8-4.		

Submittal Table 8-2: Demand Reduction Actions				
Shortage Level	Demand Reduction Actions ***Drop down list*** *These are the only categories that will be accepted by the WUEdata online submittal tool. Select those that apply.*	How much is this going to reduce the shortage gap? *Include units used (volume type or percentage)*	Additional Explanation or Reference *(optional)*	Penalty, Charge, or Other Enforcement? ***For Retail Suppliers Only*** *Drop Down List*
Add additional rows as needed				
Stage 1	Expand Public Information Campaign	Up to 10%	(This is Stage 2 "Alert" of Valley Water's Shortage Stages – see Crosswalk in Table 8-4 of the UWMP). Work begins to coordinate ordinances with the County, cities, and retailers to prepare for Stage 2. Additional communication tools are employed to augment normal communication efforts, promote immediate behavioral changes, and set the tone for the onset of shortages. Specific implementation plans are developed in preparation of a drought deepening such as identifying supplemental funding to augment budgeted efforts.	
Stage 2	Expand Public Information Campaign	10% to 20%	(This is Stage 3 "Severe" of Valley Water's Shortage Stages – see Crosswalk in Table 8-4 of the UWMP). Valley Water closely coordinates with the County, cities, retailers, large landscapers, and agricultural users to implement ordinances and water use restrictions. Significant behavioral change is requested of water users. The intensity of communication efforts increases with the severity of the shortage. Messages are modified to reflect more dire circumstances.	
Stage 3	Expand Public Information Campaign	20% to 30%	(This is Stage 4 "Critical" of Valley Water's Shortage Stages – see Crosswalk in Table 8-4 of the UWMP). Stage 2 activities are expanded, and Valley Water will encourage the County, cities, and retailers to increase enforcement of their water shortage contingency plans, which could include fines for repeated violations; and all water users to significantly reduce water use.	
Stage 4	Expand Public Information Campaign	30% to 40%	(This is a continuation of Stage 4 "Critical" of Valley Water's Shortage Stages – see Crosswalk in Table 8-4 of the UWMP). Stage 2/3 activities are expanded, and Valley Water will encourage the County, cities, and retailers to increase enforcement of their water shortage contingency plans, which could include fines for repeated violations; and all water users to significantly reduce water use.	

Stage 5	Other	40% to 50%	(This is Stage 5 “Emergency” of Valley Water’s Shortage Stages – see Crosswalk in Table 8-4 of the UWMP). Water supply may be limited to meet health and safety needs. Valley Water will encourage all water users to significantly reduce water use, activates its Emergency Operations Center, coordinates closely with municipalities and retailers, and provides daily updates on conditions.	
Stage 6	Other	At least 50%	(This is the extreme end of Stage 5 “Emergency” of Valley Water’s Shortage Stages – see Crosswalk in Table 8-4 of the UWMP). Water supply may be limited to meet health and safety needs. Valley Water will encourage all water users to significantly reduce water use, activates its Emergency Operations Center, coordinates closely with municipalities and retailers, and provides daily updates on conditions.	
NOTES: As a Wholesale Supplier, Valley Water works with the County, cities and retailers who have direct enforcement ability.				

Submittal Table 8-3: Supply Augmentation and Other Actions			
Shortage Level	Supply Augmentation Methods and Other Actions by Water Supplier ***Drop down list*** *These are the only categories that will be accepted by the WUEdata online submittal tool*	How much is this going to reduce the shortage gap? *Include units used (volume type or percentage)*	Additional Explanation or Reference *(optional)*
Add additional rows as needed			
None	Expand Public Information Campaign		
Stage 1	Transfers	10%	Valley Water initiates discussions with local, state, and federal agencies to call on previously negotiated options, transfers, and exchanges.
Stage 2	Exchanges	10-20%	Water supplies are augmented through the implementation of options, transfers, exchanges, and withdrawals from groundwater banks.
Stage 3	Other Purchases	20-40%	Water supplies are augmented through the implementation of options, transfers, exchanges, and withdrawals from groundwater banks.
Stage 4	Other Purchases	20-40%	Water supplies are augmented through the implementation of options, transfers, exchanges, and withdrawals from groundwater banks.
Stage 5	Other Actions (describe)	40-50%	Water supplies are augmented through the implementation of options, transfers, exchanges, and withdrawals from groundwater banks.
Stage 6	Other Actions (describe)	> 50%	Water supplies are augmented through the implementation of options, transfers, exchanges, and withdrawals from groundwater banks.
NOTES:			

Submittal Table 10-1 Wholesale: Notification to Cities and Counties (select one)		
☑	Supplier has notified more than 10 cities or counties in accordance with Water Code Sections 10621 (b) and 10642. **Completion of the table below is not required. Provide a separate list of the cities and counties that were notified.**	
Appendix B	Provide the page or location of this list in the UWMP.	
☐	Supplier has notified 10 or fewer cities or counties. **Complete the table below.**	
City Name	60 Day Notice	Notice of Public Hearing
Add additional rows as needed		
County Name *Drop Down List*	60 Day Notice	Notice of Public Hearing
Add additional rows as needed		
NOTES: See Appendix B		

Reduced Reliance Calculation - Data Template

Table C-1: Optional Calculation of Water Use Efficiency -To be completed if Water Supplier does <u>not</u> specifically estimate Water Use Efficiency as a supply

Service Area Water Use Efficiency Demands (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Service Area Water Demands with Water Use Efficiency Accounted For								
Non-Potable Water Demands								
Potable Service Area Demands with Water Use Efficiency Accounted For	-	-	-	-	-	-	-	-

Total Service Area Population	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Service Area Population								

Water Use Efficiency Since Baseline (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Per Capita Water Use (GPCD)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Change in Per Capita Water Use from Baseline (GPCD)		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Estimated Water Use Efficiency Since Baseline		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Table C-2: Calculation of Service Area Water Demands Without Water Use Efficiency

Total Service Area Water Demands (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Service Area Water Demands with Water Use Efficiency Accounted For	355,000	315,000	306,000	330,000	325,000	330,000	335,000	345,000
Reported Water Use Efficiency or Estimated Water Use Efficiency Since Baseline	-	13,000	28,000	40,000	53,000	58,000	62,000	62,000
Service Area Water Demands without Water Use Efficiency Accounted For	355,000	328,000	334,000	370,000	378,000	388,000	397,000	407,000

Table C-3: Calculation of Supplies Contributing to Regional Self-Reliance

Water Supplies Contributing to Regional Self-Reliance (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Water Use Efficiency	-	13,000	28,000	40,000	53,000	58,000	62,000	62,000
Water Recycling	17,000	18,000	17,000	16,000	19,000	22,000	26,000	28,000
Stormwater Capture and Use							1,000	1,000
Advanced Water Technologies (purified water for potable use)	-	-	-	-	7,000	7,000	7,000	7,000

Conjunctive Use Projects (local surface water)	58,000	55,000	59,000	36,000	37,000	40,000	41,000	41,000
Local and Regional Water Supply and Storage Projects (Non-Valley Water controlled)	11,000	9,000	7,000	11,000	11,000	11,000	11,000	11,000
Other Programs that Contribute to Regional Self-Reliance (natural groundwater recharge)	61,000	61,000	61,000	61,000	61,000	62,000	62,000	62,000
Water Supplies Contributing to Regional Self-Reliance	147,000	156,000	172,000	164,000	188,000	200,000	210,000	212,000

Service Area Water Demands without Water Use Efficiency (Acre-Feet)	**Baseline (2010)**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045 (Optional)**
Service Area Water Demands without Water Use Efficiency Accounted For	355,000	328,000	334,000	370,000	378,000	388,000	397,000	407,000

Change in Regional Self Reliance (Acre-Feet)	**Baseline (2010)**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045 (Optional)**
Water Supplies Contributing to Regional Self-Reliance	147,000	156,000	172,000	164,000	188,000	200,000	210,000	212,000
Change in Water Supplies Contributing to Regional Self-Reliance		9,000	25,000	17,000	41,000	53,000	63,000	65,000

Percent Change in Regional Self Reliance (As Percent of Demand w/out WUE)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Percent of Water Supplies Contributing to Regional Self-Reliance	41.4%	47.6%	51.5%	44.3%	49.7%	51.5%	52.9%	52.1%
Change in Percent of Water Supplies Contributing to Regional Self-Reliance		6.2%	10.1%	2.9%	8.3%	10.1%	11.5%	10.7%

Table C-4: Calculation of Reliance on Water Supplies from the Delta Watershed

Water Supplies from the Delta Watershed (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
CVP/SWP Contract Supplies (including other imported water purchases)	173,000	146,000	139,000	130,000	134,000	136,000	139,000	142,000
Delta/Delta Tributary Diversions (diverted by SFPUC)	55,000	48,000	46,000	55,000	56,000	59,000	61,000	63,000
Transfers and Exchanges								
Other Water Supplies from the Delta Watershed								
Total Water Supplies from the Delta Watershed	228,000	194,000	185,000	185,000	190,000	195,000	200,000	205,000

Service Area Water Demands without Water Use Efficiency (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)

Service Area Water Demands without Water Use Efficiency Accounted For	355,000	328,000	334,000	370,000	378,000	388,000	397,000	407,000

Change in Supplies from the Delta Watershed (Acre-Feet)	**Baseline (2010)**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045 (Optional)**
Water Supplies from the Delta Watershed	228,000	194,000	185,000	185,000	190,000	195,000	200,000	205,000
Change in Water Supplies from the Delta Watershed		(34,000)	(43,000)	(43,000)	(38,000)	(33,000)	(28,000)	(23,000)

Percent Change in Supplies from the Delta Watershed(As a Percent of Demand w/out WUE)	**Baseline (2010)**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045(Optional)**
Percent of Water Supplies from the Delta Watershed	64.2%	59.1%	55.4%	50.0%	50.3%	50.3%	50.4%	50.4%
Change in Percent of Water Supplies from the Delta Watershed		-5.1%	-8.8%	-14.2%	-14.0%	-14.0%	-13.8%	-13.9%

APPENDIX B

Documentation of Compliance with Outreach Requirements

Valley Water

Clean Water • Healthy Environment • Flood Protection

December 14, 2020

Subject: Notice of Urban Water Management Plan Update

Dear Sir or Madam:

The Urban Water Management Planning Act (California Water Code Sections 10610-10656) requires the Santa Clara Valley Water District (Valley Water) to update its Urban Water Management Plan (UWMP) every five years. Valley Water's UWMP was last updated in 2015. Currently, Valley Water is reviewing and considering revisions to the plan in accordance with the 2020 UWMP guidebook published by the California Department of Water Resources (DWR). The 2020 UWMP will be submitted to DWR by July 1, 2021.

Valley Water will make proposed revisions to the UWMP available for public review and will hold a public hearing in spring, 2021 to receive and consider comments on the proposed revisions. In the meantime, if you have any questions about the UWMP or the process for updating it, please contact Jing Wu at (408) 771-5506 or JWu@valleywater.org.

Sincerely,

Vincent Gin
Deputy Operating Officer
Water Supply Division

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From:	Jing Wu
To:	Esfahanian, Elaheh; Michael Hurley; Jonathan Keck; Scott Wagner; Girum Awoke; Gary Heap; damian.skinner@cityofgilroy.org; Tony Ndah; Harris Siddiqui; Anthony Eulo; Dan Repp; Keila Cisneros; Metra Richert; "Gregg Hosfeldt"; Elizabeth Flegel; Karla Dailey; Nicole Harvie; Dawrin Lasat; Tina Pham; Alvina Prakash; Jeff Provenzano; Diane Foronda; "MVasquez@santaclaraca.gov"; Mansour Nasser; Kevin Woodworth; Timothy Guster; John Roeder; pwalter@purissimawater.org; Andy Gere; Curt Rayer; Bill Tuttle; Brian Manning; JuliaNN@stanford.edu; Andy.gere@sjwater.com; Curt Rayer; Kateline Lin; Jake Walsh; Bolzowski, Michael R.; Chris Ghione; Mario.Jimenez@morganhill.ca.gov; Samantha Greene; Sunny Williams; Michael Martin
Cc:	Jerry De La Piedra; Vincent Gin
Subject:	Urban Water Management Plan Coordination
Start:	Tuesday, December 15, 2020 2:30:00 PM
End:	Tuesday, December 15, 2020 4:00:00 PM
Attachments:	UWMP Retailer Meeting Agenda 12-15-20.pdf

Dear Stakeholders:

Valley Water is inviting you for a 1.5-hour meeting to discuss the Urban Water Management Plan. The discussion will be focused on demand and supply projections, reduced Delta reliance, and Water Shortage Contingency Plan. The meeting agenda is attached.

If you have any questions, please contact me at (408) 771-5506, or JWu@valleywater.org <mailto:JWu@valleywater.org> .

Join Zoom Meeting

https://valleywater.zoom.us/j/96361927566?pwd=anUwNloxdTRuckh1WnFMRFA3VFhhZz09

Meeting ID: 963 6192 7566

Passcode: 906674

One tap mobile

+16699009128,,96361927566# US (San Jose) 12532158782,,96361927566# US

From:	Jing Wu
To:	Michael Hurley; Jonathan Keck; Scott Wagner; Gary Heap; damian.skinner@cityofgilroy.org; Tony Ndah; Harris Siddiqui; Anthony Eulo; Dan Repp; "Gregg Hosfeldt"; Elizabeth Flegel; Karla Dailey; Nicole Harvie; Dawrin Lasat; Tina Pham; Alvina Prakash; Jeff Provenzano; Mansour Nasser; Kevin Woodworth; Timothy Guster; John Roeder; pwalter@purissimawater.org; Andy Gere; Bill Tuttle; Brian Manning; JuliaNN@stanford.edu; Andy.gere@sjwater.com; Curt Rayer; Kateline Lin; Jake Walsh; Bolzowski, Michael R.; Chris Ghione; Mario.Jimenez@morganhill.ca.gov; Esfahanian, Elaheh; Narayan, Alvina; Linda Grand; Angela Singer; Joseph DeLaCruz; Navina Venugopal; Diane Asuncion
Cc:	Metra Richert; Samantha Greene; Michael Martin; Vincent Gin; Kirsten Struve
Subject:	Draft UWMP Tables and Common Language for Bay Delta Plan
Date:	Monday, March 22, 2021 1:35:00 PM
Attachments:	Reduced Delta Reliance for retailer.docx Water Supply Reliability for Retailer.xlsx Reduced Delta Reliance - 03-22-2021.xlsx image002.png

All,

Attached please find three draft Urban Water Management Plan (UWMP) documents for your review and use:

- Draft water supply reliability for normal, single dry, and five dry years
- Common language for Bay Delta Plan
- Draft table (C2 and C3) for demonstrating reduced Delta reliance

Per DWR guidebook, agencies are required to report "**the Projected Water Supply for Reasonably Available Volume in each five-year increment from 2025 through 2040 (2045 is optional).**" As a result, the supplies in the tables represent water that may be needed to get through a prolonged drought, assuming groundwater storage can be drawn down to the severe stage of the Water Shortage Contingency Plan. Please refer to the table notes for the assumptions used in the supply estimates. The tables are in draft form and may be subject to change. Valley Water will continue to use its Water Supply Master Plan and annual Monitoring and Assessment Program to evaluate water supply projects to ensure continued sustainability of our water supply.

We plan to have the entire draft UWMP out for your review by the end of this month, so you can find other common languages (climate change impact, water shortage contingency plan, etc..) in the plan then. It will be a short turnaround time for your review, as we are targeting the first week of May for posting the draft plan.

Thank you. Please contact me if you have any questions.

JING WU, Ph.D

SENIOR WATER RESOURCES SPECIALIST

Water Supply Planning and Conservation Unit

jwu@valleywater.org

Tel. (408) 630-2330 Cell. (408) 771-5506

Valley Water

SANTA CLARA VALLEY WATER DISTRICT

5750 Almaden Expressway, San Jose CA 95118

www.valleywater.org

From:	Jing Wu
To:	Michael Hurley; Jonathan Keck; Scott Wagner; Gary Heap; Tony Ndah; Harris Siddiqui; Anthony Eulo; Dan Repp; "Gregg Hosfeldt"; Elizabeth Flegel; Karla Dailey; Nicole Harvie; Dawrin Lasat; Tina Pham; Alvina Prakash; Jeff Provenzano; Mansour Nasser; Kevin Woodworth; Timothy Guster; John Roeder; pwalter@purissimawater.org; Andy Gere; Bill Tuttle; Brian Manning; JuliaNN@stanford.edu; Andy.gere@sjwater.com; Curt Rayer; Kateline Lin; Jake Walsh; Bolzowski, Michael R.; Chris Ghione; Mario.Jimenez@morganhill.ca.gov; Esfahanian, Elaheh; Narayan, Alvina; Linda Grand; Angela Singer; Joseph DeLaCruz; Navina Venugopal; Diane Asuncion
Cc:	Metra Richert; Samantha Greene; Vincent Gin; Kirsten Struve; Michael Martin
Subject:	Draft Valley Water UWMP for review
Date:	Monday, March 29, 2021 5:26:00 PM
Attachments:	DRAFT_2020 UWMP_03-29-2021.docx Appendix H - DRAFT Reduced Delta Reliance_03-29-2021.docx Appendix F - Modeling Assumptions.pdf image003.png

Hello everyone,

Valley Water's draft UWMP is attached for your review and reference. Also included are two appendices – reduced Delta reliance and modeling assumptions. I didn't include other appendices that are simply reports or process documentation – I can provide them separately if you need them. Please keep this draft plan confidential as it has not gone through legal review yet. The plan is in draft form and subject to changes.

We're hoping for comments by **4/12**, because we're planning to have a public draft ready for review by the end of April.

Thank you. Please let me know if you have questions and comments.

JING WU, Ph.D
SENIOR WATER RESOURCES SPECIALIST
Water Supply Planning and Conservation Unit
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Valley Water

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Clean Water · Healthy Environment · Flood Protection

From: Jing Wu
To: Tom Francis; Danielle McPherson; nsandkula@bawsca.org; toddc@cityofcampbell.com; paulk@cityofcampbell.com; benjaminf@cupertino.org; rogerl@cupertino.org; girum.awoke@cityofgilroy.org; Karen.Garner@cityofgilroy.org; Julie.Wyrick@cityofgilroy.com; jbiggs@losaltosca.gov; vchen@losaltosca.gov; gpersicone@losaltosca.gov; serickson@ci.milpitas.ca.gov; nthomas@ci.milpitas.ca.gov; jeannie@cityofmontesereno.org; jessica@cityofmontesereno.org; jennifer.carman@morganhill.ca.gov; Anthony Eulo; michael.fuller@mountainview.gov; "Gregg Hosfeldt"; Aarti.Shrivastava@mountainview.gov; Brad.Eggleston@cityofpaloalto.org; Jonathan.Lait@cityofpaloalto.org; Jane.Ratchye@cityofpaloalto.org; Michael.Brilliot@sanjoseca.gov; Matt.Cano@sanjoseca.gov; Rosalynn.Hughey@sanjoseca.gov; kelly.kline@sanjoseca.gov; jim.reed@sanjoseca.gov; steve.plasecki@sanjoseca.gov; kerrie.romanow@sanjoseca.gov; rbrilliot@santaclaraca.gov; acrabtree@santaclaraca.gov; cmobeck@santaclaraca.gov; jcherbone@saratoga.ca.us; dpedro@saratoga.ca.us; TRyan@sunnyvale.ca.gov; CTaylor@sunnyvale.ca.gov; rob.eastwood@pln.sccgov.org; nbowersox@losaltoshills.ca.gov; zdahl@losaltoshills.ca.gov; mmorley@losgatosca.gov; jpaulson@losgatosca.gov; Obegi, Doug
Cc: Metra Richert; Kirsten Struve; Vincent Gin
Subject: Notice of Public Hearing for Valley Water’s 2020 Urban Water Management Plan and Water Shortage Contingency Plan
Date: Monday, May 17, 2021 2:18:00 PM
Attachments: image004.png
image005.png

Valley Water

Clean Water • Healthy Environment • Flood Protection

May 17, 2021 **VIA E-MAIL**

Subject: Notice of Public Hearing for Valley Water’s 2020 Urban Water Management Plan and Water Shortage Contingency Plan

In accordance with the Urban Water Management Planning Act, Valley Water is reviewing and updating its Urban Water Management Plan (UWMP). As part of the 2020 UWMP, Valley Water expanded its Water Shortage Contingency Plan (WSCP) to a standalone document to establish actions and procedures for managing water shortages. In addition, Valley Water is appending to its 2015 UWMP through an addendum to meet the requirements of the Delta Plan Policy WR P1 (“Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance”; California Code of Regulations, Title 23, section 5003). The UWMP and WSCP are required to be submitted to the California Department of Water Resources by July 1, 2021.

Valley Water’s 2020 UWMP documents current and projected water supplies and demands over the next 25 years during normal and drought years, as well as water shortage contingency planning and conservation efforts. The plan provides an overall picture of current and future water conditions and management in Santa Clara County. The 2020 UWMP updates and supersedes all previous Valley Water Urban Water Management Plans.

Valley Water’s Board of Directors will hold a public hearing on **June 8, 2021 at 1:00 pm** to allow interested members of the public to participate in the review process. The hearing will be held virtually and can be accessed at https://valleywater.zoom.us/j/87355078274 (Or by phone: **+1 669 900 9128, Meeting ID: 87355078274#**). Local agencies, water retailers, and the public are encouraged to review the 2020 UWMP and WSCP and provide any comments prior to, or at, the public hearing.

Valley Water's 2020 UWMP, WSCP, and the Reduce Delta Reliance addendum are available for public review online at https://www.valleywater.org/your-water/water-supply-planning/your-water/water-supply-planning/urban-water-management-plan.

For more information on the public hearing or the 2020 UWMP and WSCP, please visit our website at www.valleywater.org or contact Jing Wu at (408) 630-2330 or jwu@valleywater.org.

Sincerely,

Vincent Gin
Deputy Operating Officer
Water Supply Division

From:	Jing Wu
To:	Michael Hurley; Jonathan Keck; Scott Wagner; Gary Heap; Tony Ndah; Harris Siddiqui; Anthony Eulo; Dan Repp; "Gregg Hosfeldt"; Elizabeth Flegel; Karla Dailey; Nicole Harvie; Dawrin Lasat; Tina Pham; Alvina Prakash; Jeff Provenzano; Mansour Nasser; Kevin Woodworth; Timothy Guster; John Roeder; pwalter@purissimawater.org; Andy Gere; Bill Tuttle; Brian Manning; JuliaNN@stanford.edu; Andy.gere@sjwater.com; Curt Rayer; Kateline Lin; Jake Walsh; Bolzowski, Michael R.; Chris Ghione; Mario.Jimenez@morganhill.ca.gov; Esfahanian, Elaheh; Narayan, Alvina; Linda Grand; Angela Singer; Joseph DeLaCruz; Navina Venugopal; Diane Asuncion
Cc:	Metra Richert; Kirsten Struve; Vincent Gin
Subject:	Notice of Public Hearing for Valley Water's 2020 Urban Water Management Plan and Water Shortage Contingency Plan
Date:	Monday, May 17, 2021 1:53:00 PM
Attachments:	image007.png image008.png

Valley Water

Clean Water • Healthy Environment • Flood Protection

May 17, 2021 **VIA E-MAIL**

Subject: Notice of Public Hearing for Valley Water's 2020 Urban Water Management Plan and Water Shortage Contingency Plan

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For more information on the public hearing or the 2020 UWMP and WSCP, please visit our website at

www.valleywater.org or contact Jing Wu at (408) 630-2330 or jwu@valleywater.org.

Sincerely,

Vincent Gin
Deputy Operating Officer
Water Supply Division

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Lassen

FROM PAGE 1

administered vaccines and the Susanville Indian Rancheria, which received its own supply of vaccine from Indian Health Service, a division of the U.S. Department of Health and Human Services. Longo thinks the state might be including the people with access to these vaccines in the rural county's overall population count but isn't sure it's picking up the full scope of vaccination data.

"Those are numbers that could contribute to the discrepancy," she said.

CDPH did not directly respond to a question about how it calculates a county's population, but said in an email, "In many cases, members of the military and our tribal communities are vaccinated by health care providers outside of the Department of Defense or Indian Health Services, and many counties have allocated part of their vaccines to their local Department of Corrections and Rehabilitation institutions to improve their vaccination rates."

Longo isn't blaming any one in particular for what she considers a faulty vaccination rate and she has largely resisted publicly criticizing the state, but she's frustrated by the implication that her county's vaccine rollout has been lackluster.

"We've done incredible outreach in our community," Longo said. "We're just doing the best we can."

Classroom

FROM PAGE 1

pace, and access to useful technology.

An informal survey in late April by Decoding Dyslexia California, which advocates for students with dyslexia, found that 28% of parents think their child had a positive experience during distance learning. Just over half said their students had a negative experience. The rest said it was too early to tell.

"In April 2020, my 16-year-old sophomore daughter imploded from anxiety from isolation/quarantine, (but) by fall she had mastered online classes and is getting her best grades yet this year," one parent wrote in the Decoding Dyslexia survey. "Because all of her classes are at her desk, she rarely loses homework, is much better at staying organized, focused and gets her homework done on her own. It has been fantastic for her."

Jessica Maria, a parent in the North Bay Area, said distance learning was so ineffective for her two children — one of whom, a fifth grader, has dyslexia and attention deficit disorder — that last spring she withdrew them from school and opted for homeschool.

"Keeping my son focused and on task was impossible. For us, distance learning just meant me yelling at him all the time. It wasn't working," she said.

Instead, she found a project-based curriculum online and hired a private tutor to help her son with reading and writing. Her children did science experiments, art projects, cooking and other hands-on assignments. For one project, they made a cardboard map of the United States, to scale, and learned the capitals and facts about each state.

But because she and her husband are returning soon to their workplaces, they'll no longer be able to oversee their children's education, and the children will be attending a local magnet school that focuses on project-based learning.

"If cost wasn't a concern, I'd never send my son to traditional public school again. He's been let down so many times," Maria said. "But we're giving this a shot. I think it'll be good for them to socialize. In general, right now I'm hopeful."

Students with disabilities who do return to the classroom this fall might encounter another problem: a dearth of teachers. Some districts have seen large numbers of teachers quit or retire over the past year, and a shortage of substitutes has left administrators scrambling to fill vacancies. A shortage of special education teachers before the pandemic is now much worse, administrators said.

"The burnout is real. Teachers have been working long hours, with extra stress … their personal and professional lives have been upended by the pandemic. They've been heroes throughout this, and it's been very hard," said Amy Andersen, director of personnel services for the El Dorado County Office of Education, who with her colleagues co-wrote a commentary for Policy Analysis for California Education on the challenges of reopening schools for students in special education.

Some districts are only allowing students to continue with distance learning in the fall if they're approved for independent study. A complicating factor is specialized services, like occupational therapy, outlined in a student's individualized education program. Those services will remain difficult to deliver virtually.

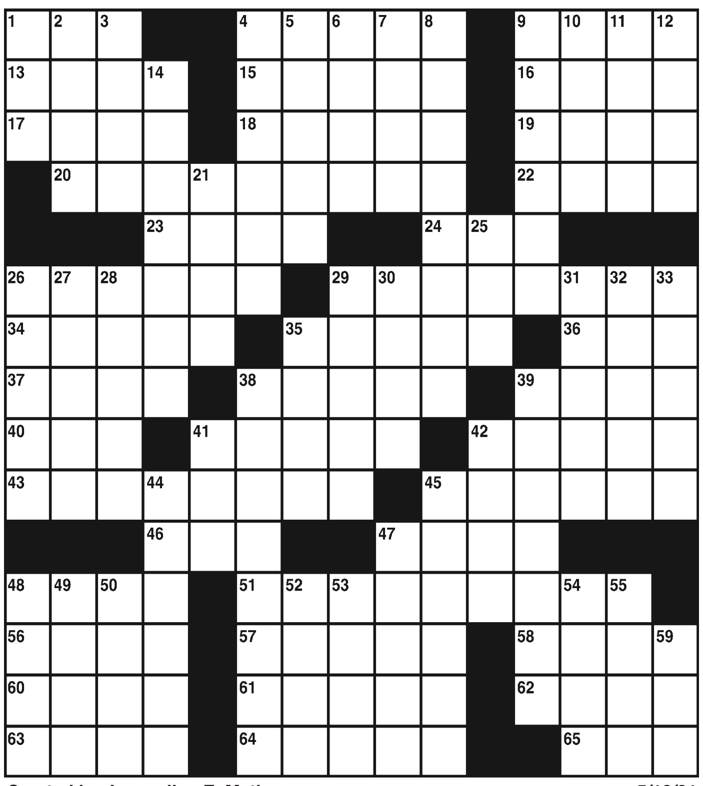
Ultimately, it's too early to know the full impact of campus closures on students with disabilities, said Whittaker of the National Center for Learning Disabilities. Until schools have done assessments and reported the data, any assumptions are purely speculative, she said.

"Unfortunately, no one has been able to actually study or measure this on a large scale," Whittaker said. "Every district has different ways of measuring student progress and nothing, so far, is public. Statewide assessments could be a good indicator of how students with disabilities (as a whole) are doing on grade-level standards compared to their peers, but I don't suspect we'll be seeing those administered fully this year, particularly where the majority of students are still learning virtually, or in a way that gives us enough good and valid data for students with disabilities."

Meanwhile, districts can take some steps to address staffing shortages, she said. She suggested they use some of their Covid relief funds to create partnerships with local colleges and teacher credential programs to build a staffing pipeline. She also suggested that districts contract out some tasks, such as evaluations or assessments, so teachers have more time in the classroom, and encourage parents to become trained as classroom aides.

Regardless of the challenges ahead, administrators are hopeful about the return of students with disabilities to the classroom. No matter how many obstacles students, families and teachers face, it won't be as bad as last year.

The Daily Commuter



Created by Jacqueline E. Mathews 5/18/21

ACROSS

1 Printer problem
4 Film genre
9 Breakfast order
13 "Somewhere __ the rainbow…"
15 Rosebush prickle
16 Give a pink slip to
17 "__ will tell"
18 Propelled a dinghy
19 __ as a pancake
20 Advanced degree
22 Hardwood trees
23 __ away; subtract
24 London broadcaster
26 Turn into
29 Spinning
34 Backsides
35 Word attached to wall or news
36 Home for an octopus
37 Fighting force
38 Summoned with a beeper
39 Sour
40 Perish
41 Steve or Tim
42 Take off
43 Always thinking of others
45 Sign of winter
46 "A rose __ rose…"
47 Metal corrosion
48 San __, CA
51 Dividing
56 Sups
57 High in the sky
58 Vittles
60 "Eyes Wide __"; Cruise/Kidman film
61 Gallant
62 Days of __; bygone times
63 Canned fish
64 Rough woolen fabric
65 Baseball's __ Griffey Jr.

DOWN

1 __ down; put on paper
2 Ardent
3 Office message
4 Pet a pet
5 Household task
6 Midwest state
7 Worry
8 Owing gratitude
9 Result
10 Fish's breathing organ
11 Metric weight
12 __ up; arranges
14 Priest's home
21 Flat caps
25 Forbid entry to
26 Pitt's namesakes
27 Creepy
28 Bedouin's transport
29 Becomes livid
30 __ house; realtor's event
31 Late singer Hayes
32 Optic __; part of the eye
33 Microsoft's Bill
35 Compadres
38 Congenial; friendly
39 Take the witness stand
41 Capone's namesakes
42 Shopper's paper
44 Cinco de Mayo party
45 Played miniature golf
47 Soldier's weapon
48 In __; jokingly
49 Hawaiian island
50 Flabbergast
52 John Deere's invention
53 Frontal __; part of the brain
54 Cozy recess
55 Pierce
59 Extra bedroom, perhaps

Monday's Puzzle Solved

	A	P	R		S	H	R	U	G		A	C	T	S
F	L	A	N		T	E	A	S	E		T	O	R	O
I	L	L	S		R	E	V	E	L	A	T	I	O	N
G	Y	M		D	A	L	E	S		M	I	N	D	S
		S	L	O	P	S			D	E	C			
S	Q	U	A	T	S			K	A	N	S	A	N	
A	U	N	T	S		B	R	A	I	D		B	I	D
M	A	D	E		H	E	A	L	S		F	L	E	E
S	R	A		B	I	N	G	E		P	I	E	C	E
	T	Y	R	A	N	T			B	A	R	B	E	D
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P	L	O	T	S		F	L	E	A	S		D	A	M
Q	U	O	T	A	T	I	O	N	S		F	I	L	E
R	A	Z	E		V	A	G	U	E		B	E	S	T
S	U	E	D		S	T	E	E	D		I	D	O	

PUBLIC HEARING NOTICE

2020 Urban Water Management Plan and Water Shortage Contingency Plan

Valley Water

Topic: 2020 Urban Water Management Plan and Water Shortage Contingency Plan

Who: Santa Clara Valley Water District

What: Public Hearing

When: Tuesday, June 8, 2021, 1:00 p.m.

Where: Online at ***https://valleywater.zoom.us/j/87355078274***
By phone: +1 669 900 9128 US (San Jose) Meeting ID: 87355078274#

Santa Clara Valley Water District (Valley Water) invites you to a public hearing regarding the 2020 Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP).

In accordance with the Urban Water Management Planning Act, Valley Water is reviewing and updating its UWMP. As part of the 2020 UWMP, Valley Water expanded its WSCP to a standalone document to establish actions and procedures for managing water shortages. In addition, Valley Water is appending to its 2015 UWMP through an addendum to meet the requirements of the Delta Plan Policy WR P1 ("Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance"; California Code of Regulations, Title 23, section 5003). The UWMP and WSCP are required to be submitted to the California Department of Water Resources by July 1, 2021.

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Valley Water looks forward to listening to your ideas and is committed to ensuring that your concerns are addressed. Valley Water's 2020 UWMP, WSCP, and the Reduce Delta Reliance addendum are available for public review online at ***https://www.valleywater.org/your-water/water-supply-planning/your-water/water-supply-planning/urban-water-management-plan***.

For more information about this meeting or this plan, contact **Jing Wu at (408) 630-2330** or **jwu@valleywater.org**.

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Theo Đạo Luật Người Mỹ Khuyết tật (ADA), Cục Nước Thung Lũng yêu cầu những cá nhân cần sự hỗ trợ đặc biệt để truy cập và/hoặc tham gia vào các Cuộc Họp Hội Đồng Quản Trị Của Valley Water xin hãy liên hệ với Thư ký văn phòng Hội Đồng Quản Trị theo số **(408) 630-2711** ít nhất 3 ngày làm việc trước khi diễn ra cuộc họp hội đồng theo lịch để đảm bảo rằng nhân viên của Valley Water có thể hỗ trợ quý vị.

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ValleyWater.org Clean Water • Healthy Environment • Flood Protection

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FINE PRINT
Declared a legal newspaper of general circulation by the Superior Court of Santa Clara County Decree No. 651274, April 7, 1988. ISSN 0882-4290. Entire contents

Newspaper : The Mercury News
Issue Date : 05/25/2021
Advertiser : SANTA CLARA VALLEY WATER DISTR
Ad Number : 6576212

DAI SUGANO — STAFF PHOTOGRAPHER

An interior view of the Los Altos estate once owned by Intel co-founder and Silicon Valley legend Robert Noyce, as seen on May 17. The land goes on the auction block in June.

Noyce

FROM PAGE 1

of landmark tech companies Fairchild Semiconductor and Intel.

For those less inclined toward history, agents say the 4.6-acre property can be easily subdivided into four lots and developed into new estates.

The property can be configured in several ways to fit a new owner's taste and investment, Sotheby's International Realty agent Greg Goumas said. "It's a chance to rewrite a new history."

The Noyce compound on Loyola Drive is certainly not the most expensive estate in the Silicon Valley — in 2012, tech investor Yuri Milner spent $100 million on a Los Altos Hills mansion three times the size — but it should fit the needs of most billionaires. The Los Altos estate has been on the market since 2018, originally listing for $21.8 million. It now goes up for online auction in June.

High-end real estate selling for more than $10 million has been moving briskly during the COVID-19 pandemic. At least 65 residential properties in Santa Clara and San Mateo counties sold for more than $10 million since March 2020, according to MLSListings in Sunnyvale. Many other high-priced estates have likely sold in private transactions not captured by the real estate data, according to the service.

The high-priced estates were concentrated in Atherton (27 homes), Hillsborough (10), Woodside (9), Palo Alto (7) and Los Altos Hills (4), according to the listing service.

Noyce began his career as a hot-shot engineer and became a prolific inventor and entrepreneur. Perhaps just as important to current Silicon Valley residents, Noyce extended stock options to his employees, leading to today's enormous personal wealth creation in the tech sector.

He bought the Los Altos home in 1960, a place for his wife and children with ample space to entertain for social and business functions, brokers said. The gated compound overlooks the first hole of the Los Altos Golf & Country Club. The main house is surrounded by amusements — a lagoon swimming pool with grotto, his man-made pond, lighted tennis court and a three-quarter acre merlot vineyard.

The human-made pond, now under renovation, include a pump that created rapids for visitors to kayak through. Hiking paths wind throughout the property between the pool, courts and water features.

The French country-style home features wide patios and indoor and outdoor kitchens.

"This house was deigned to host large, large groups of people," listing agent Arthur Sharif of Sotheby's International Realty said.

The main house has four bedrooms with additional office and loft space. The bottom floor contains a game room and a 1,500-bottle wine cellar. A guest house on the property offers another two bedrooms and loft space.

Noyce died in 1990. The current owner, a semi-retired tech executive, purchased the property in 1995.

The family is downsizing and has chosen to sell the property in an online auction.

Goumas expects the estate will draw interest from international buyers looking to add a Silicon Valley house, and perhaps some history, to their portfolio.

Contact Louis Hansen at 408-920-5043.

VTA

FROM PAGE 1

quired to do.

The Centers for Disease Control and Prevention changed its guidance in March to recommend 3-feet spacing in school settings where students and adults were masked; several other countries use 1 meter (about 3.3 feet) as their social distancing standard. Like VTA, Marin County's Golden Gate Transit made the same move to using a 3-foot standard on its buses last week.

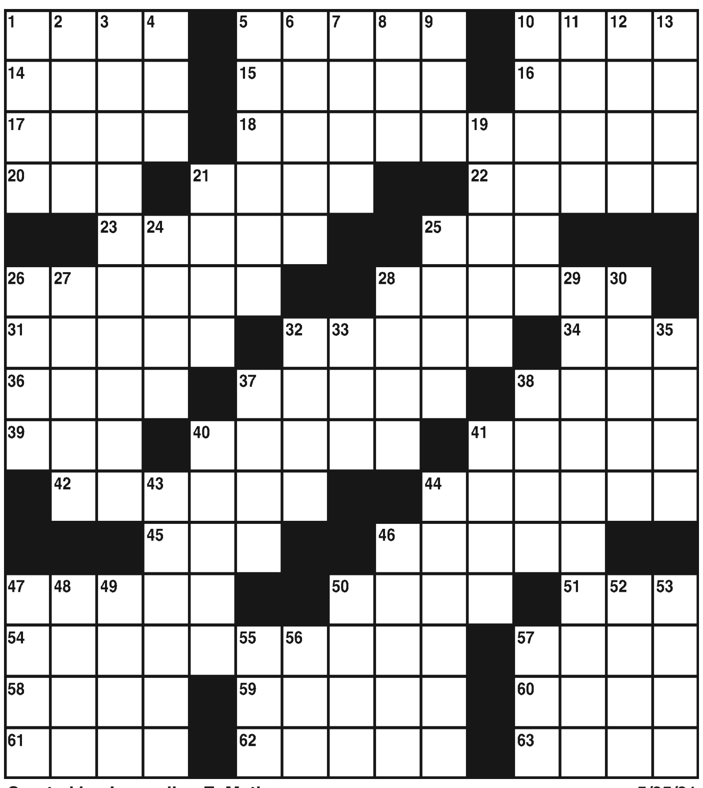
The Daily Commuter

ACROSS

1 Have a yen for
5 Weight revealer
10 To boot
14 Not up yet
15 __ Sea; Great Barrier Reef's location
16 Nourish
17 Tire tracks
18 Bamboozled
20 Highest degree
21 Swindles
22 Dangers
23 African nation
25 Trumpeter Severinsen
26 Badger
28 Desert rovers
31 Let in
32 Refrain syllables
34 Mischievous fairy
36 "King of the Jungle"
37 Uncertainty
38 Skin marking
39 "__ Miserables"
40 Appears in the distance
41 Incline
42 Maximum
44 Raspy-voiced
45 Run up a tab
46 Punctuation mark
47 Make amends
50 Black Friday event
51 Cruise, for one
54 Smuggled goods
57 "Take a __!"; words to a pest
58 Symptom of hives
59 Actor Willem
60 Lobster recipe verb
61 Poor marks
62 Transparent
63 Dollar bills

DOWN

1 Admonish
2 Border on
3 Lowest
4 49ers' goals, for short
5 Ice cream portions
6 Dracula's title
7 Garfunkel's namesakes
8 __ Vegas
9 Lawn tree
10 Where to find Chad
11 Gives permission to
12 Hunt for
13 Bookie's figures
19 Odor
21 Bodily sac
24 Make progress
25 Blockhead
26 Corridor
27 "Bye, Pierre!"
28 Captures
29 Adornment
30 Smacks
32 Tugboat sound
33 "Yo-ho-ho and a bottle of __"
35 Complimentary
37 Rx label info
38 Grand __; pitcher's horror
40 Reduce, as a price
41 Partial amount
43 March & others
44 Word attached to house or office
46 Narrow boat
47 Heartburn cause
48 Carry
49 In the past
50 Sound's partner, in phrase
52 Haggard's "__ from Muskogee"
53 Blanc & Gibson
55 Promos
56 Word of disgust
57 Premium cable channel



Created by Jacqueline E. Mathews 5/25/21

Monday's Puzzle Solved

M	I	S	T	■	■	P	U	S	S	■	E	T	C	H
O	T	H	E	R	■	O	M	I	T	■	X	R	A	Y
S	C	E	N	E	■	U	P	P	E	R	H	A	N	D
S	H	E	■	C	O	T	■	■	T	O	U	P	E	E
■	■	T	E	E	N	Y	■	■	S	U	M	■	■	■
A	R	M	A	D	A	■	■	J	O	S	E	P	H	■
L	O	U	S	E	■	P	H	O	N	E	■	E	A	R
P	O	S	T	■	L	O	O	T	S	■	T	R	U	E
S	K	I	■	B	I	T	E	S	■	S	U	I	T	E
■	S	C	R	U	B	S	■	■	S	E	N	S	E	D
■	■	■	E	Y	E	■	■	J	O	N	A	H	■	■
B	R	A	C	E	R	■	■	A	S	A	■	A	C	T
L	A	C	E	R	A	T	E	D	■	T	A	B	L	E
A	G	E	S	■	T	U	N	E	■	E	L	L	E	N
B	E	D	S	■	E	V	E	S	■	■	L	E	F	T

5/25/21

PUBLIC HEARING NOTICE

2020 Urban Water Management Plan and Water Shortage Contingency Plan

Valley Water

Topic: 2020 Urban Water Management Plan and Water Shortage Contingency Plan

Who: Santa Clara Valley Water District

What: Public Hearing

When: Tuesday, June 8, 2021, 1:00 p.m.

Where: Online at ***https://valleywater.zoom.us/j/87355078274***
By phone: +1 669 900 9128 US (San Jose) Meeting ID: 87355078274#

Santa Clara Valley Water District (Valley Water) invites you to a public hearing regarding the 2020 Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP).

In accordance with the Urban Water Management Planning Act, Valley Water is reviewing and updating its UWMP. As part of the 2020 UWMP, Valley Water expanded its WSCP to a standalone document to establish actions and procedures for managing water shortages. In addition, Valley Water is appending to its 2015 UWMP through an addendum to meet the requirements of the Delta Plan Policy WR P1 ("Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance"; California Code of Regulations, Title 23, section 5003). The UWMP and WSCP are required to be submitted to the California Department of Water Resources by July 1, 2021.

Valley Water's 2020 UWMP documents current and projected water supplies and demands over the next 25 years during normal and drought years, as well as water shortage contingency planning and conservation efforts. The plan provides an overall picture of current and future water conditions and management in Santa Clara County. The 2020 UWMP updates and supersedes all previous Valley Water Urban Water Management Plans.

Valley Water looks forward to listening to your ideas and is committed to ensuring that your concerns are addressed. Valley Water's 2020 UWMP, WSCP, and the Reduce Delta Reliance addendum are available for public review online at ***https://www.valleywater.org/your-water/water-supply-planning/your-water/water-supply-planning/urban-water-management-plan***.

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ValleyWater.org Clean Water • Healthy Environment • Flood Protection

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APPENDIX C

Water Loss Audit

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AWWA Free Water Audit Software v6.0

FWAS v6.0

This spreadsheet-based water audit tool is designed to help quantify and track water losses associated with water distribution systems and identify areas for improved efficiency and cost recovery. It provides a "top-down" summary water audit format and is not meant to take the place of a full-scale, comprehensive water audit format. Auditors are strongly encouraged to refer to the most current edition of AWWA M36 Manual for Water Audits for detailed guidance on the water auditing process and targeting loss reduction levels. This tool contains several separate worksheets. Sheets can be accessed using the tabs at the bottom of the screen, or by clicking the TOC links below.

Table of Contents (TOC)

Start Page	The current sheet. Enter contact information and basic audit details.
Worksheet	Enter the required data on this worksheet to calculate the water balance and data grading.
Interactive Data Grading	Answer questions about operational practices for each audit input, and the data validity grades will automatically populate.
Dashboard	Review NRW components, performance indicators and graphical outputs to evaluate the results of the audit.
Notes	Enter notes to explain how values were calculated, document data sources, and related information about data management practices.
Blank Sheet	By popular demand! A blank sheet. The world is your canvas.
Water Balance	The values entered in the Worksheet automatically populate the Water Balance.
Loss Control Planning	Use this sheet to interpret the results of the audit validity score and performance indicators.
Definitions	Use this sheet to understand the terms used in the audit process.
Service Connection Diagram	Diagrams depicting possible customer service connection line configurations.
Acknowledge-ments	Acknowledgements for development of the AWWA Free Water Audit Software v6.0.

AWWA Web Resources for Water Loss Control
https://www.awwa.org/Resources-Tools/Resource-Topics/Water-Loss-Control
Items referenced in the Free Water Audit Software v6.0 on the web:
- Data Grading Matrix v6.0
- Example Water Audit v6.0
- Water Audit Compiler v6.0
- AWWA Reports on Performance Indicators
- M36 Manual

Enter Basic Information

Name of Utility:	Santa Clara Valley Water District
Name of Contact Person:	Bhavani Yerrapotu
Email:	BYerrapotu@valleywater.org
Telephone | Ext.:	408-630-2735
City/Town/Municipality:	San Jose
State / Province:	California (CA)
Country:	USA
Audit Preparation Date:	Mar 02 2021
Audit Year:	2020
Audit Year Label:	Fiscal (Fiscal, Calendar, etc)
Audit Period Start Date:	Jul 01 2019
Audit Period End Date:	Jun 30 2020
Volume Reporting Units:	Acre-feet
Water System Structure:	Wholesale
Water Type:	Potable Water
System ID Number:	02-88-005
Validator Name/ID:	
Validator Email:	
Estimated Total Population Served by Water Utility:	

Key of Input Acronyms

In order of appearance in the Worksheet

VOS	Volume from Own Sources
VOSEA	VOS Error Adjustment
WI	Water Imported
WIEA	WI Error Adjustment
WE	Water Exported
WEEA	WE Error Adjustment
BMAC	Billed Metered Authorized Consumption
BUAC	Billed Unmetered Authorized Consumption
UMAC	Unbilled Metered Authorized Consumption
UUAC	Unbilled Unmetered Authorized Consumption
SDHE	Systematic Data Handling Errors
CMI	Customer Metering Inaccuracies
UC	Unauthorized Consumption
Lm	Length of mains
Nc	Number of service connections
Lp	Average length of (private) customer service line
AOP	Average Operating Pressure
CRUC	Customer Retail Unit Charge
VPC	Variable Production Cost

Color Key User input | Calculated | Optional default

Guidance for the Worksheet

Choosing to enter unit of **percent** or **volume** (applies to VOSEA, WIEA, WEEA, CMI) choose entry option:

1.00%	percent	*or*	
	volume	25.000	

Choosing to enter **default** or **custom input** (applies to UUAC, SDHE, UC) choose entry option:

0.25%	default	*or*	
	custom	75.000	

Guidance for the Interactive Data Grading

Use acronym buttons in IDG header to navigate among inputs. Acronym Key above. White = needs answers, orange = complete, clear = not required. Example below.

VOS	VOSEA	WI	WIEA	WE	WEEA	BMAC	BUAC	UMAC	UUAC
SDHE	CMI	UC	Lm	Nc	Lp	AOP	CRUC	VPC	

After clicking an acronym button, answer all visible questions in the order they're presented, choosing best-fit answer

Grade will populate when all visible questions are complete for an input — 7

The limiting criteria will be labeled along the right. If only 1 limiting criterion is shown, improving on that criterion will achieve a higher data grade. If multiple limiting criteria are shown, improving on *each* limiting criterion is necessary to achieve a higher data grade. A complete inventory of data grading criteria is available in the Data Grading Matrix v6.0 (see web resources) — Limiting

If you have questions or comments regarding this software please contact us at: wlc@awwa.org

AWWA Free Water Audit Software: Worksheet

FWAS v6.0
American Water Works Association.

Water Audit Report for: Santa Clara Valley Water District
Audit Year: 2020 | Jul 01 2019 - Jun 30 2020 | Fiscal

Click 'n' to add notes
Click 'g' to determine data validity grade

To edit water system info: go to start page

To access definitions, click the input name

All volumes to be entered as: ACRE-FEET PER YEAR

WATER SUPPLIED

Water Supplied Error Adjustments — choose entry option:

		Grade	Value	Units	Grade	Adjustment	Option	Type	
VOS	Volume from Own Sources:	7	100,960.987	Acre-ft/Yr	9	2.60%	percent	under-registration	VOSEA
WI	Water Imported:	6	451.320	Acre-ft/Yr	4	1.00%	percent	under-registration	WIEA
WE	Water Exported:	6	73.370	Acre-ft/Yr	4	1.00%	percent	under-registration	WEEA

WATER SUPPLIED: 104,037.812 Acre-ft/Yr

AUTHORIZED CONSUMPTION

		Grade	Value	Units	Entry option
BMAC	Billed Metered:	8	103,436.040	Acre-ft/Yr	
BUAC	Billed Unmetered:	n/a		Acre-ft/Yr	
UMAC	Unbilled Metered:	n/a		Acre-ft/Yr	
UUAC	Unbilled Unmetered:	8	1.458	Acre-ft/Yr	custom 1.458 acre-ft/yr

AUTHORIZED CONSUMPTION: 103,437.498 Acre-ft/Yr

WATER LOSSES

600.314 Acre-ft/Yr

Apparent Losses

choose entry option:

		Grade	Value	Units	Entry option
SDHE	Systematic Data Handling Errors:	6	1.000	Acre-ft/Yr	custom 1.000 acre-ft/yr
CMI	Customer Metering Inaccuracies:	6	519.779	Acre-ft/Yr	0.50% percent under-registration
UC	Unauthorized Consumption:	1	1.000	Acre-ft/Yr	custom 1.000 acre-ft/yr

Apparent Losses: 521.779 Acre-ft/Yr

Real Losses

Real Losses: 78.535 Acre-ft/Yr

WATER LOSSES: 600.314 Acre-ft/Yr

NON-REVENUE WATER

NON-REVENUE WATER: 601.772 Acre-ft/Yr

SYSTEM DATA

		Grade	Value	Units	
Lm	Length of mains:	8	39.9	miles	(including fire hydrant lead lengths)
Nc	Number of service connections:	10	28		(active *and* inactive)
	Service connection density:		1	conn./mile main	

Are customer meters typically located at the curbstop/property line? Yes

Lp — Grade 10
Average length of customer service line has been set to zero and a data grading of 10 has been applied

AOP — Average Operating Pressure: Grade 7 — 85.0 psi

COST DATA

		Grade	Value	Units
CRUC	Customer Retail Unit Charge:	9	$4.52	$/1000 gallons (US)
VPC	Variable Production Cost:	8	$59.51	$/acre-ft

Total Annual Operating Cost: $135,866,850 $/yr (optional input)

WATER AUDIT DATA VALIDITY TIER:

*** The Water Audit Data Validity Score is in Tier IV (71-90). See Dashboard tab for additional outputs. ***

go to dashboard

A weighted scale for the components of supply, consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION TO IMPROVE DATA VALIDITY:

Based on the information provided, audit reliability can be most improved by addressing the following components:

1: Volume from Own Sources (VOS)
2: Unauthorized Consumption (UC)
3: Billed Metered (BMAC)

KEY PERFORMANCE INDICATOR TARGETS:

OPTIONAL: If targets exist for the operational performance indicators, they can be input below:

Unit Total Losses:		gal/conn/day
Unit Apparent Losses:		gal/conn/day
Unit Real Losses[A]:		gal/conn/day
Unit Real Losses[B]:		gal/mile/day

If entered above by user, targets will display on KPI gauges (see Dashboard)

AWWA Free Water Audit Software:
User Notes

Water Audit Report for: Santa Clara Valley Water District
Audit Year: 2020 — Fiscal, Jul 01 2019 - Jun 30 2020

General Notes:	

		Audit Item	Notes on Input Derivation	Notes on Data Validity Grading
go to worksheet	go to grading	**Volume from Own Sources (VOS)**	Own sources represent water produced in the water treatment plants.	
go to worksheet	go to grading	**Volume from Own Sources Error Adjustment (VOSEA)**		
go to worksheet	go to grading	**Water Imported (WI)**	Water imported represents water received by SCVWD from the SFPUC intertie.	
go to worksheet	go to grading	**Water Imported Error Adjustment (WIEA)**	One electronic meter	
go to worksheet	go to grading	**Water Exported (WE)**	Water exported represents water sent to SFPUC through the intertie.	

		Audit Item	Notes on Input Derivation	Notes on Data Validity Grading
go to worksheet	go to grading	**Water Exported Error Adjustment (WEIA)**	One electronic meter	
go to worksheet	go to grading	**Billed Metered Authorized Consumption (BMAC)**	Billed metered is the amount billed. All treated water customers are metered.	
go to worksheet	go to grading	**Billed Unmetered Authorized Consumption (BUAC)**	No billed unmetered customers	
go to worksheet	go to grading	**Unbilled Metered Authorized Consumption (UMAC)**	No unbilled metered customers.	
go to worksheet	go to grading	**Unbilled Unmetered Authorized Consumption (UUAC)**	Transmission line repair, maintenance, and disinfection discharges	
go to worksheet	go to grading	**Systematic Data Handling Errors (SDHE)**	Only 26 meters billed to 13 customers. Audits performed.	
go to worksheet	go to grading	**Customer Metering Inaccuracies (CMI)**	24 large diameter meters - 12" and above. Meter accuracy was updated from previous year's 1.5% to 0.5% to reflect manufacturer accuracy specification for the existing meters	

		Audit Item	Notes on Input Derivation	Notes on Data Validity Grading
go to worksheet	go to grading	**Unauthorized Consumption (UC)**	Distribution system consists of wholesale transmission mains with very few opportunities for unauthorized consumption.	
go to worksheet	go to grading	**Length of Mains (Lm)**		
go to worksheet	go to grading	**Number of Service Connections (Nc)**		
go to worksheet	go to grading	**Average Length of (private) Customer Service Line (Lp)**		
go to worksheet	go to grading	**Average Operating Pressure (AOP)**		
go to worksheet	go to grading	**Customer Retail Unit Charge (CRUC)**	The treated water charge for contract treated water in FY20 was $1,474/AF which converts to $4.52/1000 gallons.	
go to worksheet	go to grading	**Variable Production Cost (VPC)**		

AWWA Free Water Audit Software
Water Balance

FWAS v6.0

Water Audit Report for: Santa Clara Valley Water District
Audit Year: 2020 | Jul 01 2019 - Jun 30 2020
Data Validity Tier: Tier IV (71-90)

Volume from Own Sources (VOS) (corrected for known errors) *103,656.044*	System Input Volume *104,111.923*	Water Exported (WE) (corrected for known errors) *74.111*	Billed Water Exported			Revenue Water (Exported) **74.111**
		Water Supplied *104,037.812*	Authorized Consumption *103,437.498*	Billed Authorized Consumption *103,436.040*	Billed Metered Consumption (BMAC) (water exported is removed) *103,436.040*	Revenue Water **103,436.040**
					Billed Unmetered Consumption (BUAC) *0.000*	
				Unbilled Authorized Consumption *1.458*	Unbilled Metered Consumption (UMAC) *0.000*	Non-Revenue Water (NRW) **601.772**
					Unbilled Unmetered Consumption (UUAC) *1.458*	
			Water Losses *600.314*	Apparent Losses *521.779*	Systematic Data Handling Errors (SDHE) *1.000*	
					Customer Metering Inaccuracies (CMI) *519.779*	
					Unauthorized Consumption (UC) *1.000*	
Water Imported (WI) (corrected for known errors) *455.879*				Real Losses *78.535*	Leakage on Transmission and/or Distribution Mains *Not broken down*	
					Leakage and Overflows at Utility's Storage Tanks *Not broken down*	
					Leakage on Service Connections *Not broken down*	

FWAS v6.0

AWWA Free Water Audit Software: Dashboard

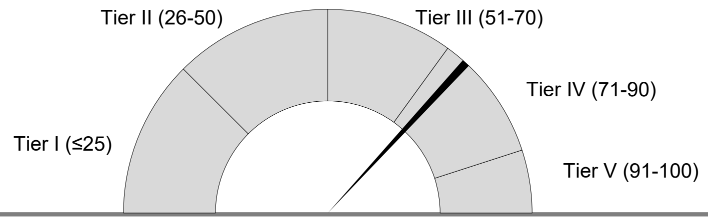
go to worksheet | go to grading | go to references

Water Audit Report for: Santa Clara Valley Water District **Audit Year: 2020** **Fiscal** **Jul 01 2019 - Jun 30 2020**

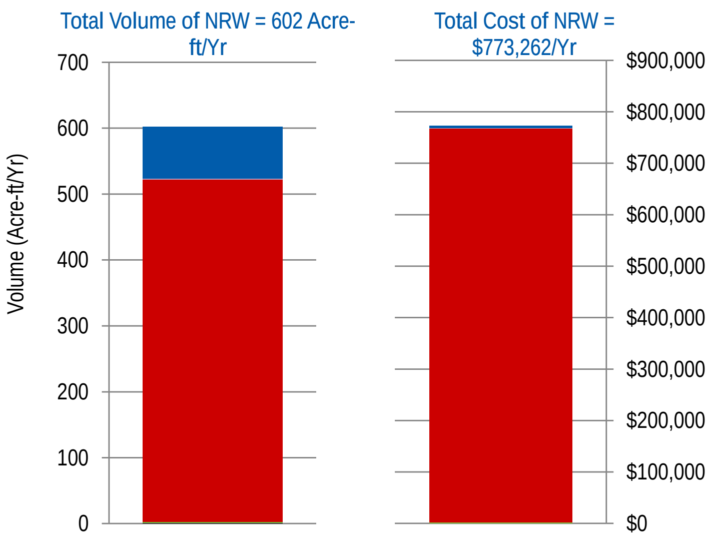
Data Validity

Data Validity Score: 73 **Data Validity Tier:** Tier IV (71-90)

See Loss Control Planning for Tier Details



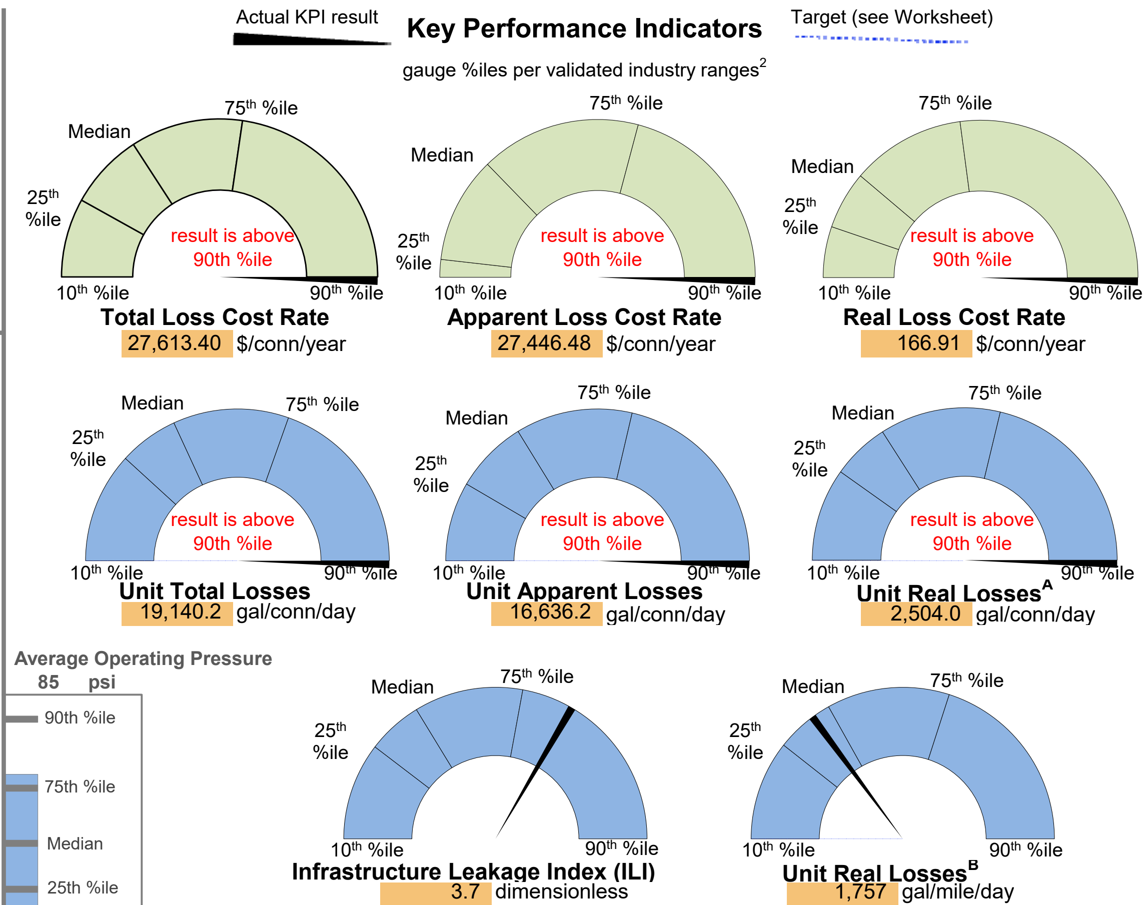
NRW Components Summary



Real Losses
Systematic Data Handling Errors
Customer Metering Inaccuracies
Unauthorized Consumption
Unbilled Unmetered Auth Cons
Unbilled Metered Authorized Cons

	Volume Acre-ft/Yr	Value $/Yr	Basis of Valuation
Apparent Losses	521.8	$768,502	CRUC
Real Losses	78.5	$4,674	VPC
Unbilled Authorized Cons	1.5	$87	VPC
Non-Revenue Water	601.8	$773,262	Blended

Key Performance Indicators



See UARL definition for additional guidance on the ILI

(UARL) Unavoidable Annual Real Losses 21.0 Acre-ft/Yr 668.0 gal/conn/day

Guidance Information for Key Performance Indicators

- The eight indicators shown are the recommended suite per the AWWA Water Loss Control Committee 2020 Position on KPIs[1].
- A suite of KPIs is necessary, as no single KPI can holistically communicate water loss performance for a given water system.
- See Table 1 below for Uses and Limitations for each KPI, excerpted from the AWWA Water Loss Control Committee Report (2020)[1], with naming conventions updated.
- Percentiles (%iles) shown on KPI gauges come from Level 1 validated data in the AWWA WLCC Reference Water Audit Dataset (2020)[2].
- KPI %iles shown above are not segregated by cohorts. Limited KPI data by cohorts may be found in WRF 4695 Guidance Manual, Appendix B (2019)[3].
- Actual KPI results that fall below 10th %ile or above 90th %ile do not necessarily imply error, but should be viewed with scrutiny.
- Percentiles not intended to imply targets. Targets may be input by user for operational KPIs, if desired, on Worksheet.
- See UARL and ILI in Definitions tab for discussion of size and pressure limitations.
- Systems that fall on the extreme ends of size or connection density should use caution when interpreting Unit Losses KPIs.

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APPENDIX D

Water Supply Master Plan 2040

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Valley Water

Water Supply Master Plan 2040

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Santa Clara Valley Water District
Water Supply Master Plan 2040

Prepared by:

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NOVEMBER 2019

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Water Supply Master Plan 2040 Executive Summary

A reliable supply of clean water is necessary for the social, economic, and environmental well-being of Santa Clara County. This is reflected in the Santa Clara Valley Water District Act that states one of the purposes of the Santa Clara Valley Water District (Valley Water) is "to do any and every lawful act necessary to be done that sufficient water may be available for any present or future beneficial use or uses of the lands or inhabitants within the District." Furthermore, Board Policy states that "there is a reliable, clean water supply for current and future generations." The Water Supply Master Plan 2040 (Master Plan) presents Valley Water's strategy for meeting the county's future water needs.

The Master Plan looks ahead at how our water needs, and our water supply may change over the next 20 years. The population is likely to grow; aging water infrastructure must be maintained and renewed; additional regulations and land use changes may impact how we use water; and climate changes are likely to alter the Sierra Nevada Mountains' snowpack resulting in longer and more severe droughts.

Valley Water's Ensure Sustainability water supply strategy focuses on investments that secure our existing water supplies, expand water conservation and reuse, and optimize our water infrastructure systems. Valley Water must secure existing supplies and facilities for future generations because they are, and will continue to be, the foundation of our water supply system. Valley Water is committed to working with the community to meet Silicon Valley's future increases in water demand through conservation, water reuse, and other drought-resilient strategies. Some projects are preferred more than others by the community. Stakeholders all agree that 1) water supply reliability is important; 2) we should maximize water conservation, water reuse, and stormwater capture; and 3) we need to keep water rates affordable. Based on stakeholder input, technical analyses, and the climate of uncertainty, the Ensure Sustainability strategy provides a framework for balancing multiple needs and interests while making effective and efficient investment decisions. Finally, Valley Water has opportunities to make more effective use of its existing assets.

The Master Plan is the Valley Water's strategy for providing a reliable and sustainable future water supply for Santa Clara County and ensuring new water supply investments are effective and efficient.

The Master Plan's annual Monitoring and Assessment Program (MAP) provides a mechanism for adapting to changing supply and demand conditions, climate change, regulatory and policy changes, other risks, and uncertainty. Through regular monitoring of specific projects and overall conditions, Valley Water will assess whether changes to the Master Plan strategy or projects are needed. Alternative projects will be evaluated based on their impacts to the water supply reliability, costs, relationships with other projects, risks and opportunities, and stakeholder input. Any changes to the Master Plan will be reflected in the annual water rate-setting process, Capital Improvement Program, and budget.

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1 A Reliable Water Supply Is Important to the Community

A reliable supply of clean water is necessary for the environmental, economic, and social well-being of Santa Clara County. A safe and reliable water supply extends beyond the significant social requirements of basic health and sanitation. This extension includes economic vitality, environmental needs, agricultural requirements, social benefits, cultural expectations and requirements, and quality of life enhancements. On behalf of the community, the Santa Clara Valley Water District (Valley Water) has made significant investments to manage demands for water and develop water supplies and infrastructure to meet the county's water needs. These investments currently enable Valley Water to manage the natural variability in demands and supplies to meet the county's current needs in all but critical drought years, when the community will be requested to reduce their water use. However, Valley Water anticipates the county's need for water will grow in the future.

1.1 Santa Clara County Needs Water for Multiple Purposes

Long-term average water use in Santa Clara County is approximately 350,000 acre-feet per year (AFY). This water is used for domestic, municipal, industrial, and agricultural use.[1] Valley Water estimates that water demand would be higher, by about 77, 000 AF in 2018, if not for the combined efforts of Valley Water, the water retailers, and the community to conserve water. Because of Valley Water's investments in water conservation since 1992, water use in the county has remained relatively consistent despite a 25 percent increase in population over the same period (Figure 1). The various significant decreases in water use are associated with the extended droughts of 1987 to 1992, 2007 to 2009, and 2012 to 2016. Rainfall and economics also affect water use.

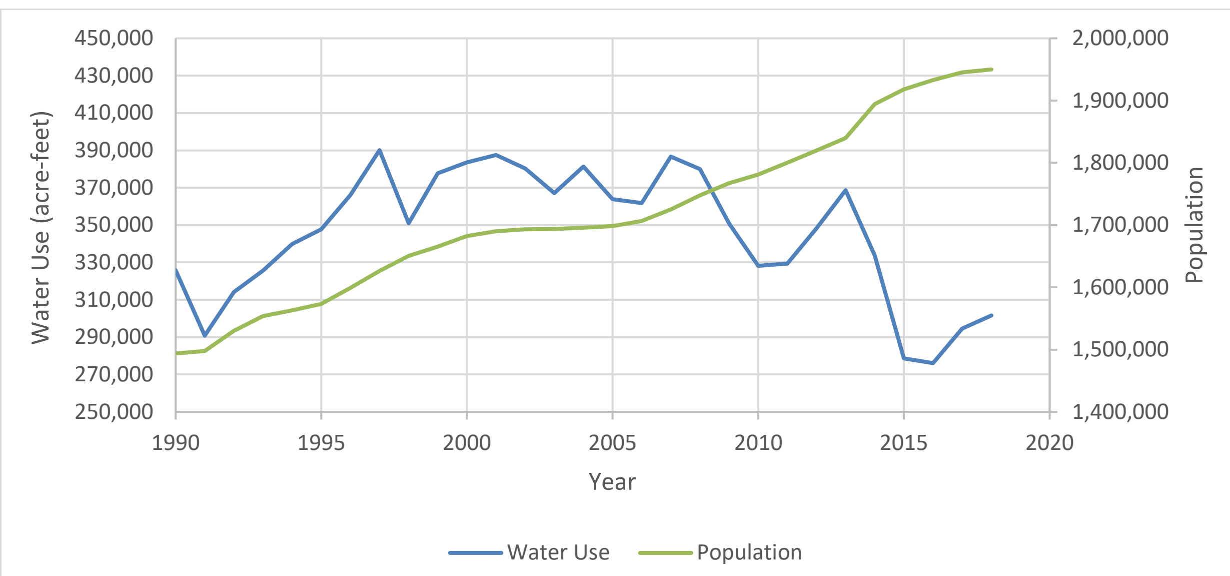

Figure 1. Historic Water Use and Population

[1] Environmental water needs vary by year and are addressed in the supply side of Valley Water's water supply system. Environmental requirements are given priority to local water supplies over use for recharge or treatment plants.

The community uses water for several purposes, including residential, commercial, industrial, institutional, landscape irrigation, and agriculture. Figure 2 shows the percentage of water use by these sectors. Residents who need water for basic sanitation and to support their quality of life, account for almost half the water used each year in the county. Nearly one-half of residential water use is outdoors. Commerce, industry, and institutions need water for product manufacturing and delivery. The agriculture sector needs water to grow crops and for livestock.

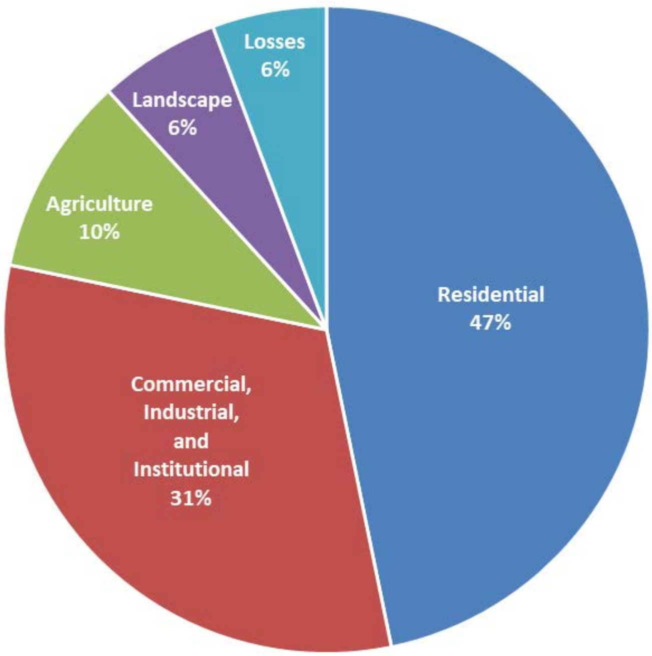

Figure 2. Water Use by Sector
(Water Retailers' 2015 Urban Water Management Plans)

The San José-Sunnyvale-Santa Clara Metropolitan Area had a gross domestic product of over $275 billion in 2017, the 13th highest in the nation (Bureau of Economic Analysis, 2018). Water shortages can have severe economic consequences. Shortage costs can range from about $85 million per year for a shortage of 10 percent up to $1.5 billion per year for a shortage of 50 percent (Appendix B, Cost Analysis Methodology). Furthermore, shortages can lead to groundwater overdraft and land subsidence, which can damage the county's infrastructure and increase flooding risks.

1.2 Valley Water has Made Significant Investments in Water Supply Reliability

Valley Water is an independent, special district/local agency that provides wholesale water supply, groundwater management, flood protection, and stream stewardship. Its service area includes all of Santa Clara County, which is located at the southern end of San Francisco Bay (Figure 3). The county encompasses approximately 1,300 square miles and has a population of about 1.9 million. Most water use occurs on the valley floor between the Santa Cruz Mountains to the west and the Diablo Range to the east. Santa Clara County is home to Silicon Valley, and the valley floor is highly urbanized. Southern Santa Clara County has some urban development, but much of the land use is still rural and agricultural.

Valley Water was formed in 1929 in response to groundwater overdraft and significant land subsidence. Northern Santa Clara County had experienced land subsidence from pumping more groundwater than could be replaced or replenished through rainfall. In response, Valley Water constructed six reservoirs in the 1930s to store winter rains for groundwater recharge and summer irrigation use. Beginning as early as 1939, the San Francisco Public Utilities Commission (SFPUC) began the delivery of some water into the county. In 1952, SFPUC began delivering imported water to water retailers in northern Santa

Clara County through what is now called the Regional Water System. Also in the 1950s, Valley Water constructed four additional reservoirs, nearly tripling local storage to approximately 169,000 acre-feet (AF).

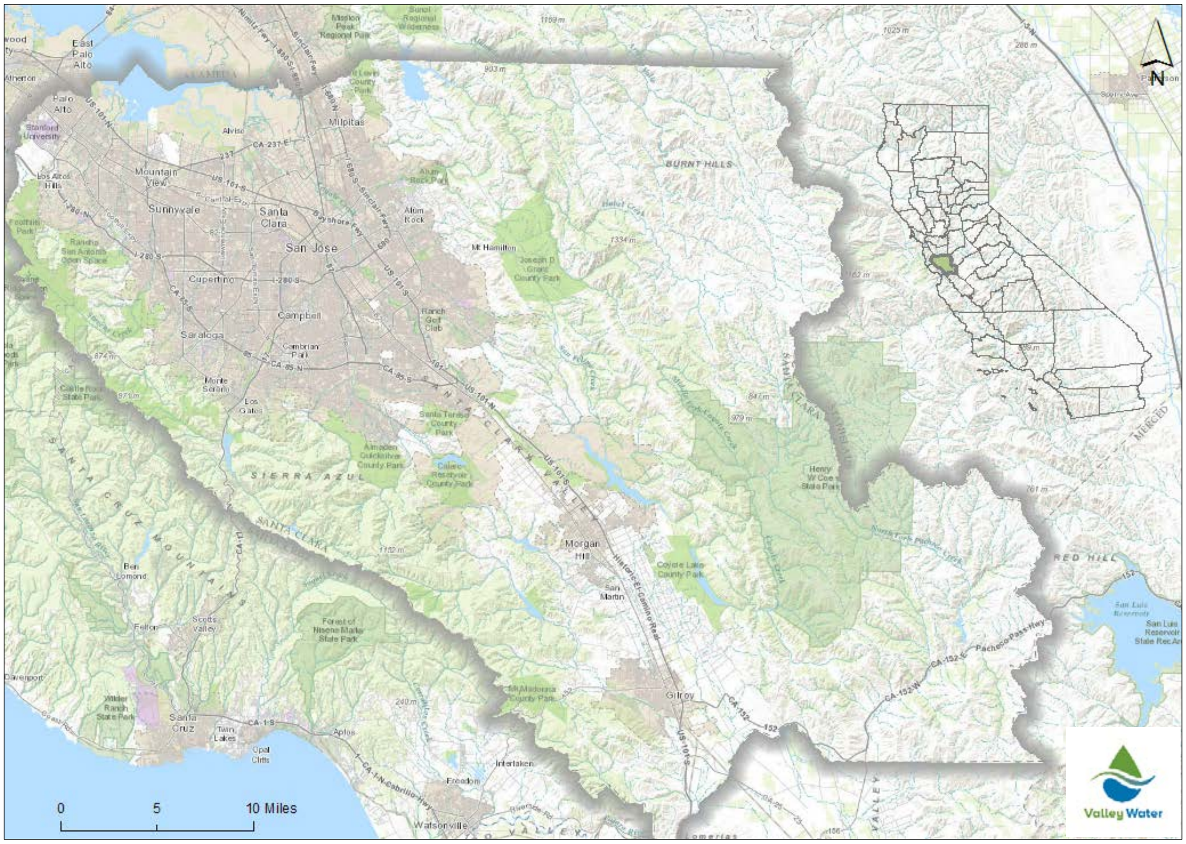

Figure 3. Santa Clara County

Still, local supplies were insufficient to meet the county's growing population, particularly after World War II, and subsidence continued. In 1965, Valley Water began importing water from the State Water Project (SWP) for groundwater recharge and use at drinking water treatment plants. By 1970, groundwater levels recovered, and land subsidence was essentially halted. To continue to provide a reliable water supply, Valley Water began receiving water from the Federal Central Valley Project (CVP) in 1987. The historical relationship between population growth, groundwater levels, land subsidence, and water sources is illustrated in Figure 4. These additional supplies, along with investments in water conservation and water reuse, have further supported and maintained groundwater level recovery.

Valley Water operates an integrated water supply system to meet demands in Santa Clara County. Current operations include 10 dams, 17 miles of raw surface water canals, five water supply diversion dams, 393 acres of groundwater recharge ponds, 91 miles of controlled in-stream recharge, 142 miles of pipelines, three drinking water treatment plants, one advanced water purification center, and three pump stations.

Local surface water, SWP and CVP water imported through the Sacramento-San Joaquin River Delta (Delta):

- replenish the local groundwater subbasins, which are pumped for use by individual well owners and retail water suppliers;
- supply Valley Water's drinking water treatment plants;
- are delivered directly to agricultural water users; and,
- help meet environmental needs.

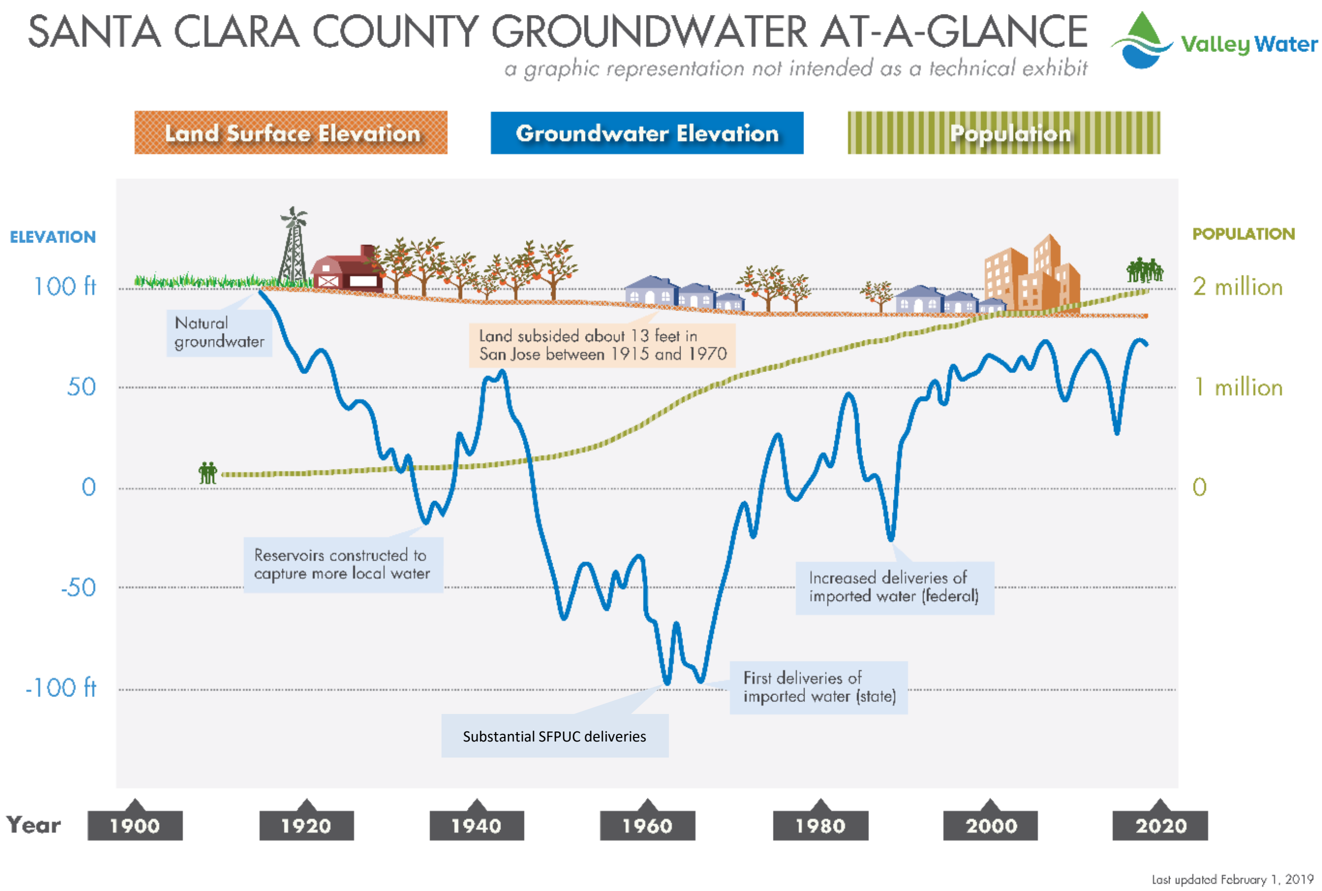

Figure 4. Relationship between Groundwater Levels, Land Subsidence, and Population

The largest source of water used in Santa Clara County is imported from outside the county, mostly through the SWP and CVP (approximately 40 percent). Another 15 percent is delivered through SFPUC's Regional Water System. Of local supplies, about 15 percent is natural groundwater recharge, 20 percent is local surface water, and 5 percent is recycled water (Figure 5).

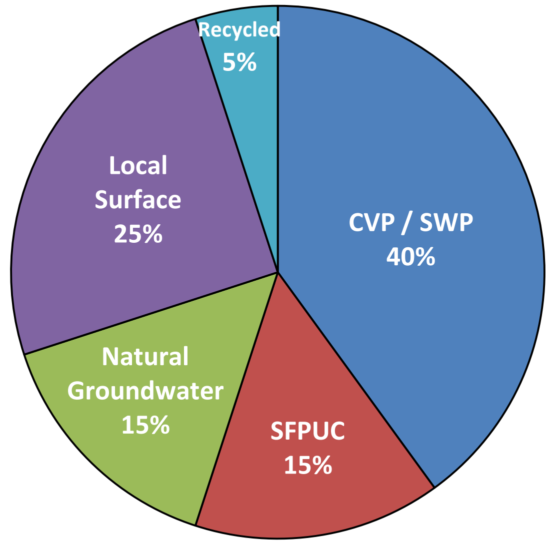

Figure 5. Santa Clara County Historic Water Sources

Valley Water manages groundwater supplies in conjunction with surface water supplies. In wet and normal years, excess supplies are stored in the local groundwater basin, local and statewide reservoirs, or the Semitropic Groundwater Bank in Kern County for use in dry years. This helps Valley Water manage natural variations in rainfall and the associated changes in water supply availability.

Other agencies and organizations also contribute to water supply reliability in Santa Clara County. The San Francisco Public Utilities Commission (SFPUC) delivers water to retailers in northern Santa Clara County. Stanford University and San Jose Water hold their own surface water rights. All four of the county's wastewater treatment plants produce recycled water for non-potable uses such as irrigation and cooling towers. The county's water supply, treatment, and distribution facilities are illustrated in Figure 6.

Figure 6. Water Supply Facilities

1.3 Need for the Water Supply Master Plan 2040

The District Act states that one of the purposes of Valley Water is "to do any and every lawful act necessary to be done that sufficient water may be available for any present or future beneficial use or uses of the lands or inhabitants within the District." Furthermore, Board Policy states that "there is a reliable, clean water supply for current and future generations." One of Valley Water's strategies for achieving this goal is to develop water supplies designed to meet at least 100 percent of average annual water demands in non-drought years and not call for water use reductions greater than 20% during drought years. The purpose, policy, and strategy recognize that a reliable water supply is vital to the social, economic, and environmental well-being of the county.

The Association of Bay Area Governments (ABAG) projects that the county's population will increase from about 1.9 million in 2015 to about 2.4 million by 2040 (ABAG, 2013[2]). Jobs are projected to increase from approximately 1 million in 2015 to approximately 1.2 million in 2040. Even though per capita water use continues to decline, Valley Water estimates that increases in population and jobs will result in an increase in water demands from the current long-term average of approximately 350,000 acre-feet per year (AFY) to a non-drought year demand of approximately 399,000 AFY in 2040, assuming no additional investments in conservation beyond the 99,000 AF by 2030 (Appendix C, Demand Projection Methodology). Urban water use throughout the county is expected to increase, but rural and agricultural water use is expected to stay about the same. This projected increase in demands, along with projected reductions in supplies and ongoing risks, means that additional water supply investments will be needed to provide a reliable water supply in the future.

1.4 Contents and Use of this Report

The modeling results in this report are based on demand, supply, and operating assumptions as of May 2019. Valley Water regularly reviews and refines its models. Future Master Plan reports will reflect updated modeling results and, if appropriate, make recommendations for revisions.

The Master Plan is organized as follows:

- Chapter 1 - A Reliable Water Supply is Important to the Community: discusses the community's water use and needs, Valley Water's role in meeting those needs, and the need for the Master Plan.
- Chapter 2 – Valley Water Needs to Ensure Adequate Supplies for Future Droughts: describes the water supply outlook, challenges, and risks to providing a reliable future water supply in Santa Clara County.
- Chapter 3 – The Water Supply Strategy Ensures Sustainability: presents Valley Water's strategy for meeting the county's future water supply needs.

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[2] These were the most current ABAG data available at the time of modeling and development of the various planning level portfolios. Valley Water is in the process of developing a new demand model, which will include updated information.

- Chapter 4 – The Monitoring and Assessment Plan Will Help Keep Valley Water on Track: describes how the water supply strategy will be monitored and adjusted over time to ensure Valley Water is on track with its water supply investments.
- Chapter 5 – References

2 Valley Water Needs to Ensure Adequate Supplies for Future Droughts

This chapter describes the water supply reliability outlook for Santa Clara County. The Master Plan evaluates the ability to meet projected water demands through year 2040 with the baseline water supply system. The evaluation shows existing supplies are sufficient to meet most future demands in normal years, but will not meet needs in future droughts. In addition, risks such as climate change, changes to regulations, and new policies could affect future water supply reliability.

2.1 Baseline Water Supplies

The baseline water supply system consists of existing water supplies and infrastructure, including several improvements. The Master Plan assumes Valley Water will improve existing dams to remove operating restrictions, complete the Rinconada Water Treatment Plant Reliability Improvement Project, upgrade Vasona Pumping Plant, rehabilitate pipelines, support water retailers' efforts to increase non-potable reuse water use to about 33,000 AFY in 2040, and increase water conservation savings to about 99,000 AFY by 2030. The Master Plan assumes declining Delta-conveyed imported water reliability as a baseline condition, which is consistent with historical trends. Lastly, the Master Plan assumes Valley Water makes reservoir releases consistent with environmental requirements and commitments, including the Fisheries and Aquatic Habitat Collaborative Effort (FAHCE) and regulatory permits.

Baseline Water Supply System

- Conservation savings increasing from about 77,000 AFY in 2018 to about 99,000 AFY by 2030
- Existing natural groundwater recharge
- Existing local surface water supplies with Fisheries and Aquatic Habitat Collaborative Effort (FAHCE) reservoir releases and flow requirements
- Recycled water use increasing from about 18,000 AFY in 2018 to about 33,000 AFY in 2040
- Existing imported water supplies, with declining Delta water reliability
- Dam seismic retrofits and other improvements to remove operating restrictions
- 10-Year Pipeline Rehabilitation
- Vasona Pumping Plant Upgrade
- Rinconada Water Treatment Plant Reliability Improvement

The Master Plan also assumes that existing infrastructure is maintained consistent with Valley Water's Asset Management Plan and that Valley Water works with other agencies to maintain and manage their assets that support water supply reliability in Santa Clara County.

Modeling indicates that the baseline system will be able to meet non-drought year demands through 2025. However, shortfalls between supplies and demands begin in year 2030. Figure 7 and Table 1 shows the projected average water supply use and non-drought year demands through year 2040. Table 1 aims to demonstrate that Valley Water will see shortfalls between supplies and demands if we only invest in those Baseline Water Supply System projects, as demand continues to grow to 399,000 AFY by

2040. This shortfall can be avoided through additional long-term water supply investments. Projects that provided water supply benefits were analyzed as a suite to determine how individual projects work together to provide a water supply benefit. Various suites of projects were presented to internal stakeholders and the Board to help develop the final investment strategy recommended in the WSMP. Those new investments are being guided by Valley Water's "ensure sustainability" water supply strategy (Section 3).

The modeling assumes decreased Delta-conveyed supplies due to increased regulatory restrictions in year 2030. The decrease of Delta supplies is anticipated to progress gradually with time, but 2030 was selected in the model as the timeframe to reflect the loss. Valley Water's water supply system model and assumptions are described in Appendix D.

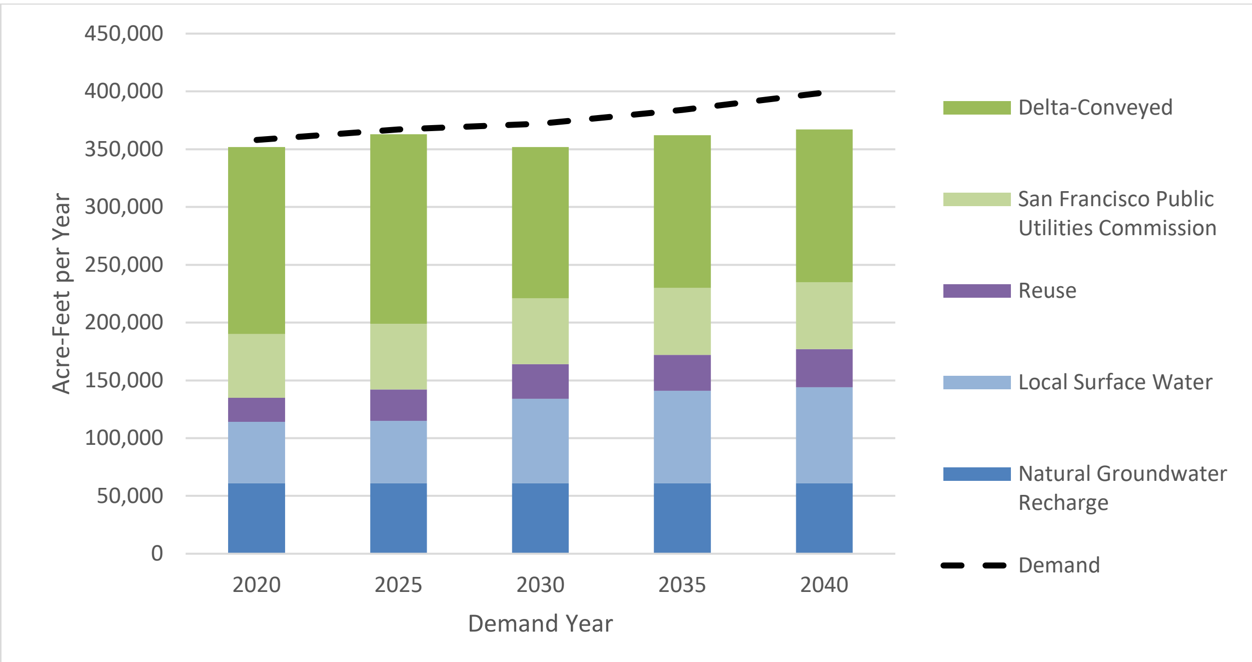


Figure 7. Average Water Supply Through 2040 with Baseline Projects

Table 1. Average Baseline Water Supply Through 2040

Source of Supply (Acre-Feet)	2020	2025	2030	2035	2040
Natural Groundwater Recharge	61,000	61,000	61,000	61,000	61,000
Local Surface Water	53,000	54,000	73,000	80,000	83,000
Reuse Water	21,000	27,000	30,000	31,000	33,000
San Francisco Public Utilities Commission	55,000	57,000	57,000	58,000	58,000
Delta-Conveyed	162,000	164,000	131,000	132,000	132,000
Average Supply	**352,000**	**363,000**	**352,000**	**362,000**	**367,000**
Demand	**358,000**	**367,000**	**372,000**	**384,000**	**399,000**

2.1.1 Local Water Supply Sources

The groundwater subbasins are naturally recharged with rainfall, seepage from surrounding hills, seepage into and out of the groundwater subbasin, leakage from pipelines, and irrigation return flows. Natural groundwater recharge varies based on rainfall and groundwater levels. On average, natural groundwater recharge provides about 61,000 AFY of supply.

Local reservoirs capture rainfall and run-off. This water is used for groundwater recharge, irrigation, or sent to a drinking water treatment plants. Currently, Valley Water surface water supplies are constrained by an average of about 44,000 AFY due to operating restrictions on local reservoirs for seismic safety. Improvements to Anderson and Guadalupe Dams are modeled to be completed before 2030 and improvements to Calero and Almaden Dams before 2035. On average, Valley Water's local surface water supplies will provide about 83,000 AFY in 2040. On average, San José Water and Stanford University's local surface water supplies provide about 11,000 AFY.

Reuse water is a local water supply source that is not dependent on rainfall. Reuse water is produced by the county's four publicly-owned wastewater treatment plants. It is municipal wastewater that has been treated to levels that make it appropriate for various non-drinking water (non-potable) purposes. In addition, Valley Water provides advanced treated purified water to South Bay Water Recycling to improve the quality of the non-potable supply. Recycled water use is projected to increase from about 18,000 AFY in 2018 to about 33,000 AFY in 2040.

Anderson Reservoir is currently being operated at a reduced capacity due to seismic concerns with the dam at full capacity.

2.1.2 Imported Water Supply Sources

Imported supplies are used to meet a large percentage of county's water needs. Imported water conveyed through the Delta via the State Water Project (SWP) and Central Valley Project (CVP) is used to supply Valley Water's drinking water treatment plants, groundwater recharge facilities, and irrigators. On average, more than 70 percent of Delta-conveyed supply is delivered to treatment plants, almost 30 percent is used for recharge, and a small percentage is delivered to irrigators. In addition, when available, Valley Water stores excess Delta-conveyed supplies in the Semitropic Groundwater Bank and San Luis Reservoir in the Central Valley, and locally in Anderson and Calero Reservoirs. Valley Water has a contract for 100,000 AFY of SWP water and 152,500 AFY of CVP water. However, the actual amount of water allocated under these contracts each year is typically less than these contractual amounts and depends on hydrology and regulatory restrictions. The average allocation of Delta-conveyed water projected for 2020 is 171,000 AFY. However, without additional investments, Valley Water expects average allocations to decline over time, to an average of about 133,000 AFY in 2040. The Master Plan assumes average Delta-conveyed imported water use within Santa Clara County will differ from SWP

and CVP allocated supplies due to carryover losses in extreme wet years and evaporation from surface water reservoirs.

Santa Clara County began receiving SFPUC water to supplement local supplies in 1939. This water is provided to north county cities with access to SFPUC's Regional Water System. On average, the SFPUC delivers about 55,000 AFY to Santa Clara County. This amount is expected to increase slightly to 59,000 AFY in 2040 as SFPUC customer demands increase. While SFPUC water is not distributed through Valley Water, it is included here to reflect its role in the overall water portfolio for Santa Clara County.

2.1.3 Supply Variability and Hydrology

Santa Clara County, like the rest of California, experiences drastic changes in year-to-year annual precipitation. The variation in precipitation, both locally and in the Delta's watersheds, results in fluctuations in the amount of water supply available from year to year. In many years, annual supplies exceed demands, while in other years, demands can greatly exceed supplies. Figure 8 and Table 2 illustrate 2040 projected demand and the availability of different water supplies in a very wet year, an average year, and in a very dry year. The supplies shown do not include the use of reserves, which lessen any shortfalls in dry years. The long-term average supplies in Table 2 include environmental flows and streamflow that is operationally difficult to store, and are different than the supplies in Table 1. However, a significant amount of water may be used for environmental purposes now and into the future. Table 1 and the remaining tables in this report show the available supply Valley Water can use to meet municipal and agricultural demands but do not include environmental flows. Figure 8 and Table 2 show all the water that is flowing into the county on average.

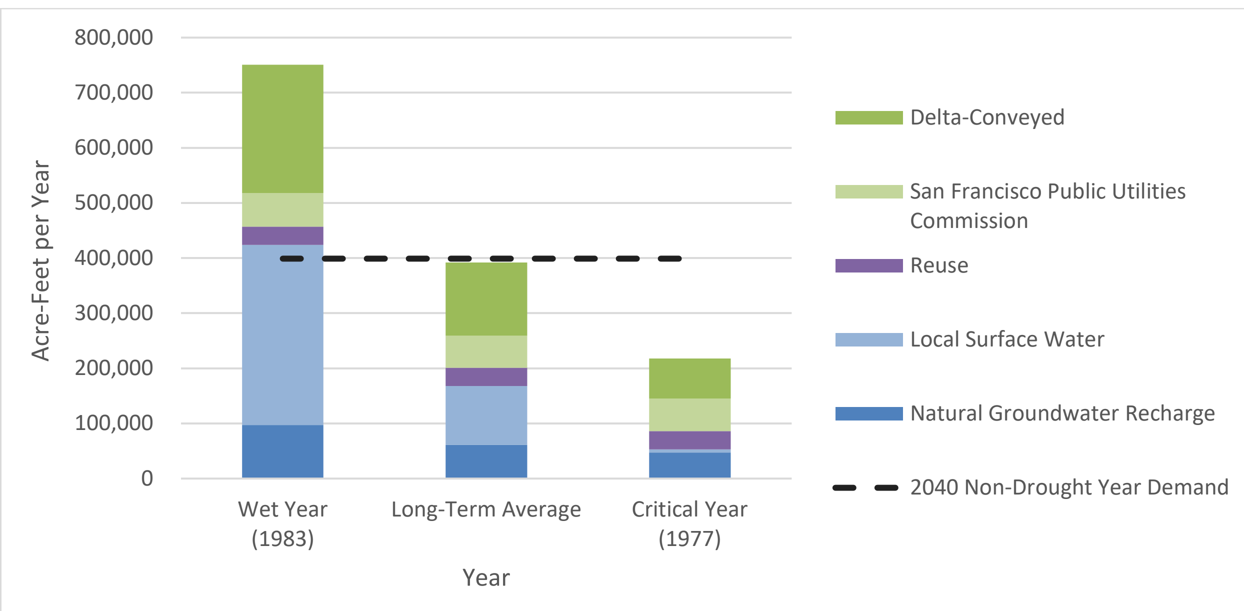


Figure 8. Projected Baseline Water Supply Availability in 2040 under Different Hydrologic Conditions

Table 2. Projected Baseline Water Supply Availability in 2040 under Different Hydrologic Conditions

Source of Supply (Acre-Feet)	Wet Year (1983)	Long-Term Average	Critical Year (1977)
Natural Groundwater Recharge	97,000	61,000	47,000
Local Surface Water	327,000	107,000	6,000
Reuse Water	33,000	33,000	33,000
San Francisco Public Utilities Commission	61,000	58,000	59,000
Delta-Conveyed	233,000	133,000	73,000
Total Supply (Acre-Feet)	**751,000**	**392,000**	**218,000**

Valley Water's basic water supply strategy to compensate for supply variability is to store excess wet year supplies in the groundwater basin, local reservoirs, San Luis Reservoir, or Semitropic Groundwater Bank. Valley Water draws on these reserve supplies during dry years to help meet demands. These reserves will be sufficient to meet demands during a critical dry year and the first several years of an extended drought. Valley Water also works with retailers to balance groundwater pumping and treated water use based on groundwater basin conditions to maximize the use of available supplies.

2.2 Future Droughts are the Primary Water Supply Challenge

Water supply reserves (e.g., water banked in the Semitropic Groundwater Bank) are insufficient to meet needs throughout an extended drought. Modeling indicates shortages during droughts in all demand years, with shortages increasing in severity and frequency as demands increase and Delta-conveyed supplies decrease. By 2040, without new supplies or conservation savings, shortages could occur in about 40 percent of years and water supplies would only be able to meet about 60 percent of normal demand during some years. Short-term water use reductions of up to 50 percent would be needed to minimize the risk of land subsidence and avoid undesirable groundwater conditions. Figure 9 and Table 3 show the supplies and groundwater reserves that would be used with year 2040 demands during a six-year drought, similar to the one that occurred between 1987 and 1992. Reserves are more available in Drought Year 4 because the water use reductions in Drought Year 3 allowed groundwater conditions to improve. However, reserves are depleted by Drought Year 5.

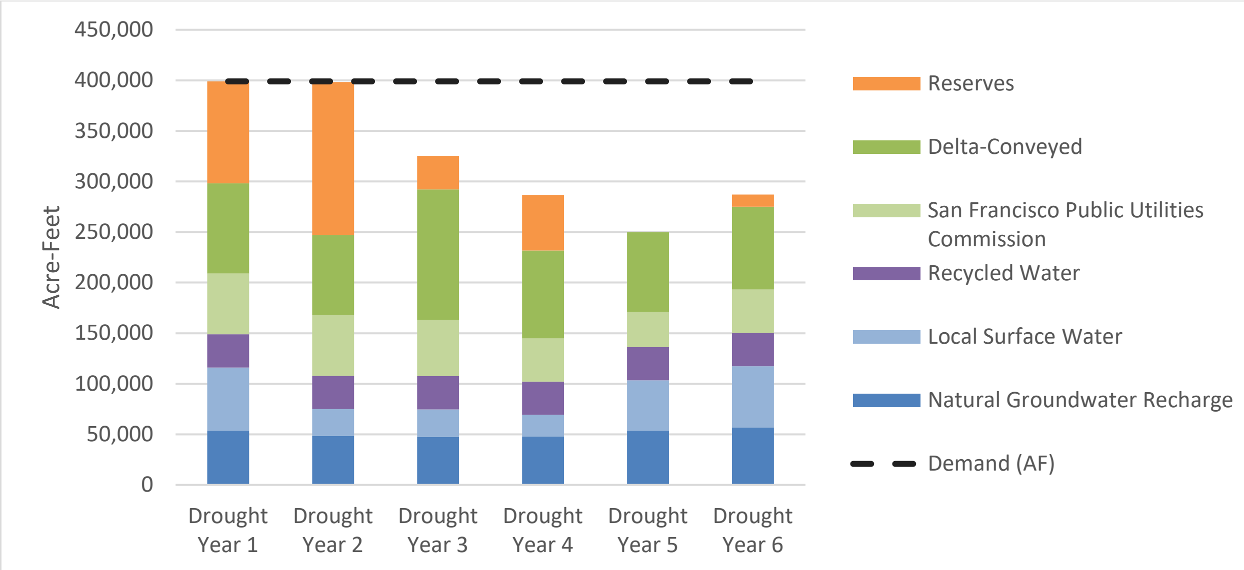


Figure 9. Baseline Water Supplies During an Extended Drought with Year 2040 Demands

Table 3. Baseline Water Supplies During an Extended Drought with Year 2040 Demands

Source of Supply (AF)	Drought Year 1	Drought Year 2	Drought Year 3	Drought Year 4	Drought Year 5	Drought Year 6
Natural Groundwater Recharge	54,000	48,000	47,000	48,000	54,000	57,000
Local Surface Water*	62,000	26,000	27,000	21,000	50,000	61,000
Reuse Water	33,000	33,000	33,000	33,000	33,000	33,000
San Francisco Public Utilities Commission	60,000	60,000	56,000	43,000	35,000	43,000
Delta-Conveyed	89,000	79,000	129,000	87,000	79,000	82,000
Reserves	101,000	151,000	33,000	55,000	0	12,000
Total Supply (AF)	**399,000**	**398,000**	**325,000**	**287,000**	**250,000**	**287,000**
Shortfall	**0,000**	**1,000**	**74,000**	**112,000**	**149,000**	**112,000**

* Local surface water increases due to demand reductions and overall conjunctive use management.

2.3 Other Water Supply Challenges and Uncertainties

Droughts are the greatest challenge to water supply reliability. However, other significant challenges and uncertainties need to be considered as part of the Water Supply Master Plan. These include climate change, additional regulatory requirements, and land-use decisions.

2.3.1 Climate Change

The impacts of climate change are already being felt in the San Francisco Bay Area and northern California. Average annual maximum temperatures have increased by 1.7°F since 1950, sea level has risen over 8 inches in the last 100 years, and the 2012-2016 drought led to a 1-in-500 year low in Sierra snowpack and $2.1 billion in economic losses statewide. These changes are projected to increase significantly in the coming decades. The Bay Area will likely see a significant temperature increase by mid-century. Precipitation will continue to exhibit high year-to-year variability, with very wet and very dry years. Average Sierra Nevada snowpack is projected to decline, up to 60 percent in mid-century under a high greenhouse gas emissions scenario. Future increases in temperature will likely cause longer and deeper droughts. These impacts will affect the quantity of available water and quality of water supplies (Ackerly et al., 2018).

Climate change is a global phenomenon, though it is manifested differently in different regions.

Valley Water's water supply vulnerabilities to climate change include:

- Decreases in the quantity of imported water supplies: More precipitation falling as rain and earlier snowmelt may exceed the storage capabilities of the existing SWP and CVP reservoirs. Increases in temperature and evapotranspiration may also lead to a higher intensity of droughts, which can decrease imported water allocations. Rising air temperatures also increase the water temperatures, which can lead to increased evaporation rates, a higher risk of harmful algal blooms, and negative impacts to fish and wildlife, all of which can impact the availability of imported water supplies for Santa Clara County. Sea level rise may also have negative impacts on imported water supplies, largely because of saltwater intrusion into the Sacramento-San Joaquin Delta. Saltwater intrusion can impact water supply allocations, as more fresh water may be needed to flow through the Delta and into San Francisco Bay to hold back the saltwater, making it unavailable for CVP and SWP use. Sea level rise will also put additional pressure on the fragile Delta levees, making them more susceptible to failure.
- Increases in seasonal irrigation demands: Higher temperatures will increase agricultural, residential, and commercial/institutional irrigation demands. It is estimated that about 40 percent of water use in the county is for irrigation.

- Increases in cooling water demands: The county has several energy plants, multiple data centers, and facilities with cooling towers. Higher temperatures may also increase demands by these users.
- Decreases in the ability to utilize local surface water supplies: Shifts in the timing and intensity of rainfall and runoff could affect the ability to capture and use local surface water supplies. It is difficult to capture rainfall when it comes in a few intense storms because reservoirs are more likely to fill and spill or releases are needed to make room for the storm flows. When it is wet, there are typically lower demands for water, so the storm flows are difficult to put to immediate use. Thus, even if average annual rainfall stays the same, the ability to utilize local supplies may decrease.

Drought-resistant landscaping helps reduce demands on water.

- Decreases in water quality: Higher temperatures, wildfire, and changes in flow patterns could result in more algal blooms, increased turbidity, and increased salinity in imported and local surface water supplies. Sea level rise could also contribute to increased salinity in Delta-conveyed supplies. At a minimum, changes in water quality require additional monitoring. Often, they require changes to treatment processes. Sometimes, they can result in the interruption of supplies from the CVP or SWP.
- Increases in the severity and duration of droughts: Droughts are already Valley Water's greatest water supply challenge. With increases in demands and reductions in supplies, this challenge will only grow. Without additional supplies and demand management measures, Valley Water would need to call for more frequent and severe water use reductions. These actions affect the economic and social well-being of the county. More severe and longer droughts will also affect the environmental well-being of the county.

Valley Water needs to implement a water supply strategy that will adapt well to future climate change by managing demands, providing drought-resilient supplies, and increasing system flexibility in managing supplies and water quality.

2.3.2 Additional Regulations and Permit Requirements

Valley Water supplies have previously been affected by changes in regulatory requirements, and additional requirements are anticipated in the future. Locally, the greatest impact of regulations has been on instream recharge operations. Historically, Valley Water constructed gravel dams to increase groundwater recharge within creeks and released water from reservoirs to maximize recharge. However, over 25 years, Valley Water has revised its instream recharge operations to comply with new regulatory requirements to better balance water supply operations with fishery and other environmental needs. Additional future changes are anticipated as Valley Water implements the Settlement Agreement produced by the Fisheries and Aquatic Habitat Collaborative Effort (FAHCE) in 2003. These past and anticipated future changes limit Valley Water's ability to use creeks for conveying

and recharging water, which in turn could reduce the flexibility of Valley Water to manage groundwater basins. Groundwater recharge is a key component of Valley Water's conjunctive use program.

Imported water supplies have also been affected by regulations related to environmental protection. Valley Water holds contracts with the California Department of Water Resources (DWR) and U.S. Bureau of Reclamation for up to 252,500 AF per year of supplies from the SWP and CVP, with actual deliveries subject to availability of water supplies and the satisfaction of regulatory constraints to protect fish, wildlife, and water quality in the Sacramento-San Joaquin Delta. These Delta-conveyed imported water deliveries from the SWP and CVP have been negatively impacted by significant restrictions on Delta pumping required by biological opinions issued by the U.S. Fish and Wildlife Service in 2008 and National Marine Fisheries Service in 2009. Based on modeling projections provided by DWR, future average imported water deliveries could decrease with additional regulatory restrictions and impacts from climate change.

The California Aqueduct delivers Delta-conveyed supplies to municipal, industrial, and agricultural customers

The State Water Resources Control Board (State Water Board) approved amendments to the Water Quality Control Plan for the San Francisco/Sacramento-San Joaquin Delta Estuary (Bay-Delta Plan) in December 2018 that will result in increased restrictions on water users within the San Joaquin Basin (Basin), potentially reducing SFPUC supplies. State Water Board staff are working with Basin stakeholders to develop voluntary agreements that will achieve an equivalent level of environmental protection while reducing impacts on water supplies. If these voluntary agreements are not developed and adopted by the State Water Board as an alternative to the December 2018 approved changes and the objectives in the recently approved plan are implemented, SFPUC supplies to Santa Clara County retailers will likely be reduced, which could increase demand for Valley Water supplies.

Imported supplies are particularly vulnerable to climate change and regulatory actions like the Bay Delta Water Quality Control Plan. State policy, as stated in the Delta Reform Act of 2009 (California Water Code Section 85021), is to "*reduce reliance on the Delta in meeting California's future water supply needs through a statewide strategy of investing in improved regional supplies, conservation, and water use efficiency. Each region that depends on water from the Delta watershed shall improve its regional self-reliance for water through investment in water use efficiency, water recycling, advanced water technologies, local and regional water supply projects, and improved regional coordination of local and regional water supply efforts.*"

2.3.3 Demands

The Master Plan includes demand projections in five-year increments through year 2040, but these long-term demand projections are uncertain. Water use is affected by multiple factors, including population, number of jobs, type of use, weather, economic conditions, social behavior, and regulations. Each of these factors has its own inherent uncertainties in projections and/or is too variable to predict over a 20-year planning horizon. For example, we know implementing the State's "Making Conservation a Way of Life" will include outdoor water use targets. However, we do not currently know what those targets will be and whether they will be achieved on schedule. We also know that maximum high temperatures will almost certainly increase, but we do not know how that will affect irrigation and cooling demands. We can anticipate an economic recession over the next 20 years, but we cannot predict when it will occur.

Historically, actual demands have been lower than those projected in prior long-term plans. For example, Valley Water's 2005 Urban Water Management Plan had a demand projection of 396,000 AF for 2015. Actual water use in 2015 was about 283,000 AF, which was low due to severe drought reductions, and actual water use in 2013 (before the drought) was about 367,000 AF. Some of the variations between projected and actual water use are related to using conservative projections to ensure we are planning for sufficient water supplies. Some of the variation are related to other factors such as regulations, social behavior, and type of water use.

2.3.4 Other Uncertainties

The greatest risk to natural groundwater recharge is a reduction in pervious surfaces due to an expanded urban footprint. Activities that keep water onsite and protect open spaces on the valley floor will help maintain natural groundwater recharge.

Open spaces and agriculture help maintain natural infiltration/recharge.

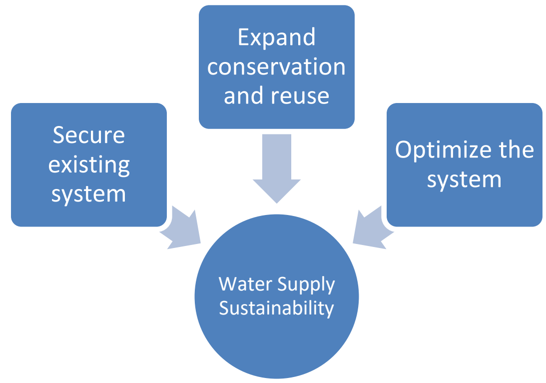
The quantity of SFPUC supplies used in the county could be reduced in the future. This could result from retailers' shifting their use of SFPUC to other supplies, future decreases in demand, or changing regulations. This could also result from SFPUC discontinuing deliveries to San José and Santa Clara because these cities have interruptible contracts with SFPUC. SFPUC, the cities, and Valley Water are looking at options to make San José and Santa Clara permanent SFPUC customers.

Valley Water continues to monitor those risks that can change the water supply outlook and is working to influence key external decisions that have the potential to impact water supply reliability. The Master Plan will be reviewed annually and updated at least every five years based on the monitoring and assessment plan described in Chapter 4. This planning cycle allows risks to be evaluated on an ongoing basis so that the water supply strategy can be updated as better information becomes available.

3 The Water Supply Strategy Ensures Sustainability

Valley Water's Ensure Sustainability water supply strategy relies on the following three elements to provide a reliable supply of water to meet needs through 2040:

1. Secure existing supplies and infrastructure, and
2. Increase water conservation and water reuse, and
3. Optimize the use of existing supplies and infrastructure.



This strategy ensures sustainability because it maintains and builds on the existing baseline system, develops drought-resistant supplies to meet drought needs, and manages risks to water supply reliability from climate change and other risks and uncertainties.

No individual project can address all the county's future water supply needs, so various combinations of projects were evaluated for their ability to meet Valley Water's reliability goal under various scenarios. Several different approaches or strategies will meet Valley Water's water supply reliability goals, but they all have tradeoffs. Some strategies rely heavily on projects that perform well during droughts and in a changed climate, but they are more expensive. Other strategies rely on lower-cost projects but are more susceptible to risks. Some strategies include projects that have environmental or other benefits but lower water supply reliability benefits. Some projects are preferred more than others by the community. Stakeholders all agree that 1) water supply reliability is important; 2) we should maximize water conservation, water reuse, and stormwater capture; and 3) we need to keep water rates affordable. Based on stakeholder input, technical analyses, and the climate of uncertainty, the Ensure Sustainability strategy provides a framework for balancing multiple needs and interests while making effective and efficient investment decisions.

3.1 The Elements of the Ensure Sustainability Water Supply Strategy Work Together

The Ensure Sustainability strategy elements work together to protect and build on past investments in water supply reliability, leverage those past investments to increase flexibility, and develop alternative supplies and demand management measures to manage risk and meet future needs, especially during extended droughts in a changing climate. These elements, combined with Valley Water's Asset Management and Infrastructure Reliability programs, provide a pathway to a sustainable water supply system. The water supply strategy elements and the associated projects for this Master Plan are discussed below. Information on specific projects that are currently in the plan and that have been evaluated for inclusion in the plan is summarized in Appendix H (Project List).

3.1.1 Secure Existing Supplies and Infrastructure

Valley Water should secure existing supplies and facilities for future generations because they are, and will continue to be, the foundation of the county's water supply system. The baseline water supply system was described in Section 2.1. While local water supplies are expected to increase as dams are retrofitted and non-potable reuse expands, Delta-conveyed imported water supplies are at risk to decline as a result of regulations and climate change.

Non-potable reuse (purple pipe) reduce demands on potable supplies.

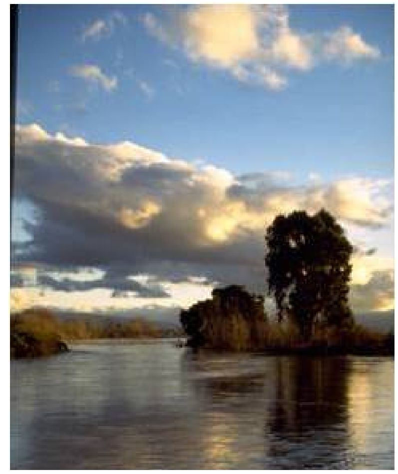
The Ensure Sustainability strategy includes Valley Water participation in the Delta Conveyance Project (formally known as the California WaterFix). The Delta Conveyance Project involves constructing alternative conveyance (one tunnel), which may be able to divert up to 9,000 cubic feet-per-second from the Sacramento River north of the Delta and deliver it to the SWP and CVP pumps at the southern end of the Delta. The goal is to reduce impacts of diversions, help maintain existing deliveries, improve the ability to do transfers, and protect water quality from sea level rise and levee failure events. The Board had decided to participate in the previously planned conveyance project, the California WaterFix, on May 8, 2018. The California WaterFix planned to improve the average available Delta-conveyed imported supply to 170,000 AFY from 133,000 AFY. The project definition of the new Delta Conveyance Project is currently under review by the State, following Governor Newsom's decision to adopt a new approach to Delta conveyance that centers on a single, smaller capacity tunnel project.

3.1.2 Increase Water Conservation and Reuse

Demand management, stormwater capture, and water reuse are critical elements of the water supply strategy. They perform well under current climate conditions and late-century climate change. Water reuse provides local supplies that are not directly hydrologically dependent, so they are resilient to extended droughts when Valley Water most needs additional supplies. They make efficient use of existing supplies, so they are sustainable. In addition, these activities are broadly supported by stakeholders.

Specific water conservation and stormwater projects include incentivizing the use of advanced metering infrastructure (AMI); customer side leak repair incentives; graywater program expansion; rebates for the installation of rain barrels, cisterns, and rain gardens; partnerships to construct stormwater capture basins; and a flood-managed aquifer project. The Additional Conservation and Stormwater Projects and Programs package should reduce future demands by an additional 10,000 AFY (above the current target of 99,000 AFY of savings by 2030) and increase water supplies by about 1,000 AFY by 2040.

The Master Plan also includes developing at least 24,000 AFY of additional recycled water (above and beyond the current target of 33,000 AFY of non-potable reuse) by 2040. For budget and schedule purposes, the Master Plan assumes the reuse target will be achieved by implementing the Los Gatos Ponds Potable Reuse Project, which includes sending purified water to Campbell for groundwater recharge in the existing ponds along Los Gatos Creek. Valley Water is currently developing a Countywide Water Reuse Master Plan that will evaluate potable reuse options, including identifying other options for achieving the Master Plan's reuse target.

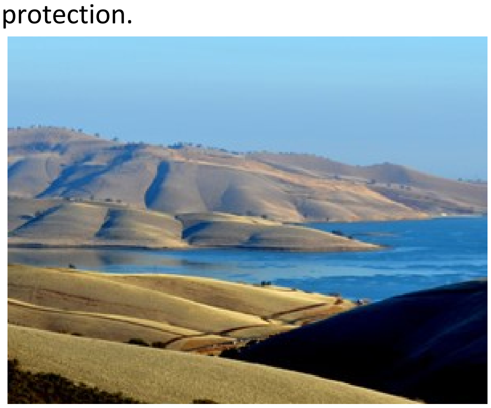


Potable reuse includes delivering purified recycled water to groundwater recharge ponds.

3.1.3 Optimize the Use of Existing Supplies and Infrastructure

This element of the Ensure Sustainability strategy includes projects that increase Valley Water's ability to use existing supplies and infrastructure. Valley Water's existing supplies are more than sufficient to meet current and future needs in wet and above normal years. In some years, supplies exceed needs, and additional facilities would increase flexibility and the ability to use or store those excess supplies. Additional infrastructure could increase Valley Water's ability to respond to outages and challenges such as droughts and water quality problems with existing supplies.

The Master Plan includes three projects that optimize the use of existing supplies and infrastructure – Pacheco Reservoir, Transfer-Bethany Pipeline, and South County Recharge. Pacheco Reservoir is consistent with the Board's priority to actively pursue efforts to increase water storage opportunities. The project, through a partnership with Pacheco Pass Water District, San Benito County Water District, and potentially other partners, will enlarge Pacheco Reservoir from about 6,000 AF to about 140,000 AF and connect the reservoir to San Felipe Division facilities of the CVP. The reservoir will be used to store local runoff and CVP supplies, operated to provide water for fisheries downstream of the reservoir, and increase in-county storage and flexibility of CVP supplies. Other potential benefits could include managing water quality impacts from low-point conditions in San Luis Reservoir and downstream incidental flood protection.



The Transfer-Bethany pipeline will connect Contra Costa Water District's Los Vaqueros Reservoir and Delta intakes to the State Water Project.

The Transfer-Bethany Pipeline will be a pipeline that connects Contra Costa Water District's (CCWD's) system to Bethany Reservoir, which serves both the South Bay Aqueduct and the California Aqueduct. This project will enable Valley Water to receive Delta surplus supplies and some contract supplies through CCWD's system in the Delta instead of or in addition to the CVP and SWP pumps in the southern Delta. This will increase reliability and flexibility for Valley Water. The project would also facilitate other potential regional projects. This project is a partnership between CCWD, Valley Water, and agencies in the Bay Area and Central Valley as part of the larger Los Vaqueros Reservoir Expansion Project.

South County Recharge includes increasing groundwater recharge capacity in the northern end of the Llagas Subbasin, either through reoperation of existing facilities or connecting existing facilities to additional water sources. This will enable Valley Water to capture more wet season water, more effectively manage supplies, and maintain groundwater levels during droughts.

Both the Transfer-Bethany Pipeline portion of the Los Vaqueros Reservoir Expansion and the Pacheco Reservoir Expansion increase Valley Water's water supply operations flexibility and increase emergency water storage. The State, which conditionally approved more than $450 million for each of the projects, recognizes that those projects also provide ecosystem improvements, recreation opportunities, and/or flood protection benefits.

The three projects – South County Recharge, Pacheco, and Transfer-Bethany Pipeline – would increase system flexibility and/or emergency supply and would also provide a combined average annual yield of about 11,500 AFY.

3.2 Water Supply Reliability Improvements Meet the Level of Service Goal

The Valley Water Board approved an updated long-term water supply reliability level of service goal on January 14, 2019 (Appendix G, Board Agenda Memorandum for January 14, 2019). The goal is to develop supplies to meet at least 100 percent of annual water demand identified in the Valley Water's Master Plan during non-drought years and at least 80 percent of annual water demand in drought years. This level of service goal balances the goals of minimizing shortages and costs. The community demonstrated its ability to manage shortages by achieving water use reductions of almost 30 percent in the 2012 to 2016 drought.

The Master Plan projects (Delta Conveyance Project, Additional Conservation and Stormwater Projects and Programs, Potable Reuse Program, Pacheco Reservoir Expansion, Transfer-Bethany Pipeline, and South County Recharge), along with the baseline supplies and infrastructure, meet the water supply reliability level of service goals, even though there are small supply shortages in demand years 2020 – 2030. The Master Plan projects will exceed Valley Water's newly-adopted level of service goal beginning in 2035. Rather than adding a project to address any small shortages (no more than 10,000 AFY), these small shortages will be managed through the monitoring and assessment plan discussed in Chapter 4.

Figure 10 and Table 4 shows average water supply use and non-drought year demands in five-year increments through 2040. Average supplies are less than demands in some years because the supply reflects how much water supply the county can expect to receive and manage. Projected demands could exceed water supplies during drought years without directed water use reductions.

Master Plan Projects:

- Delta Conveyance Project
- Additional Conservation and Stormwater Projects and Programs
- Potable Reuse Program
- Pacheco Reservoir Expansion
- South County Recharge
- Transfer-Bethany Pipeline

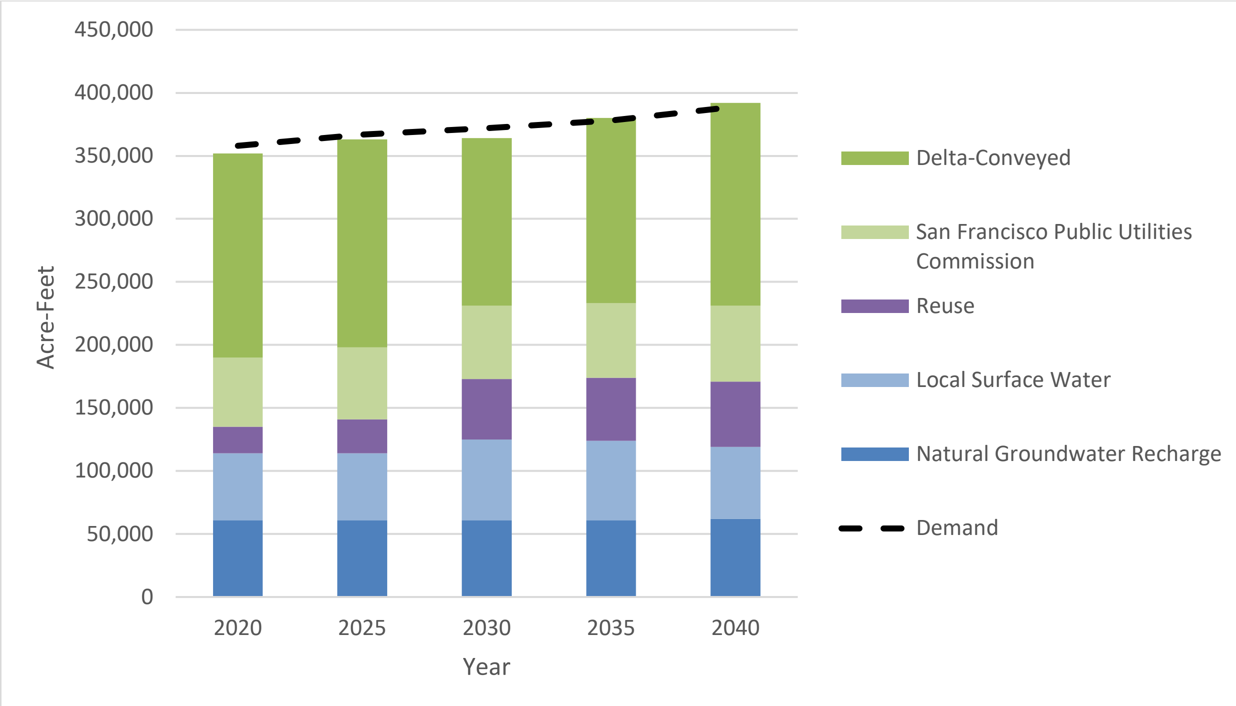


Figure 10. Average Water Supplies with Master Plan Projects

Table 4. Average Water Supplies with Master Plan Projects (AF)

Supply	2020	2025	2030	2035	2040
Natural Groundwater Recharge	61,000	61,000	61,000	61,000	62,000
Local Surface Water	53,000	53,000	64,000	63,000	57,000
Reuse	21,000	27,000	48,000	50,000	52,000
San Francisco Public Utilities Commission	55,000	57,000	58,000	59,000	60,000
Delta-Conveyed*	162,000	165,000	133,000	147,000	161,000
Average Supply	**353,000**	**363,000**	**364,000**	**379,000**	**391,000**
Demand	**358,000**	**367,000**	**372,000**	**378,000**	**389,000**

* Current Delta supplies are expected to decrease in future years, and new supplies may be provided. These values include both the expected gains and losses of supplies over time.

Figure 11 and Table 5 shows water supplies during an extended drought similar to the one that occurred from 1987 to 1992 with the Ensure Sustainability water supply strategy in place and the 2040 demand level. With the Ensure Sustainability strategy in place, the supplies are sufficient to meet 100 percent of demand during the first five years of drought and more than 90 percent in the last year.

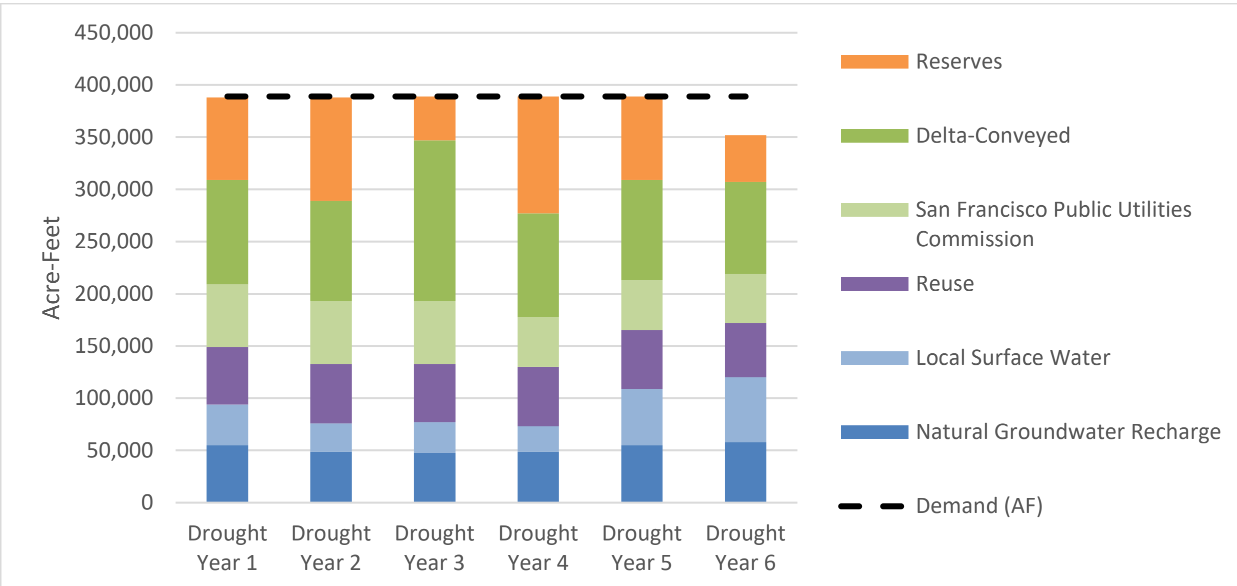


Figure 11. Water Supply Use During an Extended Drought based on 2040 Demands with Master Plan Projects included

Table 5. Water Supply Use During an Extended Drought based on 2040 Demands (AF)

Source of Supply	Drought Year 1	Drought Year 2	Drought Year 3	Drought Year 4	Drought Year 5	Drought Year 6
Natural Groundwater Recharge	55,000	49,000	48,000	49,000	55,000	58,000
Local Surface Water	39,000	27,000	29,000	24,000	54,000	62,000
Reuse	55,000	57,000	56,000	57,000	56,000	52,000
San Francisco Public Utilities Commission	60,000	60,000	60,000	48,000	48,000	47,000
Delta-Conveyed	100,000	96,000	154,000	99,000	96,000	88,000
Reserves*	79,000	99,000	42,000	112,000	80,000	45,000
Total Supply	**389,000**	**389,000**	**389,000**	**389,000**	**389,000**	**352,000**
Shortfall	**0**	**0**	**0**	**0**	**0**	**37,000**

* Water in storage used to meet demands.

Implementation of the Ensure Sustainability water supply strategy would reduce the frequency and magnitude of short-term water use reductions under 2040 demands. Figure 12 shows shortages with and without the Master Plan projects. The small blue area shows that, with full implementation of all elements of the water supply strategy, short-term water use reductions would occur only three percent of the time, and the maximum call for water use reductions would be 20 percent. If only baseline investments are made, illustrated by the orange area in Figure 12, the model predicts that water use

reductions would occur about 40 percent of the time, and the level of short-term water reductions could be as high as 50 percent. Water use reductions this high would necessitate water use restrictions and impact the local economy. Water use reductions would be needed almost half the time, and in some years, water supply would only be available to meet health and safety needs.

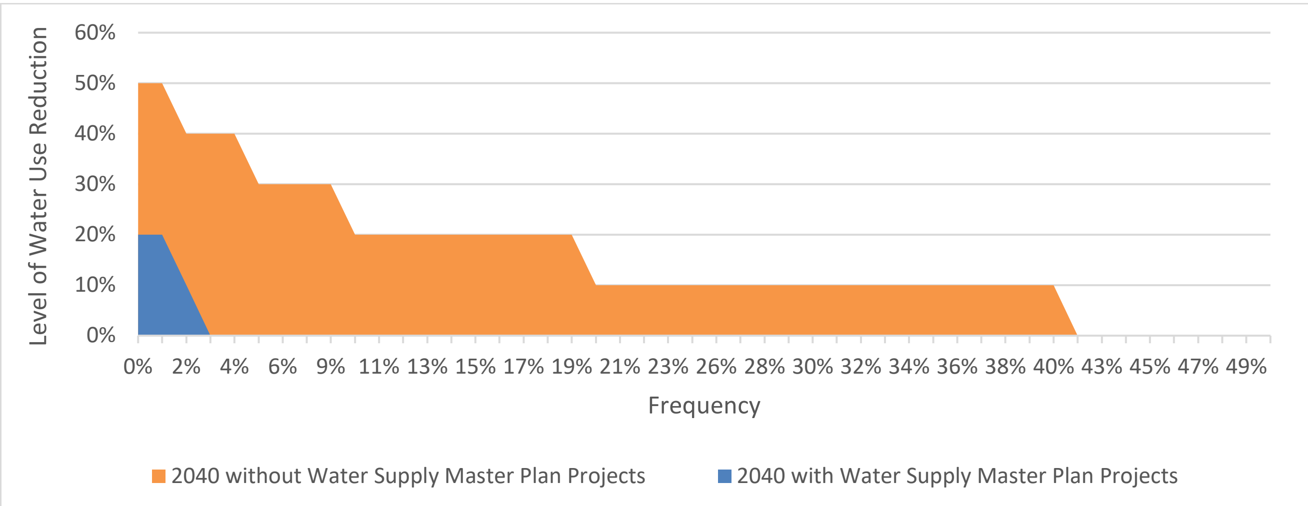


Figure 12. Water Use Reductions under Different Investment Scenarios

3.3 The Water Supply Strategy Supports Other Important Benefits

The key benefit of the Ensure Sustainability strategy is that it develops potable reuse and conservation, which are local drought-resistant supplies, to achieve Valley Water's strategy to develop supplies to meet at least 80 percent of demands during drought years. The Master Plan also achieves the following other planning objectives, which are described in Appendix A:

- Maintaining Groundwater Storage: Groundwater storage is in the Normal stage of Valley Water's water shortage contingency plan in more than 95 percent of modeled years due to the combination of projects in the Master Plan. In the Llagas Subbasin, South County Recharge projects (Butterfield Channel and/or San Pedro Ponds) will help maintain groundwater storage.
- Securing Existing Water Supplies: The Ensure Sustainability strategy includes implementing FAHCE to secure existing local water rights, retrofitting dams to remove operating restrictions, and participating in the Delta Conveyance Project to maintain existing imported water supplies.
- Maximizing Water Conservation and Water Use Efficiency: The Additional Conservation and Stormwater Projects and Programs increase the Valley Water's water conservation savings target to 109,000 AFY by 2040 and adds stormwater capture projects. The strategy also includes increasing countywide reuse to 52,000 AFY in 2040, which exceeds Valley Water's goal of water reuse meeting at least 10 percent of countywide demand.
- Protecting Groundwater Quality: Potable reuse will increase recharge using highly purified water, which will help maintain or improve groundwater quality in northern Santa Clara County. The

Delta Conveyance Project will help maintain current salinity levels in imported water supplies used for groundwater recharge.

- Meeting Drinking Water Regulations: Delta Conveyance Project should help maintain current salinity levels in imported water supplies used at drinking water treatment plants. Pacheco Reservoir and Transfer-Bethany Pipeline will increase Valley Water's flexibility in where it can obtain water from to send to treatment plants, which will help avoid water quality issues in San Luis Reservoir and the Delta.
- Maximizing Valley Water Influence over Supplies and Operations: Pacheco Reservoir, Transfer-Bethany Pipeline, and South County Recharge will increase Valley Water's ability to manage variability in water supplies and respond to emergencies. Pacheco Reservoir, Transfer-Bethany Pipeline, reuse, and Additional Conservation and Stormwater Projects and Programs will involve partnerships with other agencies, which will increase regional cooperation.
- Allowing for Phased Implementation of New Projects and Programs: Chapter 4 describes how the Master Plan projects and programs will be phased in over time. This will allow Valley Water to adjust to changes in demand and supply projections, as well as changes in project definitions.

The Pacheco Reservoir Expansion Project will increase storage capacity in Pacheco Reservoir from about 6,000 AF to over 140,000 AF.

- Adapting to Climate Change: All the elements of the Ensure Sustainability strategy adapt to climate change. Delta Conveyance Project addresses changes in runoff patterns and sea level rise in the Delta. Additional Conservation and Stormwater Projects and Programs will reduce demands for water. Reuse develops drought-resilient supplies that help carry us through dry periods. Pacheco Reservoir, Transfer-Bethany Pipeline, and South County Recharge add flexibility to the system to take advantage of increased storm intensity.
- Protecting and Restoring Creek, Bay, and Other Aquatic Ecosystems: The California Water Commission, which has conditionally awarded $485 million to the Pacheco Reservoir project, found that the project may benefit steelhead habitat in Pacheco Creek downstream of the reservoir. Implementing FAHCE will support native fisheries in Santa Clara County.
- Fulfilling Reasonable Customer Expectations for Good Service: The Master Plan projects improve water supply reliability throughout the county.
- Providing Natural Flood Protection and/or Reduced Potential for Flood Damages: The Additional Conservation and Stormwater Projects and Programs will keep stormwater on site and/or reduce discharges to stormwater facilities. The Pacheco Reservoir could also provide flood benefits to San Benito County by attenuating peak flows entering the reservoir and lowering water levels in Pacheco Creek and Pajaro River downstream.

Another important benefit of the Ensure Sustainability strategy is that it would reduce reliance on imported water supplies, which Valley Water measures by the percent of imported supplies in its water supply portfolio, as a result of increases in water use efficiency and conservation. A more diverse portfolio of supplies will be more resilient to risks and uncertainties, including climate change, than a portfolio with increased reliance on imported water supplies. Imported supplies are particularly vulnerable to climate change and regulatory actions like the Bay Delta Water Quality Control Plan. State policy, as stated in the Delta Reform Act of 2009 (California Water Code Section 85021), is to "*reduce reliance on the Delta in meeting California's future water supply needs through a statewide strategy of investing in improved regional supplies, conservation, and water use efficiency. Each region that depends on water from the Delta watershed shall improve its regional self-reliance for water through investment in water use efficiency, water recycling, advanced water technologies, local and regional water supply projects, and improved regional coordination of local and regional water supply efforts.*"

Figure 13 shows how the mix of countywide supplies would change between 2020 and 2040.   The significant changes are in reuse and Delta-conveyed supplies. Delta-conveyed supplies decrease from 46 percent of countywide supply in 2020 to 41 percent in 2040. Reuse increases from six percent of countywide supply in 2020 to 13 percent in 2040. In addition to the seven percent increase in reuse, long-term water conservation program savings are projected to increase from about 80,000 AFY in 2020 to about 109,000 AFY in 2040.

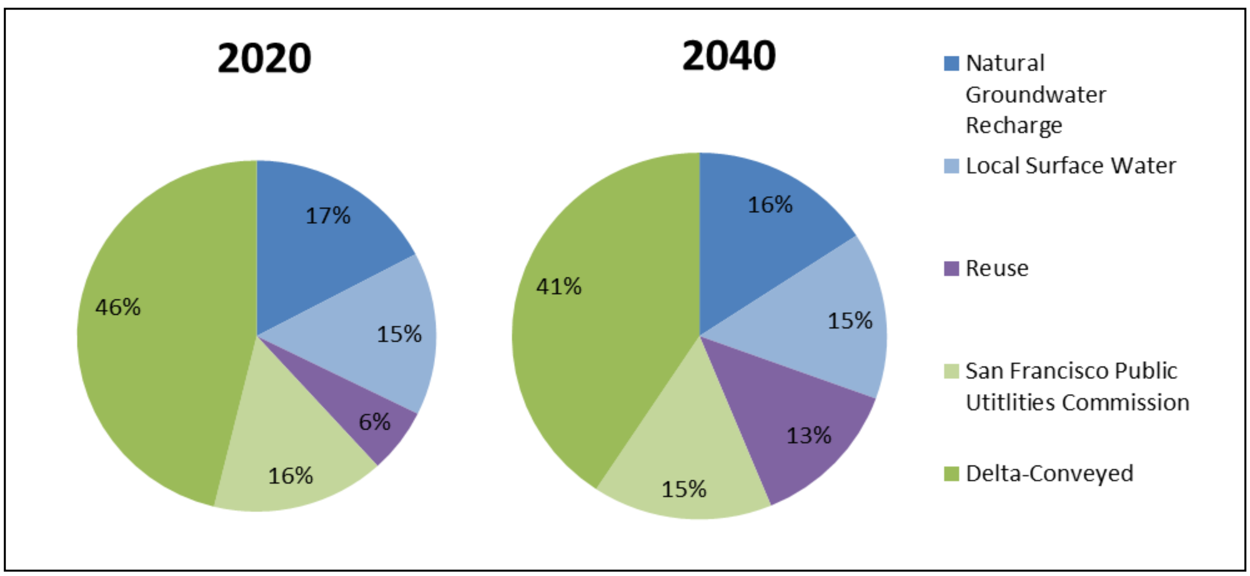


Figure 13. Change in Water Supply Mix over Time with WSMP Projects

3.4 The Ensure Sustainability Strategy is Consistent with Stakeholder Input

The Ensure Sustainability strategy incorporates stakeholder input, through several forums, including Board meetings, stakeholder meetings, Board Advisory Committee meeting, Board Committee meetings, retailer meetings, and a voter survey. Input received through January 14, 2019 is summarized in Appendices E and G (2017 Voter Survey and Board Agenda Memorandum January 14, 2019).

Stakeholders support a reliable water supply, affordable rates, and projects and programs related to water conservation, water reuse, and stormwater capture. The water supply reliability level of service and Ensure Sustainability strategy balances interests in water supply reliability and impacts on rates. Additional reuse and the Additional Conservation and Stormwater Projects and Programs are critical elements of the water supply strategy. Some of the projects in the Master Plan are not as universally supported as water reuse and the Additional Conservation and Stormwater Projects and Programs, but they address many stakeholders' interests. For example, Delta Conveyance Project is generally opposed by environmental groups. However, the project will secure Delta-conveyed water supplies at a much lower cost than some other projects, which addresses other stakeholders' interests related to costs and water supply reliability. Expanded storage is favored by voters, and Pacheco Reservoir can provide expanded storage. However, there is some opposition in the environmental community to new surface reservoirs.

3.5 The Ensure Sustainability Strategy Balances Risks and Costs

Valley Water evaluated the costs and risks associated with projects being considered for this Master Plan (Table 6). Risks were considered in four categories – stakeholder, implementation, operations, and cost. Stakeholder risks include public perception, regulatory restrictions, and partnerships. Implementation risks include construction complexity and phasing potential. Operation risks include climate change and uncertainty in long-term operations and maintenance. Cost risks include stranded assets and financing security. In general, lower-cost projects and/or local projects have lower risks than higher cost and more complex projects. The projects in the Master Plan have a balanced risk profile, with some projects considered low risk (most of the Additional Conservation and Stormwater Projects and Programs and South County Recharge), some considered medium risk (potable reuse, Pacheco Reservoir, and Transfer-Bethany Pipeline), and some considered high risk (Delta Conveyance Project). The Risk Ranking report and additional information is included in Appendix F.

Valley Water also evaluated the costs and economic benefits of improved water supply reliability associated with different projects and water supply strategies (Appendix B, Cost Analysis Methodology). Other water supply strategies included: local flexibility, regional flexibility, local storage, regional storage and statewide storage projects. The Delta Conveyance project costs were Board approved on October 17, 2017 and continue to be used until given other direction. The Ensure Sustainability strategy costs more than the other water supply strategies, but, as discussed above, it meets multiple objectives, addresses multiple stakeholder interests, and balances risk. The economic analysis of the Master Plan portfolio of projects determined the water supply reliability benefits exceed the costs. The present value of the avoided water supply shortages (benefits) is about $2.4 billion, and the present value cost of the Master Plan projects is about $2.1 billion, for a benefit:cost ratio of about 1.15. This calculation does not include

benefits associated with ecosystem improvement, emergency storage, flood risk reduction, or water quality. Nor does it include costs associated with potential increases in greenhouse gas emissions from potable reuse and Pacheco Reservoir. Table 7 shows the reduction in the frequency and severity of shortage with the Master Plan projects and the economics associated with the water supply reliability improvements.

Table 6. Master Plan Project Costs and Risks

Project	Average Annual Yield (AFY)	Valley Water Lifecycle Cost[3]	Unit Cost (AF)	Risk
Delta Conveyance Project	41,000	$630 million	$600	High/ Extreme
Additional Conservation & Stormwater Projects	11,000	$100 million	$400	Medium
Potable Reuse	19,000	$1.2 billion	$2,000	Medium
Pacheco Reservoir Expansion[1]	6,000[2]	$340 million[4]	$2,000	Medium
Transfer-Bethany Pipeline[1]	3,500	$78 million	$700	Medium
South County Recharge	2,000	$20 million	$400	Medium

Ultimately the amount of project yield and benefit that is usable by Valley Water depends on the portfolio of water supply projects that Valley Water ultimately implements and the outcome of ongoing regulatory processes.

[1] Assumes Prop. 1 Water Storage Investment Program (WISP) funding. Costs would roughly double without funding.

[2] From the Prop. 1 Water Storage Investment Program (WISP) application.

[3] Valley Water lifecycle costs are presented in 2018 present value dollars. Lifecycle cost is a 100-year cost.

[4] Assumes project cost of $1.3 billion with 3% inflation. Project assumes Prop. 1 funding ($484.5 million), WIIN funding ($250 million) WIFIA loan (49% at 35-year amortization at 3.7% interest), and partner agencies pay 20% of the project. [Valley Water Board Agenda October 8, 2019]

Table 7. Water Supply Reliability Benefits and Costs

	Without Projects	With Projects
Number of Years (out of 94) with Shortages	38	2
Maximum Shortage/Water Use Reduction	50%	20%
Present Value of Benefits (2018$)	Not applicable	$2.1 billion
Present Value of Costs (2018$)	Not applicable	$2.4 billion
Benefit:Cost Ratio	Not applicable	1.15

The estimated impacts on municipal and industrial groundwater production charges from the implementation of the Master Plan in Fiscal Year 2040 are an incremental $1,116/AF in Zone W-2 (North County) and an incremental $187/AF in Zone W-5 (South County). The average annual increase over the next 20+ years in North County groundwater charges is 4.6 percent versus about 2.6 percent without implementation of the Master Plan. In South County, the average annual increase is 5.6 percent versus about 4.9 percent without the Master Plan. This projection is based on the groundwater production

charge analysis in Valley Water's Protection and Augmentation of Water Supplies 2019-2020 (Santa Clara Valley Water District, 2019), which does not include costs for the CVP portion of Delta Conveyance Project due the uncertainty with the amount and timing of costs and assumes external funding for most of the Pacheco Reservoir capital costs. This year's groundwater production and surface water charge setting process will be conducted consistent with the District Act, and Board Resolutions 99-21 and 12-10. While recognizing the Supreme Court found Proposition 218 inapplicable to groundwater production charges, only the surface water charge setting process will mirror the process described in Proposition 218 for property-related fees for water services. Additional financial information may be found in Valley Water's annual Protection and Augmentation of Water Supplies (PAWS) report, available at valleywater.org. Figure 14 shows the anticipated impacts of the Master Plan projects on groundwater production charges.

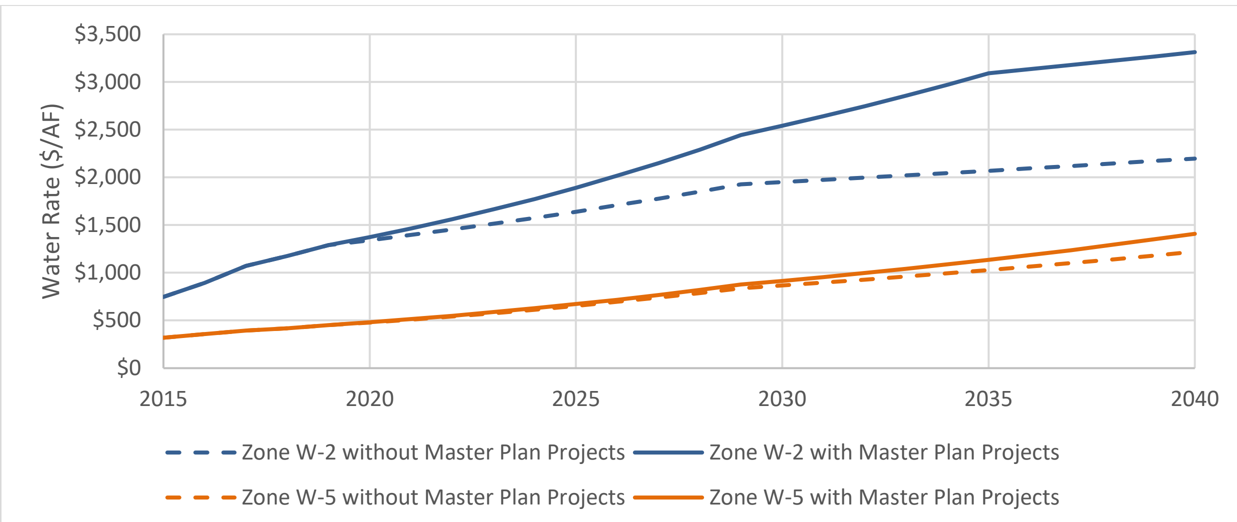


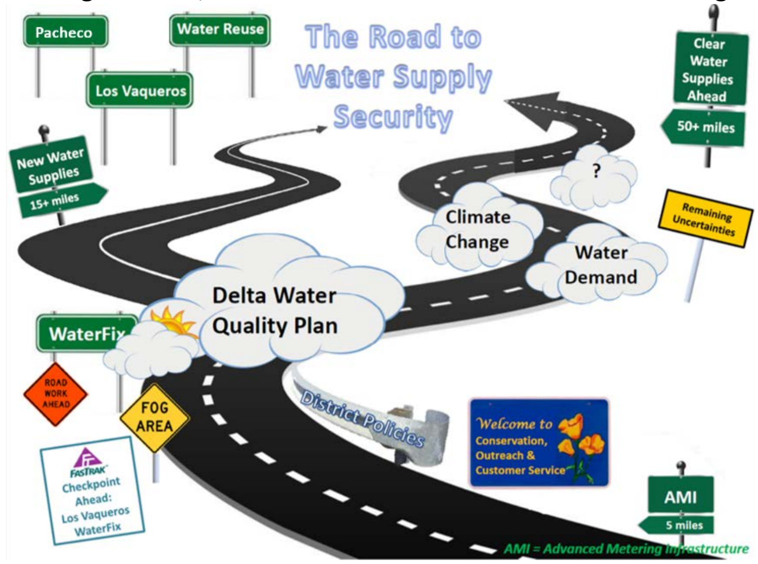
Figure 14. Municipal and Industrial Groundwater Production Charge Impacts from Master Plan

Valley Water may be able to reduce groundwater production charge impacts if the following opportunities become available in the future:

- Direct potable reuse is permitted and accepted by the community and regulatory agencies;
- Advanced treatment technologies become less expensive, more efficient, or both;
- Additional partners join the Pacheco Reservoir project;
- Cities and Valley Water agree on approaches for impact fees to benefit Master Plan projects;
- Cities implement stormwater projects with Valley Water cost-sharing;
- Projects are funded through special taxes (i.e. State Water Project Tax) or other funding mechanisms; and/or
- Projects are postponed because demands remain flat.

4 The Monitoring and Assessment Plan (MAP) Will Help Keep Valley Water on Track

A primary purpose of the Master Plan is to inform investment decisions; therefore, a critical piece of the plan is the annual Monitoring and Assessment Plan (MAP). The MAP will monitor and report on demands, supplies, and the status of projects and programs in the Master Plan so the Valley Water Board can use that information in its annual strategic planning sessions, which inform the annual water rate-setting process, Capital Improvement Program (CIP), and budget processes. Monitoring will identify where adjustments to the Master Plan might be needed to respond to changed conditions. Such adjustments could include accelerating or delaying projects due to changes in the demand trend, changing projects due to implementation challenges, adding projects due to lower than expected supply trends, etc. The MAP is an important tool for Valley Water to continuously assess its current water supplies, demands, and progress of the portfolio of Master Plan projects and to evaluate the next steps if milestones are not met. This chapter presents the Master Plan's Monitoring and Assessment Plan (MAP) for keeping the Ensure Sustainability strategy on track.



The road to water supply reliability has many obstacles. The MAP will help keep Valley Water on track. Graphic courtesy of Alameda County Water District.

4.1 The Master Plan Will be Implemented over the Next 20 Years

The first part of the MAP is the planned schedule for implementation of the Master Plan projects. The schedule is based on Valley Water's current understanding of project schedules, yields, and costs. Table 8 summarizes the schedule for constructing/implementing the various projects and programs in the Master Plan. In addition, each of the projects has its own detailed project plan and is reported on at Valley Water Board committee meetings. The project summaries are in Appendix H. Significant milestones, and risks and uncertainties for the individual projects and programs are discussed below.

4.1.1 Delta Conveyance Project

The Delta Conveyance Project is intended to secure Delta-conveyed supplies. The effort, previously known as the California WaterFix, has been in planning for over a decade. An Environmental Impact Statement/Environmental Impact Report (EIS/EIR) was completed on the two-tunnel project. The two-tunnel California WaterFix project is being revised to a single tunnel (Delta Conveyance Project) and will require new environmental analysis. The project will need to secure permits, resolve legal issues, and secure financing.

Table 8. Implementation Schedule

Project	Now – 2024	2025 – 2029	2030 – 2034	2035-2039
Delta Conveyance Project	• Planning • Permitting	• Permitting • Design	• Design • Construction	Operation
Additional Conservation & Stormwater Projects and Programs	Design and begin implementing additional conservation and stormwater projects and programs.	Support implementation of additional conservation and stormwater projects and programs.	Support implementation of additional conservation and stormwater projects and programs.	Support implementation of additional conservation and stormwater projects and programs.
Potable Reuse Program	• Complete Countywide Reuse Plan • MOU(s) with wastewater provider (s) • Select P3 entity, if applicable • EIR • Design	Construction	Operation	Operation
Pacheco Reservoir Expansion	• EIR/Feasibility Study • Permitting • Planning and Design	Construction	Operation	Operation
Transfer Bethany Pipeline	• EIR/Feasibility Study • Permitting • Planning, Design, and Construction	Operation	Operation	Operation
South County Recharge		Planning, Design, and Permitting	Construction	Operation

The benefits of the project to Valley Water's CVP supplies are unclear because sufficient CVP participation in the project has not been secured, and the project may only secure State supplies.

Other projects that could potentially help secure Delta-conveyed supplies include Sites Reservoir, long-term transfers of SWP contract supplies, and other long-term transfer and exchange agreements. Valley Water will continue to monitor these opportunities and will review the cost escalation of any project via the WSMP Monitoring and Assessment Plan (MAP).

4.1.2 Additional Conservation and Stormwater Projects and Programs

The Additional Conservation and Stormwater Projects and Programs will reduce water demands by about 10,000 AFY and increase natural groundwater recharge by about 1,000 AFY when fully implemented by the end of the planning horizon. Three of the projects – rain garden rebates, rain barrel/cistern rebates, and graywater program expansion have already been implemented. Implementation plans and potential issues for the remaining elements are summarized below.

- Advanced Metering Infrastructure (AMI): Valley Water partnered with the Bay Area Water Supply and Conservation Agency on a study that identified each water retailer's metering and related system, data gaps, and potential for collaborative procurement for AMI as an option for the region. This research, along with lessons learned from the pilot studies funded by Valley Water's Water Conservation Research Grant Program (funding through Safe, Clean Water), will help inform the direction of a future AMI Program, so that it can be as cost effective and as impactful as possible. The key issue that needs to be resolved is investor-owned utility concerns about cost distribution.
- Leak Repair Incentives: Valley Water, in coordination with the water retailers, will implement a customer-side leak repair incentive program after studying the AMI results.

Graywater from clothes washers can be used to water fruit trees, shrubs, vines, and some vegetables.

- Graywater Rebate Program Expansion: Expand Valley Water's existing rebate program for laundry-to-landscape graywater systems.
- Rain Barrels, Rain Gardens, and Cistern: Initiate a Valley Water rebate program to incentivize the installation of rain barrels and cisterns, and the construction of rain gardens in residential and commercial landscapes.
- Model Water Efficiency New Development Ordinance: The Model Water Efficiency New Development Ordinance has been finalized. The ordinance has the following main requirements on new development:
    - o Require hot water recirculation for single-family development;
    - o Pre-plumb all new single-family development for graywater collection, treatment, and redistribution;

  - Pre-plumb all new multi-family and non-residential development for alternative water sources;
  - Mandate reuse water connections for common areas in HOA developments; and
  - Outlaw the sale of non-compliant fixtures.

  Valley Water will begin working with all the county's jurisdictions on adoption in 2019. Valley Water's role will be to encourage ordinance adoption and implementation and provide technical assistance. One challenge with getting jurisdictions to adopt the policy is concern about imposing additional requirements on new development. This concern could be offset in jurisdictions that are developing climate action plans, because model ordinance implementation would reduce energy use and greenhouse gas emissions.
- Flood-Managed Aquifer Recharge (Flood-MAR): Valley Water is currently working to develop a pilot program for capturing and recharging stormwater on open space, a process referred to as Flood-MAR. The pilot program will help identify and develop strategies for collaborating with private land owners and other agencies, assessing appropriate cost-sharing amounts, and evaluating the groundwater benefit of Flood-MAR to Santa Clara County residents. The work plan is scheduled for completion in 2019.
- Centralized Stormwater Capture Projects: Includes development of two centralized stormwater capture projects in northern Santa Clara County. Centralized stormwater capture projects capture stormwater from multiple parcels for recharge in a single location and/or are municipal projects, including "green streets" projects. The Santa Clara Basin Storm Water Resources Plan completed in December 2018 identified potential projects throughout northern Santa Clara County. These projects would likely be partnerships with other jurisdictions and require outside funding, so their schedules are yet to be determined. Valley Water will continue to track project opportunities through our participation in the Santa Clara Valley Urban Runoff Pollution Prevention Program. In addition, Valley Water is continuing planning for the Upper Penitencia Creek flood protection project, which could include some stormwater retention components.

Green infrastructure and stormwater capture can provide multiple benefits, including improved water quality, reduced runoff, and groundwater recharge.

The greatest risks and uncertainties with water conservation programs is the level of active participation by residents, businesses, and governments. This risk is mitigated by the fact that new technologies and standards provide for currently unforeseen opportunities. The greatest risk for implementing stormwater projects is finding willing partners for projects that are cost-effective for Valley Water's water supply program. This risk is somewhat mitigated by regulatory requirements for stormwater management and green infrastructure that will provide water supply benefits.

4.1.3 Potable Reuse Program

The Ensure Sustainability strategy includes a Potable Reuse Program to increase drought supplies, adapt to climate change, and manage risks to imported water supplies. Valley Water is completing a Countywide Water Reuse Master Plan (Reuse Plan) that will identify a preferred mix of non-potable and potable reuse, reverse osmosis concentrate management strategies, and different alternatives for achieving the 24,000 AFY of reuse. The placeholder for the Potable Reuse Program is an indirect potable reuse project at the Los Gatos Ponds.

Reverse osmosis is one step in the advanced treatment process for purified wastewater.

Some of the challenges and uncertainties with the project are securing a source of wastewater, reverse osmosis concentrate management, potentially using a public-private partnership (P3) procurement for the first time, timing of regulations for direct potable reuse, and determining the mix of non-potable and potable reuse that best meets countywide interests. Near-term milestones include executing an agreement (or agreements) with a wastewater provider (or providers).

Other projects that could help achieve the 24,000 AFY of reuse include groundwater recharge at alternative locations than Los Gatos Ponds, groundwater injection wells, augmenting drinking water treatment supplies with purified water (direct potable reuse), expanded non-potable reuse, Regional Desalination/Brackish Water Treatment, and the Refinery Recycled Water Exchange Project.

4.1.4 Pacheco Reservoir Expansion

The expanded Pacheco Reservoir would optimize the use of existing supplies by increasing in-county storage. Project planning is underway, but several significant milestones need to be achieved before January 1, 2022 to remain eligible for State funding. These milestones include completing a feasibility study, preparing a draft EIR, and determining non-State funding. Risks and uncertainties include potentially significant environmental and cultural resource impacts, streamflow requirements for fisheries, and water rights.

Alternative projects that Valley Water will monitor and could provide similar benefits include expanding existing in-county reservoirs, Lexington Pipeline, and Los Vaqueros Reservoir Expansion.

4.1.5 Transfer-Bethany Pipeline

Transfer-Bethany Pipeline, which is one element of the larger Los Vaqueros Reservoir Expansion Project, would optimize the use of existing supplies and increase operational flexibility by enabling Valley Water to move water from Contra Costa Water District's intakes in the Delta to Valley Water's system without relying on south-of-Delta CVP and SWP pumps. This project is subject to the same State requirements for Proposition 1 funding as Pacheco, but the Los Vaqueros feasibility and environmental documents are nearly complete. Nevertheless, the project currently involves nine (9) local agency partners, so project financing and operating agreements will be complex, and water rights changes will be required. Valley

Water continues to evaluate the benefits of this project as more information becomes available. Evaluation includes performing water supply modeling, assessing the capital, operation and maintenance, and repair and rehabilitation costs, as well as investigating the appropriate governance structure. Regular project updates are provided at the Board's Water Storage Exploratory Committee.

Lexington Pipeline could serve as another mechanism to optimize the use of existing supplies as it conveys water from the Lexington Reservoir to the raw water conveyance system.

4.1.6 South County Recharge

South County recharge optimizes the use of existing supplies by increasing groundwater recharge capacity in the Llagas Subbasin. Modeling currently indicates that a south county recharge project should be on line by 2035. Valley Water will continue to consider alternative recharge projects, including expanding local reservoirs or a South County Water Treatment Plant.

One option for increasing South County recharge is to extend the Madrone Pipeline to Morgan Hill's Butterfield Channel.

4.1.7 Other Plans and Projects

Valley Water has multiple plans and programs that support the implementation of the Ensure Sustainability strategy and Master Plan, including the Groundwater Management Plan, Asset Management Plan, Recycled and Purified Water Program, Raw Water Master Plan, Imported Water Program, and Dam Safety Program. Implementing these plans and programs is critical to securing existing supplies and infrastructure consistent with the Ensure Sustainability strategy. In addition, the following activities support the implementation of the Master Plan:

- Demand Projection Update: Valley Water is reviewing its current demand projection and anticipates updating the projection in 2020 to update the demand modeling methodology and to account for actual water use following the 2012 to 2016 drought.
- Groundwater Recharge Assessment: This special study will identify strengths, weaknesses, opportunities, and threats associated with Valley Water's in-county groundwater recharge program. It will identify potential future projects for maintaining or increasing recharge capacity under a changed climate, increased regulations on instream operations, and potential Sustainable Groundwater Management Act requirements. Projects could include additional off-stream recharge ponds, additional stormwater capture projects, and Flood-Managed Aquifer Recharge.
- Ongoing Project Participation: Valley Water will continue to track and participate in projects that could serve as alternatives to the Master Plan projects, including Los Vaqueros Reservoir Expansion, Refinery Recycled Water Exchange, Regional Desalination/Brackish Water Treatment, Sites Reservoir, and long-term transfers of imported water contracts. See Appendix H.
- Coordination with Retailers: Valley Water will continue to coordinate with retailers to track groundwater pumping and treated water demand, and on broader water conservation projects.

4.2 Other Policies, Plans, and Programs May Affect Implementation

The second step of the MAP is to manage unknowns and risks through regular monitoring and assessment. Master Plan monitoring and assessment will build on regular project reports and the annual water supply outlook and look at how different deviations from the plan affects the long-term water supply reliability outlook. Staff will also evaluate how changing external factors such as changes in policy, regulations, and scientific understanding affect the long-term water supply reliability outlook. This section describes some of the activities, beyond monitoring the Master Plan projects and alternative projects.

4.2.1 Making Conservation a Way of Life

The California legislature and governor passed Senate Bill 606 (Hertzberg) and Assembly Bill 1668 (Friedman) into law in 2018 to improve water conservation and drought planning. Pursuant to the legislation, DWR and the State Water Resources Control Board (State Water Board) are developing new standards for indoor residential water use; outdoor residential water use; commercial, industrial, and institutional water use for landscape irrigation with dedicated meters; and water loss. Retail urban water supplies will be required to stay within annual water budgets based on these standards for their service areas. The methodologies for determining the annual water budgets are still being developed, so it is unclear how the standards may affect Valley Water's long-term water supply reliability outlook. Valley Water already has aggressive water conservation targets of 99,000 AFY of savings by 2030 and 109,000 AFY of savings by 2040. However, the new standards could further drive down water use and reduce or postpone the need for some Master Plan projects.

4.2.2 Fisheries and Aquatic Habitat Collaborative Effort

The Fisheries and Aquatic Habitat Collaborative Effort (FAHCE) was a process established to resolve a 1996 complaint with the State Water Resources Control Board over Valley Water's use of its appropriative water rights in the Stevens Creek, Coyote Creek, and Guadalupe River watersheds (Three Creeks). In 2003, Valley Water initialed a Settlement Agreement regarding water rights with the Guadalupe-Coyote Resource Conservation District, the California Department of Fish and Wildlife, U. S. Fish and Wildlife Service and National Marine Fisheries Service and a group of non-governmental organizations, including Trout Unlimited, Pacific Coast Federation of Fishermen's Associations, California Trout, Urban Creeks Council and the Northern California Council of Federation of Fly Fishers.

Stevens Creek after restoration efforts.

The Settlement Agreement provides a roadmap for resolving the water rights complaint by balancing the use of Three Creeks waters for meeting the County's water supply needs, while improving habitat conditions for fish in the Guadalupe River, Coyote Creek, and Stevens Creek watersheds through:

- Modifications to reservoir operations to provide instream flows;

- Restoration measures to improve habitat conditions and provide fish passage; and
- Monitoring and adaptive management.

Valley Water is currently preparing a Fish Habitat Restoration Plan (FHRP) and EIR. These will be used to request modifications to Valley Water's appropriative water rights in the Three Creeks and obtain resource agency permits to implement the FHRP.

Changes to Valley Water's reservoir operations in the Three Creeks that are made through the FHRP or FAHCE adaptive management program may result in impacts to Valley Water's local water supply, but the nature of those impacts have yet to be determined.

4.2.3 Bay-Delta Water Quality Control Plan

The State Water Resources Control Board recently amended the Bay-Delta Water Quality Control Plan (Bay-Delta Plan) to establish flow and revise salinity objectives for the San Joaquin River and its major salmon bearing tributaries. The amendments could significantly reduce SFPUC's water supply, including water delivered to customers in Santa Clara County, especially during droughts. The flow requirements of the Bay-Delta Plan will not be implemented until updates to the Sacramento River and Delta portions of the Bay-Delta Plan are completed, and an implementation program is adopted through water rights proceedings. The Sacramento River and Delta updates could impose additional flow requirements on the Sacramento River and its tributaries, which is the primary source of Valley Water's State and federal imported water supplies. Hence, such flow requirements imposed by the Bay-Delta Plan are likely to reduce Valley Water's imported water supplies.

The Delta holds historic, cultural, economic, and environmental significance.

Valley Water filed a lawsuit in January 2019 challenging the amendments to the Bay-Delta Plan, asking the state court to determine whether the state has taken proper action to impose a requirement for 40% of unimpaired flow in San Joaquin River tributaries, including the Tuolumne River, within a range of 30-50%. In addition to Valley Water's lawsuit, ten other lawsuits were filed in state court by California public entities and non-profits regarding the Bay-Delta Plan. The Judicial Council of California coordinated these lawsuits for trial before one judge in Sacramento Superior Court. The United States also filed lawsuits challenging the Bay-Delta Plan, one in state court and one in federal court. All of these lawsuits are in their preliminary procedural stages.

While these lawsuits are pending resolution, Valley Water continues to work with state officials, conservation organizations, and other water agencies to develop settlement agreements (otherwise known as "Voluntary Agreements"). The Voluntary Agreements will include habitat restoration and other measures that can benefit fish and wildlife, while reducing the amount of required unimpaired flow specified in the Phase One Amendment and future Bay-Delta Plan amendments.

4.2.4 SFPUC Contracts with San José and Santa Clara

The cities of San José and Santa Clara have interruptible contracts with SFPUC. To make San José and Santa Clara permanent customers, SFPUC needs to secure sufficient supplies to meet the cities' contract amounts. Valley Water and SFPUC are partners in several efforts that could enable SFPUC to grant San José and Santa Clara permanent contract status, including Los Vaqueros Reservoir Expansion Project, Regional Desalination/Brackish Water Treatment, and a pre-feasibility study on potable reuse. Valley Water will continue to collaborate with SFPUC and the cities on efforts to make the cities permanent SFPUC customers.

4.2.5 Land Use Planning

Land use decisions can have significant impacts on demands and water supplies. Decisions to build up rather than out can maintain natural groundwater recharge and reduce per-person water use. Decisions to require water use efficiency measures beyond those mandated in state law can also reduce water use and encourage the use of alternative water supplies. Enforcing requirements for reuse water connections and water-efficient landscapes can reduce demands on potable supplies. Aggressive implementation of stormwater requirements can increase groundwater recharge, as well as provide water quality, flood protection, and environmental benefits.

The water industry is recognizing the importance of greater coordination among land use agencies and water suppliers. In addition to working with land use agencies to implement the Model Water Efficient New Development Ordinance, Valley Water is developing a plan to better coordinate with jurisdictions on land use and water supply planning. Valley Water will continue to look for opportunities to partner with local agencies to discuss the challenges and develop opportunities to protect the County's water supply.

Low impact development includes sustainable land use practices.

4.2.6 Climate Change

The impacts of climate change are already being felt in the Bay Area and northern California, and these changes are projected to increase significantly in the coming decades. Valley Water needs to continue to monitor and improve its understanding of climate change to better incorporate climate change impacts into modeling of future conditions. Valley Water will continue to review and incorporate California Department of Water Resources projections when considering the effects on imported water supplies, which are currently based on near-term climate and growth conditions. Additionally, since Valley Water's local surface water supply projections are based on historic hydrology and demand projections do not utilize a temperature factor, future evaluations would benefit from incorporating additional climate change science and projections. Valley Water will consider these areas and others for

more refined analyses of climate change impacts as critical components to the MAP and future Master Plan updates.

4.2.7 One Water Plan

Valley Water is developing the One Water Plan as a roadmap for integrated water resource planning on a watershed scale in Santa Clara County. It brings state, regional, and local policies together into a countywide framework with goals and objectives for Valley Water's three mission components of flood protection, stream stewardship, and water supply. One Water seeks to provide guidance from an overarching perspective and look for opportunities to further protect and enhance water resources.

The One Water Plan is a long-term endeavor. It offers a framework for incremental, intentional, and measurable improvement in water resources management and watershed conditions short-term and over decades. Within this vision, however, One Water will continue to operate under the current commitments, regulations, restrictions, and challenges that drive Valley Water's day-to-day operations.

4.3 Annual Reporting Will Help Keep the Ensure Sustainability Strategy on Track

The third step of the MAP is to prepare at least annual reports on Master Plan implementation that consider the following elements:

- Demand trends based on actual use, climate change science, and policy and regulatory changes;
- Supply trends based on actual supplies, climate change science, policy and regulatory changes;
- Project status, including current scope, schedule, and budget;
- Funding;
- Risk and uncertainties;
- Population growth; and
- Stakeholder input.

The Valley Water Board of Directors sets policy to provide Silicon Valley safe, clean water for a healthy life, environment, and economy.

The annual reports will include recommended changes to the Master Plan projects, as appropriate, and how those changes would affect water supply reliability, costs and groundwater production charges, risks, and relationships between projects. The annual reports will be presented to the Valley Water Board of Directors in the summer or fall, so the report can help inform the Board's annual strategic planning process and subsequent budget and water rates processes.

The implementation schedule in Section 4.1 will be updated at least annually based on Board direction. This annual cycle will enable Valley Water to adjust the Master Plan projects based on changes to assumptions, funding, supplies, demands, and infrastructure. It is anticipated that major updates to the Master Plan will occur about

every five years, to precede the Urban Water Management Plan updates. The annual reviews and periodic updates will help ensure the Master Plan is living document and it continues to provide a framework for efficient and effective investment in water supply reliability in an environment of uncertainty.

Valley Water cannot forecast the future and identify a specific response for every potential water supply scenario. The path we are on today will look different in the future, near and distant. A balanced, diverse, and sustainable water supply will help us adapt to future challenges. A strong MAP will help us stay on top of challenges and uncertainties and our options for managing them.

5 References

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6 Acronyms

ABAG	Association of Bay Area Governments
AF	Acre-Foot or Acre-Feet
AFY	Acre-Foot per Year or Acre-Feet per Year
AMI	Advanced Metering Infrastructure
Bay-Delta Plan	Bay-Delta Water Quality Control Plan
Board	Valley Water Board of Directors
Central San	Central Contra Costa Sanitary District
CCWD	Contra Costa Water District
cfs	cubic feet per second
CIP	Capital Improvement Program
CVP	Central Valley Project
Delta	Sacramento-San Joaquin Delta
DOT	California Department of Transportation
District Act	Santa Clara Valley Water District Act
DWR	California Department of Water Resources
EIS/EIR	Environmental Impact Statement/Environmental Impact Report
FHRP	Fish Habitat Restoration Plan
FAHCE	Fisheries and Aquatic Habitat Collaborative Effort
Flood-MAR	Flood-Managed Aquifer Recharge
M&I	Municipal and Industrial
MAP	Water Supply Master Plan's Monitoring and Assessment Plan
Master Plan	Water Supply Master Plan
MOU	Memorandum of Understanding
Reuse Plan	Countywide Water Reuse Master Plan
P3	public-private partnership
PAWS	Protection and Augmentation of Water Supplies
SBCWD	San Benito County Water District
SFPUC	San Francisco Public Utilities Commission
State Water Board	State Water Resources Control Board
SWP	State Water Project
UWMP	Urban Water Management Plan
Valley Water	Santa Clara Valley Water District
WEAP	Water Evaluation and Planning
WSCP	Water Shortage Contingency Plan
WUE	Water Utility Enterprise
Zone W-2	Charge zone W-2, as defined by zone boundary in map of Water Utility Zones/ North County
Zone W-5	Charge zone W-5, as defined by zone boundary in map of Water Utility Zones/ South County

Santa Clara Valley Water District
Water Supply Master Plan 2040

Appendices

A. WSMP Planning Objectives
B. Cost Analysis Methodologies
C. Demand Projection Methodology
D. Model Description and Assumptions
E. 2017 Voter Survey
F. Risk Ranking
G. Board Agenda Memorandum for January 14, 2019
H. Project List

Appendix A -WSMP Planning Objectives

Water Supply Master Plan 2040 Planning Objectives

Santa Clara Valley Water District Water Supply Master Plan 2040 Planning Objectives

The Water Supply Master Plan (WSMP) presents Valley Water's strategy for ensuring a reliable, clean water supply to meet future demands. One of the first tasks for such a planning activity is to establish objectives that the agency hopes to achieve through implementation of the plan. The objectives guide development of alternatives and include criteria to measure how well identified strategies meet the objectives. Ultimately, they help develop a recommended strategy to pursue.

Planning objectives were developed for the 2012 Water Supply and Infrastructure Master Plan (WSIMP) by staff, with input from a technical team, Stakeholder Review Committee, management team, and Valley Water Board. These objectives were based on Board policies, and staff worked with stakeholders to rank the objectives. The objectives have been reviewed and updated for proposed use in the Water Supply Master Plan 2040 update.

The proposed planning objectives and sub-objectives for the WSMP are described below. They are listed in order of priority from the 2012 WSIMP. The objectives are broad ideas that Valley Water expects to attain with the plan. With each objective are more detailed sub-objectives, which include evaluation criteria designed to be quantitatively or qualitatively measurable, non-redundant, and clear.

Most of the proposed objectives overlap with objectives in the One Water Master Plan and many may be related to stream stewardship objectives and Safe Clean Water objectives and outcome measures. Development of the WSMP is being coordinated with development of plans addressing other District mission components. Projects that primarily address Valley Water's water supply responsibilities will be included in the WSMP. Projects that are designed to address other components of Valley Water mission will be addressed in the One Water Master Plan and/or other District planning efforts.

The objectives of the WSMP are to:

Objective / Sub-objective	In support of:
1. Provide a Reliable Water Supply for Municipalities, Industries, Agriculture, and the Environment (by):	Board Ends Policy 2.1
Meeting service area demands	CEO Interpretation S 2.4
Maintaining groundwater storage	State Law and Regulations; Board Ends Policy 2.1.1
Securing existing water supplies	Board Ends Policies 2.1.2, 2.1.3, 2.1.4
Reducing reliance on the Delta	State Law and Regulations
Maximizing water conservation and water use efficiency	Board Ends Policy 2.1.5
2. Ensure Drinking Water Quality (by):	
Protecting groundwater quality	State Law and Policy; Board Ends Policy 2.1.1
Meeting drinking water quality regulations	State and Federal Law and Regulations; Board Ends Policy 2.3
3. Minimize Costs (by):	
Minimizing life-cycle costs	Executive Limitation 4.2
4. Maximize Flexibility in the Water Supply System (by):	
Maximizing District influence over supplies and operations	State Law and Policy
Minimizing implementation complexities and barriers	Board Ends Policy 1.3
Allowing for phased implementation of new projects and programs	Executive Limitation 4.2
Adapting to climate change	CEO Interpretation S.2.7
5. Protect the Natural Environment (by):	
Protecting and restoring creek, bay, and other aquatic ecosystems	State and Federal Law; Ends Policy 4.1; FAHCE Initialed Settlement Agreement
Reducing greenhouse gas emissions	Ends Policy 4.3
6. Ensure Community Benefits (by):	
Fulfilling reasonable customer expectations for good service	Executive Limitation EL-2
Improving quality of life in the county through appropriate public access to trails, open space, and District facilities	Ends Policy 4.2
Providing natural flood protection and/or reduce potential for flood damages	Ends Policies 3.1 and 3.2

Objective 1 – Provide a Reliable Water Supply for the County

This objective relates to Board Ends Policy 2.1 "Current and future water supply for municipalities, industries, agriculture and the environment is reliable." Valley Water strives to meet water demands throughout the county under all water supply conditions by maintaining a diverse mix of water supplies and a reliable infrastructure system. One of strengths of Valley Water's water supply and infrastructure system is the inter-connected nature of Valley Water's infrastructure and the variety of water supply sources. Valley Water is actively engaged in maintaining its existing imported and local water supplies and is looking at regional and local projects for new supplies. Maintaining a diverse water supply and system reliability minimizes Valley Water's risk of being unable to provide a reliable supply if one part of the system is not performing up to expectations.

Meeting Service Area Demands

CEO Interpretation S 2.4 requires Valley Water to "Develop water supplies designed to meet at least 100 percent of average annual water demand identified in Valley Water's Urban Water Management Plan during non-drought years and at least 80 percent of average annual water demand in drought years." Valley Water manages water supplies to maximize storage in wet periods for use during dry periods. Currently, supplies exceed demands in most years. However, during droughts, storage can be depleted and result in shortages between water supplies and water demands. Valley Water's Water Shortage Contingency Plan (WSCP) provides a strategy for detecting and responding to water shortages where calls for short-term reductions in water use begin when the projected end of year groundwater storage falls below 300,000 acre-feet. Shortages are primarily managed by requesting short-term behavioral changes that result in reduced water use/water demands. Projected end-of-year storage is one of the outputs of Valley Water's water supply system model.

Water supply strategies should avoid the need to call for short-term reductions in water use of more than 20 percent. Strategies will be evaluated to determine the modeled level of short-term demand reductions required.

Maintaining Groundwater Storage

Board Ends Policy 2.1.1 calls for Valley Water to "aggressively protect groundwater from the threat of contamination and maintain and develop groundwater to optimize reliability and to minimize land subsidence and salt water intrusion." In years where supplies exceed demands excess water is stored for future years. The largest 'reservoir' available to Valley Water is the groundwater basin. Maintaining groundwater storage provides reserves for use during droughts/emergencies and is also important in avoiding permanent land subsidence.

Water supply strategies ideally maintain groundwater storage above the "severe" stage in Valley Water's water shortage contingency plan in at least 95% of years modeled to avoid the need to call for short-term reductions in water use of more than 20 percent.

Securing Existing Water Supplies

Board Ends Policies 2.1.2, 2.1.3, and 2.1.4 call for Valley Water to "protect, maintain, and develop" local surface water, imported water, and recycled water, respectively. Valley Water's

existing water supply system supports most of the county's water needs and will continue to do so into the future. Optimizing the use of existing supplies and infrastructure leverages the investments Valley Water has already made in water supply reliability and increases the system's flexibility. The existing system includes the use of surface water, groundwater, recycled and purified water, imported water, and a strong commitment to water conservation. Optimizing the use of existing supplies and infrastructure leverages the investments Valley Water has already made in water supply reliability and increases the system's flexibility.

Water supply strategies should maintain existing local and imported water supplies, protect existing water supply infrastructure, and provide redundancy for outages of supplies and/or infrastructure.

Reducing Reliance on the Delta

Section 85021 of the 2009 Delta Reform Act states that "The policy of the State of California is to reduce reliance on the Delta in meeting California's future water supply needs through a statewide strategy of investing in improved regional supplies, conservation, and water use efficiency. Each region that depends on water from the Delta watershed shall improve its regional self-reliance for water through investment in water use efficiency, water recycling, advanced water technologies, local and regional water supply projects, and improved regional coordination of local and regional water supply efforts."

This sub-objective will be evaluated based on the degree to which local and regional supplies are maximized as a means of minimizing risks associated with the reliability of imported water supplies. When first developing, Santa Clara County relied on groundwater and local streams for its water supply, but excessive pumping resulted in ground subsidence. Over the last half-century, Valley Water has brought in imported water supplies to meet increasing demands, to the point where over half the water used in the county is imported from outside the county boundaries. Imported water from the Delta is Valley Water's largest source of supply (about 40 percent on average) and a single event, such as a large levee failure or failure of one of the aqueducts or pipelines, could adversely impact these deliveries.

Water supply diversity helps reduce the county's exposure to risk of any one supply investment not performing up to expectations. This sub-objective is an insurance measure that says, in effect, "Don't put all your eggs in one basket." Individual local supplies are a significantly lower percentage of the county's overall supply and less susceptible to widespread outages from single events. Although imported supplies will continue to be an important part of the county's water supply, maintaining existing local water rights and expanding supplies from local and regional projects will help maintain water supply diversity.

Water supply strategies should focus of developing local and regional sources and decrease the overall percentage of Valley Water's water supply that is imported.

Maximizing Water Conservation and Water Use Efficiency

Board Ends Policy 2.1.5, is to "Maximize water use efficiency, water conservation and demand management opportunities." Valley Water has a history of promoting water conservation and other water use efficiency efforts. By 2030, Valley Water anticipates that current and planned

conservation activities will result in 98,800 acre-feet per year in savings. These conservation savings will offset demands by about 20 percent and reduce the need for new supplies. Conservation also provides other benefits. These benefits include energy conservation, reduced greenhouse gas emissions, reduced costs, and reduced demand for wastewater treatment. Water conservation benefits may also be attributable to land use practices such low-impact development. In addition to efficient use of existing water resources, the water savings and/or yields associated with water use efficiency are minimally affected by changes in hydrology.

Water supply strategies that can exceed conservation savings of 98,800 acre-feet per year by 2030, as anticipated in the 2012 Water Master Plan, are preferred.

Objective 2 - Ensure Drinking Water Quality

This objective is based on Board Ends Policies 2.1.1 “Aggressively protect groundwater basins from the threat of contamination and maintain and develop groundwater to optimize reliability and to minimize land subsidence and saltwater intrusion” and 2.3 “Reliable high quality drinking water is delivered.” Valley Water’s water quality efforts focus on protecting groundwater quality and meeting State and Federal drinking water quality regulations. The purpose of these efforts is to protect public health and drinking water supplies for current and future beneficial use.

Protecting Groundwater Quality

Valley Water is concerned with a number of threats to groundwater quality, including nitrate, salts, gasoline, and solvents. Nitrate, primarily from anthropogenic sources, has historically been the contaminant most frequently detected above drinking water standards in groundwater. Residual nitrate from past practices may contribute to nitrate concentrations in groundwater for decades to come, as water slowly infiltrates from the surface. Further, ongoing land use practices including fertilizer and septic system use can contribute to nitrate in groundwater. Salts, primarily sodium and chloride, are also a concern as the use of recycled water continues to increase. Recycled water, without advanced treatment, is relatively high in salts and recycled water use has the potential to increase salt concentrations in groundwater. Both salts and nitrate are conservative constituents in groundwater, meaning their concentrations do not decrease significantly due to natural subsurface processes. Recharge with surface water, which typically has low concentrations of both constituents, can help reduce salt and nitrate concentrations in groundwater. Treatment processes that remove salt and nitrate from groundwater or waters that will infiltrate to groundwater can also positively affect groundwater quality.

Water supply strategies should help improve groundwater quality by reducing the concentrations of salt, nitrates, and other contaminants.

Meeting Drinking Water Quality Regulations

Valley Water’s treatment plants must comply with a long list of state and federal water quality regulations related to chemical, biological, radiological, and physical parameters prior to treatment, during treatment, and within the treated water distribution system. A key treatment challenge is to maximize the disinfection of biological contaminants such as bacteria, viruses, and protozoa, while minimizing the formation of harmful disinfection by-products such as bromate, trihalomethanes, and n-nitrosodimethylamine. Valley Water is also concerned with potential

threats to surface water quality, such as protozoan pathogens, perchlorate, endocrine disruptors, pharmaceuticals, and personal care products, each of which could require the addition of new treatment processes. Research level efforts to determine which emerging contaminants are most important to test for are on-going. However, many of the contaminants have no concrete guidelines monitoring or testing yet.

Source water quality can impact the effectiveness of the water treatment processes at Valley Water's water treatment plants. Large or sudden fluctuations in source water quality constituents of algae, turbidity, salinity, organic carbon, pH and temperature can create operational problems that can potentially result in plant shutdowns, with algae being of greatest concern. Valley Water collaborates and cooperates with other agencies to protect and monitor surface water sources but needs to have a variety of water sources to draw from should an individual source have water quality issues.

Water supply strategies need to meet current and anticipated treated water quality standards with existing or currently planned treatment facilities and should provide various options of supply water to the treatment plants that can be selected if other sources are impacted by adverse water quality constituents.

Objective 3 - Minimize Cost

This objective relates to Executive Limitation 4.2 that the Board Appointed Officers shall "Spend in ways that are cost-efficient." Costs include capital and operations costs associated with a project or program, including maintenance and mitigation. Valley Water looks at total cost to the county's residents and businesses, not just District costs.

Water supply strategies will be measured by total present value cost.

Objective 4 - Maximize Flexibility in the Water Supply System

In addition to its variety of water supply sources, one of Valley Water's strengths is the inter-connectedness and reliability of its water supply infrastructure. The WSMP will lay out Valley Water's long-term water supply strategy and identify the associated new infrastructure and infrastructure upgrade needs. Infrastructure reliability and asset management are addressed through separate programs. However, system reliability is an important consideration in long-term planning, as water supply reliability can only be assured if the system that provides the supplies is flexible to address various conditions. Multiple water supply sources, multiple storage and recharge facilities, and a well-maintained and connected infrastructure system all provide Valley Water with a flexible system that can respond to change. Some expected changes are short-term, such as switching sources due to water quality issues, calling on reserves in dry years, or asking retailers to use more groundwater during treated water pipeline shutdowns. Other changes are long-term, such as reservoir and recharge re-operations to meet aquatic habitat needs and climate change. So far, Valley Water's system has proven capable of responding to change. However, some parts of the infrastructure system may not be prepared for future changes. Some new supplies or projects may provide more flexibility for responding to future changes than others.

Maximizing District Influence over Supplies and Operations

Valley Water's influence over a source of water or water supply operation affects Valley Water's ability to manage that supply's performance. For example, Valley Water has greater ability to affect deliveries from its own reservoirs than deliveries from the State and Federal water projects. Likewise, Valley Water should have greater ability to affect expansion of the recycled and purified water with agencies it has already established a partnership. Local and regional partnerships are another means to increase Valley Water's ability to secure supplies and influence operations, and are consistent with State policy direction to implement integrated regional water management.

Water supply strategies should allow Valley Water to adapt to changes in water supplies by providing a high degree of District control including directly controlled supplies and supplies developed in partnership with other local and regional agencies.

Minimizing Implementation Complexities and Barriers

Different types of projects and programs have different levels of implementation complexity and barriers. Very complex projects and projects with significant barriers are more difficult to implement. The types of complexities and barriers that may affect Valley Water's ability to implement a project or program include legal and regulatory requirements, conflicts with existing policy, public perception, institutional and contractual relationships, and technical complexity. For instance, a local water exchange (i.e., an exchange with San Jose Water Company or the San Francisco Public Utilities Commission) might be easier to implement than an exchange that involves moving water through the Delta. Ends Policy E-1.3 states that "collaboration with government, academic, private, non-governmental, and non-profit organizations is integral to accomplishing Valley Water's mission."

Water supply strategies should be supported by the public and minimize legal, regulatory, and technical complexity.

Allowing for Phased Implementation of New Projects and Programs

The WSMP is based on assumptions about future conditions, including assumptions regarding future water demands, precipitation patterns, availability of new technologies, and imposition of future regulations. Depending of the accuracy of these assumptions new supplies may be needed sooner or later or at a different scale. Alternatives that can be implemented in phases, as needed, are more desirable.

Water supply strategies that can be phased over time and allow Valley Water to adjust to changes in water supplies or demands from those forecasted are preferred to those that must occur at once.

Adapting to Climate Change

CEO Interpretation S.2.7 of Ends Policy E-2 "there is a reliable, clean water supply for current and future generations" calls for Valley Water to "incorporate climate change mitigation and adaptation into District planning efforts." Climate change is expected to increase sea level and change

precipitation patterns, both of which can impact Valley Water's water supplies. Sea level is projected to increase by 55 inches by 2100, resulting in increased salinity in the Delta and reduced exports if no action is taken to offset impacts. Modeling results indicate that changing weather patterns may also result in more intense storms over a shorter period which could impact both local surface supplies and imported water. In addition, the frequency and severity of droughts may increase.

Water supply strategies that are not affected by changing weather patterns, or are adaptable to these changes are preferable to those that are not.

Objective 5 - Protect the Natural Environment

This objective relates to Board Ends Policies 4.1 "Protect and restore creek, bay, and other aquatic ecosystems" and 4.3 "Strive for zero net greenhouse gas emission or carbon neutrality." Valley Water and its customers value the natural environment. While the purpose of the WSMP is to provide for water supply reliability, it is important that the projects and programs be considered in the context of their impacts on the environment. This includes avoiding impacts to watersheds, streams, and natural resources such as water quality and habitat degradation. It also includes maximizing energy efficiency to reduce greenhouse gas emissions.

Protecting and Restoring Creek, Bay, and Other Aquatic Ecosystems

Santa Clara County is rich in natural resources and Valley Water participates in and supports watershed stewardship to protect and enhance resources and ensure consistency with State and Federal laws and regulations. These activities include protecting and restoring fisheries and aquatic species, preserving and restoring natural stream functions and processes, protecting and restoring riparian and in-stream habitat conditions, and protecting and improving water quality in streams, the Bay, and the Delta. District programs such as the Fisheries and Aquatic Habitat Collaborate Effort are expected to restore and maintain fisheries, wildlife, water quality, and other beneficial uses of creeks in good condition.

Water supply strategies should provide benefits to environmental resources and in-stream and reservoir water quality, or at a minimum avoid impacts to these resources.

Reducing Greenhouse Gas Emissions

Board Ends Policy 4.3 calls for Valley Water to "strive for zero net greenhouse gas emissions or carbon neutrality." Planning for future water supplies and infrastructure should consider both total emissions generated or sequestered and adaptation to climate change (which is addressed under the Maximize Flexibility criterion). The California Water Plan 2009 suggests that local agencies should implement cost effective, energy efficiency measures in their water projects as a means of reducing GHG emissions.

Water supply strategies should reduce greenhouse gas emissions.

Objective 6 - Ensure Community Benefits

This objective relates to Board Executive Limitation EL-2 “The BAOs shall promote conditions, procedures, and decisions that fulfill reasonable customer expectations for good service, are safe, dignified, and nonintrusive.” This objective also relates to Board Ends Policies 3.2 “Reduced potential for flood damages,” and 4.2.1 “Support healthy communities by providing additional trails, parks, and open space along creeks and in the watersheds.” Valley Water provides multiple services to the community. In addition to environmental stewardship and water supply, Valley Water provides flood protection services and supports recreational opportunities when possible. In developing its water supply strategy, Valley Water will consider these benefits for the community and work to ensure benefits are distributed equitably.

Fulfilling Reasonable Customer Expectations for Good Service

It is important for Valley Water to provide even levels of service within zones of benefit and minimizing adverse socio-cultural impacts. Minimizing socio-cultural impacts includes minimizing disproportionate impacts to minority and low-income populations (environmental justice), minimizing adverse impacts to cultural resources, and minimizing adverse social effects such as impacts to community character.

Water supply strategies will be evaluated by the degree to which water supply benefits are provided throughout Valley Water’s service area and the likelihood of disruption is the same throughout the service area.

Improving Quality of Life in the County through Appropriate Public Access to Trails, Open Space, and District Facilities

Valley Water supports recreational opportunities on and around its reservoirs, along creeks, and in the watersheds by providing access to District facilities and, in some cases, providing funding for recreation projects. The recreation programs are maintained and operated by other entities.

Water supply strategies should provide additional water-based recreational opportunities benefits.

Providing Natural Flood Protection and/or Reducing Potential for Flood Damages

One of the primary missions of Valley Water is to minimize flooding impacts to residents and property in Santa Clara County. Flood protection benefits could be associated with water supply projects that increase reservoir storage or reduce stormwater runoff to creeks.

Water supply strategies should provide additional flood protection benefits.

Appendix B - Cost Analysis Methodologies

POLICY ANALYSIS
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DATE: February 27, 2018
TO: Tracy Hemmeter
FR: David Mitchell
RE: Methodology for Estimating Cost of Water Shortage

Introduction

This memorandum presents a methodology for estimating the cost of water shortage. The cost of water shortage is defined as the dollar amount that water users would be willing to pay to avoid the shortage. The methodology rests on the theory of economic demand, which posits that consumers order their preferences for a good such as water from the most to the least valuable and consume up to the point where the value of the last unit consumed is equal to the price of the good. The ordering of consumption preferences in this way is what gives rise to the ubiquitous downward sloping demand curve.

We use the methodology developed in Griffin (1990) to estimate consumer willingness to pay for the increment of water forgone by water users due to restrictions on water use during a water supply shortage. This is a widely used methodology for valuing increments (or decrements) of water supply. For example, it provides the basis for the calculation of water supply benefits for the California Water Fix (CWF) (Sunding, et al., 2013; Sunding, et al., 2015), the economic cost of the state conservation mandate (M.Cubed, et al., 2015; M.Cubed, et al., 2016), as well as numerous other statewide and regional water resources benefit-cost assessments (e.g., Jenkins, et al., 1999; Jenkins, et al., 2003; EBMUD, 2012).[1]

In the next section, we lay out the methodology in detail. Following this, we give an example to illustrate how to use the methodology to estimate the water supply benefits of a water project or portfolio of projects that would increase county water supply.

Methodology

Urban water use can be classified into several broad categories, each with a different priority of use, and the willingness to pay for water by utility customers depends on the intended use of each unit of water. The willingness to pay for water used for drinking and basic sanitation, for example, is larger than the willingness to pay for water used for bathing and laundry, which in turn is larger than the willingness to pay for water used for washing cars, for filling swimming pools, and for irrigating landscape. When faced with a water use restriction, utility customers have the choice of which types of water uses to curtail, and the framework for measuring shortage losses incorporates the idea that utility customers respond to a water use restriction by eliminating less valuable water uses before eliminating more

[1] A comprehensive discussion of the methodology is provided in Chapter 5 of the textbook Water Resource Economics by Ronald C. Griffin. The methodology is also discussed in Chapter 7 of Robert A. Young's book Determining the Economic Value of Water: Concepts and Methods.

valuable water uses, for instance by reducing water used for irrigating landscape prior to reducing drinking water consumption.

Figure 1 depicts a schedule of willingness to pay for different units of water as a demand curve for water that orders these units from highest valued uses to lowest valued uses. Under normal conditions, a customer facing a volumetric water rate of P* demands units of water for which willingness to pay exceeds P*. In Figure 1, this quantity is Q* units. Units of water beyond Q* have value to the customer, but their value is less than their cost, P*, so a rational consumer would choose to forego purchasing units beyond Q*.

Suppose a quantity restriction is placed on water use so that the customer can purchase no more than Q^R units of water. The customer must forego Q*- Q^R units of water. The value of these foregone units of water is measured by the shaded area in Figure 1. Mathematically, this shaded area is calculated as the integral of the demand function evaluated between Q^R and Q*:

$$WTP(Q^* - Q^R) = \int_{Q^R}^{Q^*} D(Q)dQ$$

The customer will also avoid having to directly pay for Q*- Q^R. Thus the customer initially saves P^*(Q*- Q^R). However, most utilities set P* to recover both their variable operating costs and a portion of their fixed costs. Since utilities operate on a break-even basis, they will still need to recoup the fixed costs that would have been recovered by selling the Q*- Q^R units of water. Denoting V as the portion of P* that covers the variable costs of production, the utility will still need to recover (P*-V) (Q*- Q^R) from the customer to cover its fixed costs. Thus, while the customer initially avoids P^*(Q*- Q^R), the utility will seek to recover (P*-V) (Q*- Q^R) in the future, and the net cost avoided by the customer is therefore only V(Q*- Q^R).

The economic loss to the customer of foregoing Q*- Q^R units of water is therefore:

$$L(Q^*, Q^R) = \int_{Q^R}^{Q^*} D(Q)dQ - V(Q^* - Q^R)$$

Viewed in the other direction, $L(Q^*, Q^R)$ also measures the economic benefit to the customer of not having to forego Q*- Q^R units of water.

It is convenient to represent Q^R as a multiple of Q*. Let r be the corresponding percentage reduction in Q* that yields Q^R. Then Q^R = (1-r)Q* and the economic loss function becomes:

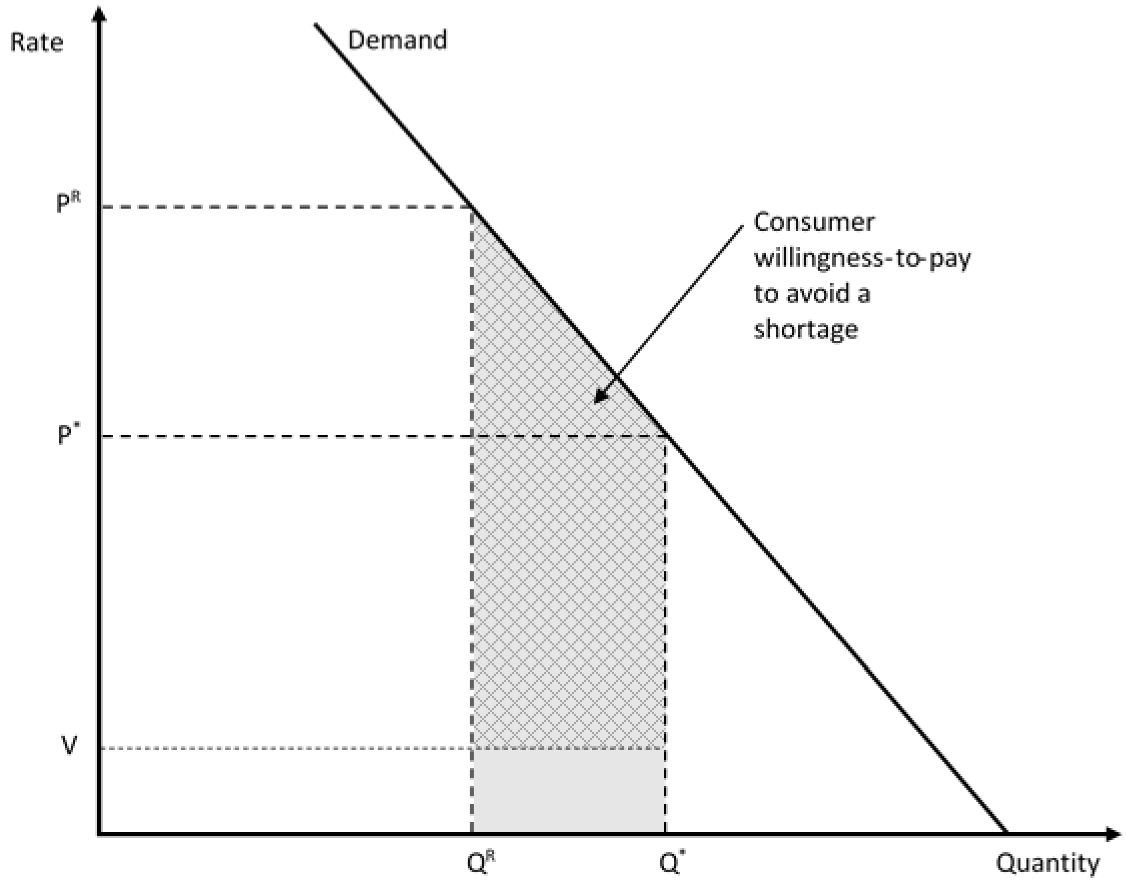
$$L(Q^*, r) = \int_{(1-r)Q^*}^{Q^*} D(Q)dQ - rVQ^*$$

Operationalizing the economic loss function requires assigning a functional form to D(Q). If we use a linear demand function, where D(Q) = a-bP, then the economic loss function is given by

$$Linear\ Demand\ Function\colon\ L(r|Q^*, P^*, e^*, V) = rP^*Q^*\left(1 - \frac{1}{2}\frac{r}{e^*}\right) - rVQ^*$$

where e* is the elasticity of demand at Q*.[2]

Figure 1. Consumer Willingness to Pay to Avoid a Water Shortage



It is more common, however, to use a constant elasticity demand (CED) function, where $D(Q)=AQ^{1/e}$. Then the economic loss function is given by

$$CED\ Loss\ Function\text{:}\ L(r|Q^*, P^*, e, V) = \frac{e}{1+e} P^* Q^* \left[1 - (1-r)^{\frac{1+e}{e}}\right] - rVQ^*$$

where e is the constant elasticity of demand.

A limitation of the CED specification is that it can produce unrealistically high estimates of shortage cost for very large shortages.[3] For this reason, it is customary to place an upper limit on the marginal value of water assigned by the CED. Denoting this upper limit as P_{max}, we can calculate the shortage level, r*, above which the CED would assign marginal values greater than P_{max} as

[2] The elasticity parameter measures the percentage change in quantity demanded given a one percent change in the price of water and is governed by the slope of the demand schedule.
[3] This is due to the fact that marginal values of water under the CED specification increase exponentially as shortages increase in magnitude.

$$r^* = 1 - \left[P_{max} \cdot Q^{*1/e}(1/P^*)\right]^e \cdot [1/Q^*]$$

This leads to the following constrained CED loss function

$$L(r|Q^*, P^*, e, V, r^*) = \begin{cases} \frac{e}{1+e}P^*Q^*\left[1-(1-r)^{\frac{1+e}{e}}\right] - rVQ^* & if\ r \leq r^* \\ \frac{e}{1+e}P^*Q^*\left[1-(1-r^*)^{\frac{1+e}{e}}\right] + (r-r^*)P_{max}Q^* - rVQ^* & if\ r > r^* \end{cases}$$

The economic analyses for CWF (Sunding, et al., 2013; Sunding, 2015) and the state conservation mandate (M.Cubed, et al., 2015; M.Cubed, et al., 2016) set P_{max} to $20,000/AF.

The CED specification generally produces larger loss estimates than the linear demand specification. For comparative purposes, we provide shortage loss estimates under both specifications in the example that follows.

We note that the CED specification was used in the state's CWF Economic Analysis (Sunding, et al., 2013; Sunding, 2015). It was also used in the state's analysis of the economic cost of the urban conservation mandate (M.Cubed, et al., 2015; M.Cubed, et al., 2016). For consistency with these analyses, the CED specification should be preferred over the linear demand specification.[4]

<u>Example Calculation of Shortage Cost</u>

To illustrate the application of the methodology in practice, we use it to calculate the water supply benefits to Santa Clara County for the originally proposed two tunnel CWF. Because the administration's current proposal to phase the construction of CWF may result in different water supplies to Santa Clara County than were used in this example, the results should not be treated as an estimate of CWF water supply benefits. The calculations herein are for illustrative purposes only.

The calculations summarized in this memo are contained in two Excel workbooks. The shortage costs calculated with the linear demand loss function are in the workbook

"SCVWD_CWF_Example_Shortage_Costs_LinearDemand_Loss_Function.xlsx"

The shortage cost calculated with the constrained CED loss function are in the workbook

"SCVWD_CWF_Example_Shortage_Costs_CED_Loss_Function.xlsx"

Per the loss functions described above, the key parameters needed to estimate shortage cost are the baseline price of water (P*), the baseline quantity of demand (Q*), the elasticity of demand (e), the variable cost of water supply (V), and the percentage shortage (r). The values for these parameters used for the example are summarized in Tables 1 through 4.

The baseline price of water is set to each Santa Clara County retailer's current water rate, which were provided by SCVWD staff in the Excel file "Retailer Water Rates 2001-18 update 12-01-17.xlsx." Stanford is not a retail water supplier and does not have a published water rate. We therefore use the volume-

[4] In its 2040 Water Supply Update Plan, East Bay Municipal Utilities District, used the mid-point between the linear demand and constant elasticity demand estimates to characterize shortage costs for their water system.

weighted average rate of the other retailers for Stanford. In the case of independent groundwater users, we use the average pumping cost, also provided by SCVWD staff.

The baseline quantities are for the 2040 level of demand for the county and were provided by SCVWD staff in the Excel file "Retailer Demands v2.xlsx." We apportioned each retailer's gross demand to four water use categories: (1) residential, (2) commercial/institutional, (3) industrial, and (4) system losses. This is the same level of disaggregation used in the state's assessment of the economic costs of the urban water conservation mandate (M.Cubed, et al., 2015; M.Cubed, et al., 2016). We used the demand shares shown in Table 2 to apportion each retailer's gross demand to these categories. We derived the shares in Table 2 using data from each retailer's 2015 Urban Water Management Plan.[5]

The residential elasticity estimates are mostly taken from Sunding (2012). Estimates were not available for Purissima Hills or the independent groundwater users. We use the volume-weighted average elasticity of the other retailers for these entities. For CWS Los Altos, we use a recently estimated elasticity from M.Cubed (2018).[6]

For the commercial/institutional and industrial sectors, we use the same elasticity assumptions as were used for the state's assessment of the economic costs of the urban water conservation mandate (M.Cubed, et al., 2015; M.Cubed, et al., 2016). The basis for the commercial/institutional and industrial elasticity estimates are as follows:

> <u>Commercial/Institutional</u>: The estimate is based on a review of the literature on short run commercial water use elasticities. Lynn et al. (1993) reported a range of -0.12 to -0.48. These results are supported by studies by Schneider and Whitlach (1991) who find elasticities ranging from -0.36 to -0.40, and by Williams and Suh (1986) who estimate an elasticity of -0.23 for short-run commercial water use. For this analysis we use -0.3, the midpoint of the range reported in Lynn et al.
>
> <u>Industrial</u>: Renzetti (1992) summarized studies of industrial water use elasticities and reported a range between -0.15 and -0.59. Reynaud (2003) estimated an elasticity of -0.29 for industrial water use. For this analysis we use -0.37, the midpoint of the range cited by Renzetti.

The variable cost of water production is assumed to average $250/AF. This assumption is taken from the state's assessment of the economic costs of the urban water conservation mandate (M.Cubed, et al., 2015; M.Cubed, et al., 2016).

The maximum willingness to pay (P_{max}) for the constrained CED loss function is set to $20,000/AF, which is the same limit as is used in the state's economic analysis of CWF and the urban water conservation mandate.

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[5] Except in the case of Purissima Hills, which is not required to prepare and Urban Water Management Plan. In their case, we used data from their 2015 Water Rates Study to apportion the aggregate demand. We assume Stanford water use is entirely institutional and we assume groundwater use is 75% residential and 25% commercial/institutional.

[6] The Brattle Group estimate of -0.075 for CWS Los Altos is unusually low and outside of the normal range of published estimates for urban retail water demand. Using 10 years of monthly consumption data for CWS Los Altos, M.Cubed (2018) estimates an elasticity of -0.15 for CWS Los Altos, which is in line with the estimates from The Brattle Group for the other Santa Clara County retailers.

Table 1. Data for Shortage Cost Estimation

Water Provider	Quantity (Q*) AF	Vol Rate (P*) $/AF	Elasticity Residential	Elasticity Comm/Inst	Elasticity Industrial	Variable Cost (V) $/AF
CWS Los Altos	14,200	2,154	-0.150	-0.300	-0.370	$250
Gilroy	14,935	1,056	-0.275	-0.300	-0.370	$250
Great Oaks	10,726	1,652	-0.192	-0.300	-0.370	$250
Milpitas	14,627	2,801	-0.164	-0.300	-0.370	$250
Morgan Hill	9,162	897	-0.187	-0.300	-0.370	$250
Mountain View	14,054	2,962	-0.218	-0.300	-0.370	$250
Palo Alto	13,788	3,999	-0.127	-0.300	-0.370	$250
San Jose Muni	29,349	1,560	-0.155	-0.300	-0.370	$250
San Jose Water	150,130	2,366	-0.207	-0.300	-0.370	$250
Santa Clara	35,088	2,479	-0.221	-0.300	-0.370	$250
Sunnyvale	30,865	2,243	-0.197	-0.300	-0.370	$250
Purissima Hills	2,046	2,840	-0.198	-0.300	-0.370	$250
Stanford	4,700	2,281	-0.198	-0.300	-0.370	$250
N. County GW	8,992	1,175	-0.198	-0.300	-0.370	$250
Coyote & S. County GW	8,578	418	-0.198	-0.300	-0.370	$250
Total	361,240					

Table 2. 2040 Demand Shares by Retailer

Retailer	Residential	Commercial/ Institutional	Industrial	Losses	Total
CWS Los Altos	75%	22%	0%	3%	100%
Gilroy	63%	25%	2%	10%	100%
Great Oaks	73%	21%	2%	4%	100%
Milpitas	54%	21%	15%	10%	100%
Morgan Hill	66%	27%	0%	7%	100%
Mountain View	50%	39%	4%	8%	100%
Palo Alto	57%	33%	4%	7%	100%
San Jose Municipal	45%	25%	28%	3%	100%
San Jose Water Company	53%	40%	1%	7%	100%
Santa Clara	49%	37%	9%	5%	100%
Sunnyvale	48%	47%	0%	5%	100%
Purissima Hills	88%	7%	0%	5%	100%
Stanford	0%	100%	0%	0%	100%
North County GW	75%	25%	0%	0%	100%
Coyote & S. County GW	75%	25%	0%	0%	100%

The simulated annual water shortages in Santa Clara County for 94 years of hydrology without and with CWF are summarized in Tables 3 and 4, respectively. The simulation results were provided by SCVWD

staff in the Excel file “Shortages with and without CWF includes No Regrets.xlsx.” The simulations are based on the 2040 demands in Table 1. Both the “without” and “with” CWF simulations assume the No Regrets supply and conservation projects are implemented. The “with” CWF simulation also assumes implementation of the Butterfield Recharge Project, which SCVWD groundwater modeling has indicated is needed for reliability in the southern portion of its service area..

Table 3. Simulated Santa Clara County Annual Supply Shortage % Without CWF

Hydro Year	Shortage %	**Hydro Year**	Shortage %	**Hydro Year**	Shortage %	**Hydro Year**	Shortage %
1922	0%	**1946**	0%	**1970**	0%	**1994**	10%
1923	0%	**1947**	0%	**1971**	0%	**1995**	10%
1924	0%	**1948**	10%	**1972**	0%	**1996**	0%
1925	10%	**1949**	15%	**1973**	10%	**1997**	0%
1926	0%	**1950**	10%	**1974**	0%	**1998**	0%
1927	0%	**1951**	0%	**1975**	0%	**1999**	0%
1928	0%	**1952**	0%	**1976**	0%	**2000**	0%
1929	0%	**1953**	0%	**1977**	15%	**2001**	0%
1930	10%	**1954**	0%	**1978**	30%	**2002**	0%
1931	10%	**1955**	10%	**1979**	10%	**2003**	0%
1932	15%	**1956**	10%	**1980**	0%	**2004**	10%
1933	15%	**1957**	0%	**1981**	0%	**2005**	10%
1934	15%	**1958**	0%	**1982**	0%	**2006**	0%
1935	30%	**1959**	0%	**1983**	0%	**2007**	0%
1936	10%	**1960**	0%	**1984**	0%	**2008**	0%
1937	0%	**1961**	10%	**1985**	0%	**2009**	15%
1938	0%	**1962**	15%	**1986**	0%	**2010**	15%
1939	0%	**1963**	10%	**1987**	0%	**2011**	10%
1940	0%	**1964**	10%	**1988**	0%	**2012**	0%
1941	0%	**1965**	0%	**1989**	30%	**2013**	0%
1942	0%	**1966**	0%	**1990**	15%	**2014**	10%
1943	0%	**1967**	15%	**1991**	50%	**2015**	30%
1944	0%	**1968**	0%	**1992**	30%		
1945	0%	**1969**	0%	**1993**	30%		

Table 4. Simulated Santa Clara County Annual Supply Shortage % With CWF

Hydro Year	Shortage %	**Hydro Year**	Shortage %	**Hydro Year**	Shortage %	**Hydro Year**	Shortage %
1922	0%	**1946**	0%	**1970**	0%	**1994**	0%
1923	0%	**1947**	0%	**1971**	0%	**1995**	0%
1924	0%	**1948**	0%	**1972**	0%	**1996**	0%
1925	0%	**1949**	0%	**1973**	0%	**1997**	0%
1926	0%	**1950**	0%	**1974**	0%	**1998**	0%
1927	0%	**1951**	0%	**1975**	0%	**1999**	0%
1928	0%	**1952**	0%	**1976**	0%	**2000**	0%
1929	0%	**1953**	0%	**1977**	0%	**2001**	0%
1930	0%	**1954**	0%	**1978**	10%	**2002**	0%
1931	0%	**1955**	0%	**1979**	0%	**2003**	0%
1932	0%	**1956**	0%	**1980**	0%	**2004**	0%
1933	10%	**1957**	0%	**1981**	0%	**2005**	0%
1934	15%	**1958**	0%	**1982**	0%	**2006**	0%
1935	15%	**1959**	0%	**1983**	0%	**2007**	0%
1936	10%	**1960**	0%	**1984**	0%	**2008**	0%
1937	0%	**1961**	0%	**1985**	0%	**2009**	0%
1938	0%	**1962**	10%	**1986**	0%	**2010**	0%
1939	0%	**1963**	0%	**1987**	0%	**2011**	0%
1940	0%	**1964**	0%	**1988**	0%	**2012**	0%
1941	0%	**1965**	0%	**1989**	10%	**2013**	0%
1942	0%	**1966**	0%	**1990**	0%	**2014**	0%
1943	0%	**1967**	0%	**1991**	15%	**2015**	10%
1944	0%	**1968**	0%	**1992**	30%		
1945	0%	**1969**	0%	**1993**	15%		

We use the data in Tables 1 through 4 in conjunction with the loss functions described previously to estimate the shortage cost with and without CWF for each year in the hydrologic record. We take the difference in the without and with CWF estimates to get the annual avoided shortage cost. We then average the annual estimates to get the expected annual avoided shortage cost. The results for the linear and constrained CED loss functions are summarized in Table 5.

In implementing the calculations, we have assumed the shortages in Tables 3 and 4 are uniformly distributed across the three user classes. This is a conservative assumption since it is common for water retailers to allocate shortages in a way that shields commercial and industrial water uses, thereby putting a disproportionate share of the shortage on the residential sector. Residential marginal losses are greater than commercial/institutional and industrial marginal losses because commercial/institutional and industrial demands are more elastic. Thus if we had instead assumed the residential sector absorbed a disproportionate share of the shortage, the total loss would be somewhat greater than what we have estimated.

We also have assumed that system losses decrease proportionately with the magnitude of the shortage. This also is a conservative assumption since a significant fraction of water loss is associated with system

pressurization and is not strongly influenced by the level of water delivery. Thus we likely overstate by some small amount the total avoided variable production cost.

Table 5. Expected Annual Avoided Shortage Cost with CWF

User Class	Linear Loss Function	Constrained CED Loss Function
Residential	28,368,189	42,034,921
Commercial & Institutional	16,570,072	20,924,206
Industrial	1,792,451	2,113,455
System Water Loss	-226,012	-226,012
Total	46,504,700	64,846,570
Total Rounded to Nearest $M	**47,000,000**	**65,000,000**

Assuming CWF becomes operational in 2040, the 2018 present value of avoided shortage cost can be calculated as:

$$2018\ Present\ Value = \frac{1}{(1+d)^{21}} \frac{\mu}{(1+d)^n} \frac{(1+d)^n - 1}{d}$$

where μ is the expected annual shortage cost, n is the CWF operational life in years, and d is the real discount rate. For example, given the countywide expected annual shortage costs from Table 5 and setting n to 100 and d to 0.03, we get the present value of avoided shortage costs shown in Table 6.[7] The values for d and n were selected to match the ones the state is currently using for its benefit-cost analysis of CWF.

In this example, the 2018 present value of CWF avoided shortage cost is approximately $0.8 billion using the linear demand loss function and $1.1 billion using the constrained constant elasticity demand loss function. As with any present value calculation, the results are sensitive to the values selected for d and n. The present value is increasing in n and decreasing in d. It is good practice to sensitivity test present value results for alternative values of d and n.

Table 6. Example Countywide 2018 Present Value of CWF Avoided Water Shortage Cost

Linear Demand Loss Function	Constrained CED Loss Function
$798,000,000	$1,104,000,000
Note: Based on countywide expected annual shortage cost in Table 5, real discount rate of 0.03, and CWF operation life of 100 years. Results rounded to nearest million. As with any present value calculation, results are sensitive to choice of discount rate, project life, and the assumptions underlying the estimates of annual shortage losses. It is always good practice to sensitivity test present value results for this reason.	

[7] Results are rounded to the nearest million.

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Water Shortage Cost Model Inputs

2040 Demand Shares

Class	CWS Los Altos	Gilroy	Great Oaks	Milpitas	Morgan Hill	Mountain View	Palo Alto	San Jose Muni	San Jose Water	Santa Clara	Sunnyvale	Purissima Hills	Stanford	North County GW	Coyote & South County GW	County Avg
Residential	0.752	0.630	0.726	0.540	0.657	0.499	0.566	0.446	0.531	0.489	0.482	0.884	0.000	0.750	0.750	0.544
Commercial/Institutional	0.219	0.253	0.213	0.209	0.271	0.387	0.332	0.249	0.397	0.368	0.472	0.066	1.000	0.250	0.250	0.355
Industrial	0.001	0.017	0.021	0.148	0.000	0.037	0.037	0.280	0.007	0.093	0.000	0.000	0.000	0.000	0.000	0.045
Losses	0.028	0.100	0.040	0.103	0.072	0.077	0.065	0.025	0.065	0.050	0.046	0.050	0.000	0.000	0.000	0.056
Total	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Source: Retailer 2015 UWMP demand projections, except Purissima Hills which is based on its 2015 Water Rates Study.
Stanford is assumed to provide water for institutional puporses only. GW water shares are assumed.

	CWS Los Altos	Gilroy	Great Oaks	Milpitas	Morgan Hill	Mountain View	Palo Alto	San Jose Muni	San Jose Water	Santa Clara	Sunnyvale	Purissima Hills	Stanford	North County GW	Coyote & South County GW	County Total
2040 Total M&I Demand	14,200	14,935	10,726	14,627	9,162	14,054	13,788	29,349	150,130	35,088	30,865	2,046	4,700	8,992	8,578	361,240

Source: Retailer Demands v2.xlsx

Imputed 2040 Class Baseline Quantities

	CWS Los Altos	Gilroy	Great Oaks	Milpitas	Morgan Hill	Mountain View	Palo Alto	San Jose Muni	San Jose Water	Santa Clara	Sunnyvale	Purissima Hills	Stanford	North County GW	Coyote & South County GW	County Total
Residential	10,678	9,409	7,787	7,899	6,019	7,013	7,804	13,090	79,719	17,158	14,877	1,809	0	6,744	6,434	196,439
Commercial/Institutional	3,110	3,779	2,285	3,057	2,483	5,439	4,578	7,308	59,602	12,912	14,568	135	4,700	2,248	2,145	128,347
Industrial	14	254	225	2,165	0	520	510	8,218	1,051	3,263	0	0	0	0	0	16,220
System Losses	398	1,494	429	1,507	660	1,082	896	734	9,758	1,754	1,420	102	0	0	0	20,233
Total	14,200	14,935	10,726	14,627	9,162	14,054	13,788	29,349	150,130	35,088	30,865	2,046	4,700	8,992	8,578	361,240

Demand Elasticities

	CWS Los Altos	Gilroy	Great Oaks	Milpitas	Morgan Hill	Mountain View	Palo Alto	San Jose Muni	San Jose Water	Santa Clara	Sunnyvale	Purissima Hills	Stanford	North County GW	Coyote & South County GW
Residential	-0.150	-0.275	-0.192	-0.164	-0.187	-0.218	-0.127	-0.155	-0.207	-0.221	-0.197	-0.198	-0.198	-0.198	-0.198
Commercial/Institutional	-0.300	-0.300	-0.300	-0.300	-0.300	-0.300	-0.300	-0.300	-0.300	-0.300	-0.300	-0.300	-0.300	-0.300	-0.300
Industrial	-0.370	-0.370	-0.370	-0.370	-0.370	-0.370	-0.370	-0.370	-0.370	-0.370	-0.370	-0.370	-0.370	-0.370	-0.370

Sources:

Residential — *The Brattle Group (2012). Residential Losses from Urban Water Shortages in Santa Clara Valley Water District. Prepared for Santa Clara Valley Water District, October 4, 2012.*
M.Cubed (2018). California Water Service 2020 Test Year Sales Forecast: 2018 General Rate Case. Prepared for California Water Service, January 2018.
Purissima Hills, Stanford and GW are weighted averages of the other retailers.

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	CWS Los Altos	Gilroy	Great Oaks	Milpitas	Morgan Hill	Mountain View	Palo Alto	San Jose Muni	San Jose Water	Santa Clara	Sunnyvale	Purissima Hills	Stanford	North County GW	Coyote & South County GW
Baseline Water Price ($/AF)	$2,154	$1,056	$1,652	$2,801	$897	$2,962	$3,999	$1,560	$2,366	$2,479	$2,243	$2,840	$2,267	$1,175	$418

Source: Retailer Water Rates 2001-18 updated 12-01-17.xlsx

	CWS Los Altos	Gilroy	Great Oaks	Milpitas	Morgan Hill	Mountain View	Palo Alto	San Jose Muni	San Jose Water	Santa Clara	Sunnyvale	Purissima Hills	Stanford	North County GW	Coyote & South County GW
Variable Production Cost ($/AF)	$250	$250	$250	$250	$250	$250	$250	$250	$250	$250	$250	$250	$250	$250	$250

County Water Shortage Percent by Hydrologic Year

Hydrologic Year	Base Case	With WSMP
1922	0%	0%
1923	0%	0%
1924	0%	0%
1925	10%	0%
1926	0%	0%
1927	0%	0%
1928	0%	0%
1929	10%	0%
1930	10%	0%
1931	10%	0%
1932	30%	0%
1933	20%	0%
1934	20%	0%
1935	20%	0%
1936	10%	0%
1937	0%	0%
1938	0%	0%
1939	0%	0%
1940	0%	0%
1941	0%	0%
1942	0%	0%
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1964	0%	0%
1965	10%	0%
1966	0%	0%
1967	10%	0%
1968	0%	0%
1969	0%	0%
1970	0%	0%

1971	0%	0%
1972	0%	0%
1973	10%	0%
1974	0%	0%
1975	0%	0%
1976	0%	0%
1977	20%	0%
1978	40%	0%
1979	10%	0%
1980	0%	0%
1981	0%	0%
1982	0%	0%
1983	0%	0%
1984	0%	0%
1985	0%	0%
1986	0%	0%
1987	0%	0%
1988	0%	0%
1989	30%	0%
1990	20%	0%
1991	50%	0%
1992	40%	10%
1993	30%	20%
1994	10%	0%
1995	10%	0%
1996	0%	0%
1997	0%	0%
1998	0%	0%
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2002	0%	0%
2003	10%	0%
2004	0%	0%
2005	10%	0%
2006	0%	0%
2007	0%	0%
2008	0%	0%
2009	20%	0%
2010	20%	0%
2011	0%	0%
2012	0%	0%
2013	10%	0%
2014	10%	0%
2015	40%	0%

Expected Avoided Shortage Cost With WSMP
2040 Level of Demand

User Class	Expected Average Annual Shortage Cost
Residential	71,286,663
Commercial & Institutional	34,231,047
Industrial	3,431,375
Avoided System Water Losses	-355,161
Total	**108,593,923**
Rounded to nearest million	**109,000,000**
2018 Present Value	**$ 2,460,000,000**

Present value of avoided shortage costs (aka benefits) with the Master Plan projects

Level of Shortage	Annual Cost
10%	$86,461,993
20%	$236,860,198
30%	$504,076,623
40%	$956,888,340
50%	$1,546,337,639

Annual cost of a single year of shortage at the level indicated

Santa Clara Valley Water District

MEMORANDUM

FC 14 (01-02-07)

TO: Jerry De La Piedra

FROM: Tracy Hemmeter

SUBJECT: Unit Cost of Water Methodology

DATE: December 9, 2016

The District's 2017 Water Supply Master Plan will evaluate projects and portfolios using several criteria, including the unit cost of water. Other factors include supply reliability (the frequency and magnitude of projected shortages), groundwater storage, reducing reliance on the Delta, water quality, total cost, flexibility and adaptability, environmental effects, and other community effects. It is important to use a methodology that provides for an "apples-to-apples" comparison of unit costs, since different projects have different scales of operation, different operating periods, or both. Given that the District Board needs information on projects and portfolios in Spring 2017, it is also important to use an approach that is readily implemented by staff. This memorandum summarizes Expert Panel input on the different methodologies, describes the proposed method for calculating unit costs of water, and presents other considerations related to the presentation of unit costs of water.

Background

Staff discussed three approaches to calculating unit costs of water with the Expert Panel on December 8, 2016. The first approach was the "Levelized Unit Cost of Water" method provided by David Mitchell on December 1, 2016 (Attachment 1). The levelized unit cost of water, or LCW, is the cost that, if assigned to every unit of water produced or saved by the project of the analysis period, will equal the total lifecycle cost of the project, when discounted back to the base year. LCW is expressed as:

$$LCW = \frac{\sum_{t=0}^{T} \frac{C_t}{(1+d)^t}}{\sum_{t=0}^{T} \frac{Q_t}{(1+d)^t}}$$

Where:

C_t = cost in period t, including capital costs, finance charges as appropriate, O&M costs, repair and replacement costs, and expected salvage value.[1]
d = annual discount rate of 5.5%
T = analysis period or useful life of the project
Q_t = project yield in period t

In presenting this method to the Expert Panel, staff used an analysis period corresponding to the WEAP simulation period of 94-years and the yields corresponding to the annual output of total water supply system yield from WEAP for each of the 94 years. The second approach that was presented to the Expert Panel used a "Simplified" method that was based on the "Levelized Unit Cost of Water" method, but used an analysis period corresponding the useful life of projects and the average annual water supply system yield. The third approach presented was the "Reliability-Weighted" method, which only considered the critical dry year yield of projects.

Expert Panel Input

The panel generally agreed with using the "Levelized Unit Cost of Water" or "Simplified" approach and associated assumptions, with the following comments:

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[1] Salvage value represents the residual value of the project in period T+1. Any value would be negative cost. The District assumes minimal salvage value and does not propose to include them in the cost evaluation at this time.

- Unit costs are most meaningful when they are for projects and portfolios that generate the same level of benefit or service, e.g., the same level of reliability or the same average yield. Since it is unlikely that any individual project would be able to achieve the District's reliability target, it would be best to use the unit cost of water for comparing portfolios of projects that achieve the same level of reliability.
- The assumed inflation rate of 3 percent is higher than long-term current forecasts for California, but may be appropriate for construction projects that historically have higher inflation rates than the general inflation rate. Staff noted that the District uses 3 percent inflation in its water rate forecast model and Capital Improvement Plan.
- The distribution of capital costs should replicate the anticipated actual expenditure rate.
- Using an analysis period that is different than the useful life of a project, i.e., the WEAP simulation period, would need to account for things such as reinvesting in projects that have a shorter useful life or costs that extend past the useful life.
- The assumption that that the project would be fully financed at the start of the construction period results in a somewhat inflated estimate. It would be reasonable to assume that we would we would let out bonds as we incur costs and, since the assumed finance rate and discount rates of 5.5 percent are the same, we could represent all capital costs as "pay as you go" without inflation.
- Using the average annual yield is fine for projects that have fairly stable yields. For projects that have a lot of variation, staff should sample the average yield over 10 year periods to determine variability in the results.
- The "Reliability-Weighted" method is trying to do two things at once – measuring both the cost-effectiveness and the value of the projects. However, these are two different things. The value of projects is better estimated by doing a benefit-cost analysis.
- Costs should be normalized for point of delivery. The cost for transfers at a customer's door will be greater than the cost of transfers at San Luis Reservoir.
- The District needs to be clear that the costs being calculated are District costs. Significant non-District costs should be noted where applicable, e.g., landscape conversion costs not rebated by the District.
- The District should not include loss of revenue as a "cost" associated with water conservation and demand management programs. The District should, however, account for avoided variable costs (treatment, pumping, etc) associate with such programs.
- A sensitivity analysis of costs and yields should be performed for any portfolio that includes the California WaterFix or other very large infrastructure projects.

The Expert Panel stressed the importance of looking at more than just unit costs, or cost-effectiveness. They noted the importance of local control, risk, and diversification. Since a full benefit-cost analysis is not practical for all the potential portfolios, they concurred with using a "consumer reports" approach to presenting benefits. They also suggested presenting the assessment of portfolio benefits to the Board prior to presenting costs, so that Board can discuss what it values and then look at the costs.

"Simplified" Method

Staff proposes using the simplified LCW method for estimated unit costs of water. The spreadsheet in Attachment 2 illustrates how this approach will be implemented using the Mid-Basin Potable Reuse project described in the 2014 South Bay Water Recycling Strategic and Master Plan.

Costs

The starting date of the analysis is 2016. Costs are expressed in 2016 dollars. Cost estimates from prior years are inflated to 2016 dollars using the Engineering News Records (ENR) construction cost index (CCI).

Capital costs are estimated using project-specific preliminary engineering estimates where available, planning level cost estimates, or actual costs from comparable projects. The estimated capital cost for the example project in 2016 dollars is $155 million.

Capital costs typically start in Year 3 and are distributed according to the following pattern over a total of nine years – 0.06, 0.06, 0.06, 0.06, 0.1, 0.2, 0.2, 0.2, and 0.06.

Operations and maintenance (O&M) costs are estimated using project-specific preliminary engineering estimates where available, planning level cost estimates, or actual costs from comparable projects. For projects with variable O&M costs (e.g., their yield varies from year to year), the O&M costs will be estimated using projected yield and estimated annual unit costs for O&M. The annual O&M costs for the example project are $642.67 per AF of potable reuse yield[2]. The average annual potable reuse yield is 4,440 AF or an annual O&M cost of about $2.9 million.

Repair and replacement (R&R) costs will be estimated using the District's asset management database. The database has R&R activities for existing facilities for 100 years. The R&R costs for proposed facilities will be scaled based on the planned costs for similar facilities. The costs will be expressed as annual values, with the assumption that the District would put the necessary funding in to a R&R reserve that would be used as needed. This approach is consistent with the District Asset Management Plan. For the example project, it is assumed that the pump stations and other mechanical equipment will be replaced every 20 years at a cost of $20 million in 2016 dollars. In other words, the R&R costs are $1 million per year.

The District, for purposes of this analysis, is assuming there are no salvage values for the projects.

Discount Rate

The District is using a discount rate of 5.5 percent.

Analysis Period

The analysis period will be the time it takes to complete the Water Supply Master Plan, implement or construct the project, and operate the project for its useful life. Year 0 is 2016. The project start date is assumed to be Year 3 (2019), which provides one year for completing the Water Supply Master Plan and one year for project validation/initiation.

In the example project, the useful life of the project is estimated at 50 years.

Project Yield

The District's water supply system model[3] is used to evaluate the water supply yield of projects and portfolios, with the exception of water conservation and demand management programs. The yield of projects and portfolios is determined by calculating the difference between total system supplies with and without the project on an average annual basis. The yield for water conservation and demand management programs will be the annual reduction in demands on the water supply system associated with the program.

In the example project, the average annual water supply system yield from the project is 4,116 AFY. This is slightly lower than the average amount of potable reuse because there is a slight decrease in the use of surface water supplies with the project.

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[2] The O&M unit costs are for a facility producing 5,600 AFY of constant yield.

[3] The District uses the Water Supply Evaluation and Planning (WEAP) system to evaluate and compare water supply scenarios.

Discussion

The purpose of the Water Supply Master Plan is to present the District's strategy for providing a reliable and sustainable water supply and ensuring new water supply investments are effective and efficient. Currently, the District is evaluating individual projects. Based on those evaluations, staff will combine projects into portfolios and evaluate how different projects work together toward meeting our water supply reliability goals. Unit costs provide an indication of the cost-effectiveness of projects and portfolios, but they are only one of the factors being considered in the Water Supply Master Plan analysis. Other factors include supply reliability (the frequency and magnitude of projected shortages), total cost, groundwater storage, reducing reliance on the Delta, water quality, flexibility and adaptability, environmental effects, and other community effects. Staff will also include information on total cost and reliability when presenting summary information on the projects and portfolios. Groundwater storage, Semitropic storage, and percent of local versus imported supplies are factors that can easily be presented in graphic format. Staff concurs with and appreciates the Expert Panel's emphasis on looking at non-cost factors in valuing different water supply strategies.

Tracy

Senior Project Manager
Water Supply Planning and Conservation Unit

Attachments:
Attachment 1 – Levelized Unit Cost of Water
Attachment 2 – Example Calculation of Unit Costs

Levelized Unit Cost of Water

The levelized unit cost of water (LCW) allows alternative projects to be compared when different scales of operation, different investment and operating time periods, or both exist. For example, the LCW could be used to compare the cost of water from the Water Fix with that from direct potable reuse.

The LCW is that cost that, if assigned to every unit of water produced (or saved) by the project over the analysis period, will equal the total lifecycle cost (TLCC) of the project, when discounted back to the base year.

TLCC is given by

$$TLCC = \sum_{t=0}^{T} \frac{C_t}{(1+d)^t}$$

Where:

C_t = cost in period t, including capital costs, finance charges as appropriate, O&M costs, repair and replacement costs, and expected salvage value.[1]

d = annual discount rate

T = analysis period or useful life of the project

TLCC is the present value cost of the project.

LCW is the constant unit rate for project water that would fully recover the project's TLCC.

$$TLCC = \sum_{t=0}^{T} \frac{Q_t \times LCW}{(1+d)^t}$$

Where:

Q_t = project yield in period t

Since LCW is a constant, it can be taken out of the summation operator.

$$TLCC = LCW \sum_{t=0}^{T} \frac{Q_t}{(1+d)^t}$$

Rearranging terms gives:

[1] Salvage value is a negative cost and represents the residual value of the project in period T+1.

$$LCW = \frac{TLCC}{\sum_{t=0}^{T} \frac{Q_t}{(1+d)^t}} = \frac{\sum_{t=0}^{T} \frac{C_t}{(1+d)^t}}{\sum_{t=0}^{T} \frac{Q_t}{(1+d)^t}}$$

If project yield is constant over time, the formula for LCW reduces to the familiar levelized cost formula used in many engineering economics textbooks:

$$LCW = \frac{TLCC \times \frac{d(1+d)^T}{(1+d)^T - 1}}{Q}$$

Where:

Q = Constant annual project yield

Sources:

Cooley, H. and R. Phurisamban (2016), The Cost of Alternative Water Supply and Efficiency Options in California, Pacific Institute.

Fidar A., F. A. Memon & D. Butler (2016): Economic implications of water efficiency measures I: assessment methodology and cost-effectiveness of micro-components, Urban Water Journal, DOI: 10.1080/1573062X.2016.1223859

Short, W., D. Packey, and T. Holt (1995), A Manual for the Economic Evaluation of Energy Efficiency and Renewable Energy Technologies, National Renewable Energy Laboratory, Golden, Colorado.

Visser, E. and A. Held (2014), Methodologies for Estimating Levelized Cost of Electricity: Implementing the Best Practice LCoE Methodology, ECOFYS, Netherlands B.V.

Project Name: **Template**

PV Cost/PV AF:	$2,400

Source of Costs:
Source of Yield:
Notes:

Real Discount Rate:	2.43%
Nominal Discount Rate	5.5%
Inflation Rate	3.0%

Year	Year #	Capital Cost (2018$)	O&M Cost (2018$)	R&R Cost (2018$)	Total Cost	Present Value Cost (2018$)	Average Water Supply System Yield (AF)	Present Value Yield (AF)
	Total	**$155,000,000**	**$147,000,000**	**$49,000,000**	**$351,000,000**	**$221,359,248**	**201,684**	**92,222**
2016	-2	$0	$0	$0	$0	$0		-
2017	-1	$0	$0	$0	$0	$0		-
2018	0	$0	$0	$0	$0	$0		-
2019	1	$0	$0	$0	$0	$0		-
2020	2	$9,300,000	$0	$0	$9,300,000	$8,864,464		-
2021	3	$9,300,000	$0	$0	$9,300,000	$8,654,406		-
2022	4	$9,300,000	$0	$0	$9,300,000	$8,449,325		-
2023	5	$9,300,000	$0	$0	$9,300,000	$8,249,104		-
2024	6	$15,500,000	$0	$0	$15,500,000	$13,422,713		-
2025	7	$31,000,000	$0	$0	$31,000,000	$26,209,278		-
2026	8	$31,000,000	$0	$0	$31,000,000	$25,588,205		-
2027	9	$31,000,000	$0	$0	$31,000,000	$24,981,849		-
2028	10	$9,300,000	$0	$0	$9,300,000	$7,316,959		-
2029	11		$3,000,000	$1,000,000	$4,000,000	$3,072,504	4,116	3,162
2030	12		$3,000,000	$1,000,000	$4,000,000	$2,999,696	4,116	3,087
2031	13		$3,000,000	$1,000,000	$4,000,000	$2,928,613	4,116	3,014
2032	14		$3,000,000	$1,000,000	$4,000,000	$2,859,214	4,116	2,942
2033	15		$3,000,000	$1,000,000	$4,000,000	$2,791,460	4,116	2,872
2034	16		$3,000,000	$1,000,000	$4,000,000	$2,725,312	4,116	2,804
2035	17		$3,000,000	$1,000,000	$4,000,000	$2,660,731	4,116	2,738
2036	18		$3,000,000	$1,000,000	$4,000,000	$2,597,681	4,116	2,673
2037	19		$3,000,000	$1,000,000	$4,000,000	$2,536,124	4,116	2,610
2038	20		$3,000,000	$1,000,000	$4,000,000	$2,476,027	4,116	2,548
2039	21		$3,000,000	$1,000,000	$4,000,000	$2,417,353	4,116	2,487
2040	22		$3,000,000	$1,000,000	$4,000,000	$2,360,070	4,116	2,429
2041	23		$3,000,000	$1,000,000	$4,000,000	$2,304,144	4,116	2,371
2042	24		$3,000,000	$1,000,000	$4,000,000	$2,249,543	4,116	2,315
2043	25		$3,000,000	$1,000,000	$4,000,000	$2,196,237	4,116	2,260
2044	26		$3,000,000	$1,000,000	$4,000,000	$2,144,193	4,116	2,206
2045	27		$3,000,000	$1,000,000	$4,000,000	$2,093,383	4,116	2,154
2046	28		$3,000,000	$1,000,000	$4,000,000	$2,043,777	4,116	2,103
2047	29		$3,000,000	$1,000,000	$4,000,000	$1,995,346	4,116	2,053
2048	30		$3,000,000	$1,000,000	$4,000,000	$1,948,063	4,116	2,005
2049	31		$3,000,000	$1,000,000	$4,000,000	$1,901,900	4,116	1,957
2050	32		$3,000,000	$1,000,000	$4,000,000	$1,856,831	4,116	1,911
2051	33		$3,000,000	$1,000,000	$4,000,000	$1,812,831	4,116	1,865
2052	34		$3,000,000	$1,000,000	$4,000,000	$1,769,873	4,116	1,821
2053	35		$3,000,000	$1,000,000	$4,000,000	$1,727,932	4,116	1,778
2054	36		$3,000,000	$1,000,000	$4,000,000	$1,686,986	4,116	1,736
2055	37		$3,000,000	$1,000,000	$4,000,000	$1,647,010	4,116	1,695
2056	38		$3,000,000	$1,000,000	$4,000,000	$1,607,982	4,116	1,655
2057	39		$3,000,000	$1,000,000	$4,000,000	$1,569,878	4,116	1,615
2058	40		$3,000,000	$1,000,000	$4,000,000	$1,532,677	4,116	1,577
2059	41		$3,000,000	$1,000,000	$4,000,000	$1,496,357	4,116	1,540
2060	42		$3,000,000	$1,000,000	$4,000,000	$1,460,899	4,116	1,503
2061	43		$3,000,000	$1,000,000	$4,000,000	$1,426,280	4,116	1,468
2062	44		$3,000,000	$1,000,000	$4,000,000	$1,392,482	4,116	1,433
2063	45		$3,000,000	$1,000,000	$4,000,000	$1,359,485	4,116	1,399
2064	46		$3,000,000	$1,000,000	$4,000,000	$1,327,270	4,116	1,366
2065	47		$3,000,000	$1,000,000	$4,000,000	$1,295,818	4,116	1,333
2066	48		$3,000,000	$1,000,000	$4,000,000	$1,265,111	4,116	1,302
2067	49		$3,000,000	$1,000,000	$4,000,000	$1,235,132	4,116	1,271
2068	50		$3,000,000	$1,000,000	$4,000,000	$1,205,864	4,116	1,241
2069	51		$3,000,000	$1,000,000	$4,000,000	$1,177,289	4,116	1,211

2070	52	$3,000,000	$1,000,000	$4,000,000	$1,149,391	4,116	1,183
2071	53	$3,000,000	$1,000,000	$4,000,000	$1,122,154	4,116	1,155
2072	54	$3,000,000	$1,000,000	$4,000,000	$1,095,563	4,116	1,127
2073	55	$3,000,000	$1,000,000	$4,000,000	$1,069,602	4,116	1,101
2074	56	$3,000,000	$1,000,000	$4,000,000	$1,044,256	4,116	1,075
2075	57	$3,000,000	$1,000,000	$4,000,000	$1,019,510	4,116	1,049
2076	58	$3,000,000	$1,000,000	$4,000,000	$995,351	4,116	1,024
2077	59	$3,000,000	$1,000,000	$4,000,000	$971,765	4,116	1,000
2078	60			$0	$0		-
2079	61			$0	$0		-
2080	62			$0	$0		-
2081	63			$0	$0		-
2082	64			$0	$0		-
2083	65			$0	$0		-
2084	66			$0	$0		-
2085	67			$0	$0		-
2086	68			$0	$0		-
2087	69			$0	$0		-
2088	70			$0	$0		-
2089	71			$0	$0		-
2090	72			$0	$0		-
2091	73			$0	$0		-
2092	74			$0	$0		-
2093	75			$0	$0		-
2094	76			$0	$0		-
2095	77			$0	$0		-
2096	78			$0	$0		-
2097	79			$0	$0		-
2098	80			$0	$0		-
2099	81			$0	$0		-
2100	82			$0	$0		-
2101	83			$0	$0		-
2102	84			$0	$0		-
2103	85			$0	$0		-
2104	86			$0	$0		-
2105	87			$0	$0		-
2106	88			$0	$0		-
2107	89			$0	$0		-
2108	90			$0	$0		-
2109	91			$0	$0		-
2110	92			$0	$0		-
2111	93			$0	$0		-
2112	94			$0	$0		-
2113	95			$0	$0		-
2114	96			$0	$0		-
2115	97			$0	$0		-
2116	98			$0	$0		-
2117	99			$0	$0		-
2118	100			$0	$0		-

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Santa Clara Valley Water District

MEMORANDUM

FC 14 (01-02-07)

TO: Karen Koppett

FROM: Tracy Hemmeter

SUBJECT: Addendum to Unit Cost of Water Methodology Memorandum dated December 9, 2016

DATE: January 30, 2019

The purpose of this memorandum is update or clarify portions of the enclosed Unit Cost of Water Methodology Memorandum dated December 9, 2016. The updates and clarifications reflect how the methodology was actually applied during development of the Water Supply Master Plan 2040 (WSMP 2040). The changes are consistent with subsequent input from David Mitchell of M.Cubed related to unit costs analyses for California WaterFix. Updates and clarifications are only provided for those elements that differ from the original memorandum.

Costs

Costs in the WSMP 2040 are expressed as 2017 dollars. Cost estimates from prior years are inflated to 2017 dollars using the Engineering News and Records construction cost index. The costs are expressed as 2017 dollars to be consistent with presentations to the District Board of Directors in 2017 and 2018.

Capital costs are distributed according to the project-specific engineering estimate. If a project-specific schedule is unavailable, capital costs are typically distributed according to the following pattern over nine years – 0.06, 0.06, 0.06, 0.06, 0.1, 0.2, 0.2, 0.2, and 0.06.

Discount Rate

The District is using a real discount rate of approximately 2.43 percent, which is calculated using the following equation:

$$d=(1+d_n)/(1+i)-1$$

where d_n is the assumed nominal discount rate of 5.5 percent and i is the assumed inflation rate of 3.0 percent. These assumptions are consistent with other District financial assumptions.

Analysis Period

The analysis period will be the time it takes to implement or construct the project and operate the project for its useful life, up to 100 years. Infrastructure projects are assumed to be renewed and replaced, rather than salvaged. Therefore, they are analyzed over a 100-year period. A 100-year analysis is consistent with the District's Asset Management Plan. Year 0 is 2017. Most project expenses are assumed to start in Year 2020.

Project Yield

Water supply yield is determined by calculating difference between water used with and without the project. Recognizing that projects perform differently depending on the other projects they are paired with, staff will estimate project yields under a variety of scenarios and calculate a range of unit costs. In the example project, the annual water supply yield used in the unit cost analysis is 4,116 AFY. This is how much of the 5,600 AFY of project capacity the model indicates would be used in a scenario that

includes other potable reuse projects. In a scenario without other projects, the project yield (or utilization rate) is about 4,500 AFY, resulting in a unit cost of about $3,200 per AF.

Please let me know if you have any questions or need additional information.

Senior Project Manager

Enclosure: Unit Cost of Water Methodology dated December 9, 2016

cc (all w/enc): S. Greene, M. Richert

Appendix C - Demand Projection Methodology

Water Supply Master Plan 2040 Demand Forecasting Methodology

WATER SUPPLY MASTER PLAN

WATER DEMAND FORECASTING METHODOLOGY – TRENDING SCENARIO 20*2020 Baseline

Demand Projection Steps

- Utilized the IWRMain Forecast Model. One model area was created for each retailer to create service area demands for the water supply model, WEAP.
- For the 2020 base year water use, we used the lower of the retailer's 2015 Urban Water Management Plan (UWMP) 20x2020 targets or their projection for 2020, if different. The base year water use was input by water use sector for each service area. To break down the 2020 water use into water sector, we used the retailer's 2013 water use monthly billing data by sector. We assumed that the proportion of monthly use by sector remains relatively similar between 2013 and 2020.
- To account for future demographic growth out to 2040, we used a previous analysis of ABAG 2013 data and updated that growth in households and jobs using Plan Bay Area 2016 county data and 2016 DOT jobs forecast. We adjusted household type growth (single family vs multi-family) in some service areas based on previous conversations with some of the retailers and cities. Those conversations were documented in the appendix of the 2015 UWMP.
- We applied household growth rates to the residential water use sectors. The city and retailer conversations of their residential makeup in the future were considered. We placed most growth in the multifamily sector because most areas in north county will see less new single family developments; and where single family homes are built, water use efficiencies and smaller landscapes will likely make future water use characteristics in that sector look more like multifamily use.
- We used job growth rates from the regional projections for non-residential growth. Job growth by sector was applied to appropriate water use sectors.
- Once the base water demand projections were run using these inputs, we applied unaccounted for water to each retailer using their UWMP data in the post-processing files.
- Then we used our future water conservation program savings modelled after 2020, and applied water conservation demand reduction to each service area to the post-processing files.
- Where applicable, we also added recycled water demand based on the retailer's UWMPs in the post processing files.

Assumptions

- Assume retailers achieve their 20x2020 targets, or their 2020 water use projections in their UWMPs.
- Assumes that much of the expected post drought rebound would be realized by, or near, 2020
- Using 2020 water use projections as a base year, assumes many water use efficiencies in place
- Passive and active conservation based on Valley Water's WUE model are realized

Benefits and Disadvantages

- Benefits
    - Allows for a good comparison of updated retailer projections in the 2015 UWMPs
    - Allows for a consistent approach to be applied across all service areas for a better countywide analysis.
    - Includes the effect of more recent demographic projections
- Disadvantage – Many retailers adjusted their projections to include effect of the 2012 -2016 drought and, therefore, the 20 x 2020 targets have already been achieved by many of the retailers

Appendix D - Model Description and Assumptions

Water Supply Master Plan 2040 Modeling Approach and Assumptions

WATER SUPPLY MASTER PLAN 2040 MODELING APPROACH AND ASSUMPTIONS

WEAP BACKGROUND

The Santa Clara Valley Water District (Valley Water) uses the Water Evaluation and Planning (WEAP) model developed by the Stockholm Environment Institute as one method of evaluating water supply alternatives. WEAP is a software tool developed for water resources planning that uses water demand and supply information that takes into account multiple and competing uses and priorities. It is a deterministic integrated water resources management model. Valley Water simulates its facilities and operations including groundwater basins, reservoirs and creeks, imported supplies, treatment plants, water banking, distribution facilities, and conservation efforts in the model. The model also accounts for non-Valley Water sources and distribution of water in the county such as water from San Francisco Public Utilities Commission (SFPUC) Regional Water System, recycled water, and local water developed by other organizations.

ASSUMPTIONS

WEAP operates on a monthly time-step that simulates the water supply and demand of the last 94 years (1922 through 2015). The baseline condition includes existing facilities and assumes completion of dam seismic retrofits according their current schedules for completion. Future Delta-conveyed imported water deliveries for Years 2020 and 2025 are based on DWR's 2015 Final Delivery Capability Report – Early Long-Term Scenario, which includes climate change and existing restrictions from biological opinions (USFWS 2008 for Delta Smelt, NMFS 2009 for Salmonids). Delta-conveyed baseline supplies for Years 2030 through 2040 are based on the H4 Existing Conveyance High Outflow (ECHO) Scenario from the DWR 2015 Final Delivery Capability Report. The model also includes revised operations associated with the FAHCE 2003 settlement agreement.

Water delivery is modeled to meet demands according to availability and priority. Demands in the system include retailer demands, agricultural demands, independent groundwater pumping, raw water deliveries, environmental flow requirements, and groundwater recharge. Retailer demands are from Valley Water's "Trending Scenario" (as described in Appendix B). Agricultural demands, independent groundwater pumping, and raw water deliveries are estimated based on historical use and growth projections. Environmental flow requirements are based on requirements in the Fisheries and Aquatic Habitat Collaborative Effort (FAHCE) settlement agreement and permit requirements. Groundwater recharge demands are based on recharge facility capacity.

To meet county-wide demands in the model, non-Valley Water water supplies are used first; including SFPUC supplies, recycled water, and local surface water supplies from San Jose Water. These supplies are followed by Valley Water-managed local surface water and imported water. Stanford University has surface water rights that serve the demands of the Stanford University service area. Currently, Stanford's surface water diversions are only used for the non-potable irrigation system on campus. If there are remaining unmet demands for municipal

or agricultural use, they are met with groundwater pumping. This preserves groundwater supplies for droughts and other shortages as much as possible. Supplies in excess of municipal, industrial, domestic, agricultural, and environmental needs are sent to percolation ponds to recharge the groundwater basins, held over in reservoirs, and/or delivered to Semitropic Groundwater Bank.

The model tracks water resources throughout the county including imported water, rainfall, reservoir levels, river flow, treatment plant production, groundwater recharge, groundwater pumping, recycled water, and delivery of water to meet all demands.

A complete summary of assumptions used in the modeling for the Water Supply Master Plan is included in Attachment 1 (WSMP WEAP Modeling Assumptions).

ALTERNATIVE ANALYSIS

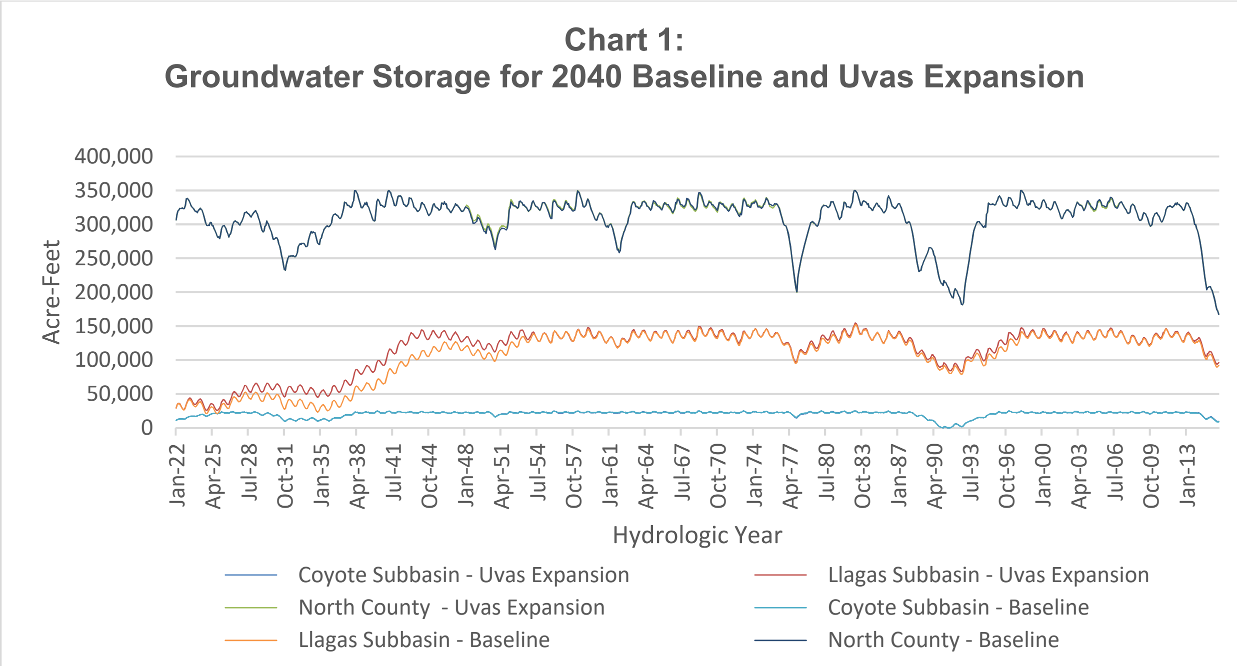
A baseline utilizing projected water demands and supplies in the year 2040 was created to compare and evaluate the project alternatives considered for the Water Supply Master Plan 2040. Each project alternative was then added and integrated into the baseline model and the model re-run to obtain new results.

Output from the model includes monthly and annual reporting of a wide range of data including groundwater storage levels, local reservoir operations, flows at key locations, and Valley Water's ability to meet demands. The output is summarized for the baseline and each alternative as illustrated in Attachment 2 (an example model output).

The effectiveness of a given project alternative is determined with the evaluation of a few key outputs as measured against the baseline; these include groundwater storage, the ability of a project alternative to avoid water use restrictions, and total water yield. Other criterion, such as project complexity, water quality, and recreation, are considered outside of the WEAP modeling framework described herein.

Groundwater Storage

Groundwater is important because one of Valley Water's key missions is to maintain groundwater storage as a reserve for dry years and to ensure that subsidence does not reoccur. Groundwater storage for the three groundwater management areas with and without a project can be compared to see how well the alternative improves groundwater conditions, such as in Chart 1 below showing groundwater storage for the 2040 Baseline and a scenario expanding Uvas Reservoir. Groundwater level is also used to determine if water use restrictions are triggered under Valley Water's Water Shortage Contingency Plan.



Avoidance of Water Use Restrictions

The Board approved Valley Water's Water Shortage Contingency Plan (WSCP) that identifies when Valley Water should call on the community to reduce water use in response to drought or other shortages. The WSCP is based on the end of year groundwater storage, as this reflects the general health of the water system. The plan has five levels; ranging from Level 1 (Normal) when short-term water use reductions are not required to Level 5 (Emergency) which can be triggered by an immediate crisis. Each level has a short-term water use reduction target that the Board can call upon the public to achieve. For example, in 2015 when the groundwater level was projected to be in the 'critical' stage by the end of the year, the Board called for a 30% reduction in water use. In evaluating potential water supply facilities and programs, Valley Water seeks alternatives that can reduce the number of years (over the 94-year simulation in the model) that trigger a call for reductions, as well as the severity of those reductions. Valley Water's current level of service goal is to develop supplies to meet 100 percent of demands in normal years and at least 80 percent of demands in drought years. In the model, this equates to finding project alternatives that avoid calls for water use reductions of more than 20 percent. The number of years with reductions and the maximum demand reduction can be seen in rows 37 through 45 in the example model output shown in Attachment 2.

Total Water Yield

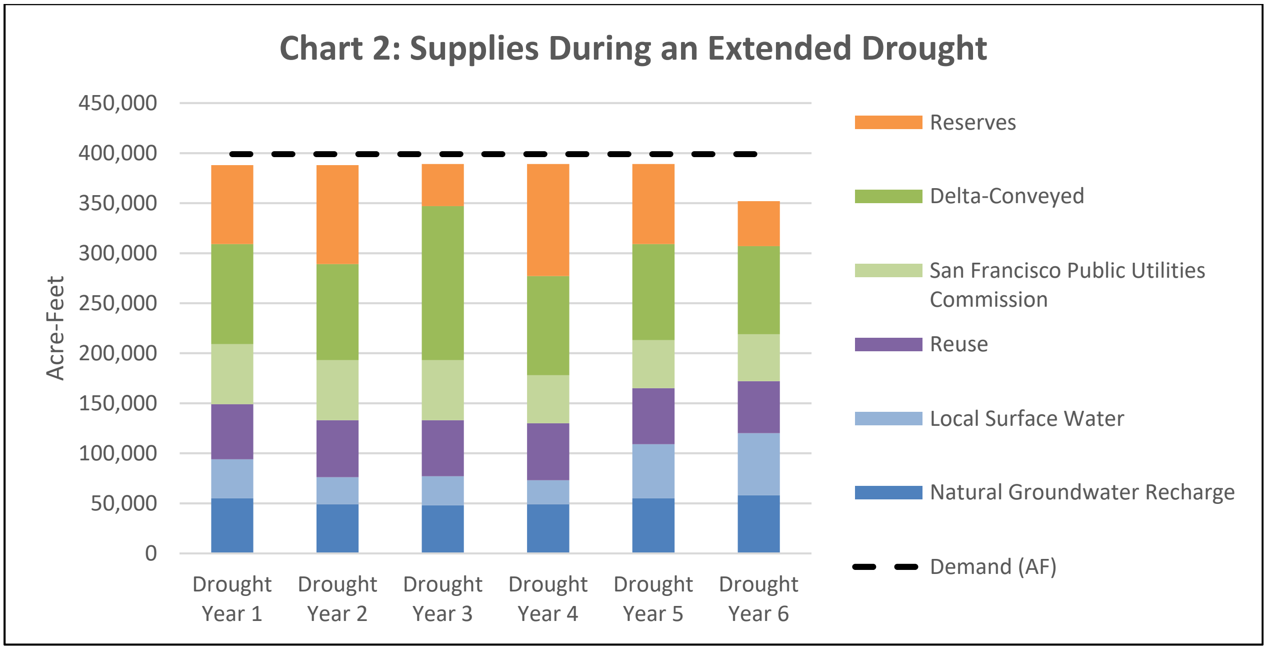
A third measure of the robustness of a project alternative is the total water yield. This is a summation of average water supply use from natural groundwater recharge, local surface water, recycled water, potable reuse, imported water, and supplemental supplies. The total water yield is also used to calculate the unit cost of each alternative. The average supply from each type of source can be seen in rows 47 through 54 in the example model output shown in Attachment 2.

Other Outputs

Other outputs are also considered when evaluating water supply alternatives based on WEAP modeling results. The amount of storage in the Semitropic groundwater bank, unused carryover in the federal Central Valley Project (CVP) and State Water Project (SWP) systems, and creek water that flows to San Francisco Bay are examined and can show the efficiency of the water supply system with a project alternative included.

The drought years of 1987 through 1992 can be specifically analyzed for each project alternative to see how well the project alternative performs in extended dry conditions. Chart 2 shows how the Water Supply Master Plan projects perform during a repeat of the 1987 to 1992 drought.

Other types of data may be important for specific types of project alternatives. For example, the amount of water stored by a new or expanded reservoir is critical for storage projects, or the volume of water that can be delivered to a new percolation pond is key for those types of projects.



USE OF MODEL RESULTS

The data from the WEAP model is used to identify project alternatives that best meet county-wide demands. Individual project alternatives are combined into portfolios and these portfolios run through the model to evaluate the performance of the portfolio against the baseline. The WEAP model provides a consistent method of assessing the effectiveness of various project alternatives and portfolios. The effectiveness of project alternatives is balanced with the cost, environmental impact, effects to water quality, and other criteria to recommend a set of projects in the master plan for future implementation that best meets Valley Water objectives.

	Trending Scenario Baseline Model Assumptions
1 General	
Historical Hydrology	1922 – 2015
Demand Year	2040
Model Version	Water Evaluation And Planning model (WEAP), WEAP Version: 2018.1, August 23, 2018 Dictionary Version: 375
Model Name	Master WEAP Model April 2018 v016_July 2018
Elements modeled	Complete water supply system
General Scenario Description	Planned operations for 2040
Model Method	Deterministic
2 Surface Water Supplies	
CVP Supplies to Coyote Creek	Downstream recharge and flow requirements less 2 cfs min Anderson release if combined (Anderson and Coyote) storage is less than: Nov: 42.0 TAF Dec: 46.1 TAF Jan: 71.3 TAF Feb: 74.8 TAF Mar: 87.6 TAF Apr: 87.6 TAF May - Oct: 0 cfs
CVP supplies to Anderson Reservoir	Link 1 (Diversion to Anderson, storage priority = 94): Yes, if month is March or April AND San Luis Reservoir storage < 950,000 af; then move 200 cfs Link 2 (Demand Priority = 4; FAHCE): Yes, if month is March or April AND Anderson storage <35,000 af, then move 150 cfs until storage reaches 35,000 af
CVP supplies priorities	1 - Minimum flows to Upper Coyote (10 cfs), Madrone (7 cfs), Santa Teresa WTP 2 - Rinconada and Penitencia Water Treatment Plants 3 - Remaining recharge in Upper Coyote and Llagas System (Madrone, Main, San Pedro) 4 - Other Coyote recharge (remaining Upper Coyote Creek, Coyote Perc Pond, Lower Coyote Creek) 5 - Los Gatos, Guadalupe and most other recharge 6 - Westside recharge (west of Los Gatos system)
CVP Reallocation Agreement (1997 - 25 year agreement)	Assumed to expire and no longer be used after 2022; historical M&I use set at 130,000; 2004-2014 actual allocations applied to same formula as 1922-2003; 2015 actual allocation for CVP of 40,300 af, which included an additional 7,800 af of supply to meet SCVWD 'Public Health and Safety' requirements

	Trending Scenario Baseline Model Assumptions
Imported Water Allocations	2015 Delivery Capability Report - Existing Conveyance High Outflow (ECHO) Scenario; includes enhanced spring outflow, 2025 climate change, existing biological opinions (FWS 2008 for Delta Smelt, NMFS 2009 for Salmonids), South Delta operating restrictions (Scenario 6) and Fall X2 and enhanced spring outflow requirements; average = 133,000 AFY (CVP + SWP) Cal WaterFix: Department of Water Resources Change in Point of Diversion hearing exhibit 500. 2025 climate change, existing biological opinions (FWS 2008 for Delta Smelt, NMFS 2009 for Salmonids), South Delta operating restrictions (Scenario 6) and Fall X2 and enhanced spring outflow requirements. CVP agriculture contract amount of 33,100 AFY and assuming CVP M&I historic use of 130,000 AFY
Semitropic Participation	350,000 acre-foot (AF) capacity; initial storage = 200,000 AF
Semitropic Water Bank "Put"	Once 10,000 AF of water has gone to each primary carryover reservoir (both SWP and CVP), then send any surplus imported water to Semitropic until annual maximum put capacity is reached or Semitropic Bank is full. SCVWD maximum annual Semitropic put is 31,675 AF (based on SCVWD's participation rate of 35% * current total Semitropic maximum annul put capacity of 90,500 acre-feet: 0.35 * 90,500 = 31,675 acre-feet)
Semitropic Water Bank "Take"	Take if Santa Clara Plain groundwater storage falls below 278 TAF, there are unmet treated water demands, or if there are other unmet demands and Semitropic storage is above 189 TAF. 189 TAF in Semitropic is being reserved for use in an extended drought (6 years of minimum takes of 31,500 acre-feet each). There is no capacity restrictions on takes, only annual take limits. Annual take limits are based on SWP allocations.
San Luis Reservoir	2015 Final Delivery Capability Report - H4 no tunnels scenario. Includes climate change, biological opinions, and enhanced spring and fall outflows.
San Luis Low Point	CVP deliveries are restricted to 75% of allocation to Santa Teresa and Rinconada WTP when a low point event is active (San Luis storage < 300,000 AF); however if expanded Anderson or Pacheco Reservoirs are active AND their storage is available for release, this restriction is not implemented.
CVP Carryover	Up to 50 TAF max per year; lost if San Luis Reservoir storage goes to 2,000,000 AF; fill with 10 TAF before putting to Semitropic, then once Semitropic put is maxed, put to carryover again (also see Semitropic "Put" assumptions)

	Trending Scenario Baseline Model Assumptions
SWP Carryover	Up to 50 TAF max per year; lost if San Luis Reservoir storage goes to 2,000,000 AF; fill with 10 TAF before putting to Semitropic, then once Semitropic put is maxed, put to carryover again (also see Semitropic "Put" assumptions)
Wheeling CVP to SWP	Transfer CVP water thru SBA when we have a San Luis Reservoir (SLR) low point condition (when SLR storage drops below 300 TAF) or during the month of December to allow surplus CVP water to be used in the SWP system -- including being sent to Semitropic Water Bank
Delta Conveyance Project	Not in base case. Only in Delta Conveyance Project scenarios
San Francisco Public Utilities Commission (SFPUC)	SFPUC supplies identified in SCVWD's 2015 Urban Water Management Plan (UWMP) and SFPUC's 2015 UWMP
Climate Change	Included in CalSim II imported water allocations and San Luis Reservoir storage values received from California Department of Water Resources. Climate change for year 2025
3 Recycled Water	
Recycled Water Demands	Included in SCVWD 2015 UWMP demand setup from retailers' master plans; 33,000 af in 2040
4 Groundwater	
Natural Groundwater Recharge (Annual Average)	Santa Clara Plain = 36043 AFY
	Coyote Valley Study Area = 2396 AFY
	Llagas = 22478 AFY
Net groundwater losses (average)	0
Includes subbasin exchanges?	No
Initial Groundwater Storage	Santa Clara Plain = 301,400 AF (EOY 2013)
	Coyote Valley Study Area = 10,300 AF (EOY 2013)
	Llagas = 26,600 AF (EOY 2013)
Santa Clara Plain Stop Recharge	345,000 AF
Maximum Groundwater Pumping Capacity	Santa Clara Plain = 200,000 AF; Coyote Valley = 20,000 AF; Llagas = 100,000 AF
Groundwater Storage Capacity	Santa Clara Plain = 350,000 AF
	Coyote Valley Study Area = 25,000 AF
	Llagas = 155,000 AF

	Trending Scenario Baseline Model Assumptions
5 Reservoir Operations	
Fisheries and Aquatic Habitat Collaborative Effort (FAHCE) Operations	Active
South County LSAA Reservoir Flow Requirements (Chesbro & Uvas)	Active
Anderson / Coyote combined Reservoir Operations Rule Curve	Nov - 74,000 AF Dec - 82,000 AF Jan - 90,000 AF Feb - 100,000 AF Mar - 105,000 AF Apr - 111,998 AF
Anderson and Coyote Water Rights	Maximum annual withdrawal of 43,370 + 24,560 AF/year
Anderson supplies to Main and Madrone	Yes
Emergency Storage for Water Supply	Anderson 20,000 AF; Calero 4,000 AF
Anderson to distribution system	Release 6TAF/month less required for downstream recharge if Anderson Storage plus inflow > 62TAF
Division of Safety of Dams (DSOD) Seismic Restrictions	Coyote Reservoir - per DSOD storage management compliance procedure, December 1992
Almaden-Calero Canal	Almaden above transfer rule curve; Calero below transfer rule curve; Almaden FAHCE pulse flow requirements prioritized over transfers in Feb-Apr; maximum transfer of 6,000 AF per water year
6 Recharge	
Total recharge capacity	Santa Clara Plain = 92,600 AFY
	Coyote = 17,100 AFY
	Llagas = 39,300 AFY
7 Demands	
Demand Projections	Calculated by SCVWD by assuming water retailers meet the State of California's "20x2020 Water Conservation Plan" goal of reducing per capita urban water use by 20 percent by the year 2020, then used regional growth projections and residental growth projections to calculate demands through 2040

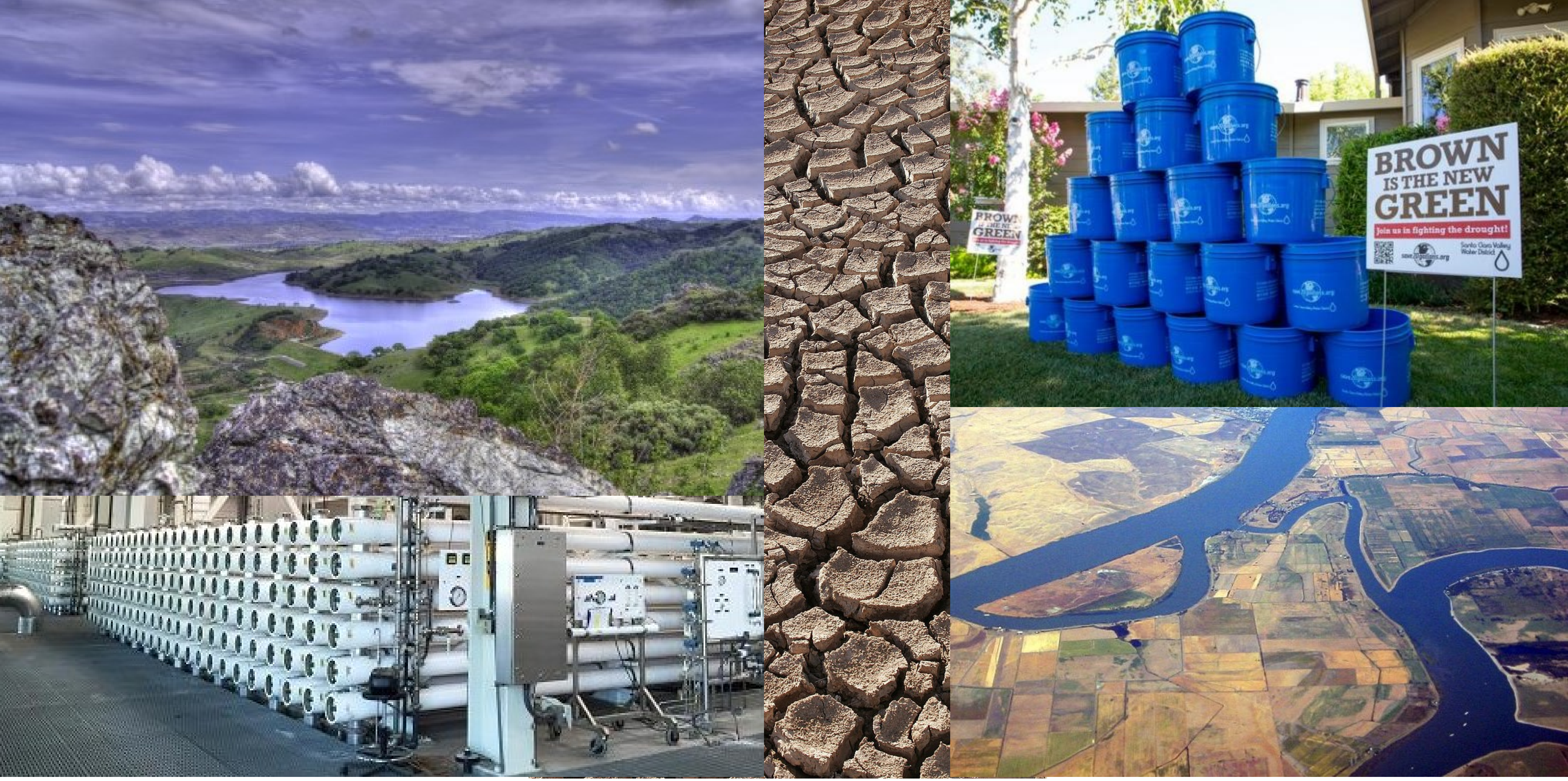
	Trending Scenario Baseline Model Assumptions
Weather Demand Reduction Factors	None
Conservation ('92 Baseline) including Agriculture	2030: 98,800 AF
Water Shortage Contingency Plan (WSCP) Actions	New Water Shortage Contingency Plan as follows: There are 5 groundwater storage thresholds or stages the model uses to trigger a WSCP demand reduction action or event, all based on Santa Clara Plain/North County groundwater storage at the end of the calendar year and applied to the following calendar year: **Stage 1 (Normal)** occurs when Santa Clara Plain storage is above 278,000 AF **Stage 2 (Alert)** occurs when Santa Clara Plain storage is <= 278,000 AF and above 232,000 AF **Stage 3 (Severe)** occurs when Santa Clara Plain storage is <= 232,000 AF and above 185,000 AF **Stage 4 (Critical)** occurs when Santa Clara Plain storage is <= 185,000 AF and above 139,000 AF **Stage 5 (Emergency)** occurs when Santa Clara Plain storage is <= 139,000 AF Each stage has a base demand reduction factor assigned to it: **Stage 1** = 0% **Stage 2** = 10% **Stage 3** = 15% **Stage 4** = 30% **Stage 5** = 50%
Total Countywide Demands	2040: 399,000 AF, based on SCVWD's '20x2020 Demand Projections' which includes Service Area Demands + new Surface Deliveries + TW losses captured as 2.15 % of raw water deliveries to treatment plant that is returned to Santa Clara Plain groundwater subbasin
Increased Demand Allocation	Per retailers, maintain groundwater/treated water proportion for incremental increases in demand
8 Treated Water	
Water Treatment Plant (WTP) Capacity	Rinconada WTP = 80 MGD
	Penitencia WTP = 40 MGD
	Santa Teresa WTP = 100 MGD
Treated Water (Contract)	2040: 131,273 AF
Treated Water (Non-Contract)	18,992 AFY; 0 if SWP allocation is less than 52%

	Trending Scenario Baseline Model Assumptions
9 Baseline Projects	
Dam Seismic Upgrades	Almaden, Anderson, Calero, and Guadalupe Active 2030, 2035, 2040
Main and Madrone Pipeline Repair	Active/Completed in 2019

ATTACHMENT 2: EXAMPLE WEAP MODEL OUTPUT SUMMARY

DRAFT	2040 Trending H4, No Regrets + CWF + IPR + Pacheco + Xfer Bethany	
Groundwater Storage (Annual Avg Acre-foot)		
Coyote Subbasin	22,934	
Llagas Subbasin	133,948	
North County Santa Clara Sbb	336,286	
Sum	**493,168**	
Local Reservoir Storage (Annual Avg Acre-foot)		
Almaden Reservoir	660	
Anderson Reservoir	55,938	
Calero Reservoir	5,870	
Chesbro Reservoir	3,151	
Coyote Reservoir	9,541	
Guadalupe Reservoir	1,533	
Lexington Reservoir	6,890	
Stevens Creek Reservoir	1,995	
Uvas Reservoir	5,654	
Pacheco Reservoir	108,932	
Sum of Local Storage	**200,164**	
Non-Local Storage (Annual Avg Acre-foot)		
Semitropic	270,470	
CVP Carryover	10,026	
swp carryover	11,009	
GW Bank SOD	0	
Los Vaqueros Expansion (bank or monthly avg supp	0	
Sum of Non-Local Storage	**291,505**	
Flow to Bay (Total)		
San Francisco Bay	6,062,595	
Los Gatos Creek	1,122,304	
Monterey Bay	4,041,269	
Water Shortage Contingency Plan Actions		
Count of Years with Demand Reductions	2	
Maximum Demand Reduction	-20.00%	
Number of Years in Stage 2 (10%)	1	
Number of Years in Stage 3 (20%)	1	
Number of Years in Stage 4 (30%)	0	
Number of Years in Stage 5 (40%)	0	
Number of Years in Stage 6 (50%)	0	
Meets Reliability Targets	Yes	
Baseline Supplies Used		
Natural Groundwater Recharge	62,207	
Local Surface Water	56,502	
Recycled Water	32,848	
Potable Reuse	18,940	
San Francisco Public Utilities Commission	59,643	
Delta-Conveyed	160,697	
Supplemental Dry Year Supplies	0	
Sum	390,836	
Annual Average Losses		
Reservoir Evaporation	12,483	
Spills to Bay - San Francisco	23,090	
Spills to Bay - Monterey	16,329	
CVP Overflow Not Used	4,820	
SWP Overflow Not Used	8,426	
Unused Potable Reuse Capacity	4,857	
Lost Groundwater	4,633	
Lost Groundwater Bank (Semitropic rule: 10% of pu	942	
Lost Water Sum	**75,581**	

Appendix E – 2017 Voter Survey



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MARKET & OPINION RESEARCH SERVICES

Santa Clara Valley Water District SM

Telephone Survey of Santa Clara County Voters Re: Water Conservation

Conducted for: Santa Clara Valley Water District

April 2017

Appendix E

Methodology

- Telephone survey of registered voters in Santa Clara County
- Conducted by trained, professional interviewers from March 23 – 28, 2017
- 400 completed interviews
- Margin of error: ± 4.9 percentage points
- Interviews conducted in English, Spanish, Chinese, and Vietnamese

Please note that due to rounding, some percentages may not add up to exactly 100%.

Key Findings

- In spite of the wet winter and potential end to the drought, voters in the Santa Clara Valley Water District still see the need to prepare for the future and invest in a more reliable water supply.
- They do not recall cutting back their water use during the drought as having been much of a challenge.
- A majority are open to a small rate increase of $5-10 per month, but many oppose a larger $20-30 increase.
- Framing the investment as something that would ensure a more reliable water supply is sufficient—adding information on the corresponding use reductions could introduce confusion.
- Specific investments in recycled water for irrigation and industrial uses, storm water capture, and updating aging infrastructure generate the most enthusiasm.

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Water Use Reductions

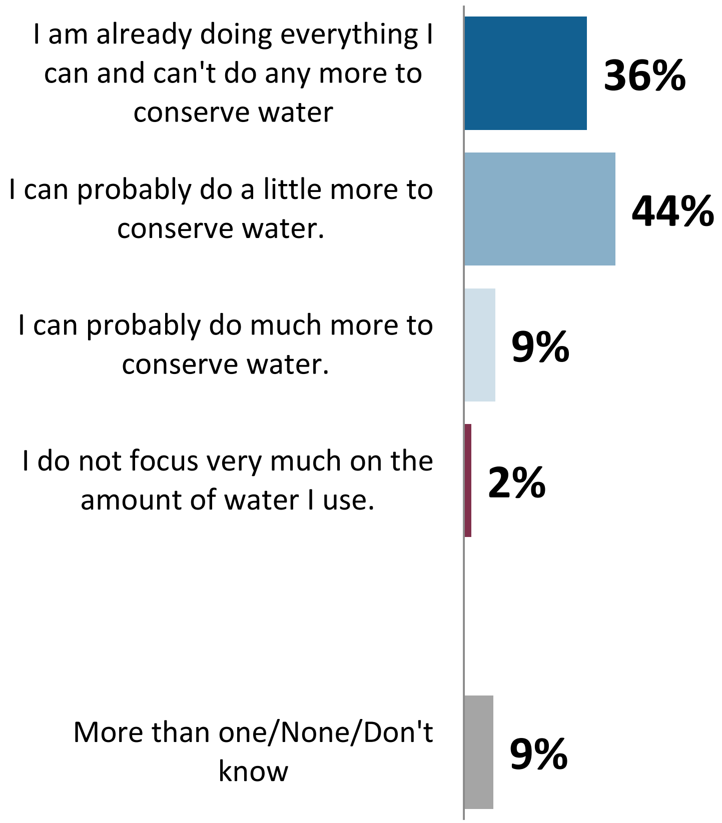
Appendix E

Efforts to Reduce Water Use

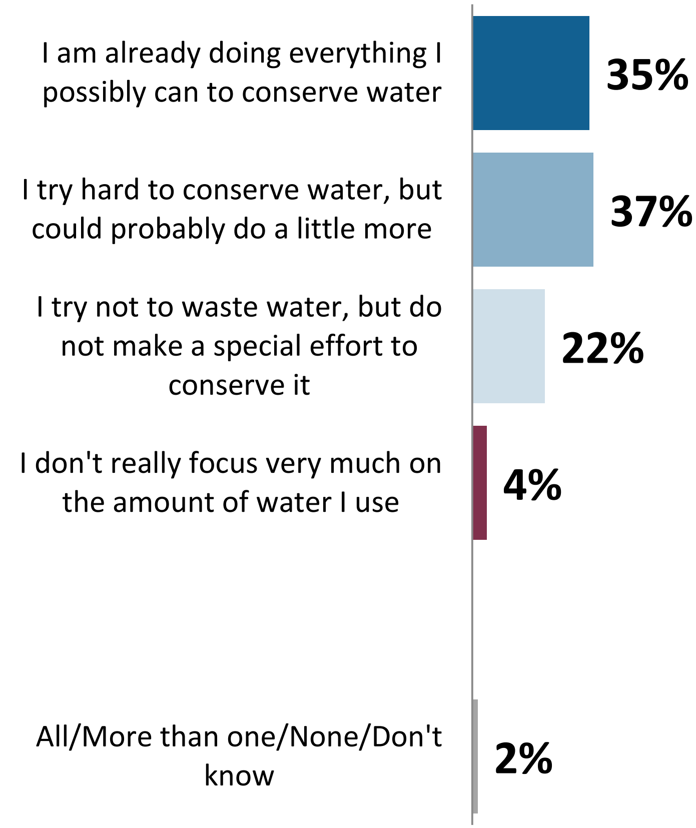
Most report they are still making an effort to conserve water, although the majority could do more. The number who say they're doing everything they can to conserve has not changed since a similar question in 2015.

Which of the following statements best describes your current efforts to reduce your water use?

15-5606 Drought and Drought Policy Survey



2017 Water Conservation Survey



Appendix E

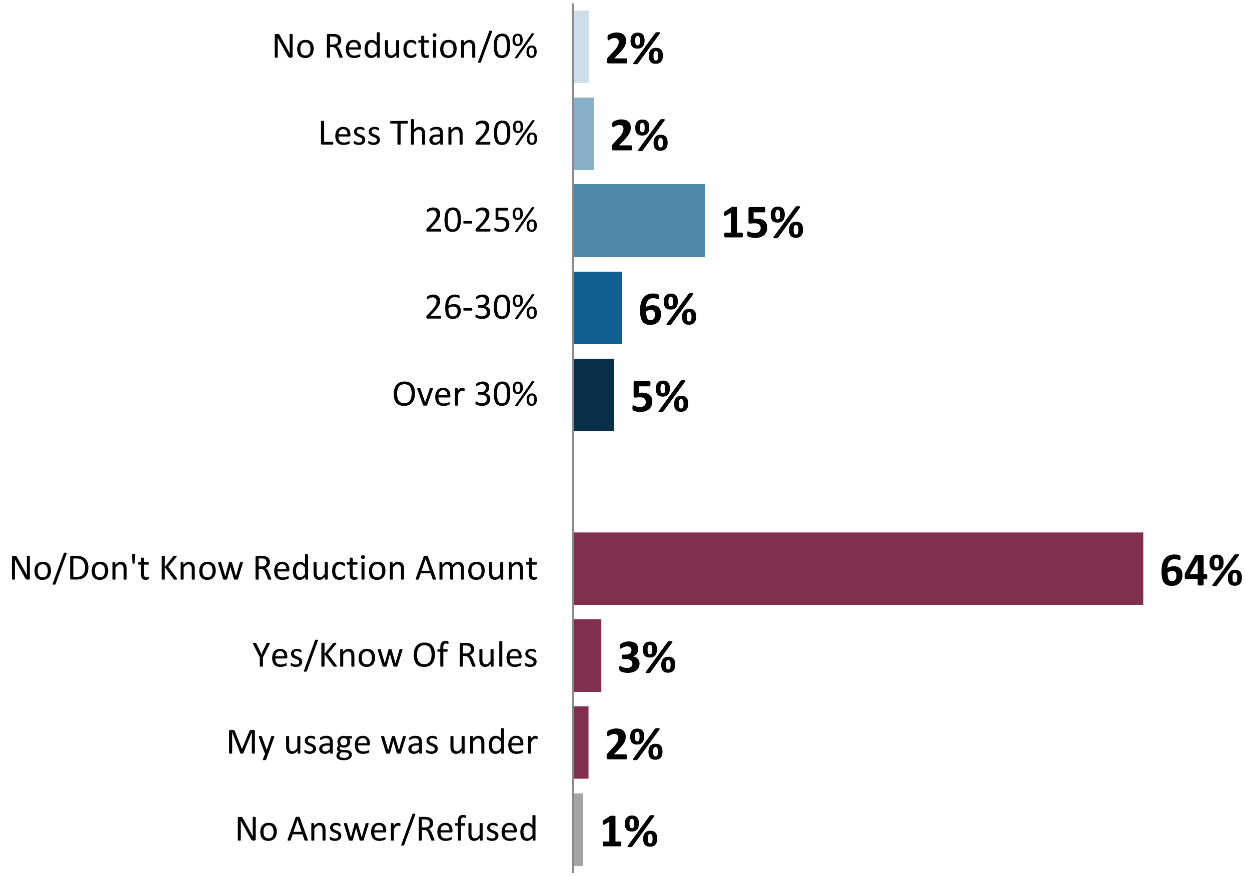
EMC RESEARCH

Q3.

Knowledge of Water Use Reduction

Few recall how large of a reduction in water use was called for last summer.

Do you happen to know how much of a reduction in water use your local water agency was calling for last summer during the statewide drought?



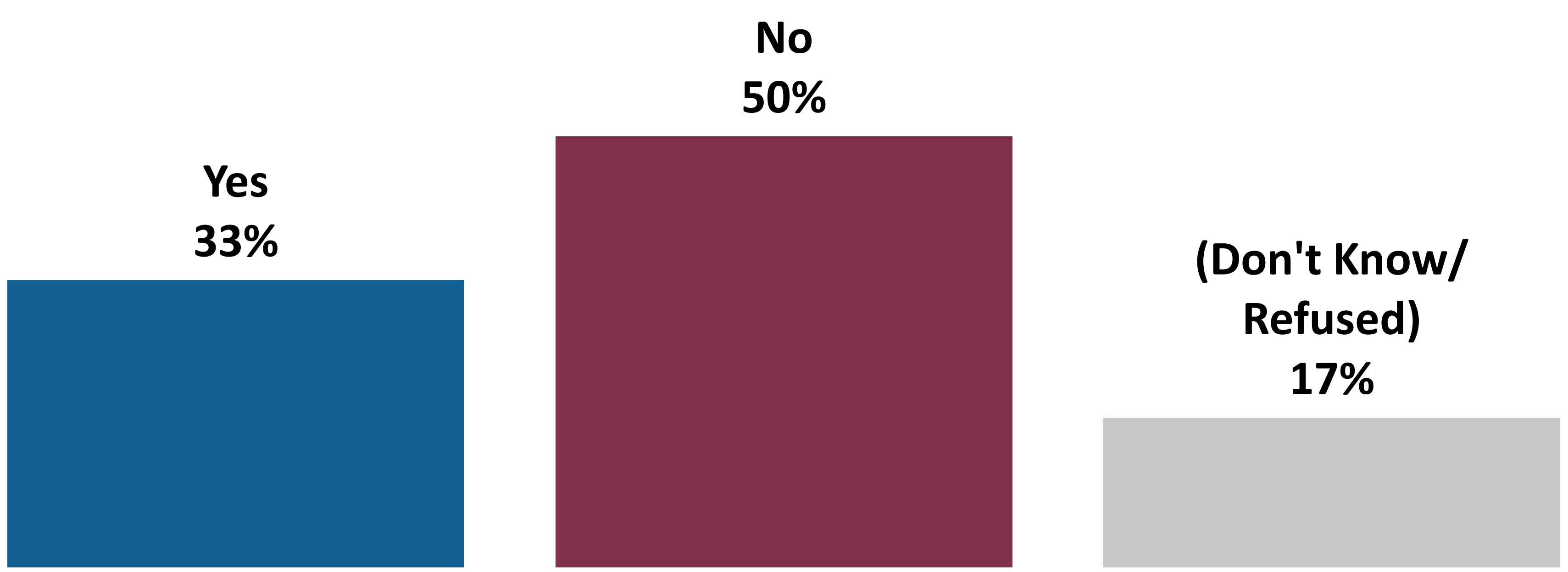
Appendix E

Q4.

Knowledge of Fines

Only a third report that their local agency imposed fines during the drought.

As far as you know, did your local water agency impose any fines or surcharges for using too much water during the statewide drought?



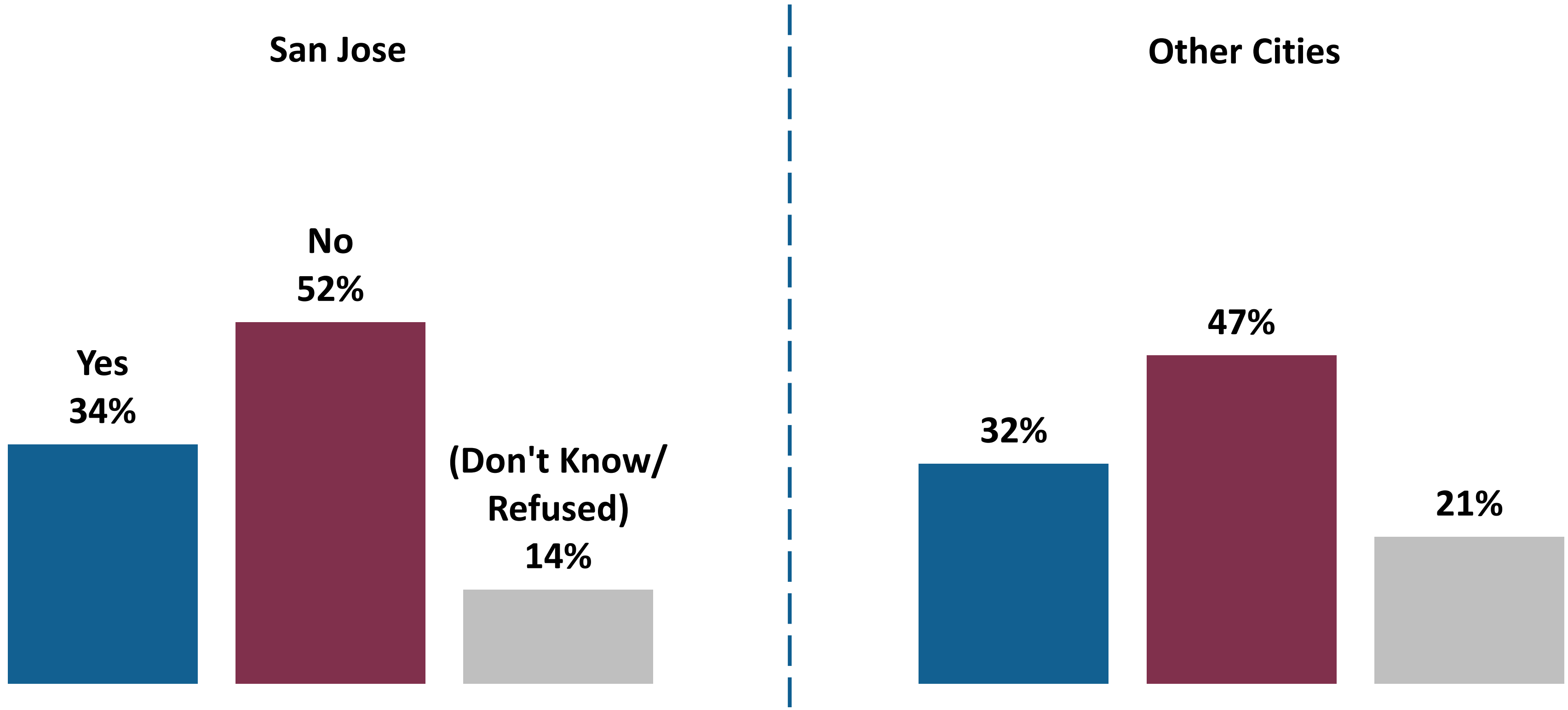
Appendix E

Q5.

Knowledge of Fines by City

Recollection of fines or surcharges is similar in San Jose and other cities.

As far as you know, did your local water agency impose any fines or surcharges for using too much water during the statewide drought?

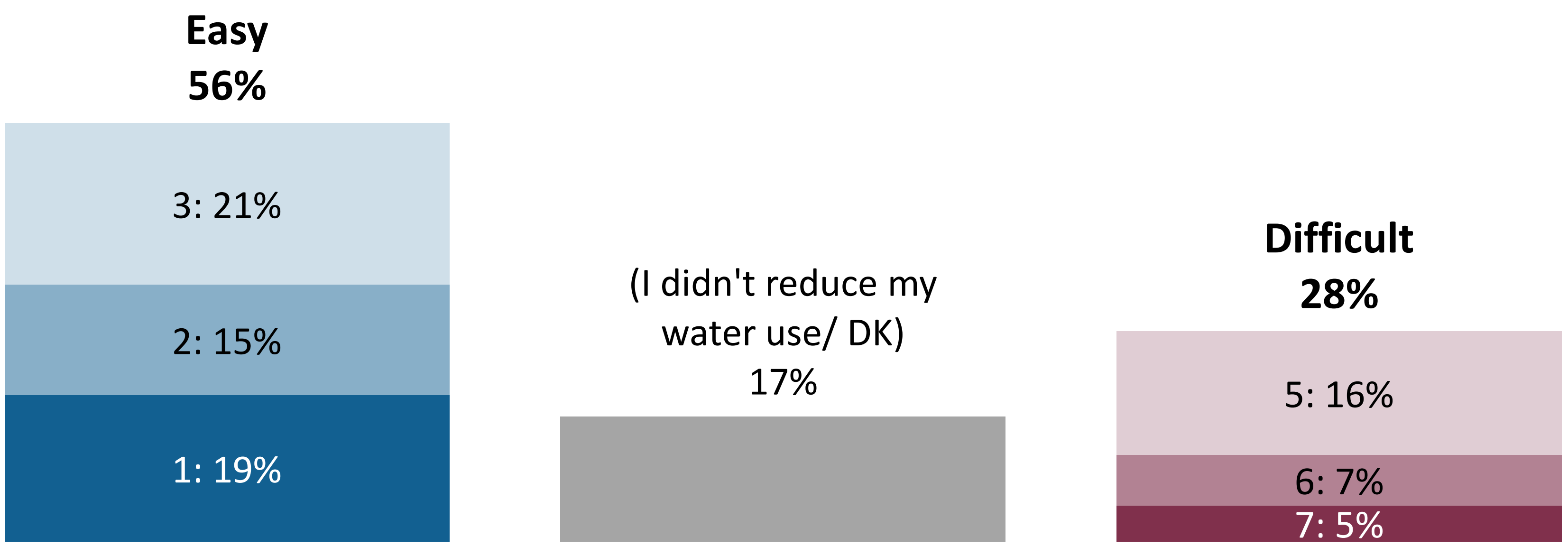


Appendix E

Reducing Water Use During the Drought

A majority felt that reducing their water use during the drought was relatively easy.

Thinking about a scale where 1 is very easy and 7 is very difficult, how easy or difficult was it for you to reduce your water use during the drought?



Appendix E

Q6.

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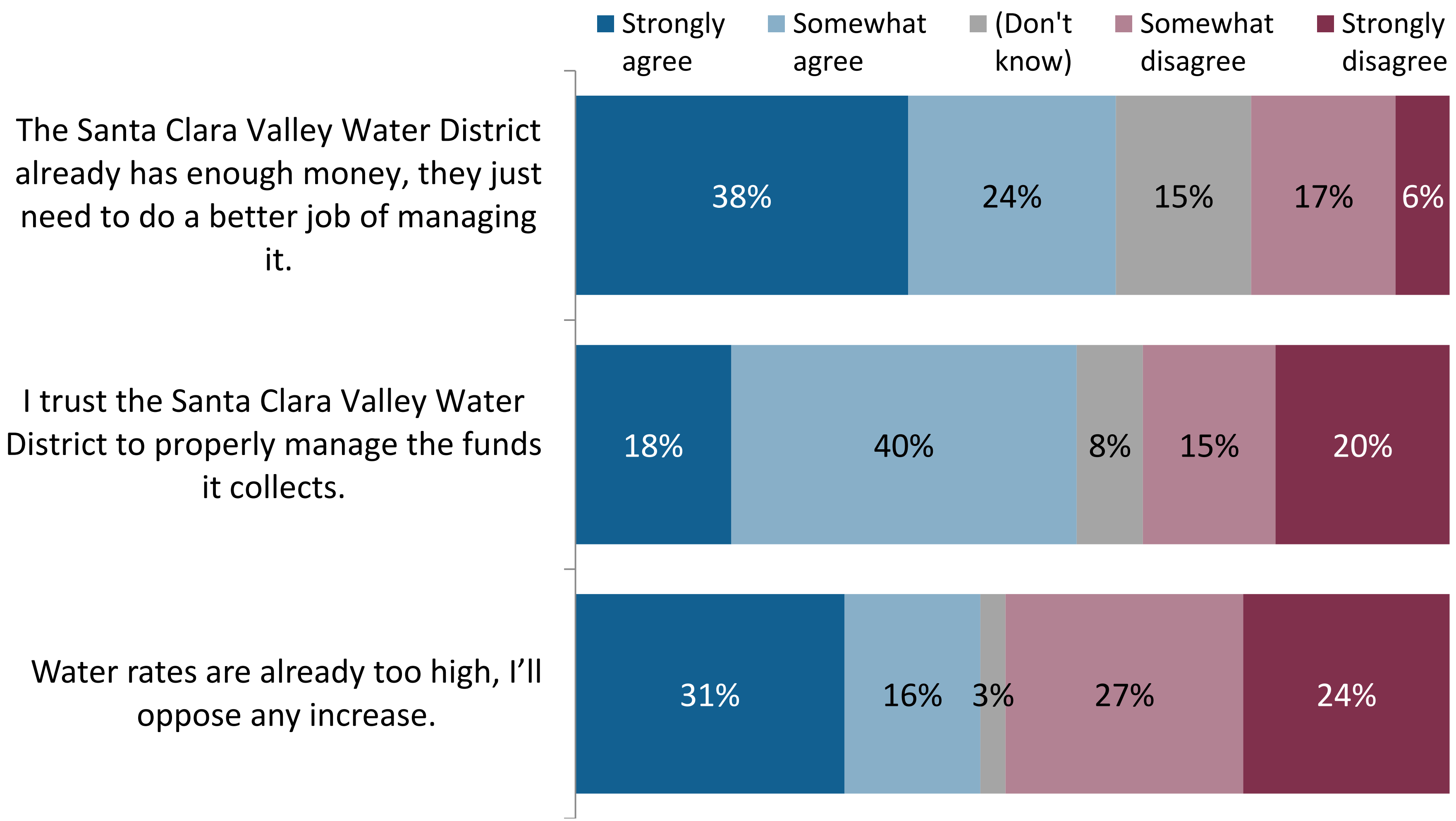
Support for Increased Water Rates

Appendix E

Water Attitudes

While there is widespread agreement that SCVWD already has enough money, most voters also trust the District to spend funds properly and less than a third are strongly opposed to rate increases.



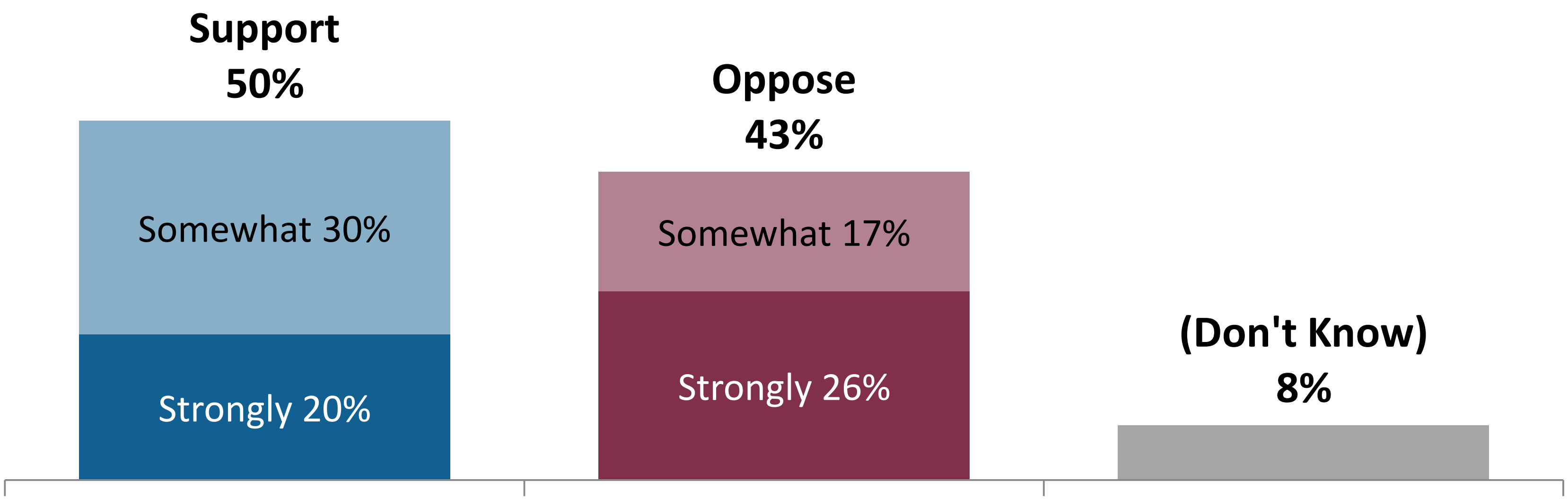
Q12-14. Please tell me whether you strongly agree, somewhat agree, somewhat disagree, or strongly disagree with each of the following statements.

Appendix E

Initial Support for Increase

Before hearing any details, half at least somewhat support increasing water rates to ensure a more reliable supply of water.

In general, would you say you support or oppose modest increases in water rates to ensure a more reliable supply of water for our future?

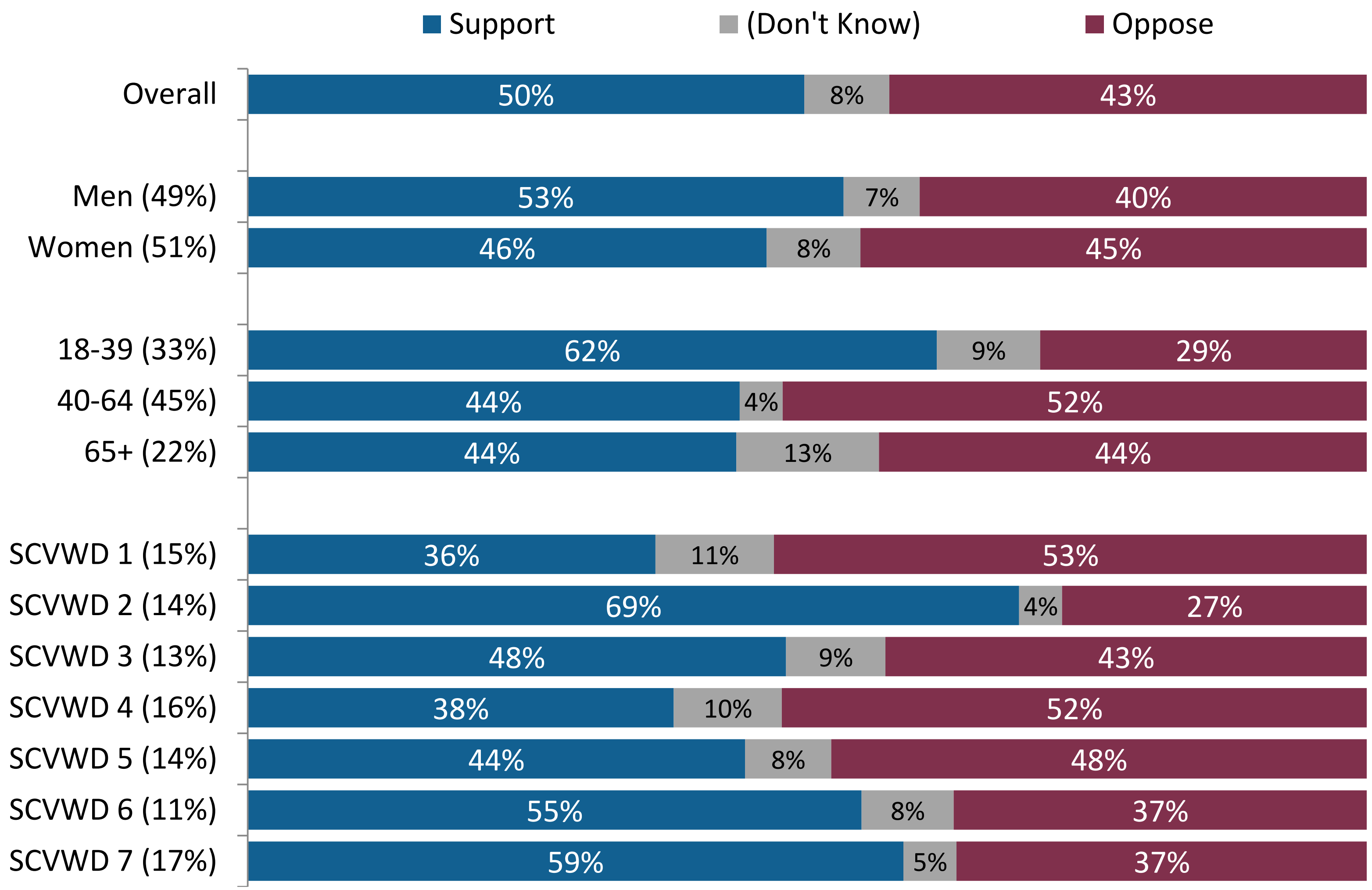


Appendix E

Q7.

Initial Support by Subgroup

Younger voters are likely to support increased rates to ensure a more reliable supply of water. Support varies considerably by geography.



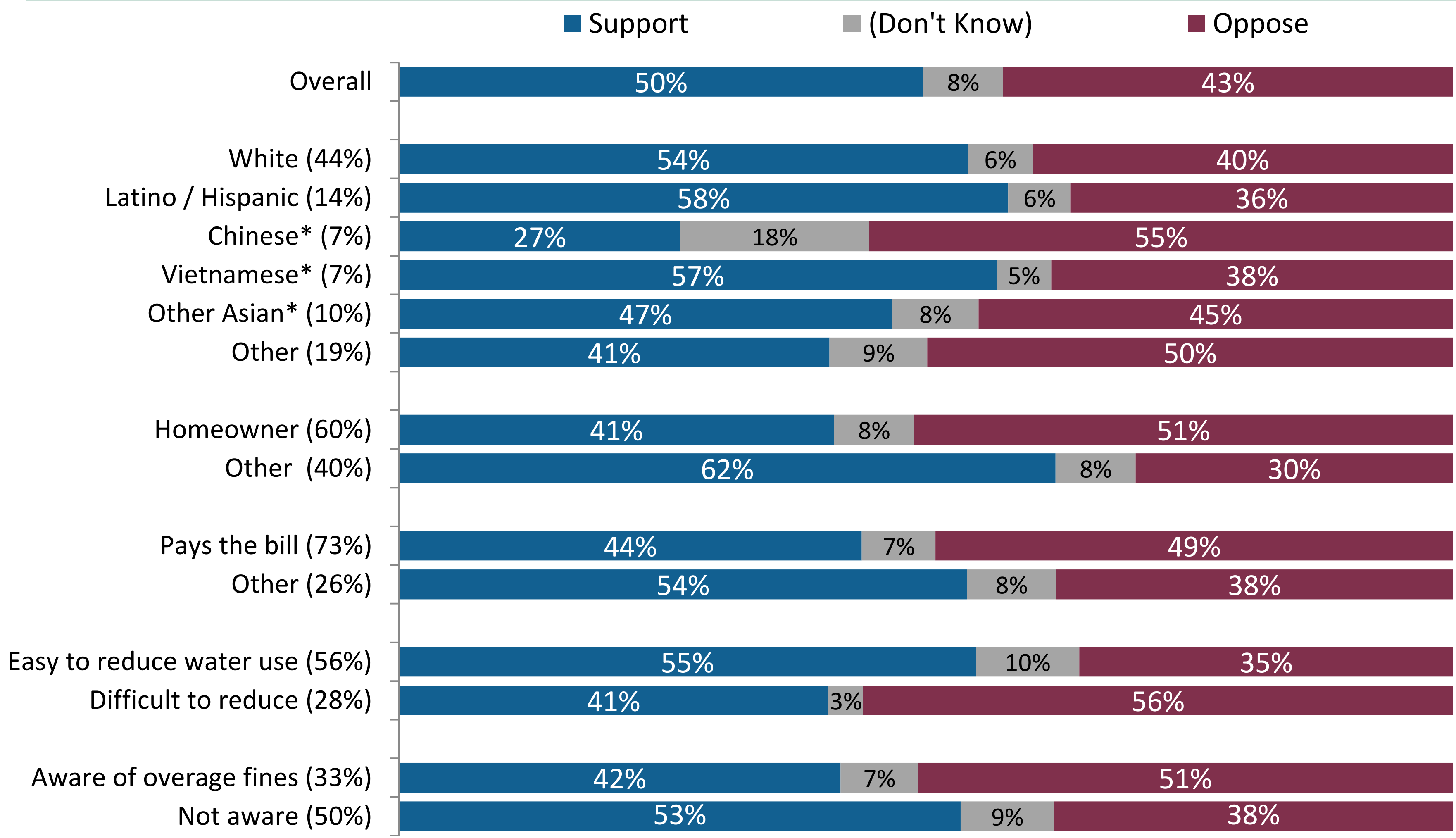
Q7. In general, would you say you support or oppose modest increases in water rates to ensure a more reliable supply of water for our future?

Appendix E

FMC RESEARCH

Initial Support by Subgroup

Homeowners and water bill-payers are more likely to oppose modest rate increases, as are those wo found it harder to reduce their water use during the drought.



**use caution when generalizing the results among these groups due to small sample sizes*

Q7. In general, would you say you support or oppose modest increases in water rates to ensure a more reliable supply of water for our future?

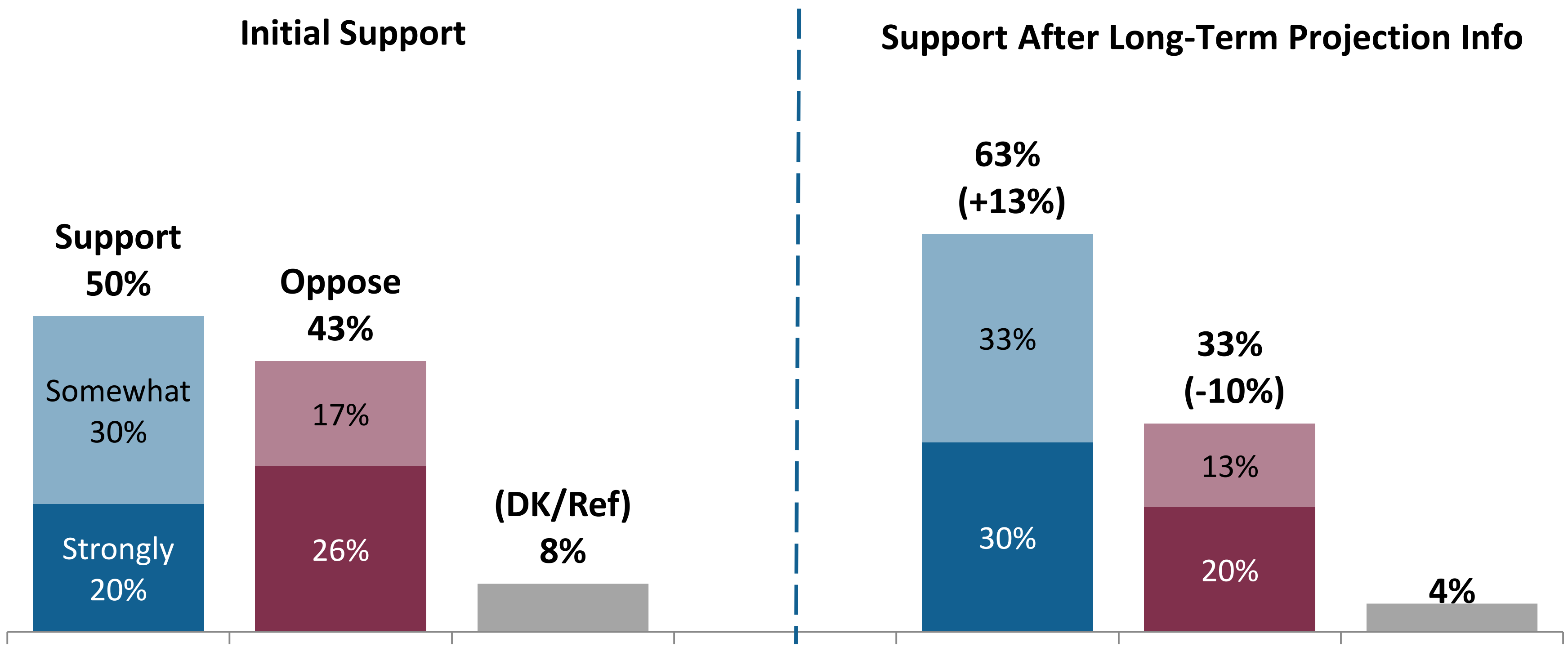
Appendix E

FMC RESEARCH

Support After Long-Term Projection Information

Support increases to well over a majority once voters hear more information about the need for investments in water supply reliability.

Despite the recent rain, our local water suppliers are continuing to evaluate long-term water supply needs for our area given future challenges such as droughts, climate change, and population growth. Projections show that in future drought years we may have to cut back water use by up to 30%. To prepare for water shortages during drought years, local water agencies are planning to invest in projects that would ensure a more reliable water supply like expanding reservoirs, expanding the use of recycled water and increasing storm water reuse. These investments would increase water rates for local residents, but would mean that customers would not have to make such significant cuts in water use during drought years.



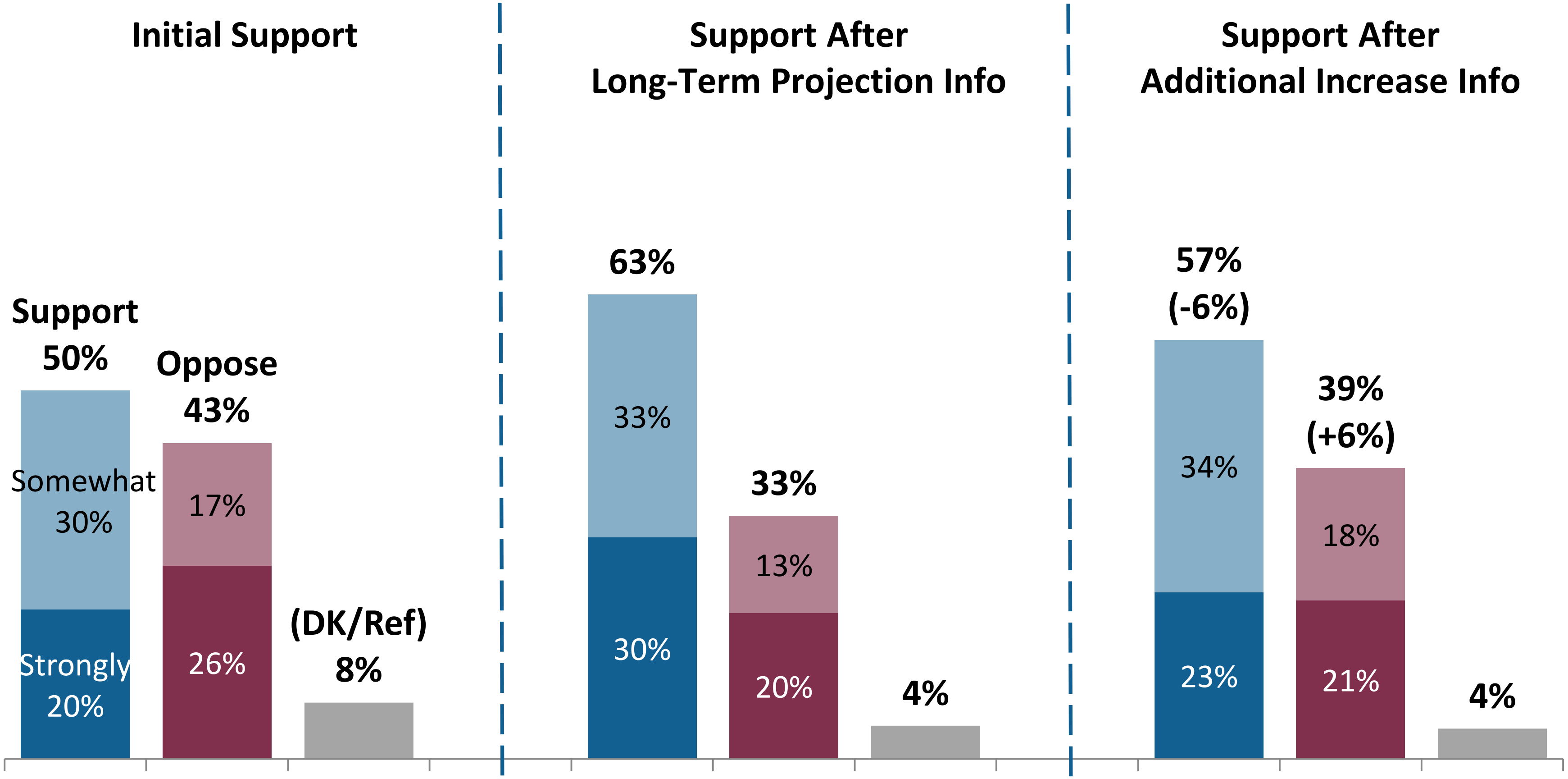
Q8. Given what you've heard, would you say you support or oppose modest increases in water rates to ensure a more reliable supply of water for our future?

Appendix E

Support After Additional Increase Information

Support decreases slightly after voters learn that these increases would come on top of other increases that are already planned, but a majority remains supportive.

Rate increases to further improve water supply reliability would be in addition to already planned increases, primarily for maintaining and improving existing infrastructure.



Q9. Given what you've heard, would you say you support or oppose modest increases in water rates to ensure a more reliable supply of water for our future?

Appendix E

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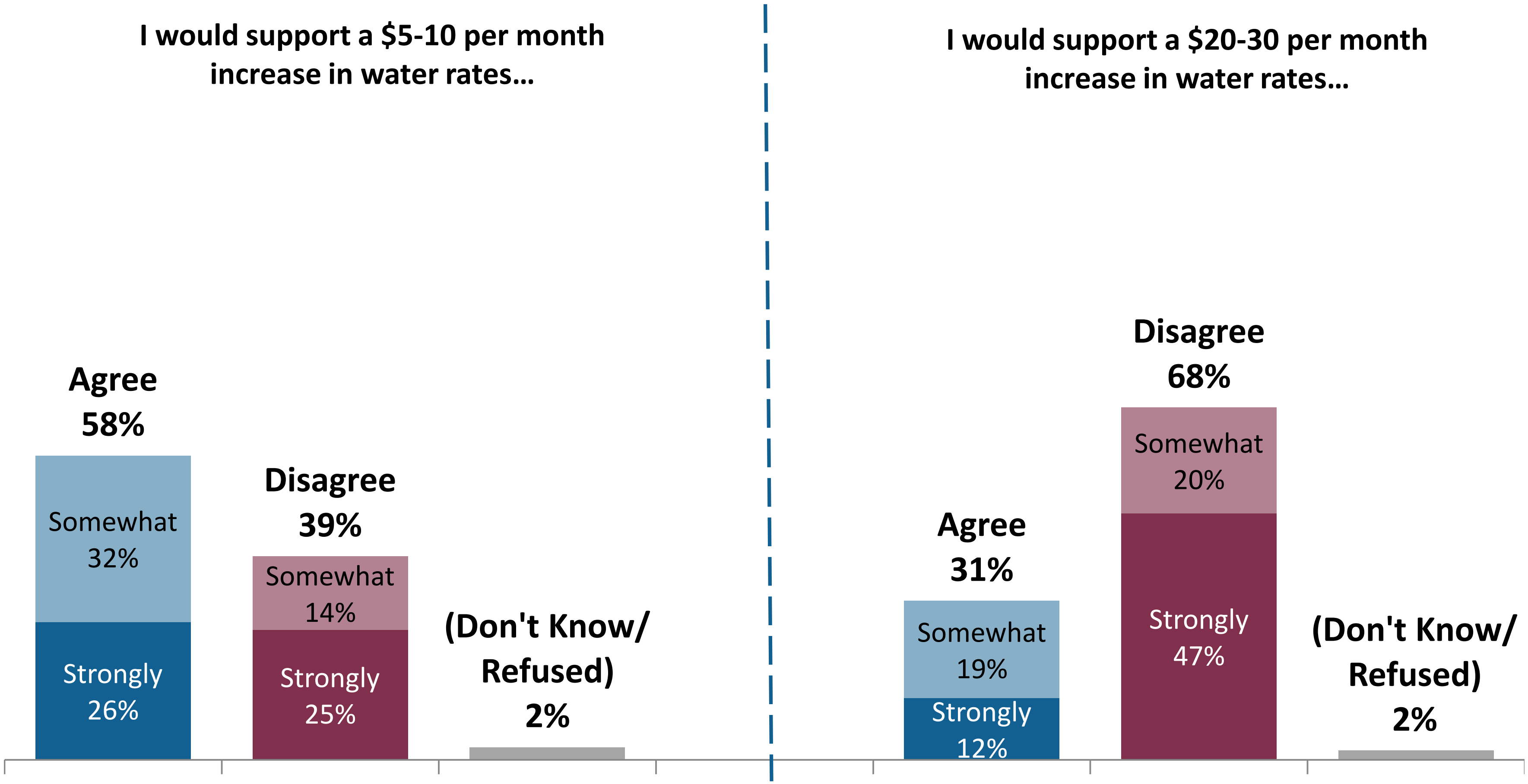
Attitudes Toward Specific Increases

Appendix E

Attitudes Towards Water Rates Increase

A majority would support a $5-10 per month increase. Twenty to $30 is a much harder sell.



Q10-11. Please tell me whether you strongly agree, somewhat agree, somewhat disagree, or strongly disagree with each of the following statements.

Appendix E

Attitudes Toward a $5 to $10 Increase

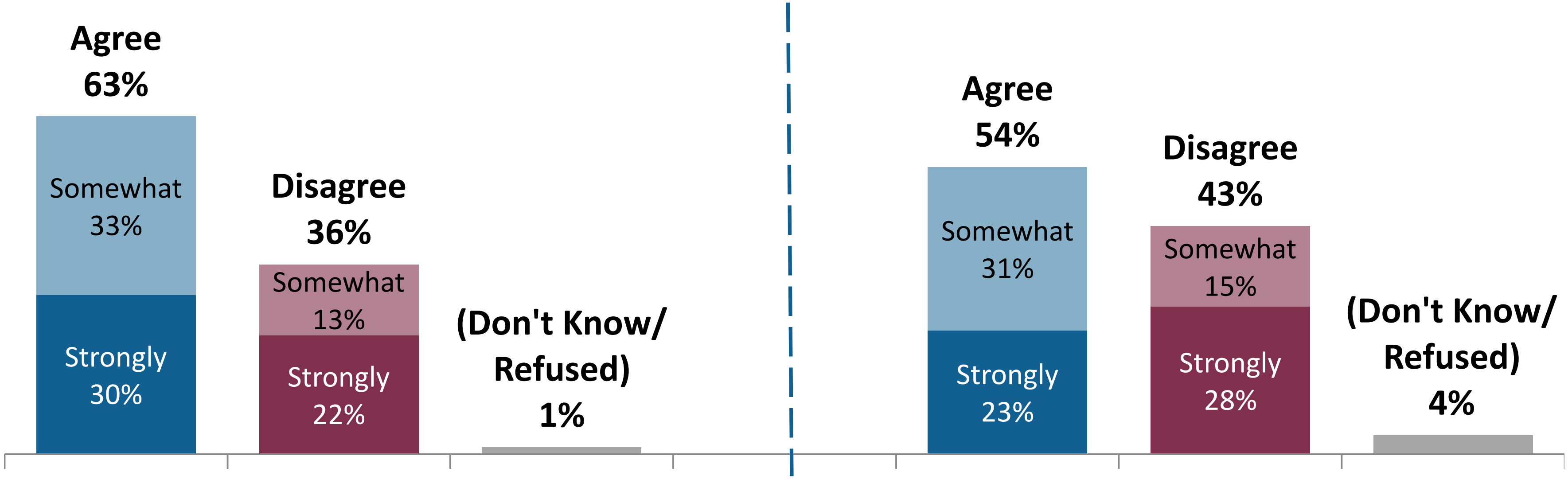
Those who hear an increase amount only are more open to a $5-10 increase than those who also hear about the corresponding tradeoff in cutbacks.

Rate Increase Only
n=200, MoE=±6.9%

<u>In order to ensure a more reliable supply of water for our area,</u> I would support a $5-10 per month increase in water rates now to invest in infrastructure for the future.

Percent Reduction and Rate Increase
n=200, MoE=±6.9%

<u>In order to avoid having to reduce my water use by more than 20% during drought years,</u> I would support a $5-10 per month increase in water rates now to invest in infrastructure for the future.



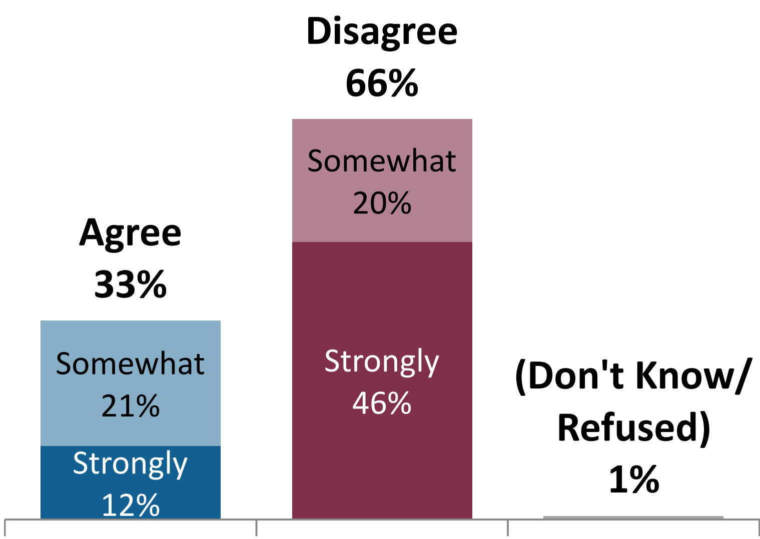
Q11. Please tell me whether you strongly agree, somewhat agree, somewhat disagree, or strongly disagree with each of the following statements.

Attitudes Toward a $20 to $30 Increase

Including the reduction tradeoff does not make a $20-30 increase more palatable.

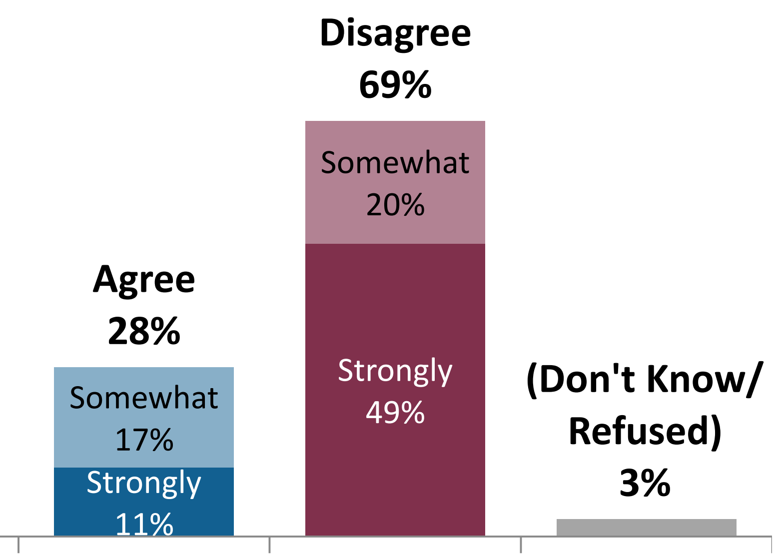
Rate Increase Only
n=200, MoE=±6.9%

In order to ensure a more reliable supply of water for our area, I would support a $20-30 per month increase in water rates now to invest in infrastructure for the future.



Percent Reduction and Rate Increase
n=200, MoE=±6.9%

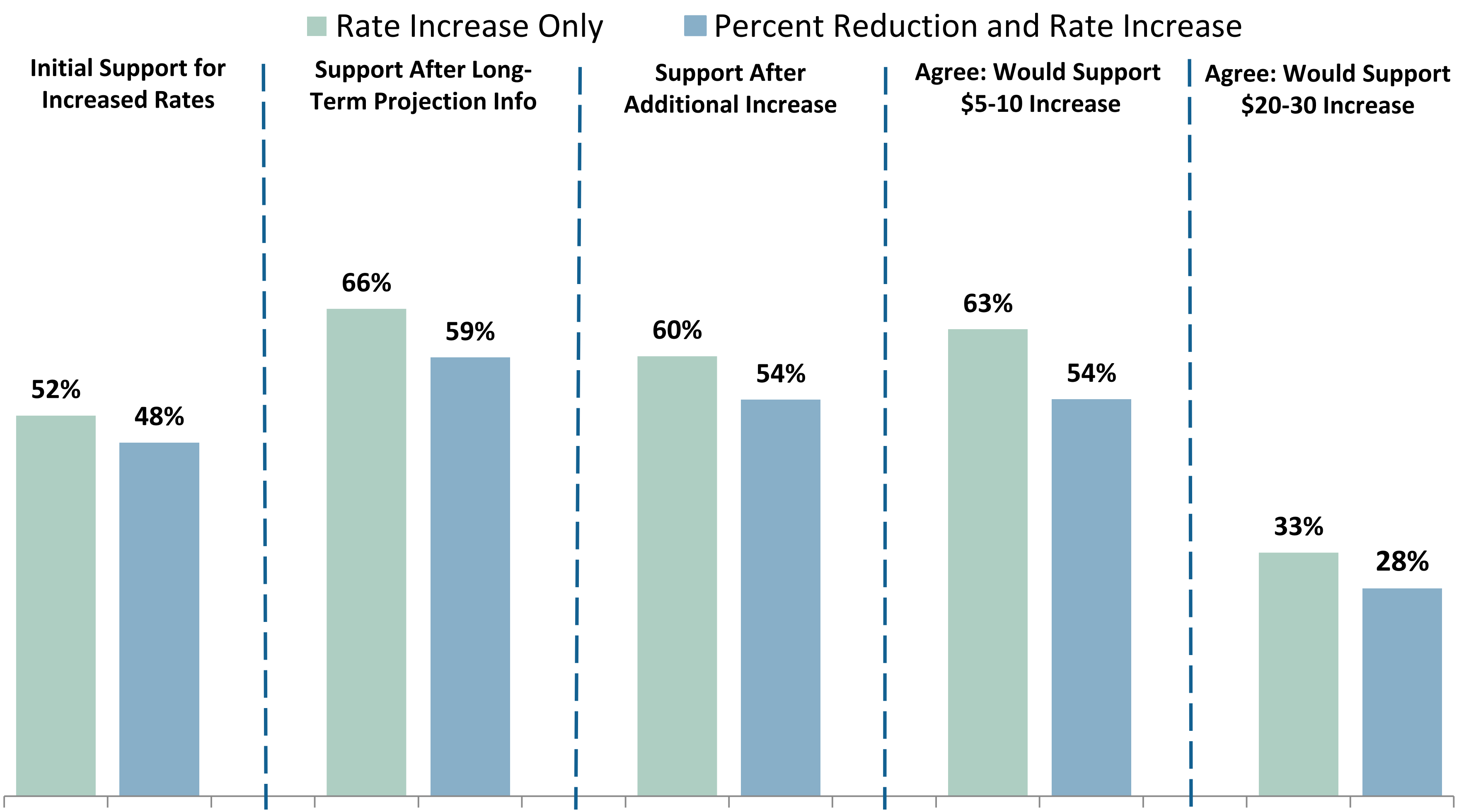
In order to avoid having to reduce my water use by more than 10% during drought years, I would support a $20-30 per month increase in water rates now to invest in infrastructure for the future.



Q10. Please tell me whether you strongly agree, somewhat agree, somewhat disagree, or strongly disagree with each of the following statements.

Support and Attitudes - Rate Increase Only

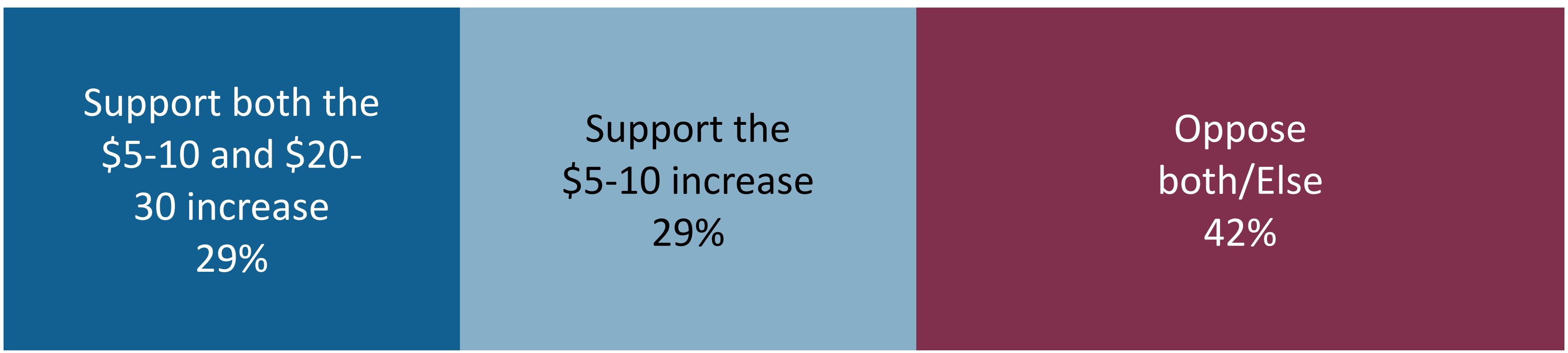
Although we don't see that explaining the limit on cutbacks is helpful, note that those who heard about the reduction targets were less supportive of rate increases throughout.



Appendix E

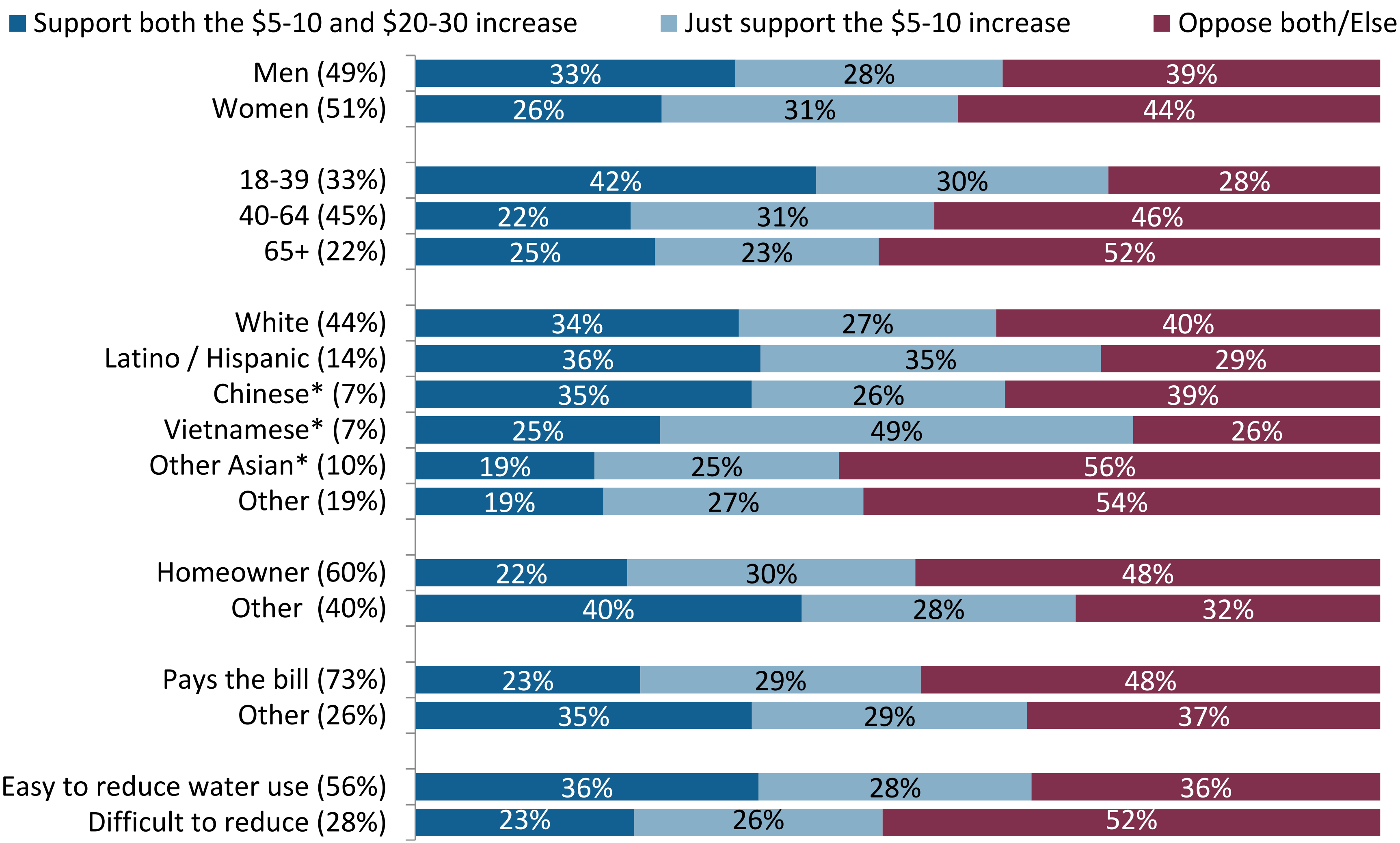
Support Segmentation: Increase in Water Rates

Just under a third support both increase amounts. The same number support the smaller increase only.



Support Segmentation by Subgroup

Younger voters and renters are most likely to be supportive of both increases.

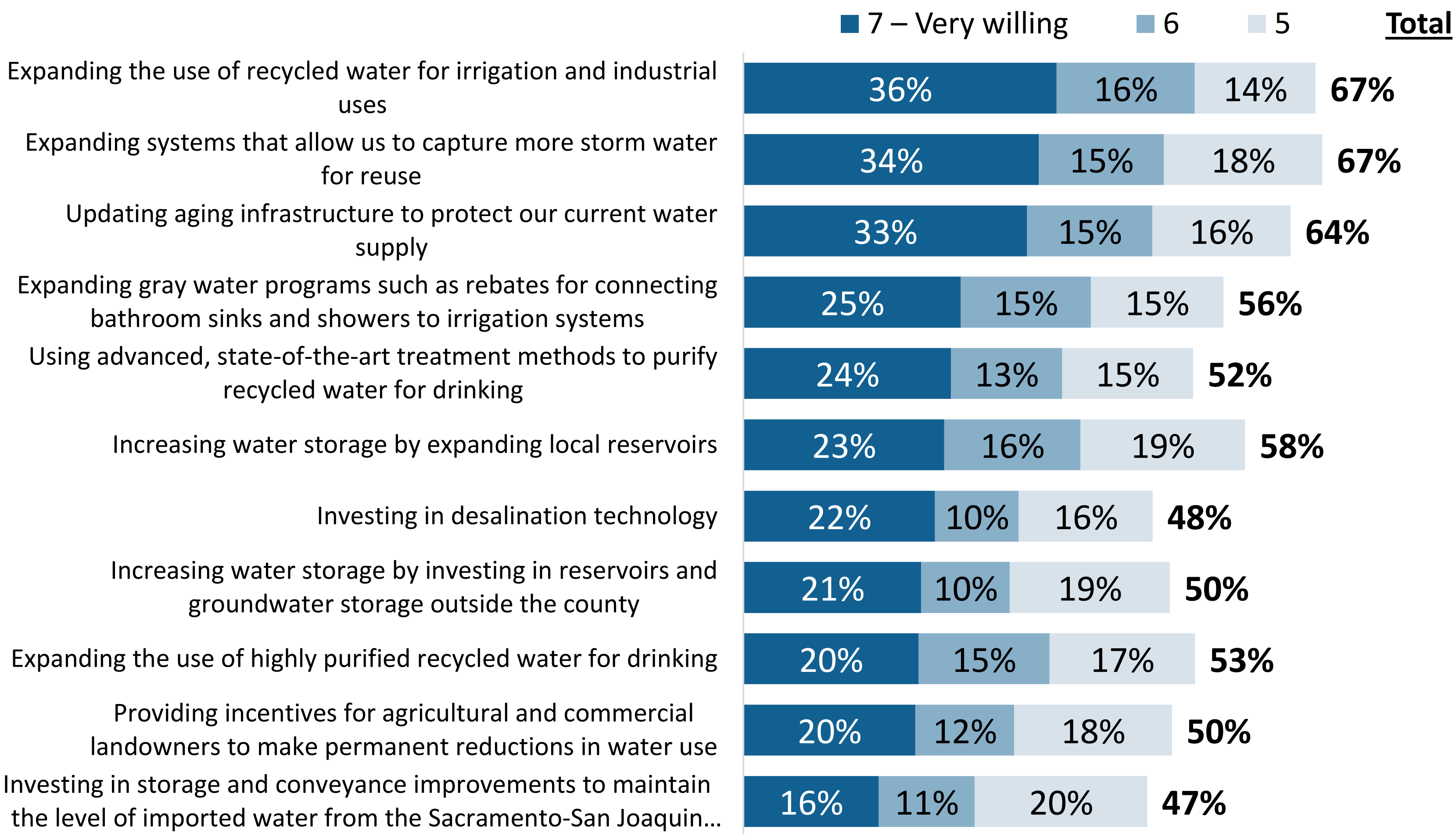


Appendix E

*use caution when generalizing the results among these groups due to small sample sizes

Willingness to Pay for Specific Improvements

Expanding purple water use and storm water capture and updating aging infrastructure are the specific improvements for which voters are most willing to pay increased rates.

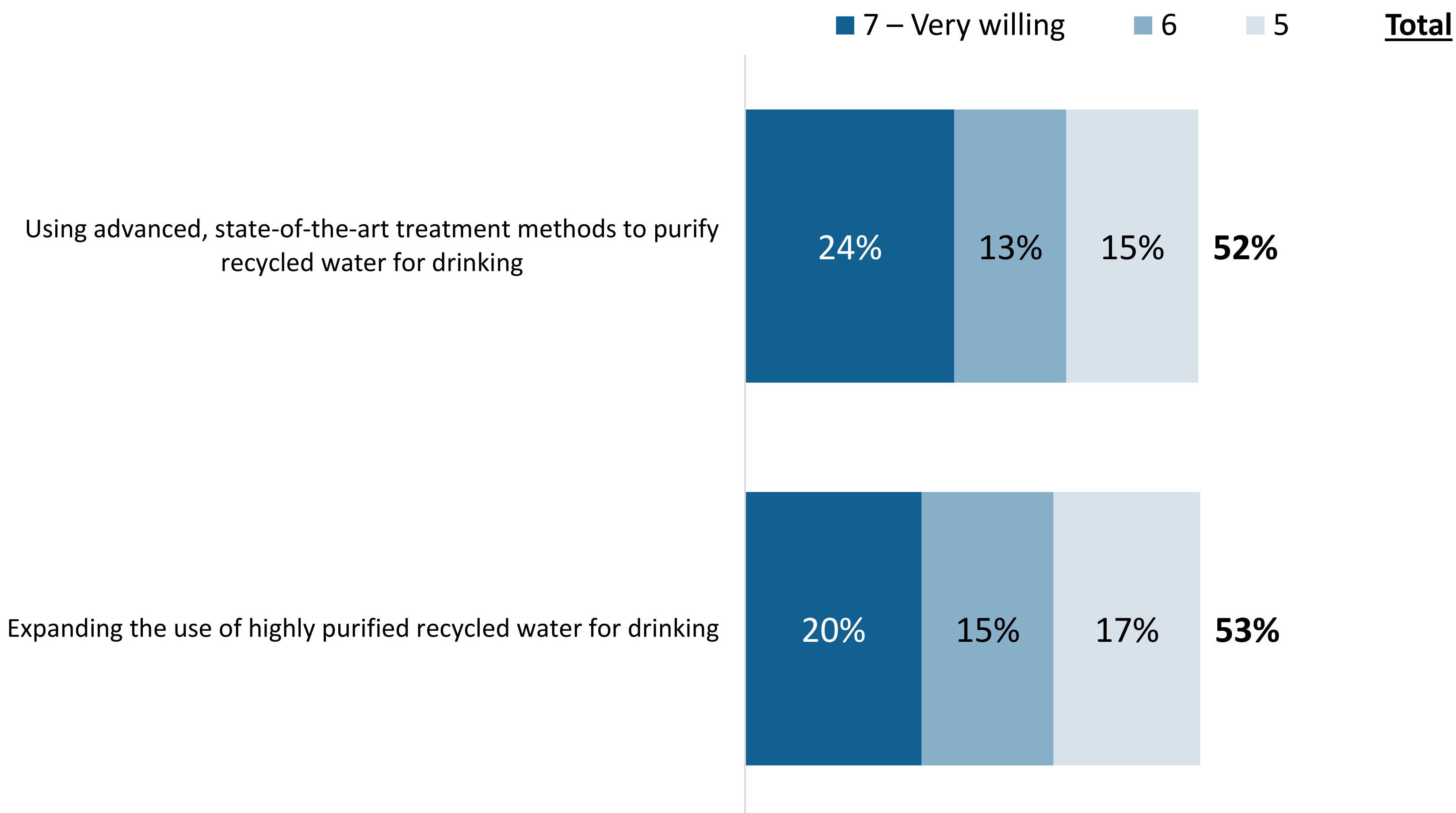


Q15-Q25. I'm going to read you a list of improvements the Santa Clara Valley Water District could make to ensure a more reliable supply of water. These improvements could potentially lead to changes in water rates. For each one, please indicate your willingness to pay increased rates for each type of improvement. Please use a scale from 1 to 7, where 1 means you are not at all willing to pay higher water rates for that item, and 7 means you are very willing to pay higher water rates for that item.

Appendix E

Willingness to Pay for Potable Reuse

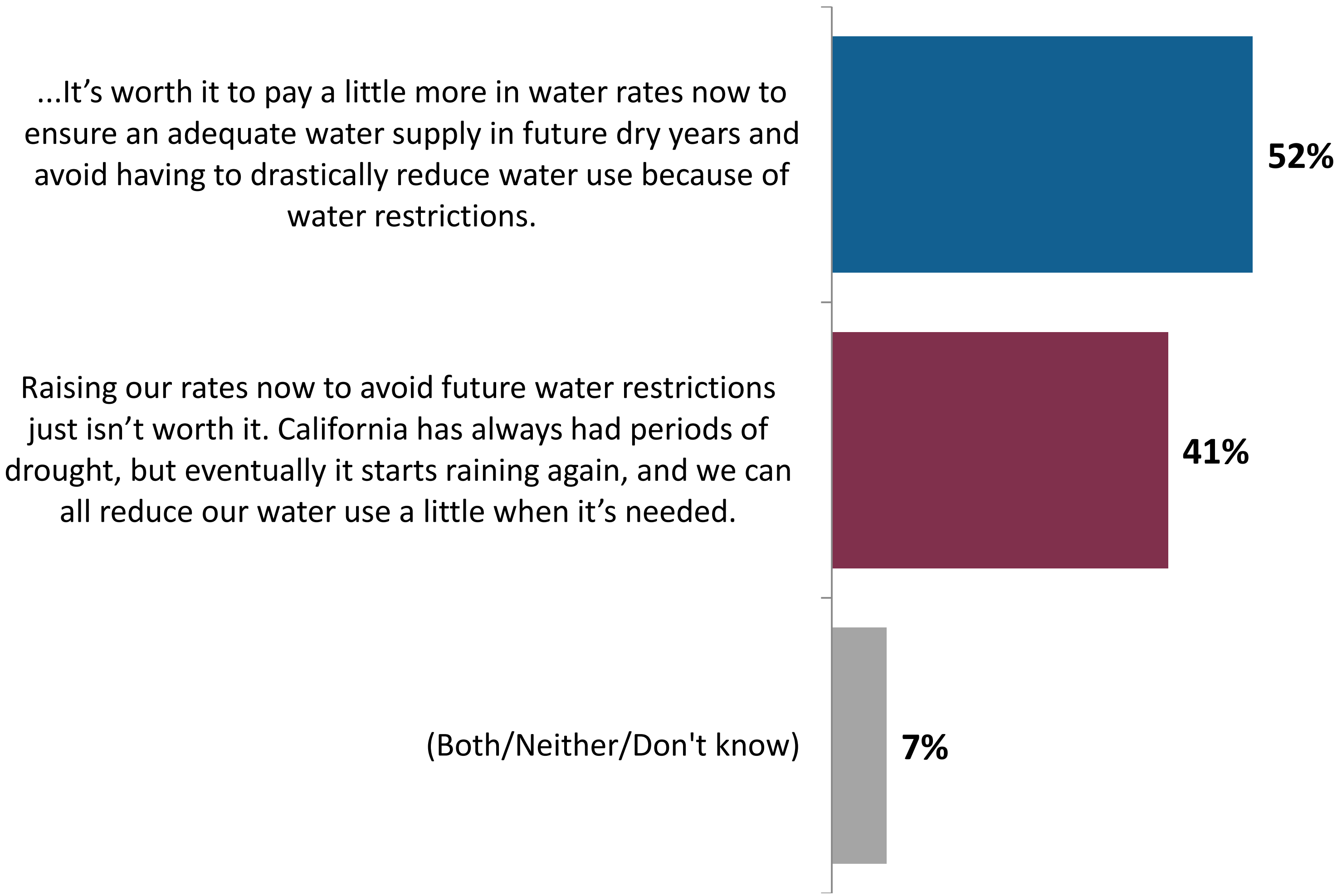
State-of-the-art treatment of recycled water for drinking generates slightly more enthusiasm than highly purified recycled water.



Q15-Q25. I'm going to read you a list of improvements the Santa Clara Valley Water District could make to ensure a more reliable supply of water. These improvements could potentially lead to changes in water rates. For each one, please indicate your willingness to pay increased rates for each type of improvement. Please use a scale from 1 to 7, where 1 means you are not at all willing to pay higher water rates for that item, and 7 means you are very willing to pay higher water rates for that item.

Forced Choice: Worth Investing Now?

Just about half agree that it's worth it to pay more now to be prepared for future dry years and avoid big water restrictions later.

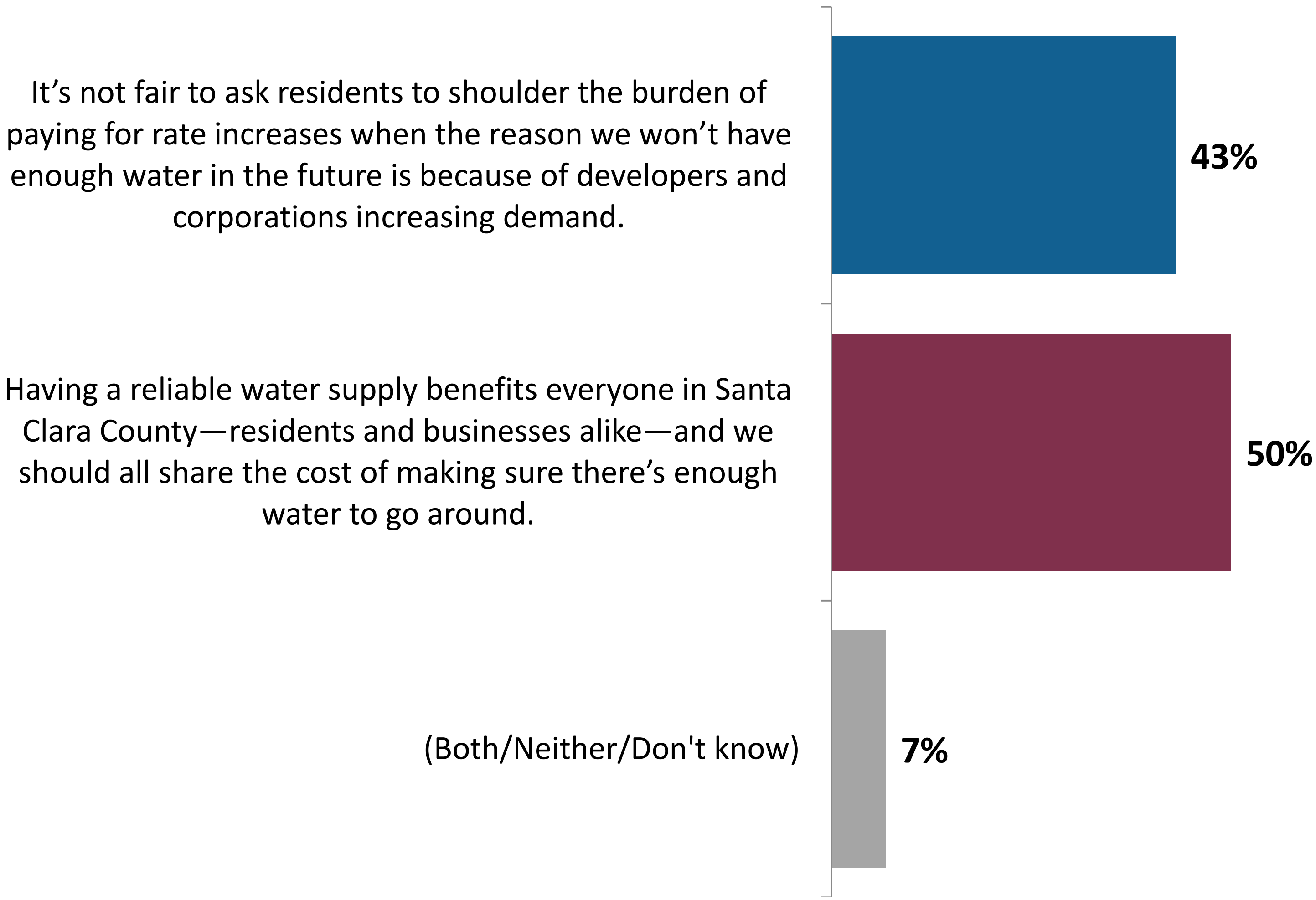


Q26. Now I'd like to read you a pair of statements. Please tell me whether the first one or the second one is closer to your opinion.

Appendix E

Forced Choice: Cost Sharing

Half feel that residents and businesses should all share the cost of ensuring an adequate water supply, while slightly fewer say it's not fair for residents to shoulder the burden.



Q27. Now I'd like to read you a pair of statements. Please tell me whether the first one or the second one is closer to your opinion.

Contacts

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Appendix F – Risk Ranking

WATER SUPPLY MASTER PLAN 2017 – PROJECT RISKS

9/8/2017

Results of Pairwise and Traditional Risk Analyses

Contents

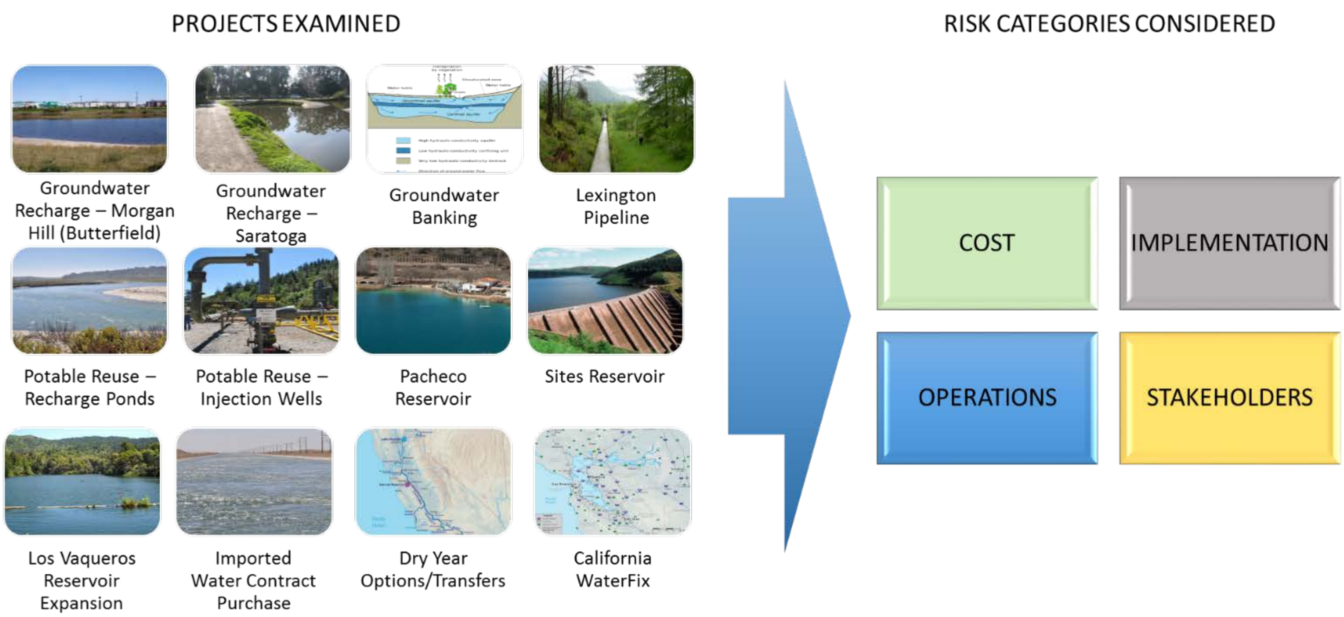
Appendices

OVERVIEW

Santa Clara Valley Water District (District) staff conducted a risk analysis of the projects being considered for inclusion in the 2017 Water Supply Master Plan (WSMP; Figure 1). The WSMP is the District's strategy for providing a reliable and sustainable water supply in a cost-effective manner. The WSMP process includes assessing the existing water supply system, estimating future supplies and demands, identifying and evaluating projects to fill gaps between supplies and demands, and recommending a strategy for long-term water supply reliability. This risk analysis helps evaluate the types, severity, and likelihood of risk associated with each WSMP project so that the District Board of Directors and community better understand the uncertainties associated with each project's ability to meet future water demands.

This report summarizes the results of the risk analysis developed to quantitatively assess the types and level of risk impacting each project. Project descriptions and cost estimates are in Appendix A - Project Descriptions. Appendix B details the methodology used to conduct the risk analysis.

FIGURE 1. PROJECTS AND RISK CATEGORIES – PROJECTS BEING CONSIDERED FOR THE 2017 WSMP AND THE TYPES OF RISK INCLUDED IN THE RISK ANALYSIS.



RISK CATEGORIES

During an Expert Panel meeting on June 8, 2017, staff and panel experts discussed different types of project risks. Afterwards, staff grouped the risks into four risk categories: Cost, Implementation, Operations, and Stakeholders. The types (or elements) of risk are summarized in Table 1 by risk category. At four meetings, one for each risk category, District subject matter experts discussed risk elements within the risk category and then conducted pairwise and traditional risk analyses of the 2017 WSMP projects. Many risks spanned the categories, but the aspects of the risk were distinct in each meeting. For example, the capital costs risk was considered during the Cost and Stakeholders risk meetings, but the Costs meeting considered the uncertainty of the capital cost estimates for each project while the Stakeholders meeting considered whether higher capital costs could result in greater stakeholder opposition. Table 1 summarizes the risks by risk category.

TABLE 1. RISK ELEMENTS BY CATEGORY. SUBJECT MATTER EXPERTS IN EACH RISK CATEGORY MET TO ASSESS PROJECT RISK WITH CONSIDERATION OF THE RISK ELEMENTS WITHIN EACH RISK CATEGORY. SEPARATE MEETINGS WERE HELD FOR EACH RISK CATEGORY.

Risk Category	Risk Elements
Costs	• Capital costs, including quality of cost estimate • Costs of regulatory compliance • Match requirements and cost-sharing • Counter-party risk/ability of partners to pay costs • Stakeholders and rate payer ability to pay • Financing and funding security • Scheduling issues • Economic fluctuations and instability • Potential for stranded assets
Implementation	• Phasing potential • Project duration and schedule • Reoperation requirements • Land availability • Constructability (e.g., structural issues, technology) • Managerial capacity (knowledge and resource availability) • Range of implementation options • Regulatory requirements • Project planning maturity
Operations	• Climate change • Yield variability and reliability • Operating Partnerships • Uncertainty of long-term operations and maintenance costs • Project inter-dependency • Environmental and water quality regulations • Control • Appropriate infrastructure • Redundancy • Emergency operations/asset failures
Stakeholders	• Public support • Permitting risks • Media • Internal stakeholder concerns • External stakeholder opposition • Environmental/special interest groups • Partnership risks • Government stakeholders • Costs

PAIRWISE RISK ANALYSIS

A pairwise risk analysis provides a quantitative approach for ranking projects by risk. Having projects ranked by riskiness improves the District Board's and community's ability to compare projects' ability to meet future needs. To complete the risk assessment, the project team assembled five to six subject matter experts from the District into four groups, one group for each risk category. The team chose District experts that had knowledge specific to their assigned risk category. Then, the subject matter experts compared each project against another project using the pairwise matrix in Table 2. The crossed-out boxes represent duplicate comparisons or compare the project against itself. The subject matter experts each determined which of the two projects being compared was a higher risk for the risk category. For example, the first comparison is Morgan Hill (Butterfield) Recharge and Groundwater Banking. If someone determined that Groundwater Banking has more risk, they would enter a "G" for Groundwater Banking

PAIRWISE RISK ANALYSIS BY RISK ELEMENT

Tables 3a-d provide the results of the pairings by risk category. Each project is represented by an abbreviation and the numbers indicate how many people chose it as the higher risk. For example, all six participants assessing cost risks thought that Imported Water Contract Purchase was higher risk than Morgan Hill (Butterfield) Recharge, so the associated cell is filled with "I6." Alternatively, two of the six participants thought Imported Water Rights Purchase (I) was higher risk than Groundwater Banking (G), so the associated cell is filled with "I2 G4."

TABLE 2. PAIRWISE COMPARISON MATRIX. EACH SUBJECT MATTER EXPERT COMPLETED THE PAIRWISE ANALYSIS BY ENTERING THE LETTER ASSOCIATED WITH THE HIGHER RISK PROJECT IN EACH EMPTY CELL.

* Morgan Hill (Butterfield) Recharge Pond

	Dry Year Options/ Transfers **D**	Lexington Pipeline **LX**	Ground-water Recharge-Saratoga **SP**	Ground-water Recharge - Morgan Hill* **B**	Ground -water Bankin g **G**	Sites Reservoir **S**	Los Vaqueros Reservoir Expansion **L**	Potable Reuse – Los Gatos Ponds **PL**	Potable Reuse – Ford Pond **PF**	Potable Reuse – Injection Wells **PI**	Imported Water Contract Purchase **I**	Pacheco Reservoir **PR**	California Water Fix **C**
Dry Year Options/ Transfers **D**	X												
Lexington Pipeline **LX**	X	X											
Groundwater Recharge-Saratoga **SP**	X	X	X										
Groundwater Recharge - Morgan Hill* **B**	X	X	X	X									
Groundwater Banking **G**	X	X	X	X	X								
Sites Reservoir **S**	X	X	X	X	X	X							
Los Vaqueros Reservoir Expansion **L**	X	X	X	X	X	X	X						
Potable Reuse – Los Gatos Ponds **PL**	X	X	X	X	X	X	X	X					
Potable Reuse – Ford Pond **PF**	X	X	X	X	X	X	X	X	X				
Potable Reuse – Injection Wells **PI**	X	X	X	X	X	X	X	X	X	X			
Imported Water Contract Purchase **I**	X	X	X	X	X	X	X	X	X	X	X		
Pacheco Reservoir **P**	X	X	X	X	X	X	X	X	X	X	X	X	
California WaterFix **C**	X	X	X	X	X	X	X	X	X	X	X	X	X

TABLE 3A-D. PAIRWISE COMPARISON RESULTS. THE TABULATED RESULTS FOR THE COST (A), IMPLEMENTATION (B), OPERATION (C), AND STAKEHOLDER (D) PAIRWISE ANALYSIS. EACH LETTER PRESENTS A PROJECT AS SHOWN IN THE HEADER ROW AND COLUMN. THE NUMBER FOLLOWING THE LETTERS IN EACH CELL REPRESENTS THE NUMBER OF EXPERTS WHO THINK THE ASSOCIATED PROJECT IS RISKIER.

a.

COST RISKS	Dry Year Options/ Transfers **D**	Lexington Pipeline **LX**	Ground-water Recharge Saratoga **SP**	Ground-water Recharge - Morgan Hill* **B**	Ground-water Banking **G**	Sites Reservoir **S**	Los Vaqueros Reservoir Expansion **L**	Potable Reuse – Los Gatos Ponds **PL**	Potable Reuse – Ford Pond **PF**	Potable Reuse – Injection Wells **PI**	Imported Water Contract Purchase **I**	Pacheco Reservoir **PR**	California WaterFix **C**
Dry Year Options/ Transfers **D**	X	D2 LX2	D2 SP2	D2 B2	D2 G2	D0 S4	D0 L4	D1 PL3	D1 PF3	D1 PI3	D2 I2	D0 PR4	D0 C4
Lexington Pipeline **LX**	X	X	LX3 SP1	LX4 B0	LX1 G3	LX0 S4	LX0 L4	LX0 PL4	LX0 PF4	LX0 PI4	LX2 I2	LX0 PR4	LX0 C4
Groundwater Recharge-Saratoga **SP**	X	X	X	SP4 B0	SP1 G3	SP0 S4	SP0 L4	SP0 PL4	SP0 PF4	SP0 PI4	SP1 I3	SP0 PR4	SP0 C4
Groundwater Recharge - Morgan Hill* **B**	X	X	X	X	B0 G4	B0 S4	B0 L4	B0 PL4	BO PF4	B0 PI4	B0 I4	B0 PR4	B0 C4
Groundwater Banking **G**	X	X	X	X	X	G1 S3	G0 L4	G0 PL4	G0 PF4	G0 PI4	G1 I3	G0 PR4	G0 C4
Sites Reservoir **S**	X	X	X	X	X	X	S3 L1	S3 PL1	S3 PF1	S3 PI1	S3 I1	S0 PR4	S0 C4
Los Vaqueros Reservoir Expansion **L**	X	X	X	X	X	X	X	L3 PL1	L3 PF1	L3 PI1	L2 I2	L0 PR4	L0 C4
Potable Reuse – Los Gatos Ponds **PL**	X	X	X	X	X	X	X	X	PL1 PF3	PL0 PI4	PL2 I2	PL0 PR4	PL0 C4
Potable Reuse – Ford Pond **PF**	X	X	X	X	X	X	X	X	X	PF0 PI4	PF2 I2	PF0 PR4	PF0 C4
Potable Reuse – Injection Wells **PI**	X	X	X	X	X	X	X	X	X	X	PI2 I2	PI0 PR4	PI0 C4
Imported Water Contract Purchase **I**	X	X	X	X	X	X	X	X	X	X	X	I0 PR4	I0 C4
Pacheco Reservoir **P**	X	X	X	X	X	X	X	X	X	X	X	X	PR1 C3
California WaterFix **C**	X	X	X	X	X	X	X	X	X	X	X	X	X

* Morgan Hill (Butterfield) Recharge Pond

b.

IMPLEMEN-TATION RISKS	Dry Year Options/ Transfers **D**	Lexington Pipeline **LX**	Ground-water Recharge-Saratoga **SP**	Ground-water Recharge - Morgan Hill* **B**	Ground-water Banking **G**	Sites Reservoir **S**	Los Vaqueros Reservoir Expansion **L**	Potable Reuse – Los Gatos Ponds **PL**	Potable Reuse – Ford Pond **PF**	Potable Reuse – Injection Wells **PI**	Imported Water Contract Purchase **I**	Pacheco Reservoir **PR**	California WaterFix **C**
Dry Year Options/ Transfers **D**	X	D1 LX3	D2 SP2	D3 B1	D4 G0	D0 S4	D0 L4	D1 PL3	D0 PF4	D0 PI4	D4 I0	D0 PR4	D0 C4
Lexington Pipeline **LX**	X	X	LX3 SP1	LX3 B1	LX3 G1	LX1 S3	LX1 L3	LX1 PL3	LX1 PF3	LX1 PI3	LX3 I1	LX0 PR4	LX0 C4
Groundwater Recharge-Saratoga **SP**	X	X	X	SP3 B1	SP2 G2	SP2 S2	SP1 L3	SP1 PL3	SP0 PL4	SP0 PI4	SP3 I1	SP0 PR4	SP0 C4
Groundwater Recharge - Morgan Hill* **B**	X	X	X	X	B3 G1	B0 S4	B0 L4	B0 PL4	B0 PF4	B0 PI4	B3 I1	B0 PR4	B0 C4
Groundwater Banking **G**	X	X	X	X	X	G0 S4	G0 L4	G0 PL4	G0 PI4	G0 PI4	G3 I1	G0 PR4	B0 C4
Sites Reservoir **S**	X	X	X	X	X	X	S3 L1	S4 PL0	S3 PF1	S4 PI0	S4 I0	S0 PR4	S0 C4
Los Vaqueros Reservoir Expansion **L**	X	X	X	X	X	X	X	L3 PL1	L2 PF2	L3 PI1	L4 I0	L1 PR3	L0 C4
Potable Reuse – Los Gatos Ponds **PL**	X	X	X	X	X	X	X	X	PL3 PF1	PL0 PI4	PL4 I0	PL0 PR4	PL0 C4
Potable Reuse – Ford Pond **PF**	X	X	X	X	X	X	X	X	X	PF1 PI3	PF4 I0	PF0 PR4	PF0 C4
Potable Reuse – Injection Wells **PI**	X	X	X	X	X	X	X	X	X	X	PI2 I2	PI0 PR4	PI0 C4
Imported Water Contract Purchase **I**	X	X	X	X	X	X	X	X	X	X	X	I0 PR4	I0 C4
Pacheco Reservoir **P**	X	X	X	X	X	X	X	X	X	X	X	X	PR0 C4
California WaterFix **C**	X	X	X	X	X	X	X	X	X	X	X	X	X

* Morgan Hill (Butterfield) Recharge Pond

c.

OPERATION RISKS	Dry Year Options/ Transfers **D**	Lexington Pipeline **LX**	Ground-water Recharge-Saratoga **SP**	Ground-water Recharge - Morgan Hill* **B**	Ground-water Banking **G**	Sites Reservoir **S**	Los Vaqueros Reservoir Expansion **L**	Potable Reuse – Los Gatos Ponds **PL**	Potable Reuse – Ford Pond **PF**	Potable Reuse – Injection Wells **PI**	Imported Water Contract Purchase **I**	Pacheco Reservoir **PR**	California Water Fix **C**
Dry Year Options/ Transfers **D**	X	D3 LX2	D4 SP1	D4 B1	D3 G2	D0 S5	D2 L3	D3 PL2	D3 PF2	D2 PI3	D4 I1	D1 PR4	D0 C4
Lexington Pipeline **LX**	X	X	LX5 SP0	LX5 B0	LX0 G5	LX0 S5	LX0 L5	LX0 PL5	LX0 PF5	LX0 PI5	LX2 I3	LX0 PR5	LX0 C5
Groundwater Recharge-Saratoga **SP**	X	X	X	SP1 B4	SP0 G5	SP0 S5	SP0 L5	SP0 PL5	SP0 PF5	SP0 PI5	SP0 I5	SP0 PR5	SP0 C5
Groundwater Recharge - Morgan Hill* **B**	X	X	X	X	B0 G5	B0 S5	B0 L5	B0 PL5	B0 PF5	B0 PI5	B2 I3	B0 PR5	B0 C5
Groundwater Banking **G**	X	X	X	X	X	G0 S5	G0 L5	G3 PL2	G3 PF2	G1 PI4	G2 I3	G0 PR5	G0 C5
Sites Reservoir **S**	X	X	X	X	X	X	S5 L0	S5 PL0	S5 PF0	S4 PI1	S5 I0	S4 PR1	S0 C5
Los Vaqueros Reservoir Expansion **L**	X	X	X	X	X	X	X	L5 PL0	L5 PF0	L4 PI1	L5 I0	L5 PR0	L0 C4
Potable Reuse – Los Gatos Ponds **PL**	X	X	X	X	X	X	X	X	PL3 PF2	PL1 PI4	PL3 I2	PL0 PR5	PL0 C5
Potable Reuse – Ford Pond **PF**	X	X	X	X	X	X	X	X	X	PF0 PI5	PF3 I2	PF0 PR5	PR0 C5
Potable Reuse – Injection Wells **PI**	X	X	X	X	X	X	X	X	X	X	PI4 I1	PI0 PR5	PI0 C5
Imported Water Contract Purchase **I**	X	X	X	X	X	X	X	X	X	X	X	I0 PR5	I0 C5
Pacheco Reservoir **P**	X	X	X	X	X	X	X	X	X	X	X	X	PR0 C5
California WaterFix **C**	X	X	X	X	X	X	X	X	X	X	X	X	X

* Morgan Hill (Butterfield) Recharge Pond

d.

STAKE-HOLDER RISKS	Dry Year Options/ Transfers **D**	Lexington Pipeline **LX**	Ground-water Recharge-Saratoga **SP**	Ground-water Recharge - Morgan Hill* **B**	Ground-water Banking **G**	Sites Reservoir **S**	Los Vaqueros Reservoir Expansion **L**	Potable Reuse – Los Gatos Ponds **PL**	Potable Reuse – Ford Pond **PF**	Potable Reuse – Injection Wells **PI**	Imported Water Contract Purchase **I**	Pacheco Reservoir **PR**	California WaterFix **C**
Dry Year Options/ Transfers **D**	X	D1 LX2	D1 SP2	D1 B2	D1 G2	D1 S2	D1 L2	D1 PL2	D1 PF2	D1 PI2	D2 I1	D0 PR3	D0 C3
Lexington Pipeline **LX**	X	X	LX2 SP1	LX3 B0	LX1 G2	LX0 S3	LX0 L3	LX1 PL2	LX1 PF2	LX1 PI2	LX1 I2	LX0 PR3	LX0 C3
Groundwater Recharge-Saratoga **SP**	X	X	X	SP3 B0	SP1 G2	SP0 S3	SP0 L3	SP0 PL3	SP0 PF3	SP0 PI3	SPI I2	SP0 PR3	SP0 C3
Groundwater Recharge - Morgan Hill* **B**	X	X	X	X	B1 G2	B0 S3	BO L3	B0 PL3	B0 PF3	B0 PI3	B2 I1	B0 PR3	B0 C3
Groundwater Banking **G**	X	X	X	X	X	G1 S2	G1 L2	G1 PL2	G1 PF2	G1 PI2	G2 I1	G0 PR3	G0 C3
Sites Reservoir **S**	X	X	X	X	X	S3 S0	S2 L1	S2 PL1	S2 PF1	S2 PI1	S2 I1	S0 PR3	S0 C3
Los Vaqueros Reservoir Expansion **L**	X	X	X	X	X	X	X	L1 PL2	L1 PF2	L1 PI2	L2 I1	L0 PR3	L0 C3
Potable Reuse – Los Gatos Ponds **PL**	X	X	X	X	X	X	X	X	PL1 PF2	PLO PI3	PL2 I1	PIO PR3	PLO C3
Potable Reuse – Ford Pond **PF**	X	X	X	X	X	X	X	X	X	PF0 PI3	PF2 I1	PF0 PR3	PF0 C3
Potable Reuse – Injection Wells **PI**	X	X	X	X	X	X	X	X	X	X	PI2 I1	PIO PR3	PIO C3
Imported Water Contract Purchase **I**	X	X	X	X	X	X	X	X	X	X	X	I0 PR3	I0 C3
Pacheco Reservoir **P**	X	X	X	X	X	X	X	X	X	X	X	X	PR0 C3
California WaterFix **C**	X	X	X	X	X	X	X	X	X	X	X	X	X

* Morgan Hill (Butterfield) Recharge Pond

PAIRWISE RANKING RESULTS

Table 4 shows the pairwise ranking results. The letter designation represents the riskier project based on the results of the four subject matter expert groups combined. The percentage indicates the amount of agreement between the four groups. 100% indicates that all four risk groups agree the project was riskier. Where 75 percent is indicated, three of four teams ranked it higher risk (where 75%* is noted, the result was three of four, and one tie). Where 66% is indicated, two of three groups agreed and a tie in the fourth group. Finally, 50 percent indicates an even split between the four risk categories. Most the comparisons had agreement among the four categories.

TABLE 4. PAIRWISE RANKING RESULTS

ALL RISK CATEGORIES	Dry Year Options/ Transfers **D**	Lexington Pipeline **LX**	Ground-water Recharge-Saratoga **SP**	Ground-water Recharge - Morgan Hill* **B**	Ground-water Banking **G**	Sites Reservoir **S**	Los Vaqueros Reservoir Expansion **L**	Potable Reuse – Los Gatos Ponds **PL**	Potable Reuse – Ford Pond **PF**	Potable Reuse – Injection Wells **PI**	Imported Water Contract Purchase **I**	Pacheco Reservoir **PR**	California WaterFix **C**
Dry Year Options/ Transfers **D**	X	LX 66%	D/SP 50%	D/B 50%	D 66%	S 100%	L 100%	PL 75%	PF 75%	PI 100%	D 75%	PR 100%	C 100%
Lexington Pipeline **LX**	X	X	LX 100%	LX 100%	G 75%	S 100%	L 100%	PL 100%	PF 100%	PI 100%	I 66%	PR 100%	C 100%
Groundwater Recharge-Saratoga **SP**	X	X	X	SP 75%*	G 75%*	S 75%*	L 100%	PL 100%	PF 100%	PI 100%	I 75%	PR 100%	C 100%
Groundwater Recharge - Morgan Hill* **B**	X	X	X	X	G 75%	S 100%	L 100%	PL 100%	PF 100%	PI 100%	B/I 50%	PR 100%	C 100%
Groundwater Banking **G**	X	X	X	X	X	S 100%	L 100%	PL 75%	PF 75%	PI 100%	G/I 50%	PR 100%	C 100%
Sites Reservoir **S**	X	X	X	X	X	X	S 100%	S 100%	S 100%	S 100%	S 100%	PR 75%	C 100%
Los Vaqueros Reservoir Expansion **L**	X	X	X	X	X	X	X	L 75%	L/PF 50%	L 75%	L 75%*	PR 100%	C 100%
Potable Reuse – Los Gatos Ponds **PL**	X	X	X	X	X	X	X	X	PL/PF 50%	PI 100%	PL 75%*	PR 100%	C 100%
Potable Reuse – Ford Pond **PF**	X	X	X	X	X	X	X	X	X	PI 100%	PF 75%*	PR 100%	C 100%
Potable Reuse – Injection Wells **PI**	X	X	X	X	X	X	X	X	X	X	PI 50%	PR 100%	C 100%
Imported Water Contract Purchase **I**	X	X	X	X	X	X	X	X	X	X	X	PR 100%	C 100%
Pacheco Reservoir **P**	X	X	X	X	X	X	X	X	X	X	X	X	C 100%
California WaterFix **C**	X	X	X	X	X	X	X	X	X	X	X	X	X

* Morgan Hill (Butterfield) Recharge Pond

From the pairwise analysis results, California WaterFix is the riskiest project being considered, followed by the surface water reservoirs and potable reuse using injection wells. The two potable reuse projects using recharge ponds are tied, as are groundwater banking and the Lexington Pipeline. The least risky projects are the groundwater recharge projects.

TABLE 5. PAIRWISE COMPARISON RISK RANKING. Project pairwise rank determined using the count of comparisons for which each project was determined as the riskiest. The total votes by experts lists the sum of the raw scores for each project.

PAIRWISE TOTALS	PAIRWISE RANK	TOTAL VOTES BY EXPERTS
California WaterFix C	13	187
Pacheco Reservoir PR	12	165
Sites Reservoir S	11	146
Los Vaqueros Reservoir Expansion L	9	130
Potable Reuse – Injection Wells PI	10	120
Potable Reuse – Ford Road PF	8	96
Potable Reuse – Los Gatos Ponds PL	8	93
Groundwater Banking G	6	62
Imported Water Contract Purchase I	3	61
Dry Year Options/Transfers D	4	58
Lexington Pipeline LX	6	58
Groundwater Recharge - Saratoga SP	2	38
Groundwater Recharge Morgan Hill (Butterfield) B	1	23

RISK SEVERITY AND LIKELIHOOD ANALYSIS

The four risk category teams also assessed the severity and likelihood of risk for each project. The goal of this risk scoring exercise is to help determine how much riskier one project is compared to another and to identify if the risk is primarily from the likelihood that the risk materializes, the severity of the outcome if the risk materializes, or both. The methodology and risk scoring criteria are included in Appendix B. Each risk category expert scored the risk severity and likelihood for each project on a scale from 1 to 4, with four (4) being the highest magnitude of risk. The definitions are summarized in Table 6. Table 7 presents the sum of the median score for each of the risk categories by project, from highest to lowest risk. The relative ranking of risk using the severity and likelihood is the same as when the pairwise results are used. Figure 2. Risk Matrix. illustrates the severity and likelihood analysis results in a risk matrix.

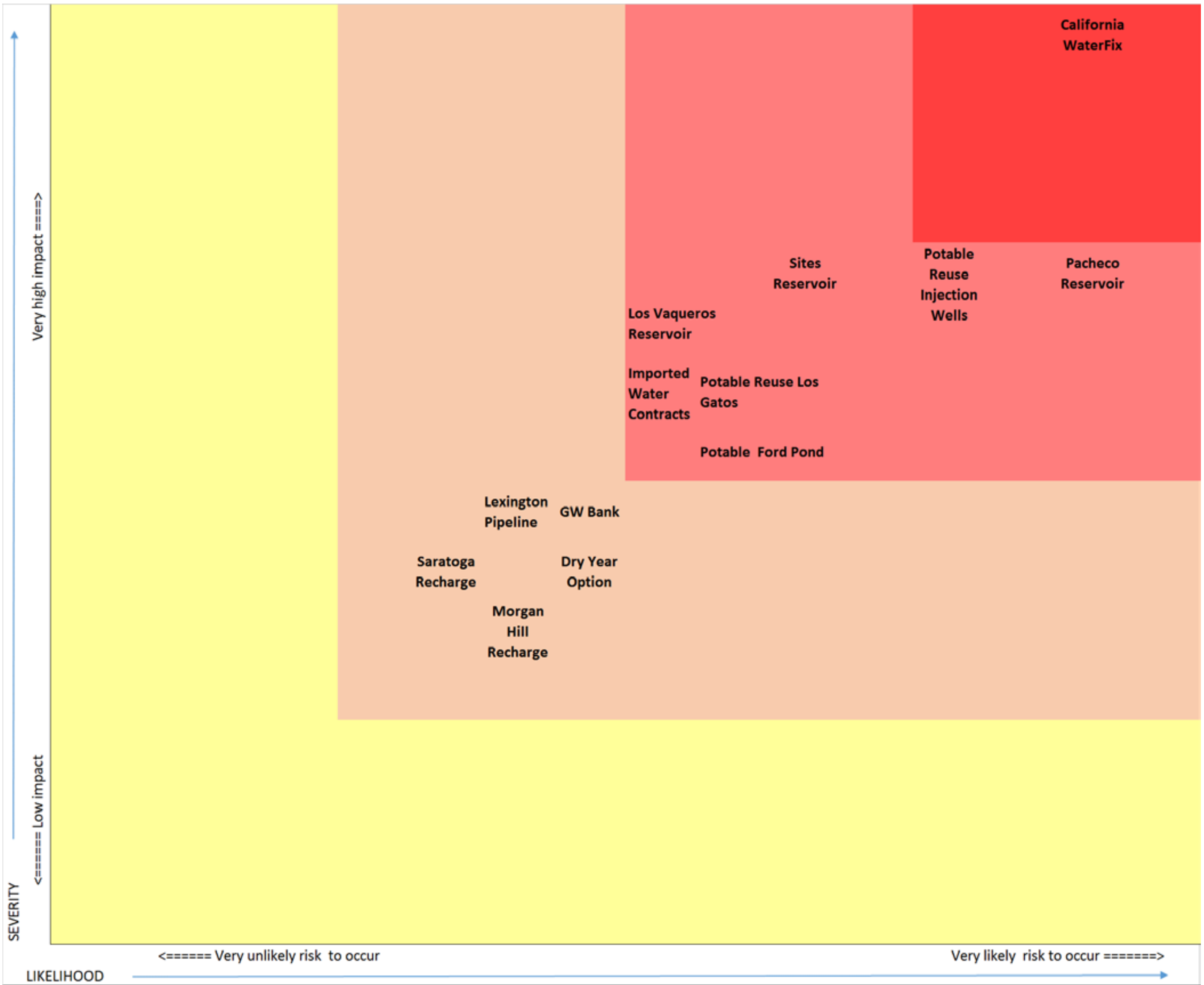
TABLE 6. RISK SEVERITY AND LIKELIHOOD DEFINITIONS

Severity	1. Low= low to no effect on project 2. Medium = minor to modest impacts 3. High = significant or substantial impacts 4. Very High = extreme potential impacts
Likelihood	1. Very Unlikely = Risks will not materialize 2. Unlikely = Risks probably will not materialize 3. Likely = Risks probably will materialize 4. Very Likely = Almost certain risks will materialize

TABLE 7. RISK SEVERITY AND LIKELIHOOD RESULTS

Project	Severity Score (Max. of 16)	Likelihood Score (Max of 16)
California WaterFix C	16	15
Pacheco Reservoir PR	12	15
Sites Reservoir S	12	11
Potable Reuse – Injection Wells PI	12	13
Los Vaqueros Reservoir Expansion L	11	9
Potable Reuse – Ford Road PF	9	10
Potable Reuse -Los Gatos Ponds PL	10	10
Groundwater Banking G	8	8
Lexington Pipeline LX	8	7
Dry year options/transfers D	7	8
Imported Water Contract Purchase I	10	9
Groundwater Recharge -Saratoga SP	7	6
Groundwater Recharge Morgan Hill (Butterfield) B	6	7

FIGURE 2. RISK MATRIX. LIKELIHOOD OF PROJECT IMPACT INCREASES UPWARD ALONG THE VERTICAL AXIS AND SEVERITY INCREASES ALONG THE HORIZONTAL AXIS. SEE TABLE 9 FOR THE RAW DATA USED TO DEVELOP THIS FIGURE.



TOTAL PROJECT RISK CALCULATION

Staff calculated the total project risk for each category by weighting the pairwise ranking by the severity and likelihood (equation 1).

Equation 1

$$Risk_{category} = \left(1 + \frac{Severity + \ Likelihood}{8}\right) \times \ Pairwise\ Ranking$$

The severity and likelihood score is divided by eight (the maximum possible combined score) to represent severity and likelihood as a portion of the maximum possible combined score. This proportion is then added to one (1) so that the pairwise analysis remains the primary driver of the order of risk, and then the severity and likelihood is a multiplicative factor that acts on the risk ranking. If the severity and likelihood is significant, it will substantially increase the total risk score. If the severity and likelihood score are small, there will be little impact on the total risk score. Alternatively, not adding one (1) to the severity and likelihood proportion would result in the severity and likelihood decreasing the ranking number unless the severity and likelihood proportion equals one. Then the risk score was normalized by dividing by the maximum possible score and multiplying by 100 to convert to a percentage value. The project risks for each category are in Figures 3 through 6. The combined total project risk is in Figure 7.

FIGURE 3. WEIGHTED COST RISK

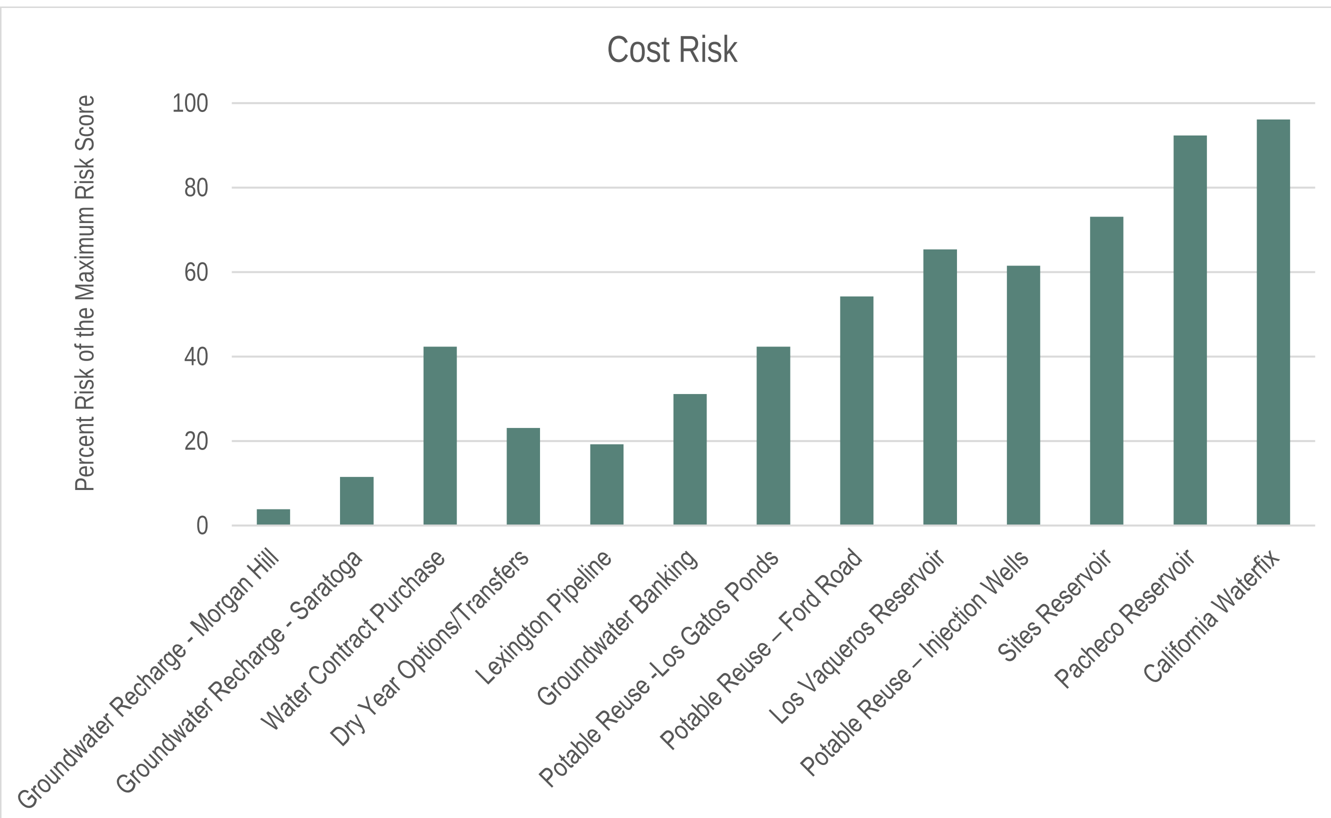


FIGURE 4. WEIGHTED IMPLEMENTATION RISK

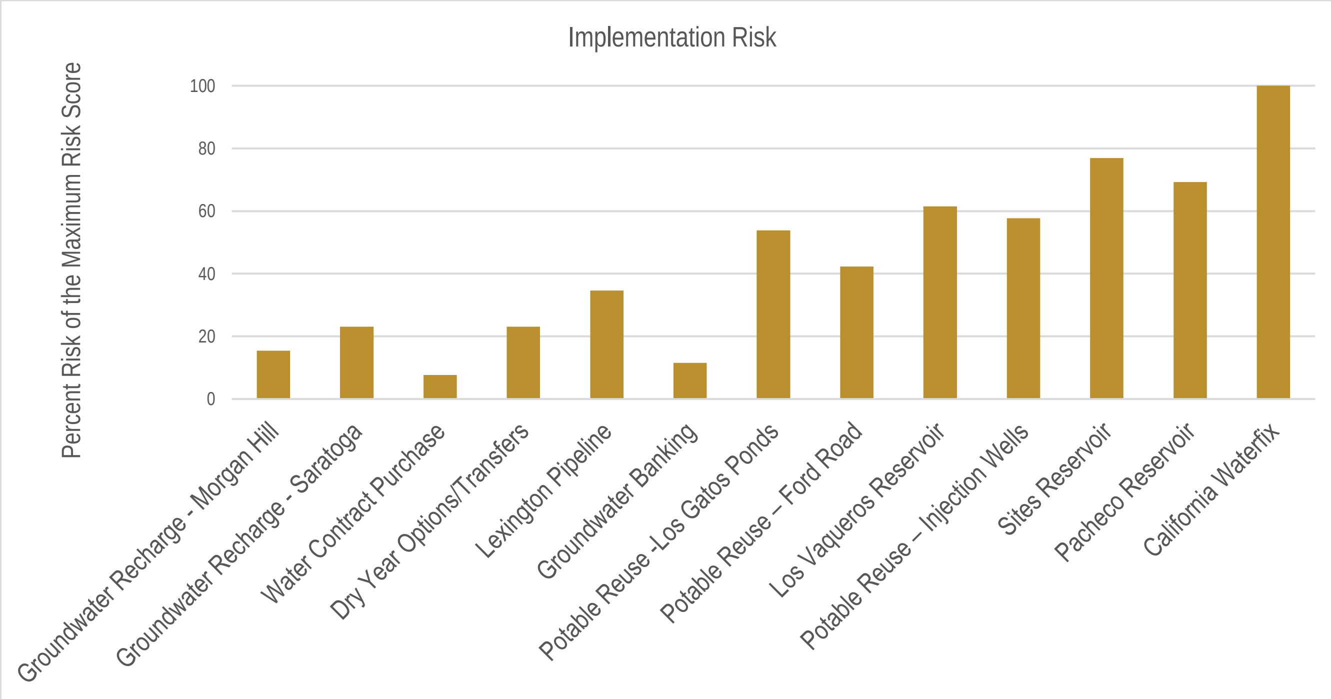


FIGURE 5. WEIGHTED OPERATIONS RISK

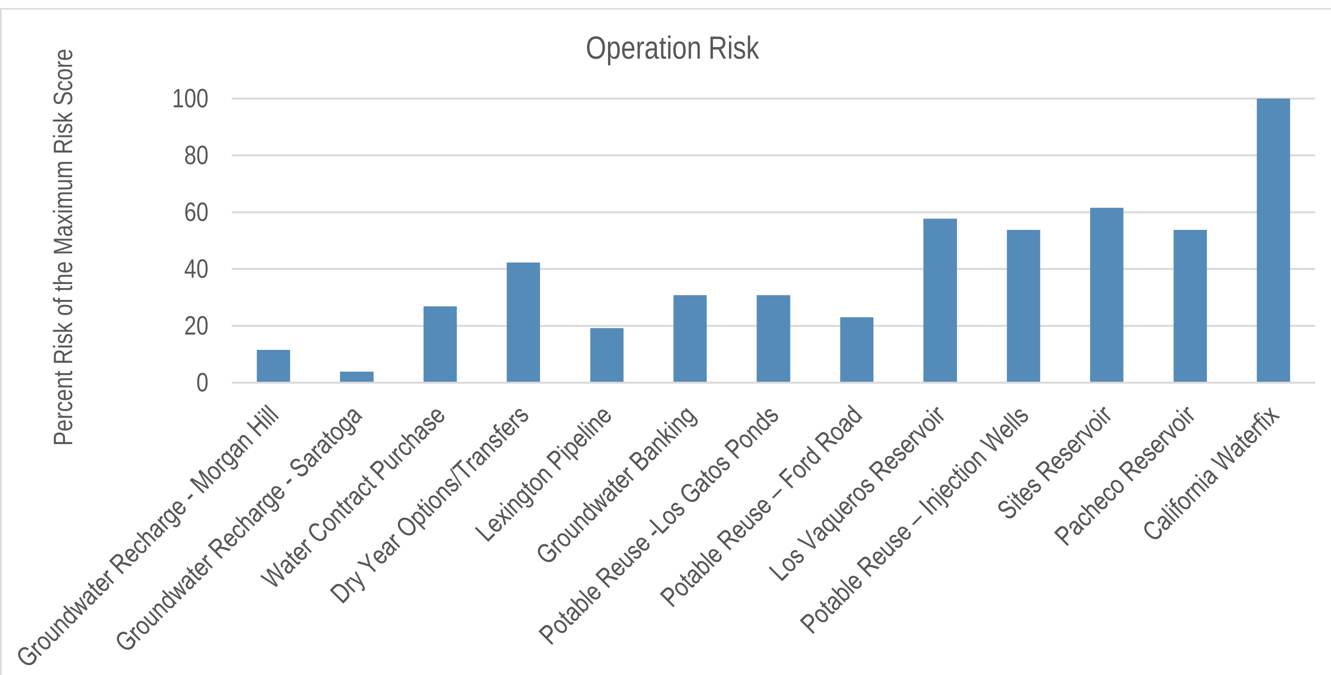


FIGURE 6. WEIGHTED STAKEHOLDER RISK

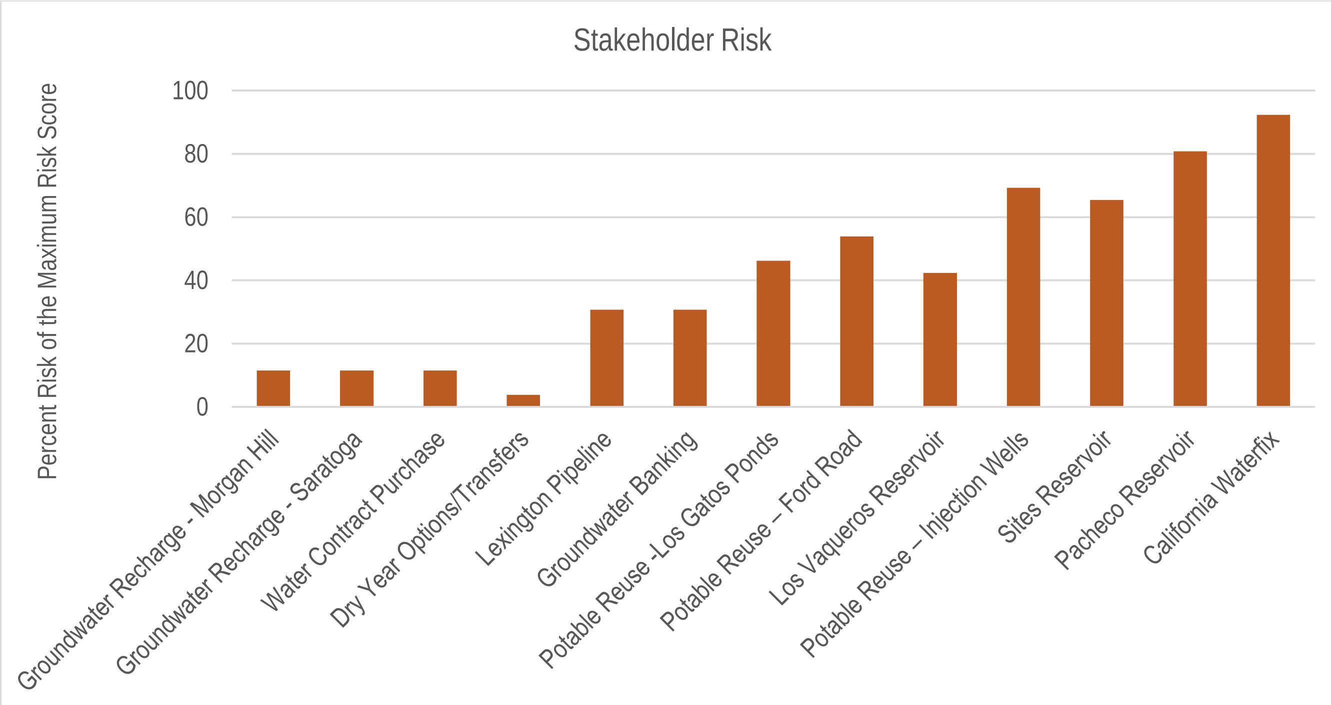
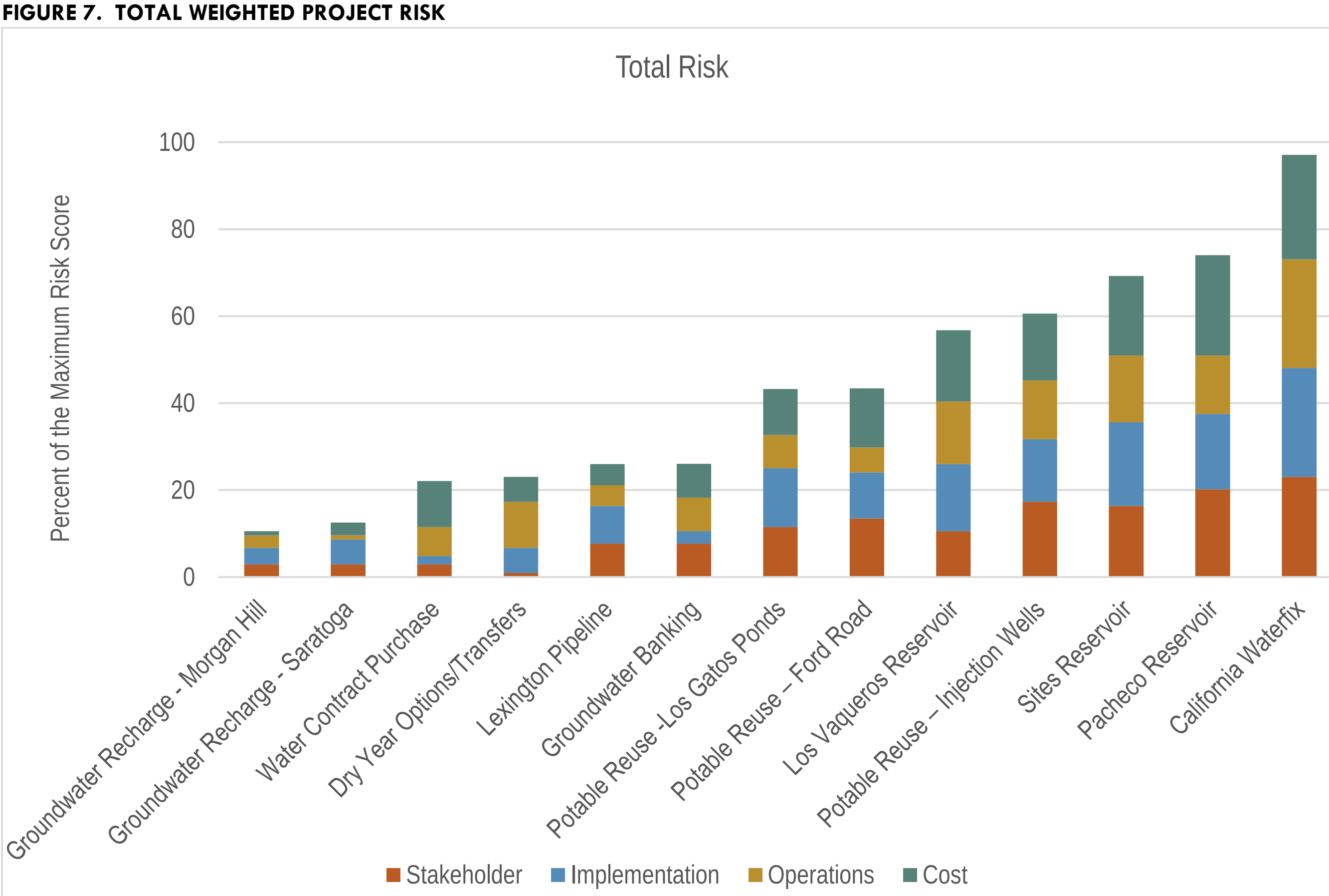


FIGURE 7. TOTAL WEIGHTED PROJECT RISK



PROJECT RISK SUMMARY AND CONCLUSIONS

California WaterFix and the three surface water reservoirs (Pacheco, Sites, and Los Vaqueros) are among the highest risk projects based on this analysis. California WaterFix and Sites Reservoir risk is distributed relatively evenly among the four categories, while Pacheco has more cost risk and Los Vaqueros has less stakeholders risk compared to the other risk categories.

Uncertainties related to future regulatory requirements for the California WaterFix may affect project operations and impact water supply yields. Although significant contingencies have been included in the cost estimates, there could be cost overruns due to the size and complexity of the construction project. Additionally, opposition from vocal stakeholders and potential legal challenges could lead to schedule delays and changes in proposed operations that impact the project's water supply benefit.

Sites Reservoir would depend on Sacramento River flows and Pacheco Reservoir would store Delta-conveyed supplies (along with local water), causing uncertainty in the amount of water that either reservoir will supply. Future environmental regulations and hydrologic changes could significantly affect the modeled yields from the reservoirs. In addition, both reservoirs will likely have significant environmental mitigation requirements that could further reduce the water supply and increase the project costs.

In contrast to Sites, California WaterFix, and Los Vaqueros, the risk analysis results suggest that the Pacheco Reservoir cost-related risk is more significant than the stakeholders, implementation, and operations risks. The cost risks are based on concerns that Pacheco partners have less financial resources and the project has less secure funding sources compared to Sites, California WaterFix, or Los Vaqueros. In addition, the cost estimate for construction and operations/maintenance could increase considerably since the project is in the early phases of planning.

The analysis shows that Los Vaqueros Reservoir has a relatively low risk compared to the other reservoir proposals and California WaterFix, with 12 percent less total risk than the next riskiest reservoir (Sites Reservoir). Risk experts from each of the risk categories commented that Los Vaqueros has been expanded before with little opposition, on time, and on budget. In addition, experts from the costs group noted that there are several potential cost-sharing partners that are financially reliable. There are potential implementation and operation complexities due to the large number of partners.

The analysis also shows that potable reuse using injection wells is riskier than potable reuse using recharge ponds. Injection wells are a relatively new technology compared to recharge ponds and recharge pond operations, maintenance, and costs are better understood. However, experts were concerned that Ford Ponds will require decommissioning several retailer wells, potentially being a stakeholder acceptance and project implementation issue. General potable reuse concerns included public acceptance, poor cost estimates for advanced purification systems, and unknown regulatory requirements. However, experts thought it is less risky than reservoirs or California WaterFix because the water will be a drought-proof, reliable, local supply and that the current socio-political environmental surrounding potable reuse as a water supply will help improve public perception.

Groundwater banking and Lexington Pipeline both had the same amount of total risk. However, compared to Lexington Pipeline, groundwater banking had higher cost and operations risks and lower implementation risks. Since the District already participates in groundwater banking with Semitropic Water Storage District (Semitropic), stakeholders are familiar banking and the associated costs risks. In addition, implementation risks and operations risks are like those with Semitropic in that there needs to be exchange capacity in dry years and the storage is not in-county. While those risks exist, they are relatively small compared to other projects

since the District has experience planning for and mitigating those risks. However, the new potential banking partners will need to build infrastructure to be able to bank District water.

In contrast to groundwater banking, most of the risk associated with Lexington Pipeline is implementation risk. The implementation concern is the ability to build the pipeline through urban areas and potentially complex geologies. Since the pipeline would be locally maintained and operated, there are less operational and cost-related risks. The main cost risk associated with Lexington Pipeline is the construction cost. In contrast, the District would not control the groundwater banking operations and costs would be a recurrent negotiation.

Imported water contract purchase and dry year transfer risks are primarily associated with cost and operation. The contract purchase option is a permanent transfer of SWP Table A contractual water supplies, which are subject to the same regulatory restrictions and delivery uncertainties as our current imported water supplies. In addition, the SWP South Bay Aqueduct has conveyance limits that could make it difficult to receive additional Table A contract water during higher allocation years. In contrast, dry year transfers can only be delivered during specific months. However, if dry year transfers are available, there is little risk that the District will not receive the purchased transfer water. Imported water contract purchase and dry year transfer are both lower risk relative to most other projects since neither require construction, reducing their implementation and cost risks. However, stakeholder experts suggested that it may have poor optics to buy more Table A water when we already do not receive 100 percent of our contract allotment and that it may be difficult to find someone interested in selling their Table A water contract. Similarly, dry year transfers may not be available for purchase when needed.

The Morgan Hill (Butterfield) recharge channel and Saratoga recharge pond were the lowest risk projects because they are less costly than other projects, are local, and the District has successfully completed similar projects. Morgan Hill (Butterfield) recharge channel is currently owned by Morgan Hill and actively used for stormwater conveyance during the winter. To use the channel for recharge as planned, the District will need to coordinate operations with Morgan Hill and extend the District's Madrone Pipeline to the channel. The chief concern with Saratoga recharge pond is identifying and purchasing a suitable property for recharge.

In general, the lowest risk projects are those that are locally controlled or similar to already completed projects. Imported water rights purchase, dry year transfer, and groundwater banking are current practices, so the District is prepared for the uncertainties associated with those projects. Similarly, Morgan Hill (Butterfield) recharge channel is similar to the Madrone recharge channel and is locally controlled. Potable reuse is the newest technology the District is considering, but the facilities are locally controlled and the District is currently testing potable reuse to confirm its operational capabilities. Experts did find potable reuse with recharge ponds to be lower risk than potable reuse with injection wells. The District has experience managing recharge ponds, consistent with the conclusion that lower risk projects are those that are most similar to existing District projects. Projects that require substantial construction and cost-sharing are higher risk, such as California WaterFix and the Pacheco, Sites, and Los Vaqueros Reservoirs.

This risk assessment helps provide the Board of Directors and external stakeholders more thorough understanding of each proposed project. Understanding project risks and how these risks may materialize can help determine which projects to invest in and what project-related issues to prepare for in the future as project development proceeds.

Appendix A: Project and Program Descriptions (as of September 2017)

Project	Pros	Cons	Average Annual Yield (AFY)[1]	Present Value Cost to District (2017)	Cost/AF
California WaterFix: Constructs two 40-foot diameter tunnels at least 100 feet below ground surface capable of diverting up to 9,000 cubic feet-per-second from the Sacramento River and delivering it to the federal and state pumps. Alternative to conveying water all Central Valley Project and State Water Project supplies through the Delta. Would require environmental flow and water quality criteria be met.	• Secures existing Delta-conveyed supplies • Upgrades aging infrastructure • Protects the environment through less impactful diversions • Improves reliability of other Delta-conveyed supplies and transfers • Protects water quality	• Implementation complexity • Long-term operational uncertainty • Stakeholder opposition • Financing uncertainty	41,000	$620 million	$600
Dry Year Options / Transfers: Provides 12,000 AF of State Water Project transfer water during critical dry years. Amount can be increased or decreased. Can also include long-term option agreements.	• Provides supply in critical years when needs are greatest • Allows for phasing • Can implement in larger increments • Complements all other projects	• Subject to Delta-restrictions • Increases reliance on Delta • Cost volatility • Uncertainty with willing sellers	2,000	$100 million	$1,400

[1] The average annual yield of many projects depends on which projects they are combined and the scenario being analyzed. For example, groundwater banking yields is higher in portfolios that include wet year supplies. Similarly, they would be lower in scenarios where demands exceed supplies and excess water is unavailable for banking.

Project	Pros	Cons	Average Annual Yield (AFY)[1]	Present Value Cost to District (2017)	Cost/AF
Groundwater Banking: Provides 120,000 AF of banking capacity for Central Valley Project and State Water Project contract water. Sends excess water to a groundwater bank south of the Delta during wet years and times of surplus for use during dry years and times of need. Annual put and take capacities of 30,000 AFY. Project more effective in portfolios that include new supplies.	• Significantly reduces drought shortages when paired with projects with all-year supply • Allows for phasing	• Subject to Delta restrictions • Uncertainty with Sustainable Groundwater Management Act implementation	2,000	$170 million	$3,900
Groundwater Recharge – Morgan Hill Recharge: Extends the Madrone Pipeline from Madrone Channel to Morgan Hill's Butterfield Channel and Pond near Main Street. Would need to be operated in conjunction with the City's stormwater operations.	• Optimizes the use of existing supplies • Conjunctive use strategy • Helps drought recovery • Local project	• Minimal impact on drought shortages • North County locations limited • Potential siting conflicts with existing land uses	2,000	$20 million	$400
Groundwater Recharge – Saratoga: Constructs a new groundwater recharge facility in the West Valley, near the Stevens Creek pipeline.			1,000	$50 million	$1,300

Project	Pros	Cons	Average Annual Yield (AFY)[1]	Present Value Cost to District (2017)	Cost/AF
Lexington Pipeline: Constructs a pipeline between Lexington Reservoir and the raw water system to provide greater flexibility in using local water supplies. The pipeline would allow surface water from Lexington Reservoir to be put to beneficial use elsewhere in the county, especially when combined with the Los Gatos Ponds Potable Reuse project which would utilize the capacity of the Los Gatos recharge ponds where most water from Lexington Reservoir is currently sent. In addition, the pipeline will enable the District to capture some wet-weather flows that would otherwise flow to the Bay.	• Optimizes the use of existing local supplies • Increases local flexibility • Complements potable reuse	• Water quality issues will require pre-treatment/management • Minimal reduction in drought shortages	3,000	$90 million	$1,000

Project	Pros	Cons	Average Annual Yield (AFY)[1]	Present Value Cost to District (2017)	Cost/AF
Los Vaqueros Reservoir: Secures an agreement with Contra Costa Water District and other partners to expand the off-stream reservoir by 110,000 AF (from 160 TAF to 275 TAF) and construct a new pipeline (Transfer-Bethany) connecting the reservoir to the South Bay Aqueduct. Assumes District's share is 35,000 AF of storage, which is used to prorate costs. Emergency storage pool of 20,000 AF for use during droughts. District would also receive Delta surplus supplies when there is capacity to take. Average yield for District about 3,000 AFY. Assumes sales of excess District supplies to others. Transfer-Bethany Pipeline provides about ¾ of the project benefits at ¼ of the cost.	• Provides drought supplies • Improved transfer/exchange capacity • Allows for phasing (Transfer-Bethany Pipeline provides significant benefit) • Complements projects with all-year supply • Supports regional reliability • Public and agency support	• Operational complexity • Institutional complexity	3,000	$40 million	$400
Pacheco Reservoir: Enlarges Pacheco Reservoir to 140,000 AF. Assumes local inflows and ability to store Central Valley Project supplies in the reservoir. Construction in collaboration with Pacheco Pass Water District and San Benito County Water District. Potential other partners.	• Locally controlled • Addresses San Luis Reservoir Low-Point problem • Provides flood protection • Provides cold water for fisheries • Increases operational flexibility	• Impacts to cultural resources • Long-term operational uncertainty • Increases long-term environmental commitments • May require use of Delta-conveyed supplies to meet environmental commitments • Stakeholder opposition	6,000	$450 million	$2,700

<table>
<tr><th>Project</th><th>Pros</th><th>Cons</th><th>Average Annual Yield (AFY)[1]</th><th>Present Value Cost to District (2017)</th><th>Cost/AF</th></tr>
<tr><td>Potable Reuse – Ford Pond: Constructs potable reuse facilities for 5,000 AFY of groundwater recharge capacity at/near Ford Ponds.</td><td rowspan="3">• Local supply
• Not subject to short or long term climate variability
• Allows for phasing</td><td rowspan="3">• Reverse osmosis concentrate management for injections wells and Los Gatos Ponds projects
• Uncertainty with agreements with San Jose
• Injection well operations complex
• Potential public perception concerns</td><td>3,000</td><td>$190 million</td><td>$2,500</td></tr>
<tr><td>Potable Reuse – Injection Wells: Constructs (or expands in conjunction with the Los Gatos Ponds project) potable reuse facilities for 5,000 to 15,000 AFY of groundwater injection capacity.</td><td>5,000 – 15,000</td><td>$290 million - $860 million</td><td>$2,000</td></tr>
<tr><td>Potable Reuse -Los Gatos Ponds: Constructs facility to purify water treated at wastewater treatment plants for groundwater recharge. Potable reuse water is a high-quality, local drought-proof supply that is resistant to climate change impacts. Assumes 24,000 AFY of advanced treated recycled water would be available for groundwater recharge at existing recharge ponds in the Los Gatos Recharge System.</td><td>19,000</td><td>$990 million</td><td>$1,700</td></tr>
</table>

Project	Pros	Cons	Average Annual Yield (AFY)[1]	Present Value Cost to District (2017)	Cost/AF
Sites Reservoir: Establishes an agreement with the Sites JPA to build an off-stream reservoir (up to 1.8 MAF) north of the Delta that would collect flood flows from the Sacramento River and release them to meet water supply and environmental objectives. Assumes District's share is 24,000 AF of storage, which is used to prorate yields from the project. The project would be operated in conjunction with the SWP and CVP. In some years, District would receive less Delta-conveyed supply with the project than without the project.	• Off-stream reservoir • Improves operational flexibility of Statewide water system	• Increases reliance on the Delta • Subject to Delta risks • Long-term operational uncertainty • Operational complexity • Institutional complexity	8,000	$170 million	$800
Water Contract Purchase: Purchase 20,000 AF of SWP Table A contract supply from other SWP agencies.	• Provides all year supply	• Increases reliance on the Delta • Subject to Delta risks • Willing sellers' availability	12,000	$360 million	$800

APPENDIX B. WSMP 2017 PROJECT RISK ANALYSIS METHODOLOGY

CONTENTS

The following staff participating in the risk analysis:

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BACKGROUND:

At the expert panel meeting on June 8, 2017, a panel member suggested that the Water Supply Planning team conduct a risk assessment on the projects being considered as part of the WSMP. A participant at the expert panel meeting suggested using a Paired Comparison Analysis. The WSMP project team and expert panel brainstormed elements of project risk, which the technical team then used to create risk categories that encompassed the risk elements. After the meeting, the project team identified internal subject matter experts for each risk category to participate in the paired comparison risk assessment. The project team then decided to combine the paired comparison risk analysis with a traditional risk ranking (severity and likelihood) to better understand the relative magnitude of each risk. This provides a detailed explanation of the methodology employed. The results and conclusions are presented in the September 8, 2017, *WSMP 2017 – PROJECT RISKS: Results of Pairwise and Traditional Risk Analyses.*

RISK CATEGORIES

The WSMP project team reviewed the risk elements brainstormed during the expert panel meeting and grouped them into four risk categories: stakeholder, implementation, operations, and cost (Table 1). The risk categories reflect the different stages of a project where risk can occur. Each project requires approval or support from a diverse set of stakeholders, ranging from the public to the Board of Directors. This may be needed only at the beginning of a project, or throughout as is the case with regulatory approval. Once a project is supported by stakeholders, the project enters the planning/implementation phase. Implementation risks capture risks that occur during planning, design, permitting, and construction. The cost risk category encompasses elements of uncertainty associated with the initial cost estimates through the uncertainty associated with recurring operations and maintenance costs during the project's lifespan. Once the project is implemented, issues associated with project operations will need to be addressed throughout the lifespan of the project. An example of a potential recurring operations issue is the need to re-operate as environmental regulations or climate changes.

Once the project team determined the risk categories, they reviewed risk management references to ensure they were presenting a comprehensive assessment of risk. During the literature review, the technical team found a risk category structure named POET that is analogous to their risk categorization (TRW, Inc.). POET categories include political, operational, economic, and technical, and is used to assess challenges and opportunities associated with programs, customer challenges, and strategies, regardless of the size and complexity.

- Political: Assess and articulate associated leadership, mission/business decision drivers, organizational strengths/weaknesses, policies, governance, expectation management (e.g., stakeholder relationship), program management approach, etc.
- Operational: Obtain and evaluate mission capabilities, requirements management, operational utility, operational constraints, supporting infrastructure and processes, interoperability, supportability, etc.
- Economic: Review capital planning and investment management capabilities, and assess the maturity level of the associated processes of budgeting, cost analysis, program structure, acquisition, etc.
- Technical: Assess and determine the adequacy of planned scope/scale, technical maturity/obsolescence, policy/standards implementation, technical approach, etc.

The risk categories determined by the project team have slightly different names than the POET categories, but they cover very similar content.

Table 1: Risk Category and Risk Elements.

Risk Category	Risks
Costs	• Capital costs, including quality of cost estimate • Costs of regulatory compliance • Match requirements and cost-sharing • Counter-party risk • Stakeholders and rate payer perspective and ability to pay • Financing and funding security • Scheduling issues • Economic fluctuations and instability • Stranded assets
Implementation	• Phasing potential • Required time table • Reoperation requirements • Land availability • Constructability (e.g., structural issues, technology) • Managerial capacity (knowledge and resource availability) • Range of implementation options • Regulatory requirements • Project planning maturity
Operations	• Climate change • Yield variability and reliability • Operating Partnerships • Uncertainty of long-term operations and maintenance costs • Project inter-dependency • Environmental and water quality regulations • Control • Appropriate infrastructure • Redundancy • Emergency operations/asset failures
Stakeholders	• Public support • Permitting risks • Media • Internal stakeholder concerns • External stakeholder opposition • Environmental/special interest groups • Partnership risks • Government stakeholders • Costs

WSMP PROJECT RISK ASSESSMENT

After a review of risk assessment methodologies, the project team determined that while a pairwise comparison provides the relative risk ranking of projects, it does not indicate how much riskier one project is in comparison to one of lower rank. To quantify the magnitude of risk, the project team decided to add an evaluation of risk severity and likelihood.

To complete the risk assessment, the project team assembled five to six subject matter experts from the District into four groups, one group for each risk category. The team chose District experts that had knowledge specific to their assigned risk category (Table 1). At each of the four risk assessment meetings, the following agenda was followed:

1) Projects were discussed to the experts could understand the projects sufficiently to perform their analysis.
2) District experts reviewed and brainstormed additional elements of risk associated with the category.
3) District experts independently completed a pairwise comparison.
4) A meeting facilitator tallied the pairwise comparisons during the meeting and the District experts discussed some of the project comparisons where experts had disagreements.
5) District experts independently completed the risk magnitude assessment, which was tallied afterwards.

After this assessment was completed, the project team added four additional projects to the list. This required the analysis to be conducted again with the added projects. The same process was followed for the second analysis, with the following exceptions:

- A subset of the same staff was used in the second analysis, with four to five experts per category.
- The subject matter experts did not meet in person for the second analysis, so there was not the same level of discussion or ability to ask questions about projects as during the first analysis.

PAIRED COMPARISON

The subject matter experts received a matrix of the projects where they could complete their paired comparisons (Table 2A). Each expert compared one project to another and identified which project between the two is of greater risk for the risk category being evaluated. The project team then tabulated the results during the meeting for the first phase (Table 2B- All results), and the experts discussed some of the project comparisons where there was not consensus. Given time constraints, not all paired comparisons with disagreements could be discussed; instead, the project team selected the most significant disagreements for discussion. For the second phase, the experts were provided the same information and forms, and they completed the assessments on their own.

Table 2A: Pairwise Template

OPERATIONS Risk	Butterfield Recharge Pond **B**	Groundwater Banking South of Delta **G**	Sites Reservoir **S**	Los Vaqueros Reservoir Expansion **L**	Potable Reuse – Ford Road **PF**	Potable Reuse – Injection Wells **PI**	Imported Water Rights Purchase **I**	Pacheco Reservoir **PR**	California Waterfix **C**
Butterfield Recharge Pond **B**	X								
Groundwater Banking South of Delta **G**	X	X							
Sites Reservoir **S**	X	X	X						
Los Vaqueros Reservoir Expansion **L**	X	X	X	X					
Potable Reuse – Ford Road **PF**	X	X	X	X	X				
Potable Reuse – Injection Wells **PI**	X	X	X	X	X	X			
Imported Water Rights Purchase **I**	X	X	X	X	X	X	X		
Pacheco Reservoir **P**	X	X	X	X	X	X	X	X	
California Waterfix **C**	X	X	X	X	X	X	X	X	X

Table 2B: Pairwise Results

	Butterfield Recharge Pond **B**	Groundwater Banking South of Delta **G**	Sites Reservoir **S**	Los Vaqueros Reservoir Expansion **L**	Potable Reuse – Ford Road **PF**	Potable Reuse – Injection Wells **PI**	Imported Water Rights Purchase **I**	Pacheco Reservoir **PR**	California Waterfix **C**
Butterfield Recharge Pond **B**	X	G5	S5	L5	PF5	PI5	I4 B1	PR5	C5
Groundwater Banking South of Delta **G**	X	X	S5	L3 G2	PF3 G2	PI2 G3	I2 G3	PR5	C5
Sites Reservoir **S**	X	X	X	S5	S5	PI1 S4	S5	PR5	C5
Los Vaqueros Reservoir Expansion **L**	X	X	X	X	PF1 L4	PI1 L4	I1 L4	PR5	C5
Potable Reuse – Ford Road **PF**	X	X	X	X	X	PI5	I3 PF2	PR5	C5
Potable Reuse – Injection Wells **PI**	X	X	X	X	X	X	I3 PI2	PR5	C5
Imported Water Rights Purchase **I**	X	X	X	X	X	X	X	PR5	C5
Pacheco Reservoir **P**	X	X	X	X	X	X	X	X	C4 PR1
California Waterfix **C**	X	X	X	X	X	X	X	X	X

RISK SCORING METHODOLOGY

Following the pairwise comparison, the experts scored the risk severity and likelihood for individual projects (Table 3). The goal of this risk scoring exercise is to help determine how much riskier one project is from another and to identify if the risk is primarily from the likelihood that the risk materializes, the severity of the outcome if the risk

did materialize, or both. For example, it is unlikely that an earthquake would destroy a dam, but if it did, the results could be catastrophic for life and property (low likelihood, high severity). However, when completing this exercise, experts considered all the risk elements discussed during the pairwise comparison activity to determine one project risk rating for severity and one for likelihood. The ranking criteria for each risk category is explained in detail in the next section.

Table 3: Risk Scoring Template

	Severity of Implementation Risk Impact 1-4, 1 - Low Severity 4 - High severity	**Likelihood of Implementation Risk Impact 1-4, 1 - Very unlikely 4 - Very likely within timeframe**
Butterfield Recharge Pond		
Groundwater Banking South of Delta		
Sites Reservoir		
Los Vaqueros Reservoir Expansion		
Potable Reuse – Ford Road		
Potable Reuse – Injection Wells		
Imported Water Rights Purchase		
Pacheco Reservoir		
California Waterfix		

The scores from this exercise were multiplied by the ordered ranking from the pairwise analysis to determine total risk. The following section provides detailed methods for the total risk calculation.

An example of how the subject matter experts could consider risk rating was provided, but not relied upon due to the many different sub-elements of risk to consider.

EXAMPLE:

Rank the **likelihood** of a stakeholder risk adversely impacting the project

1 = Very unlikely – Support available within 5 to 10 years

2 = Unlikely – appropriate support will Probably be garnered within 5 to 10 years

3 = Likely - Probably will NOT get support within 5 to 10 years

4 = Very likely - Almost certain NOT to get needed support within 5 to 10 years

Rank the **severity** of a stakeholder risk adversely impacting the project:

1 = Low – Stakeholder support exists or lack of support will not affect project success

2 = Medium –Potential for stakeholder issues to impact project success

3 = High – Potential for stakeholder issues to significantly impact project success

4 = Very High – Likely that lack of stakeholder support would result in project failure

TOTAL PROJECT RISK CALCULATION

The project team calculated category risk for each project by weighting the pairwise ranking by the severity and likelihood (equation 1). Then, the category risks were summed to obtain each project's total risk.

Equation 1

$$Risk_{category} = (1 + \frac{Severity + \ Likelihood}{8}) \times \ Pairwise\ Ranking$$

The severity and likelihood score is divided by eight (the maximum possible combined score) to represent severity and likelihood as a portion of the maximum possible combined score. The technical team then added that proportion to one (1) so that the pairwise analysis remains the primary driver of the order of risk, and then the severity and likelihood is a multiplicative factor that acts on the risk ranking. If the severity and likelihood is significant, it will substantially increase the total risk score. If the severity and likelihood score are small, there will be little impact on the total risk score. Alternatively, not adding one (1) to the severity and likelihood proportion would result in the severity and likelihood decreasing the ranking number unless the severity and likelihood proportion equals one.

CONCLUSION

The risk assessment methods were easy to apply to the projects and provided a robust and multi-variant method assess risks associated with each project. However, explaining the methods clearly to the subject matter experts was needed. Since the second phase of review with the added project did not include discussions or the opportunity to ask questions, it may have been subject to less project understanding by the experts.

The results are discussed in September 8, 2017, *WSMP 2017 – PROJECT RISKS: Results of Pairwise and Traditional Risk Analyses.*

Appendix G - Board Agenda Memorandum for January 14, 2019

The entire Board Agenda package for January 14, 2019 (including the attachments) can be found at: https://www.valleywater.org/how-we-operate/board-meetings-agendas-minutes

File No.: 19-0060 **Agenda Date:** 1/14/2019
Item No.: 2.1.

BOARD AGENDA MEMORANDUM

SUBJECT:
Water Supply Master Plan 2040 Update. (Continued from January 8, 2019)

RECOMMENDATION:

A. Reaffirm the 2012 "Ensure Sustainability" Strategy for the Water Supply Master Plan 2040;
B. Approve changing the water supply reliability level of service goal from meeting 90 percent of normal year demands, as identified in the Water Supply Master Plan, in drought years to meeting 80 percent of demands in drought years;
C. Receive information and provide direction on the approach to the monitoring and assessment plan (MAP) for implementing the Water Supply Master Plan 2040; and
D. Direct staff to return with updates on projects with near-term decisions points.

SUMMARY:
The Water Supply Master Plan (Master Plan) is the District's strategy for providing a reliable and sustainable water supply in a cost-effective manner. It informs investment decisions by describing the type and level of water supply investments the District is planning to make through 2040, the anticipated schedule, the associated costs and benefits, and how Master Plan implementation will be monitored and adjusted. The Board last received information on the Master Plan update at its November 20, 2018 meeting. At that time, the Board received and discussed staff's recommendations to change the water supply reliability level of service goal, reaffirm the 2012 "Ensure Sustainability" strategy, and provide input on the monitoring and assessment approach. The Board requested that staff return to the Board at a later date for formal Board action and include additional information on project risks and other agencies' level of service goals. This memorandum summarizes prior analyses including the risk analysis, provides a rationale for updating the District's current water supply reliability level of service goal including other agencies' level of service goals, and describes how the Master Plan will be monitored and adapted to changing conditions.

Summary of Prior Analyses

Staff has analyzed anticipated water supply and demand conditions for 2040, without any new projects. The supply conditions assume dam retrofits are completed, the Fisheries and Aquatic Habitat Collaborative (FAHCE) settlement agreement is implemented, and State Water Project (SWP) and Central Valley Project (CVP) supplies decline over time due to additional regulatory restrictions and climate change. The demands are based on 2020 water use targets in retailers'

Urban Water Management Plans, extended through 2040 to account for updated regional growth projections and expected water conservation program savings. The analysis continues to indicate that extended droughts are our greatest challenge and the county could experience shortages of up to about 150,000 acre-feet (AF) in the most critical year.

A number of projects and combinations of projects have been evaluated for addressing these projected shortages. The analyses considered:

- Water supply yields under different scenarios,
- Other benefits such water quality or environmental benefits,
- Costs,
- Risks,
- Performance with different demand assumptions,
- Performance with different imported water supply assumptions,
- Performance under late century climate change,
- Input from the Expert Panel, and
- Stakeholder and Board interests.

Staff presented the results of these analyses at prior Board meetings, with most of the information provided at the September 19, 2017 and June 12, 2018 meetings. Based on direction from the Board on November 20, 2018, staff has now added an abbreviated risk analysis of the projects the Board has approved for planning. Most of these projects were evaluated in the Risk Ranking Report from Summer 2017 (Attachment 1). The projects are summarized in the Project List (Attachment 2). The new risk analysis considers the probabilities and consequences of projects not achieving their projected yields by 2040, the planning horizon for the Master Plan. The results are similar to the results reported in the Risk Ranking Report. The notable difference is that the risk ranking for Pacheco Reservoir is lower than last year’s result, probably due to increased certainty in funding and additional information on project benefits. In general, projects with lower yields have less risk, because the consequence of not delivering is low. Projects with higher yields and higher probabilities of not succeeding have higher risk rankings. The results are summarized in the following table.

Project	**Risk Ranking**
California WaterFix - Federal Side	Extreme
California WaterFix - State Side Only	High
No Regrets - Complete Package	Medium
No Regrets - Advanced Metering Infrastructure	Low
No Regrets - Graywater Rebate Program Expansion	Low
No Regrets - Leak Repair Incentives	Low
No Regrets - Model Water Efficient New Development Ordinance	Medium
No Regrets - Stormwater/Ag Land Recharge	Low
No Regrets - Stormwater/Rain Barrels and Cisterns	Low

No Regrets - Stormwater/Rain Gardens	Low
No Regrets - Stormwater/San Jose	Low
No Regrets - Stormwater/Saratoga	Low
Pacheco Reservoir	Medium
Potable Reuse and/or Additional Non-Potable Reuse	Medium
South County Recharge	Low
Transfer-Bethany Pipeline	Medium

A number of different approaches or strategies will meet the District's water supply reliability goals, but there are tradeoffs. Some projects perform better during droughts and a changed climate, but are expensive. Other projects may be relatively inexpensive, but do not contribute to drought reliability or are high risk. Some projects have significant benefits for the environment or other interests, but relatively little water supply benefit. Some projects types are preferred more than others by the community. Stakeholders all agree that 1) water supply reliability is important, 2) we should maximize water conservation, water reuse, and stormwater capture, and 3) we need to keep water rates affordable. Based on stakeholder input, technical analyses, and the climate of uncertainty, staff's recommendations are intended to provide a framework for balancing multiple needs and interests while making effective and efficient investment decisions.

Recommended Water Supply Strategy

The Board adopted the "Ensure Sustainability" strategy in 2012 as part of the Water Supply and Infrastructure Master Plan. The "Ensure Sustainability" strategy is comprised of three elements:

1) Secure existing supplies and infrastructure,
2) Expand the water conservation and reuse, and
3) Optimize the use of existing supplies and infrastructure.

Together these elements protect and build on past investments in water supply reliability, leverage those investments, and develop alternative supplies and demand management measures to manage risk and meet future needs, especially during extended droughts in a changing climate. Staff recommends that the Board continue with the "Ensure Sustainability" strategy, combined with the District's Asset Management and Infrastructure Reliability programs, as it provides a pathway to a sustainable water supply system. The following discussion describes the three elements of the recommended strategy and how different potential projects could support them.

1. <u>Secure Existing Supplies and Infrastructure</u>

   The District should secure existing supplies and facilities for future generations because they are, and will continue to be, the foundation of the county's water supply system. Existing supplies include about 55,000 acre-feet per year (AFY) of natural groundwater recharge, 85,000 AFY of local surface water supplies, about 20,000 AFY of recycled water, 55,000 AFY of San Francisco Public Utilities Commission (SFPUC) deliveries, and 160,000 AFY of

combined Central Valley Project (CVP) and State Water Project (SWP) imported supplies. These baseline supplies are conveyed, treated, and stored in a complex and integrated system of water supply infrastructure.

Key ongoing projects and programs that support this strategic element include the Fisheries and Aquatic Habitat Collaborative Effort (FAHCE), dam retrofits, pipeline maintenance and other asset management activities, and the Rinconada Water Treatment Plant Reliability Project. These and similar projects support securing our local supplies and infrastructure and are considered baseline projects.

Projects and programs that could support securing existing imported water supplies and infrastructure include:

- California WaterFix (SWP and/or CVP sides),
- Dry Year Options/Transfers,
- Sites Reservoir, and
- Water Contract Purchases.

Staff recommends that the Master Plan include at least 60,000 AFY of SFPUC deliveries and 150,000 AFY of CVP/SWP supplies. These numbers are based on modeling how much of these supplies are needed to meet a goal of meeting at least 80 percent of normal year demands in drought years and assume other elements of the recommended strategy are implemented.

The 60,000 AFY of SFPUC deliveries is within existing SFPUC contract amounts with its Santa Clara County customers, but may need to be revised based on how the State Water Resources Control Board implements recent changes to the Bay Delta Water Quality Control Plan. The Board decided to participate in California WaterFix on May 8, 2018, which would secure up to about 170,000 AFY of CVP/SWP water supplies.

2. <u>Increase Water Conservation and Reuse</u>

Master Plan analyses show that demand management, stormwater capture, and water reuse are critical elements of the water supply strategy. They perform well under current climate conditions and late century climate change. Water recycling and reuse provide local supplies that are not hydrologically dependent, so they are resilient to extended droughts when the District most needs additional supplies. They make efficient use of existing supplies, so they are sustainable and consistent with a “One Water” approach. In addition, these activities are broadly supported by stakeholders.

A more diverse portfolio of supplies will also be more resilient to risks and uncertainties, including climate change, than a portfolio with increased reliance on imported water supplies. Imported supplies are particularly vulnerable to climate change and regulatory actions like the Bay Delta Water Quality Control Plan. Furthermore, State policy, as stated in the Delta Reform Act of 2009 (Water Code Section 85021), is to “*reduce reliance on the Delta in*

meeting California's future water supply needs through a statewide strategy of investing in improved regional supplies, conservation, and water use efficiency. Each region that depends on water from the Delta watershed shall improve its regional self-reliance for water through investment in water use efficiency, water recycling, advanced water technologies, local and regional water supply projects, and improved regional coordination of local and regional water supply efforts."

The analysis for the Master Plan assumes that non-potable recycled water use will increase by about 13,000 AFY consistent with projections in the water retailers' 2015 Urban Water Management Plans and that long-term water conservation programs will achieve 99,000 AFY of savings by 2030. Other programs and projects that contribute to increasing water reuse and conservation include:

- Countywide Water Reuse Master Plan Projects,
- Local Land Fallowing,
- Morgan Hill Recycled Water,
- No Regrets Package of Water Conservation and Stormwater Capture Projects,
- Potable Reuse: Ford Pond,
- Potable Reuse: Injection Wells,
- Potable Reuse: Los Gatos Ponds,
- Refinery Recycled Water Exchange,
- Bay Area Brackish Water Treatment, and
- Stormwater: Saratoga #2.

Staff plans to include the "No Regrets" package of water conservation and stormwater projects in the Master Plan. The Board approved moving this package of projects into planning in September 2017 and the FY 19 budget includes $1 million for beginning implementation of the "No Regrets" package. Attachment 3, a memo presented to the Board's Water Conservation and Demand Management Committee on October 31, 2018, describes the implementation approach for the "No Regrets" package. The "No Regrets" package should reduce future demands by about 10,000 AFY and increase water supplies by about 1,000 AFY by 2040.

Staff recommends that the Master Plan include at least 24,000 AFY of additional reuse by 2040. This could be potable reuse and/or non-potable recycled water (purple pipe). Staff believes that additional reuse, along with the "No Regrets" package, is vital to the long-term sustainability of water supply reliability in the county. As described above, water reuse and conservation are local drought resistant supplies that are resilient to climate change.

The Board approved pursuing a public-private partnership for up to 24,000 AFY of potable reuse (with Los Gatos Ponds as the likely location) in December 2017. Like other major projects being considered, there are challenges and uncertainty with this project. However, there are alternatives to the project and there is time to address the challenges. Additional water reuse projects, both potable and non-potable, and governance options will be evaluated through the Countywide Water Reuse Master Plan, which is scheduled for completion in 2019.

A pre-feasibility study of the Refinery Recycled Water Exchange project is scheduled for completion in Winter 2018. The Refinery Recycled Water Exchange project would be a partnership with Central Contra Costa Sanitary District and Contra Costa Water District that would increase recycled water deliveries in Contra Costa County and provide in-lieu surface water to the District.

3. Optimize the Use of Existing Supplies and Infrastructure

This element of the strategy includes projects that increase the District's ability to use existing supplies and infrastructure. The District's existing supplies are more than sufficient to meet current and future needs in wet and above normal years. In some years, supplies exceed needs and additional facilities would increase flexibility and the ability to use or store those excess supplies. Additional infrastructure could increase the District's ability to respond to outages and respond to challenges such as droughts and water quality problems. Projects that support this element of the recommended water supply strategy include:

- Anderson Reservoir Expansion,
- Calero Reservoir Expansion,
- Church Avenue Pipeline,
- Groundwater Banking,
- Lexington Pipeline,
- Los Vaqueros Reservoir Expansion,
- North County Recharge,
- Pacheco Reservoir Expansion,
- South County Recharge: Butterfield Channel,
- South County Recharge: San Pedro Ponds,
- South County Water Treatment Plant,
- Transfer-Bethany Pipeline portion of Los Vaqueros Reservoir Expansion,
- Uvas Pipeline, and
- Uvas Reservoir Expansion.

Staff is planning to include a South County recharge project (either Butterfield Channel or San Pedro Ponds) in the Master Plan, because groundwater modeling indicates the need for additional recharge capacity. Pacheco Reservoir is consistent with the Board's priority to actively pursue efforts to increase water storage opportunities. Both the Transfer-Bethany Pipeline portion of the Los Vaqueros Reservoir Expansion and the Pacheco Reservoir Expansion increase the District's water supply operations flexibility and increase emergency water storage. The State, in approving funding of at least half the Pacheco Reservoir Expansion and Los Vaqueros Reservoir Expansion projects' construction costs (in 2015$), recognized those projects also provide ecosystem improvements, recreation opportunities, and/or flood protection benefits.

The three projects - South County Recharge, Pacheco, and Transfer-Bethany Pipeline - would provide a combined average annual yield of about 5,000 AFY, increase system flexibility,

and/or emergency supply.

In summary, staff is recommending that the Board reaffirm the “Ensure Sustainability” strategy, because it:

- Protects existing assets,
- Leverages past investments,
- Meets new demands with water reuse and conservation,
- Supports “One Water” approach,
- Develops local and regional supplies to reduce reliance on the Delta,
- Increases flexibility, and
- Increases resiliency to climate change.

The three elements of the recommended strategy work together to provide a framework for providing a sustainable and reliable water supply. Furthermore, they strike a balance between protecting what we have, investing for the future, and making the most of the water supply system.

Water Supply Reliability Level of Service Goal

The water supply reliability level of service goal is important because it guides long-term water supply planning efforts and informs Board decisions regarding investments. The current level of service, which was approved by the Board in June 2012, is an interpretation of Board Policy E-2 that “there is a reliable, clean water supply for current and future generations.” The current goal is to “develop water supplies designed to meet at least 100 percent of average annual water demand identified in the District’s Urban Water Management Plan during non-drought years and at least 90 percent of average annual water demand in drought years.” Staff is recommending a water supply reliability level of service goal to “develop water supplies designed to meet 100 percent of demands identified in the Master Plan in non-drought years and at least 80 percent of average annual water demand in drought years.”

Staff recommends using the Master Plan demand projection because it is closer to historic trends than the Urban Water Management Plan projection and will be reviewed and updated annually as part of Master Plan monitoring. Staff recommends updating the level of service goal for planning for drought reliability to meeting 80 percent of demands because it strikes a balance between minimizing shortages and the costs associated with the higher level of service. Furthermore, the community was able to reduce water use as much as 28 percent in 2015, indicating that shortages in the range of 20 percent are manageable. The recommendation for reducing the level of service to meeting 80 percent of demands in droughts is consistent with the following:

- **April 2017 Telephone Survey of Santa Clara County Voters re: Water Conservation**: The survey results (Attachment 4) indicate that voters see the need to invest in a more reliable water supply and the majority are open to small rate increases, but oppose large increases.
- **Stakeholder Input**: Staff conducted two stakeholder workshops in January 2018 (Attachment

5). During the workshops, staff discussed an interim level of service goal of meeting 85 percent of demands in drought years. Some stakeholders were interested in a lower level of service goal with planned mandatory water use restrictions to force more efficient water use. Others expressed interest in a lower level of service goal to reduce costs. Others thought the interim level of service goal was about right, and one retailer preferred the existing Board-approved goal. Stakeholders were concerned about overinvesting and impacts on water rates and affordability.

- **Incremental Costs**: The incremental costs of increasing the level of service from meeting 80 percent of demands in drought years to meeting 90 percent of demands in drought years exceed the value of benefits achieved by the increase. The present value lifecycle cost (in 2017 dollars) of additional projects that are needed to increase the level of service from 80 percent to 90 percent range from about $90 million to over $450 million. However, the present value (in 2017 dollars) of the benefits of fewer shortages over the lifecycle of the projects range from $0 to about $300 million. In other words, few projects provide incremental benefits that are worth the incremental cost of increased reliability.
- **Frequency of Shortage**: Modeling indicates that most scenarios that achieve the recommended level of service goal have shortages in less than 10 percent of years. Scenarios that meet 90 percent of demands in droughts years typically have shortages in less than five percent of years, which is a very high level of water supply reliability. By comparison, the District has called for mandatory water use reductions in about 30 percent of the last 30 years.
- **Planning for Uncertainty:** The water supply planning model evaluates water supply conditions under a variety of scenarios, but it cannot anticipate every potential scenario and there is inherent uncertainty in projections. For example, staff is using a demand projection that is based on current water use trends and growth projections. State efforts on “making water conservation a California way of life” or initiatives like Climate Smart San Jose could drive water use lower. On the other hand, climate change could result in more extended droughts, which continue to be our greatest water supply challenge. The recommended level of service strikes a balance between overinvesting in new supplies that may not be needed and underinvesting in supplies needed to manage future extreme conditions. In addition, uncertainty will be managed through annual review of the Master Plan and its assumptions and periodic updates to reflect changed conditions.
- **Regional Agencies’ Goals:** Staff reviewed the water supply reliability goals for other Bay Area water agencies, including Alameda County Water District, Zone 7 Water Agency, East Bay Municipal Utility District, Contra Costa Water District, San Francisco Public Utilities Commission, and Marin Municipal Water District. The water supply reliability level of service goals for these agencies ranged from meeting 75 percent to 90 percent of demands during droughts, with the median being 85 percent.

Agency	District Equivalent
Alameda County Water District	Meet at least 90% of demands during droughts
Zone 7 Water Agency	Meet at least 85% of demands during droughts
East Bay Municipal Utility District	Meet at least 85% of demands during droughts

Contra Costa Water District	Meet at least 85% of demands during droughts
San Francisco Public Utilities Commission	Meet at least 80% of demands during droughts
Marin Municipal Water District	Meet at least 75% of demands during droughts

Staff previously evaluated goals of 80, 85, and 90 percent as part of the Master Plan update. The projects, and therefore costs, needed to achieve the 80 and 85 percent levels of reliability were almost the same in numerous scenarios that were evaluated. However, increasing the level of reliability from 80 or 85 percent to 90 percent required significant additional investment. Staff is recommending the 80 percent level of reliability rather than 85% because it better aligns with the Water Shortage Contingency Plan (WSCP) stages in the "Making Water Conservation a California Way of Life" legislation, the Board's current call for a 20 percent reduction in water use compared to 2013, and was exceeded during 2015.

The recommended level of service is intended to be used for long-term planning purposes and guiding associated long-term investments. While long-term planning considers a range of hydrologic conditions, uncertainties, and risks, the actual level of service in a particular year will depend on actual conditions and could be affected by hydrologic conditions, short-term outages, and extreme situations.

The Water Conservation and Demand Management Committee concurred with staff's recommended updates to the level of service goal at its June 25, 2018 meeting. The Committee did request that staff further elaborate on the State water conservation requirements and uncertainty and their relationship with the level of service goal. That is part of the monitoring and assessment plan discussed below.

The projects already approved by the Board for planning (California WaterFix (SWP and CVP), 24,000 AFY of reuse, the "No Regrets" package of additional water conservation and stormwater capture projects, Transfer-Bethany Pipeline, and Pacheco Reservoir), along with South County Recharge, exceed the recommended level of service goal. However, it is unlikely that all the projects would be implemented and delivering their assumed benefits by Year 2040, the planning horizon for this Master Plan. Staff also evaluated a subset of the potential Master Plan projects (SWP side of California WaterFix (no CVP side), 24,000 AFY of reuse, the "No Regrets" package, and South County Recharge). This subset of projects, as well as others, meets the recommended level of service goal. The present value of the lifecycle benefits range from about $2.48 billion to $2.7 billion. The present value lifecycle costs (2017$) to the District from the two scenarios range from about $1.6 billion to $2.45 billion.

The water rate impacts associated with different scenarios are not included at this point because the impacts depend on the timing of project implementation and the project funding mechanisms. Additional information on the range of potential water rate impacts will be included in the draft Water Supply Master Plan 2040 report, along with a schedule for project implementation. It is important to note that not all the Master Plan projects need to be implemented in the near future. Project phasing will allow the District to implement projects to align with supply and demand projections, as well

manage cash flow and impacts on rates.

Scenario	**Without Projects (Basecase)**	**With Some Projects Approved for Planning**	**With All Projects Approved for Planning**
Minimum Drought Reliability	Meets 50% of demands	Meets 80% of demands	Meets 90% of demands
Present Value Benefits (2017$)	Not applicable	$2,480,000,000	$2,700,000,000
Present Value Cost to District (2017$)	Not applicable	$1,600,000,000	$2,450,000,000
Benefit:Cost Ratio	Not applicable	1.6	1.1

Monitoring and Assessment Plan (MAP) Approach

A primary purpose of the Master Plan is to inform investment decisions. Therefore, a critical piece of the water supply plan is a process to monitor and report to the Board on the demands, supplies, and status of projects and programs in the Master Plan so the Board can use that information in its annual strategic planning sessions, which inform the annual water rate setting, Capital Improvement Program (CIP), and budget processes. Monitoring will identify where adjustments to the Master Plan might be needed to respond to changed conditions. Such adjustments could include accelerating and delaying projects due to changes in the demand trend, changing projects due to implementation challenges, adding projects due to lower than expected supply trends, etc. This section describes the Monitoring and Assessment Plan (MAP) approach for the Master Plan.

The first step in the MAP is to develop an implementation schedule for the Master Plan based on Board direction on the recommended water supply strategy and Master Plan projects. The implementation schedule will consider how projects should be timed to meet reliability goals, costs, cash flow, rate impacts, and other needs and opportunities. The schedule will include anticipated start and completion dates for planning, permitting design, and construction, and major decision points. Staff will monitor the status of all these components and plans to report to the Board on Master Plan implementation at least annually.

The second step of the MAP is to manage unknowns and risks through regular monitoring and assessment. Master Plan monitoring and assessment will build on regular reports on projects and annual water supply conditions and will look at how all the different deviations from schedule affect the long-term water supply reliability outlook. Staff will also evaluate how changing external factors such as changes in policy, regulations, and scientific understanding affect the long-term water supply reliability outlook. Examples of external factors include policies and regulations affecting the Delta (e.g., Bay Delta Water Quality Control Plan) and land use decisions.

Another external factor that the District will be monitoring closely is the state's effort to make water conservation a California way of life. There are various components to the effort, including requiring

that all urban water retailers in the state establish an urban water use objective (i.e. a water budget for their service area). Much of the methodology on how to calculate that objective will be determined over the next few years, so it is still to be determined how that may affect the District's long-term water supply reliability outlook. However, the District already has an aggressive water conservation target out to 2030 that will be further expanded with implementation of the No Regrets package of projects. Staff estimates that water conservation savings will be equivalent to over 20 percent of what water use would be in 2040 without conservation savings.

Staff will also identify and monitor the status of projects that could serve as alternative projects should changes to the Master Plan be needed. Examples of such projects include Sites Reservoir, groundwater banking, and shallow groundwater reuse. Staff will also continue to track and participate in projects currently in development, such as the Refinery Recycled Water Exchange project. Ideally, the District will be able to keep all project opportunities open at minimum cost. Realistically, keeping some opportunities open will be costly.

The third step of the MAP is to report to the Board on Master Plan implementation on at least an annual basis, usually during the summer. In addition, the Board will receive reports on specific projects and pertinent policy and regulatory developments as needed. If changes to or decisions about the Master Plan, Master Plan projects, or other projects appear needed, staff will develop recommendations for the Board based on how decisions would affect the level of service, costs and rate impacts, risk management, and relationships between projects. Staff will also describe how projects relate to each other and stakeholder input. The intent is for staff to provide as complete a picture as possible to inform the Board's strategic planning and investment decisions and to incorporate the Board's decisions into the CIP, budget, and water rate setting processes.

The fourth step of the Map is to adjust projects as necessary upon approval by the Board. It is more likely than not that projects, both existing and new projects, will evolve and change over time. The path we are on today will look different in the future, near and distant. We cannot forecast the future and identify a specific response for every possible scenario. However, having a balanced, diverse, and sustainable water supply will help us adapt to future challenges and a strong monitoring and assessment plan (MAP) will help us stay on top of challenges and uncertainties and our options for managing them.

This paragraph illustrates how the MAP would work, in the context of the Master Plan's inclusion of 24,000 AFY of reuse. The placeholder project for implementing the 24,000 AFY of reuse is the Los Gatos Ponds Potable Reuse Project, which has a current CIP construction estimate of about $215 million (District share of construction cost; private partner would pay difference) and a completion date of 2027, followed by P3 water service agreement costs and post-P3 agreement term operations, maintenance, and replacement costs. If the Master Plan were prepared today, staff would use the CIP budget and schedule, as well as estimated post-construction costs, in Step 1 of the MAP - developing the implementation schedule. Step 2 would include ongoing evaluation of the project in light of ongoing discussions with wastewater producers, the Countywide Water Reuse Master Plan, the Recycled Water Exchange Pre-Feasibility Study and other potential reuse project analyses, and the Board's direction on water rates. As part of Step 3, staff would report to the Board on the status of the Los Gatos Ponds Potable Reuse Project and other projects, as well water supplies, demands,

financial considerations, any pertinent regulatory changes, etc. Based on the information, staff could recommend that the Board adjust the scope, schedule, and/or budget for the Los Gatos Ponds project or consider alternative projects. For example, if demands remain low, finances are a concern, and/or there is a lack of progress securing wastewater for treatment, the Board could choose to delay the project. Based on the Board's direction, staff would adjust the CIP, budget, and water rate forecast as part of Step 4 of the MAP. Then, the annual MAP process would restart. This same analysis would be performed for all the projects in the Master Plan on at least an annual basis.

Next Steps

The next steps for the Master Plan are to prepare a draft Master Plan 2040 based on Board direction. Staff anticipates having a draft Master Plan ready for Board and stakeholder review in March 2019. The intent is to have at least two workshops - one with water retailers and one with other stakeholders. Additional presentations may be made at Board advisory committees. Staff plans to present a final Master Plan to the Board in June 2019.

Staff anticipates returning to Board in the next six months on several projects that are currently in development and will require Board deliberation on next steps. These projects include, but are not limited to, Sites Reservoir, Los Vaqueros Reservoir, and California WaterFix Long-Term Transfers. Staff will incorporate the Board's input on the Master Plan's water supply strategy and level of service into these presentations.

FINANCIAL IMPACT:
There is no financial impact associated with this item. The water supply reliability level of service goal and water supply strategy help inform Board investment decisions but do not commit the District to a specific course of action regarding projects. Rather, it affirms the District's commitment to balance the costs and benefits of investments in long-term water supply reliability.

CEQA:
The recommended action does not constitute a project under CEQA because it does not have a potential for resulting in direct or reasonable foreseeable indirect physical change in the environment. The water supply reliability level of service goal and water supply strategy help inform Board investment decisions, but do not commit the District to a specific course of action regarding projects. All projects that are planned for implementation will go through environmental review consistent with CEQA.

ATTACHMENTS:
Attachment 1: Risk Ranking Report
Attachment 2: Project List
Attachment 3: No Regrets Memo
Attachment 4: 2017 Survey Results
Attachment 5: 2018 Stakeholder Workshops Summary

Attachment 6: PowerPoint

UNCLASSIFIED MANAGER:
Jerry De La Piedra, 408-630-2257

Appendix H – Project List

Project List (as of February 2019)

Water Supply Master Plan 2040
Project List (as of February 2019)

Project	Project Status[1]	District Lifecycle Cost (Present Value, 2018)[2]	Average Annual Yield (AFY)[3]	Cost/AF	Relative Risk[4]
Anderson Reservoir Expansion: Increases reservoir storage by 100,000 AF to about 190,000 AF, increasing Valley Water's ability to capture and store local runoff. Planning for reconstruction of Anderson Reservoir to meet seismic standards is currently underway. Consideration of also expanding the reservoir would likely delay the required work.	Inactive	$1.2 billion	10,000	$5,300	TBD
Bay Area Brackish Water Treatment/Regional Desalination: Secures a partnership with other Bay Area agencies to build a brackish water treatment plant in Contra Costa County. Valley Water would receive up to 5 MGD of water in critical dry years. There are concerns permitting and the availability of water rights during dry periods when such a facility would be most needed. This project will require collaboration among multiple agencies and requires partners for moving forward.	Active	$80 million	1,000	$2,900	TBD

[1] Project status is either "Master Plan Project" for projects in the Water Supply Master Plan 2040, "Active" for projects where there is ongoing Valley Water activity and the project could be an alternative project for the Water Supply Master Plan, or "Inactive" for projects that could be potential future projects.
[2] Valley Water Lifecycle Cost (Present Value, 2018$) includes capital, operations, maintenance, rehabilitation, and replacement costs, as applicable, for a 100-year period, discounted back to 2018 dollars. Only Valley Water costs, after grants and other funding sources, are included. All costs are subject to change pending additional planning and analysis.
[3] The average annual yield of many projects depends on which projects they are combined with and the scenario being analyzed. For example, groundwater banking yields are higher in portfolios that include wet year supplies. Similarly, they would be lower in scenarios where demands exceed supplies and excess water is unavailable for banking.
[4] Valley Water staff complete risk ranking analyses in September 2017 and December 2018. Not all the potential projects were included in the analysis. "TBD" indicates the project was not included in either of the risk ranking analyses.

Project	Project Status[1]	District Lifecycle Cost (Present Value, 2018)[2]	Average Annual Yield (AFY)[3]	Cost/AF	Relative Risk[4]
Calero Reservoir Expansion: Expands Calero Reservoir storage by about 14,000 AF to 24,000 AF. Planning and design for Calero Reservoir Seismic Retrofit project is currently underway. Consideration of also expanding the reservoir would likely delay the required work.	Inactive	$180 million	3,000	$2,300	TBD
Church Avenue Pipeline: Diverts water from the Santa Clara Conduit to the Church Avenue Ponds. The Morgan Hill recharge projects provide the same or better yields at a lower cost.	Inactive	$31 million	1,000	$900	TBD
Conservation Rate Structures: Many retailers implement conservation rate structures. Given recent court rulings on rate structure, retailers are reluctant to add new conservation rate structures at this time	Inactive	TBD	TBD	TBD	TBD
Countywide Water Reuse Master Plan: Valley Water is working with local recycled water producers, retailers, and other stakeholders to develop a Countywide Water Reuse Master Plan (CWRMP) that will address key challenges in potable water reuse, including: (1) identification of how much water will be available for potable reuse and non-potable recycled water expansion, (2) evaluation of system integration options, (3) identification of specific potable reuse and recycled water projects, and (4) development of proposals for governance model alternatives including roles and responsibilities. The plan, which is scheduled to be completed in 2020, may identify additional reuse opportunities to incorporate into the Water Supply Master Plan.	Active	TBD	TBD	TBD	TBD

Project	Project Status[1]	District Lifecycle Cost (Present Value, 2018)[2]	Average Annual Yield (AFY)[3]	Cost/AF	Relative Risk[4]
Delta Conveyance Project (formerly known as California WaterFix): Constructs alternative conveyance capable of diverting up to 9,000 cubic feet-per-second from the Sacramento River north of the Delta and delivering it to the SWP pumps at the southern end of the Delta. The goal is to reduce impacts of diversions, help maintain existing deliveries, improve the ability to do transfers, help adapt to changing precipitation and runoff patterns, and protect water quality from sea level rise. The project has significant implementation complexity and stakeholder opposition. The State is currently revising the project from two tunnels down to one tunnel. A new project description is forthcoming.	Master Plan Project	$630 million	41,000	$600	High - Extreme
Del Valle Reoperations: This project, as currently envisioned, would allow for more storage in Lake Del Valle, a State Water Project facility in Del Valle Regional Park that is operated by East Bay Regional Park District. The benefits of the additional storage are primarily related to operational flexibility and water quality. The project may not increase long-term water supply yields or drought year yields.	Inactive				TBD
Dry Year Options / Transfers: Provides 12,000 AF of State Water Project transfer water during critical dry years through long-term agreements. Amount can be increased or decreased. There are uncertainties with long-term costs and ability to make transfers in critical dry years. Short-term water transfers and exchanges are part of routine Valley Water imported water operations.	Inactive	$100 million	2,000	$1,400	Low

Project	Project Status[1]	District Lifecycle Cost (Present Value, 2018)[2]	Average Annual Yield (AFY)[3]	Cost/AF	Relative Risk[4]
Groundwater Banking: Provides up to 120,000 AF of banking capacity for Central Valley Project and State Water Project contract water. Sends excess water to a groundwater bank south of the Delta during wet years and times of surplus for use during dry years and times of need. Amount could be increased or decreased. There are uncertainties with the ability to make transfers in critical dry years and Sustainable Groundwater Management Act implementation.	Active	$75 million	2,000	$1,300	Low
Lexington Pipeline: Constructs a pipeline between Lexington Reservoir and the raw water system to provide greater flexibility in using local water supplies. The pipeline would allow surface water from Lexington Reservoir to be put to beneficial use elsewhere in the county and increase utilization of existing water rights, especially in combination with the Los Gatos Ponds Potable Reuse project. In addition, the pipeline will enable Valley Water to capture some wet-weather flows that would otherwise flow to the Bay. Water quality issues would require pre-treatment/management. An institutional alternative could include an agreement to use some of Valley Water's Lexington Reservoir water right at San Jose Water Company's Montevina Water Treatment Plant.	Inactive	$85 million	3,000	$1,000	Low
Local Land Fallowing: Launches program to pay growers not to plant row crops in critical dry years. This would primarily save water in the South County. The South County recharge projects have similar or greater yields at a lower cost and are more consistent with County land use policy and grower interests.	Inactive	$50 million	1,000	$2,400	TBD

Project	Project Status[1]	District Lifecycle Cost (Present Value, 2018)[2]	Average Annual Yield (AFY)[3]	Cost/AF	Relative Risk[4]
Los Vaqueros Reservoir: Secures an agreement with Contra Costa Water District and other partners to expand the off-stream reservoir by 115 TAF (from 160 TAF to 275 TAF) and construct a new pipeline (Transfer-Bethany) connecting the reservoir to the South Bay Aqueduct. Assumes Valley Water's share is 30 TAF of storage, which includes an emergency storage pool of 20 TAF for use during droughts. Would require funding and operating agreements with multiple parties, likely including formation of a Joint Powers Authority.	Active	$131 million	3,600	$1,200	Medium
Morgan Hill Recycled Water: Constructs a 2.25 MGD scalping plant in Morgan Hill. Would need to replace a lower cost recycled water project in Gilroy due to capacity constraints on the system.	Inactive	$85 million	3,000	$1,100	TBD
Additional Conservation and Stormwater Projects and Programs	Master Plan Project	$60 million	11,000	$200	Medium
Advanced Metering Infrastructure (AMI): Implements a cost share program with water retailers to install AMI throughout their service area. AMI would alert customers of leaks and provide real-time water use data that allows users to adjust water use.		$20 million	4,000	$100	Low
Graywater Rebate Program Expansion: Expand Valley Water's existing rebate program for laundry-to-landscape graywater systems. Potentially could include a direct installation program and/or rebates for graywater systems that reuse shower and sink water.		$1 million	< 1,000	$3,300	Low
Leak Repair Incentive: Provides financial incentivizes homeowners to repair leaks.		$1 million	< 1,000	$9,200	Low

Project	Project Status[1]	District Lifecycle Cost (Present Value, 2018)[2]	Average Annual Yield (AFY)[3]	Cost/AF	Relative Risk[4]
New Development Model Ordinance: Encourages municipalities to adopt an ordinance for enhancing water efficiency standards in new developments. Components include submetering multi-family residences, onsite water reuse (rainwater, graywater, black water), and point-of use hot water heaters.		$2 million	5,000	$100	Medium
Stormwater - Agricultural Land Recharge: Flooding or recharge on South County agricultural parcels during the winter months.		$10 million	1,000	$1,000	Low
Stormwater - Rain Barrels: Provides rebates for the purchase of a rain barrels.		$10 million	< 1,000	$17,900	Low
Stormwater - Rain Gardens: Initiates a Valley Water rebate program to incentivize the construction of rain gardens in residential and commercial landscapes.		$10 million	< 1,000	$3,000	Low
Stormwater - San Jose: Constructs a stormwater infiltration system in San Jose. Assumes 5 acres of ponds. Potential partnership with City of San Jose.		$3 million	1,000	$100	Low
Stormwater – Saratoga #1: Constructs a stormwater infiltration system in Saratoga. Assumes 5 acres of ponds. Assumes easement rather than land purchase. Close to Stevens Creek Pipeline, so could also potentially be used as a percolation pond.		$3 million	< 1,000	$1,100	Low

Project	Project Status[1]	District Lifecycle Cost (Present Value, 2018)[2]	Average Annual Yield (AFY)[3]	Cost/AF	Relative Risk[4]
Pacheco Reservoir: Through a partnership with Pacheco Pass Water District, San Benito County Water District (SBCWD), and potentially other partners, Valley Water will enlarge Pacheco Reservoir from about 6,000 AF to about 140,000 AF and connect the reservoir to the San Felipe Division of the CVP. The primary water sources to fill the expanded reservoir would be natural inflows from the North and East Forks of Pacheco Creek. Supplemental flows to the expanded reservoir would arrive from Valley Water's SBCWD's share of contracted CVP pumped water from San Luis Reservoir. The project will be operated to provide water for fisheries downstream of the reservoir and increase in-county storage. Other potential benefits could include managing water quality impacts from low-point conditions in San Luis Reservoir and downstream flood protection. The project will also deliver water to up to eight south-of-Delta wildlife refuges in Merced County. Potentially significant environmental and cultural resource impacts.	Master Plan Project	$340 million	6,000	$2,000	Medium
Potable Reuse – Ford Pond: Constructs potable reuse facilities for 4,000 AFY of groundwater recharge capacity at/near Ford Ponds. Potable reuse water is a high-quality, local drought-proof supply that is resistant to climate change impacts. The project would require agreements with the City of San Jose and may require moving existing water supply wells.	Inactive	$295 million	3,000	$2,800	Medium
Potable Reuse – Injection Wells: Constructs potable reuse facilities for 15,000 AFY of groundwater injection capacity. Potable reuse water is a high-quality, local drought-proof supply that is resistant to climate change impacts. The injection wells could be constructed in phases and be connected to the pipeline carrying purified water to the Los Gatos Ponds. The project would require agreements with the City of San Jose and reverse osmosis concentrate management. Injection well operations are more complex than recharge pond operations.	Inactive	$1.2 billion	12,000	$3,100	High

Project	Project Status[1]	District Lifecycle Cost (Present Value, 2018)[2]	Average Annual Yield (AFY)[3]	Cost/AF	Relative Risk[4]
Potable Reuse - Los Gatos Ponds: Involves purifying water at an expanded Silicon Valley Advanced Water Purification Center in Alviso, pumping the water to Campbell, and using the purified water for groundwater recharge in the existing ponds along Los Gatos Creek. Potable reuse water is a high-quality, local drought-proof supply that is resistant to climate change impacts. Assumes up to 24,000 AFY of advanced treated recycled water would be available for groundwater recharge at existing recharge ponds in the Los Gatos Recharge System. Some of the outstanding issues with the project are reverse osmosis concentrate management and agreements with the City of San Jose or another wastewater provider.	Master Plan Project	$1.2 billion	19,000	$2,000	Medium
Refinery Recycled Water Exchange: Central Contra Costa Sanitary District (Central San) is a wastewater agency in Contra Costa County. It currently produces about 2,000 acre-feet per year (AFY) of recycled water, but has wastewater flows that could support more than 25,000 AFY of recycled water production. The conceptual program would involve delivering recycled water to two nearby refineries that are currently receiving about 22,000 AFY of CCWD Central Valley Project (CVP) water; in exchange Valley Water would receive some of CCWD's CVP water.	Active	TBD	11,000	TBD	TBD
Retailer System Leak Detection/Repair: Recent legislation requires retailers to complete annual water loss audits, which will then be used by the State to establish water loss standards. Staff will reconsider this alternative after the standards are developed.	Inactive	TBD	TBD	TBD	TBD
Saratoga Recharge: Constructs a new groundwater recharge facility in the West Valley, near the Stevens Creek pipeline. Would help optimize the use of existing supplies. Land availability and existing land uses limit potential project locations.	Inactive	$50 million	1,000	$1,300	Low

Project	Project Status[1]	District Lifecycle Cost (Present Value, 2018)[2]	Average Annual Yield (AFY)[3]	Cost/AF	Relative Risk[4]
Shasta Reservoir Expansion: A Feasibility Study and Environmental Impact Statement have been completed for a Shasta Reservoir Expansion. The United States Bureau of Reclamation concluded the project is technically feasible, and is conducting preliminary investigations. State law prohibits Prop 1 storage funding for the project and restricts funding for any studies. Staff will continue to monitor opportunities related to Shasta Reservoir Expansion. US Fish & Wildlife Service recommended against the project in 2014 because it would fail to protect endangered salmon in the Sacramento River. The State sued Westlands Water District for working on the EIS and planning studies. The judge has since ordered Westlands Water District to stop work and ruled that it violated state law for working on projects that would adversely affect the McCloud River. Westlands Water District has appealed the decision.	Incctive	TBD	TBD	TBD	TBD
Sites Reservoir: Establishes an agreement with the Sites JPA to build an off-stream reservoir (up to 1,800 TAF) north of the Delta that would collect flood flows from the Sacramento River and release them to meet water supply and environmental objectives. The project would be operated in conjunction with the SWP and CVP, which improves flexibility of the statewide water system but would be subject to operational complexity.	Active	$250 million	8,000	$1,200	High

Project	Project Status[1]	District Lifecycle Cost (Present Value, 2018)[2]	Average Annual Yield (AFY)[3]	Cost/AF	Relative Risk[4]
Shallow Groundwater Reuse: A feasibility study for the recovery and beneficial use of shallow groundwater was completed in 2009. Although potential sites for shallow groundwater reuse were identified, staff has identified several concerns. These concerns include water quality, sustainable yields, and lack of infrastructure for storage and conveyance. In addition, several reuse sites are in areas where recycled water is already delivered for non-potable use. Valley Water will new opportunities as they arise.	Inactive	TBD	TBD	TBD	TBD
South County Recharge – Butterfield Channel: Extends the Madrone Pipeline from Madrone Channel to Morgan Hill's Butterfield Channel and Pond near Main Street. Would help optimize the use of existing supplies. Would need to be operated in conjunction with the City's stormwater operations.	Master Plan Project	$10 million	2,000	$400	Low
South County Recharge - San Pedro Ponds: Implements a physical or institutional alternative to enable the ponds to be operated at full capacity without interfering with existing septic systems in the vicinity.	Active	$10 million	1,000	$400	TBD
South County Water Treatment Plant: Provides in-lieu groundwater recharge by delivering treated surface water to the Cities of Morgan Hill and Gilroy. Would require a connection to the Santa Clara Conduit or other raw water pipeline and pipelines from the plant to the cities' distribution systems. Valley Water owns two properties that could potentially be used for this project. The South County recharge projects provide similar benefits at significantly lower cost.	Active	$112 million	2,000	$2,400	TBD

Project	Project Status[1]	District Lifecycle Cost (Present Value, 2018)[2]	Average Annual Yield (AFY)[3]	Cost/AF	Relative Risk[4]
Stormwater – Saratoga #2: Constructs a stormwater infiltration system on a parcel in Saratoga. Assumes 5 acres of ponds. Currently zoned as ag land; assumes land purchase. About 0.6 miles from the Stevens Creek Pipeline. The cost-effectiveness is low due to the land purchase requirement. Other stormwater projects are included in the "No Regrets" package.	Inactive	$50 million	<1,000	$10,700	TBD
Temperance Flat Reservoir: Temperance Flat Reservoir would be located upstream of Friant Dam on the San Joaquin River. Staff's current analysis is that any water supply benefits to Valley Water from the project would be indirect, largely manifested by lowered requirements for Delta pumping for delivery to the San Joaquin Exchange contractors at the Delta-Mendota Pool.	Inactive	TBD	TBD	TBD	TBD
Transfer-Bethany Pipeline: The pipeline will connect Contra Costa Water District's (CCWD's) system to Bethany Reservoir, which serves the South Bay Aqueduct and the California Aqueduct. This project will enable Valley Water to receive Delta surplus supplies and some contract supplies through CCWD's system in the Delta instead of (or in addition to) the CVP and SWP pumps in the southern Delta. This will increase reliability and flexibility for Valley Water. The project would also facilitate other potential regional projects. Would provide an alternative to through-Delta conveyance of supplies from projects such as the Bay Area Brackish Water Treatment and Refinery Recycled Water Exchange projects. Also, it would facilitate conveyance of Delta surplus supplies or transfers from CCWD and East Bay Municipal Utility District. The pipeline is one element of the larger Los Vaqueros Reservoir Expansion Project, which is partnership between CCWD, Valley Water, and agencies in the Bay Area and Central Valley. Would require funding and operating agreements with multiple parties, likely including formation of a Joint Powers Authority.	Master Plan Project	$78 million	3,500	$700	Medium

Project	Project Status[1]	District Lifecycle Cost (Present Value, 2018)[2]	Average Annual Yield (AFY)[3]	Cost/AF	Relative Risk[4]
Uvas Pipeline: Captures excess water (e.g., water that would spill) from Uvas Reservoir and diverts the water to Church Ponds and a 25 acre-foot pond near Highland Avenue. The new pond would be adjacent to and connected by a pipe to West Branch Llagas Creek. The South County recharge projects provide similar or better yields at a lower cost.	Inactive	$90 million	1,000	$2,600	TBD
Uvas Reservoir Expansion: Would expand Uvas Reservoir by about 5,100 AF to 15,000 AF, reducing reservoir spills. Project would be located on Uvas Creek, which currently provides good steelhead habitat. Other water storage options under consideration provide better yield for the cost.	Inactive	$330 million	1,000	$20,500	TBD
Water Contract Purchase: Purchase 20,000 AF of SWP Table A contract supply from other SWP agencies. Would increase reliance on the Delta and be subject to willing sellers' availability. Could also include Long-Term Transfers being considered along with California WaterFix.	Active	$365 million	12,000	$800	Medium

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Valley Water

Clean Water • Healthy Environment • Flood Protection

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APPENDIX E

2016 Groundwater Management Plan

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2016

Groundwater Management Plan

Santa Clara Valley Water District

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Santa Clara Valley Water District

2016 Groundwater Management Plan
Santa Clara and Llagas Subbasins

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November 2016

Santa Clara Valley Water District

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BOARD OF DIRECTORS

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Acronyms and Abbreviations

AF: acre-feet

AFY: acre-feet per year

BAO: Board Appointed Officer

Board: Santa Clara Valley Water District Board of Directors

CASGEM: California Statewide Groundwater Elevation Monitoring Program

CCAMP: Central Coast Ambient Monitoring Program

CEO: Chief Executive Officer

County: Santa Clara County

CVP: Central Valley Project

CY: Calendar Year

DDW: State Water Resources Control Board Division of Drinking Water

DEH: Santa Clara County Department of Environmental Health

DFW: California Department of Fish and Wildlife

District: Santa Clara Valley Water District

District Act: Santa Clara Valley Water District Act

DSOD: California Division of Safety of Dams

DTSC: California Department of Toxic Substances Control

DWR: California Department of Water Resources

DWSAP: Drinking Water Source Assessment and Protection Program

EDD: Electronic Data Deliverable

EIR: Environmental Impact Report

FAHCE: Fisheries and Aquatic Habitat Collaborative Effort

FWS: United States Fish and Wildlife Service

FY: Fiscal Year (July 1 to June 30)

GAMA: Groundwater Ambient Monitoring assessment

GCRCD: Guadalupe Coyote Resource Conservation District

GIS: Geographic Information System

GMMP: Groundwater Mitigation and Monitoring Plan

GSA: Groundwater Sustainability Agency

GSP: Groundwater Sustainability Plan

GWMP: Groundwater Management Plan

IDT: Integrated Device Technology, Inc.

ILRP: Irrigated Lands Regulatory Program

InSAR: Interferometric Synthetic Aperture Radar

IQR: Interquartile range

LAMP: Local Agency Management Plan

LIDAR: Light Imaging, Detecting, and Ranging

LLNL: Lawrence Livermore National Laboratory

LUFT: Leaking Underground Fuel Tank

MCL: Maximum Contaminant Level

MGD: Million gallons per day

MLE: Maximum Likelihood Estimate

MRP: Municipal Regional Permit

MTBE: Methyl tert-butyl ether

NAVD 88: North American Vertical Datum of 1988

NDMA: N-Nitrosodimethylamine

NGVD 29: National Geodetic Vertical Datum of 1929

NMFS: National Marine Fisheries Service

NPDES: National Pollutant Discharge Elimination System

OWTS: Onsite Wastewater Treatment Systems

PAWS: Protection and Augmentation of Water Supplies

PFC: Perfluorochemical

PPT: parts per trillion

PSI: pounds per square inch

QA: Quality Assurance

QC: Quality Control

RWIG: Recycled Water Irrigation and Groundwater

SBA: South Bay Aqueduct

SBWR: South Bay Water Recycling

SCRWA: South County Regional Wastewater Authority

SCVURPPP: Santa Clara Valley Urban Runoff Pollution Prevention Program

SCVWCD: Santa Clara Valley Water Conservation District

Acronyms and Abbreviations

SFEI: San Francisco Estuary Institute

SFPUC: San Francisco Public Utilities Commission

SGMA: Sustainable Groundwater Management Act

SMCL: Secondary Maximum Contaminant Level

SNMP: Salt and Nutrient Management Plan

State Water Board: State Water Resources Control Board

SVAWPC: Silicon Valley Advanced Water Purification Center

SWID: Stormwater Infiltration Device

SWP: State Water Project

TDS: Total Dissolved Solids

USEPA: United States Environmental Protection Agency

USGS: United States Geological Survey

UST: Underground Storage Tank

UWMP: Urban Water Management Plan

VOC: Volatile Organic Compound

Water Board: Regional Water Quality Control Board

Water Code: California Water Code

WPCP: Water Pollution Control Plant

WTP: Water Treatment Plant

WWTP: Wastewater Treatment Plant

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Executive Summary

EXECUTIVE SUMMARY

Nearly half of the water used in Santa Clara County (county) is pumped from the Santa Clara and Llagas subbasins, with some communities relying solely on groundwater. For over 80 years, the Santa Clara Valley Water District (District) has managed groundwater in the county per statutory authority provided by the Santa Clara Valley Water District Act (District Act).[1] The District's comprehensive groundwater management programs and investments have resulted in sustainable groundwater conditions for many decades, and will ensure groundwater resources are sustainable far into the future.

This 2016 Groundwater Management Plan (GWMP) describes the District's comprehensive groundwater management framework, including existing and potential actions to achieve basin sustainability goals and ensure continued sustainable groundwater management. The GWMP covers the Santa Clara and Llagas subbasins, located entirely in Santa Clara County and identified by the Department of Water Resources (DWR) as Basins 2-9.02 and 3-3.01, respectively.

GROUNDWATER MANAGEMENT PLAN AUTHORITY

This 2016 GWMP is prepared pursuant to authority granted by the District Act and supersedes all previous Groundwater Management Plans.

The 2016 GWMP also satisfies the objectives of the Sustainable Groundwater Management Act (SGMA). SGMA, enacted by the state legislature in 2014, and subsequent Groundwater Sustainability Plans (GSPs) Emergency Regulations have resulted in statewide requirements for basins designated as medium and high priority basins by DWR. In the basins designated by DWR as medium and high priority, local public agencies and Groundwater Sustainability Agencies (GSAs) are required to develop and implement GSPs or alternatives to GSPs (Alternative Plans). DWR has identified the Santa Clara and Llagas subbasins as medium- and high-priority basins, respectively.

The 2016 GWMP meets the requirements of California Water Code (Water Code) Section 10733.6, which allows for an Alternative Plan to be submitted to DWR. Specifically, the District believes the 2016 GWMP, prepared pursuant to the District Act, qualifies as an Alternative Plan per Water Code Section 10733.6(b)(1), which defines an Alternative Plan as a plan developed pursuant to other law authorizing groundwater management. The 2016 GWMP, which updates technical information from the District's previous GWMP adopted by the Board in 2012, meets the objectives of SGMA and contains information and elements that are functionally equivalent to the elements of a GSP required by Articles 5 and 7 of the GSP Emergency Regulations.

DISTRICT OVERVIEW

The District is an independent special district that provides wholesale water supply, groundwater management, flood protection, and stream stewardship for its service area, which includes all of Santa Clara County. The mission of the District is to provide Silicon Valley safe, clean water for a healthy life, environment, and economy. The District is governed by an elected Board of Directors, comprised of seven members elected from equally-divided districts drawn through a formal process.

Formed in 1929 in response to groundwater overdraft and subsidence, the District has been a leader in the conjunctive management of groundwater and surface water for many decades. Under the District Act, the District's objectives and authority related to groundwater management are to recharge groundwater basins, conserve, manage and store water for beneficial and useful purposes, increase water supply, protect surface water

[1] Santa Clara Valley Water District Act, Water Code Appendix, Chapter 60.

and groundwater from contamination, prevent waste or diminution of the District's water supply, and do any and every lawful act necessary to ensure sufficient water is available for present and future beneficial uses.[2]

SGMA lists the District as one of fifteen exclusive agencies with powers to comply with SGMA within its statutory boundary.[3] In May 2016, following a public hearing, the District Board of Directors (Board) adopted a resolution to become the Groundwater Sustainability Agency (GSA) for the Santa Clara and Llagas subbasins.

Groundwater management programs are funded by the District's Water Utility Enterprise, with funding sources including charges for groundwater production, treated water, recycled water, and surface water, along with property taxes, interest earnings, reimbursements, and grants. These funds are used to operate and maintain the District's complex water supply infrastructure network, maintain water supply sources and water rights, and make capital improvements as needed to ensure water supply reliability.

WATER SUPPLY AND GROUNDWATER OVERVIEW

The District manages a diverse water supply portfolio, with sources including groundwater, local surface water, imported water, and recycled water. About half of the county's water supply comes from local sources and the other half comes from imported sources. Imported water includes the District's State Water Project and Central Valley contract supplies and supplies delivered by the San Francisco Public Utilities Commission (SFPUC) to cities in northern Santa Clara County. Local sources include natural groundwater recharge and surface water supplies. A small, but growing, portion of the county's water supply is recycled water.

The District supplies are distributed to recharge facilities in the Santa Clara and Llagas subbasins, drinking water treatment plants, local creeks for environmental needs, or directly to water users. The conjunctive management of surface water and groundwater maximizes water supply reliability, allowing the District to store surface water in local groundwater basins to help balance pumping and provide reserves for use during dry years when surface water availability is limited.

Local groundwater resources make up the foundation of the county's water supply, but they need to be augmented by the District's comprehensive water supply management activities to reliably meet the county's needs. These include the managed recharge of imported and local surface water and in-lieu recharge through the provision of treated surface water, acquisition of supplemental water supplies, and water conservation and recycling. The District also has programs to protect, manage and sustain water resources. The District operates and maintains a complex infrastructure network, with major features including:

- 10 surface water reservoirs
- 169,000 acre-feet total reservoir storage capacity
- 17 miles of raw surface water canals
- 393 acres of groundwater recharge ponds
- 91 miles of controlled in-stream recharge
- 142 miles of pipelines
- three pumping stations
- three drinking water treatment plants
- Silicon Valley Advanced Water Purification Center

In addition to working to secure adequate water supplies for the county, the District also has a long history of protecting groundwater resources, beginning with efforts to address salt water intrusion adjacent to San Francisco

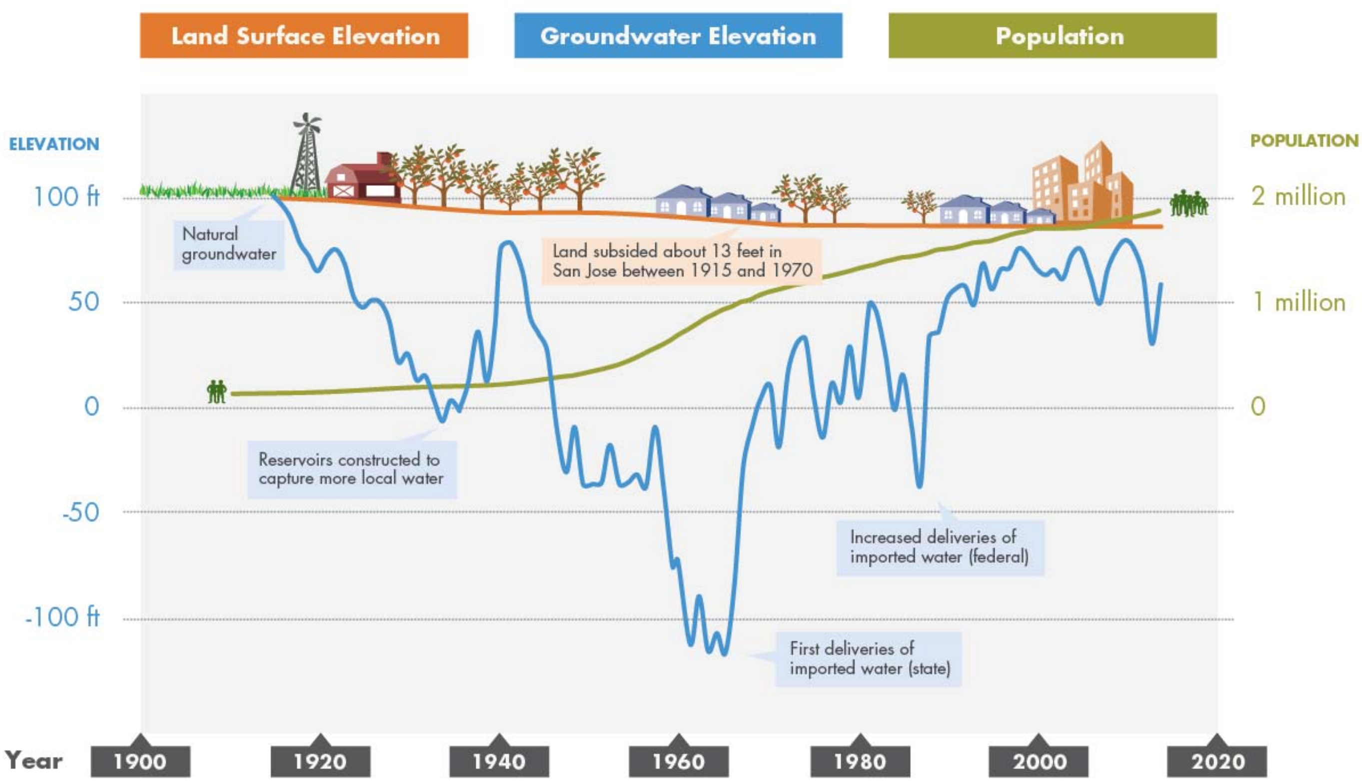
[2] District Act, Sections 4 and 5.

[3] California Water Code Section 10723 (a).

Bay in the late 1950s.[4] In the 1980s, contamination from leaking chemical storage tanks at semiconductor manufacturing facilities brought groundwater quality issues to the forefront. District efforts to aggressively protect groundwater quality have included close coordination with regulatory agencies overseeing cleanup, the implementation of numerous programs including efforts to seal abandoned wells and reduce nitrate loading, the oversight of fuel leak cases, the regulation of wells, and efforts to influence statewide policy from threats such as MTBE, an additive formerly used in gasoline.[5] More recently, the District worked with stakeholders to develop Salt and Nutrient Management Plans to assess salt and nutrient loading to groundwater and identify related management strategies. This includes ensuring recycled and purified water projects are adequately protective of local groundwater quality.

Protecting groundwater resources is a key District mission as demonstrated by District Board Supply Objective 2.1.1: "Aggressively protect groundwater from the threat of contamination and maintain and develop groundwater to optimize reliability and to minimize land subsidence and salt water intrusion." Figure ES-1 shows how the District's investments and conjunctive management programs have contributed to a sustainable groundwater supply.

Figure ES-1. Santa Clara County Groundwater History



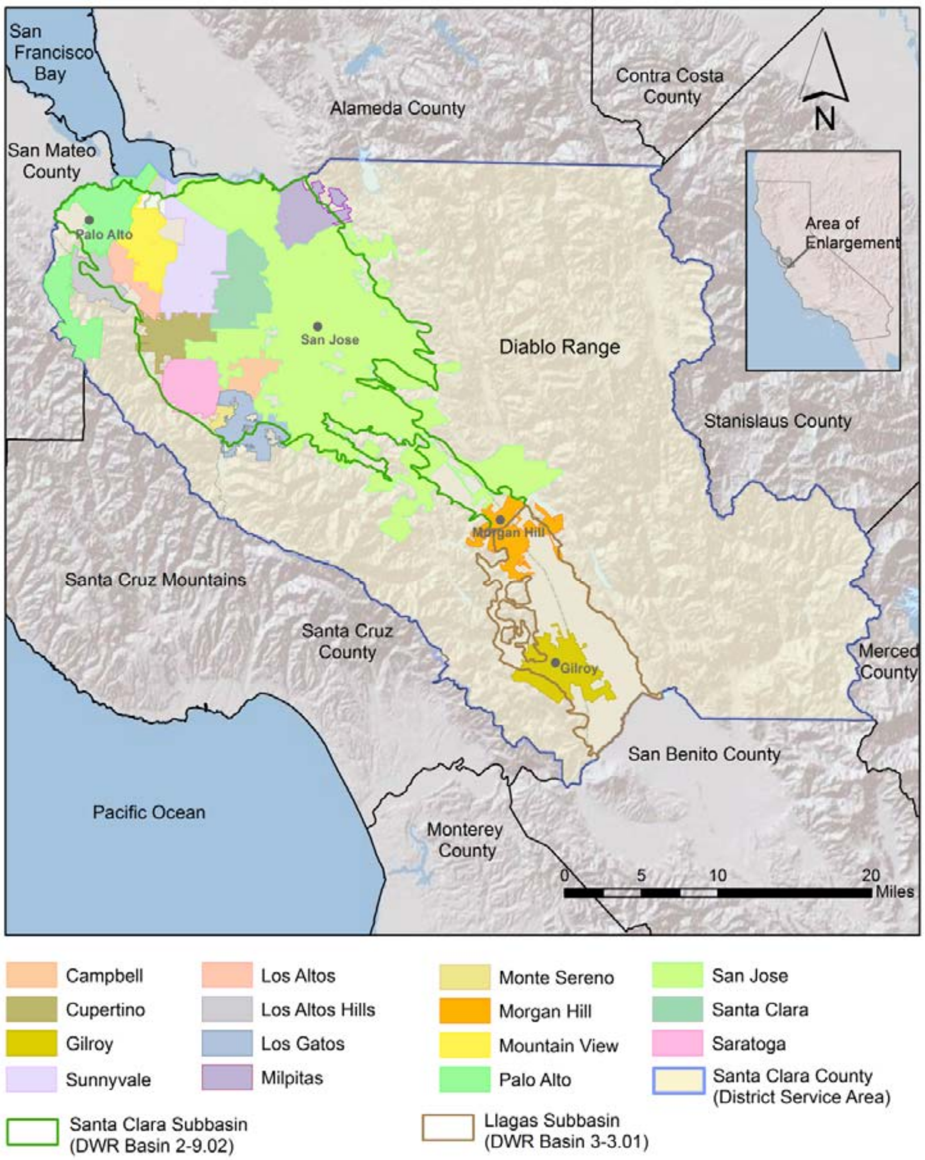
GROUNDWATER SUBBASINS

The 2016 GWMP covers the Santa Clara and Llagas subbasins, located entirely in Santa Clara County and identified by DWR as Basins 2-9.02 and 3-3.01, respectively (Figure 1-1).[6] The Santa Clara Subbasin is part of the Santa Clara

[4] Santa Clara Valley Water District, Saltwater Intrusion Investigation, September 1980.
[5] California History Center & Foundation, Water in the Santa Clara Valley: A History, 2005.
[6] California Department of Water Resources, California's Groundwater: Bulletin 118 Update 2003.

Valley Basin (Basin 2-9), which extends from southern San Jose north into Alameda, Contra Costa, and San Mateo counties. The Llagas Subbasin is part of the Gilroy-Hollister Valley Basin (Basin 3-3), which extends from Morgan Hill into San Benito County. The Santa Clara and Llagas subbasins cover a surface area of approximately 385 square miles (Figure ES-2). Due to different land use and management characteristics, the District further delineates the Santa Clara Subbasin into two groundwater management areas: the Santa Clara Plain and the Coyote Valley.

Figure ES-2. Santa Clara County Groundwater Subbasins



The groundwater subbasins provide multiple benefits to residents and businesses in Santa Clara County. Although most of the groundwater pumped is a result of District managed recharge programs, the subbasins provide some groundwater supply resulting from the percolation of rainfall in the recharge areas and natural seepage through local creeks and streams. In addition, the groundwater subbasins serve as an extensive conveyance network, allowing water to move from the recharge areas to individual groundwater wells. The groundwater subbasins also provide some natural filtration of surface water as it percolates through the soil and rock. The groundwater

subbasins provide water storage, allowing water to be carried over from the wet season to the dry season and even from wet years to dry years. Due to the District's comprehensive groundwater management programs, the subbasins are in long-term balance. Groundwater quality is typically very good, and most public water supply wells do not require any treatment beyond disinfection.

2016 GROUNDWATER MANAGEMENT PLAN

The District's prior Groundwater Management Plan was adopted by the Board in 2012 and described the District's comprehensive groundwater management framework, including basin management objectives, strategies, groundwater management programs, and outcome measures. The 2016 GWMP updates and expands on technical information in the 2012 GWMP and is prepared as an Alternative to a GSP under SGMA. Basin management goals, strategies, programs, and outcome measures in the 2016 GWMP (summarized below) are very similar to the 2012 plan, as they have been effective in ensuring sustainable conditions.

Lastly, the 2016 GWMP acknowledges potential new authorities under SGMA that would be available upon Board adoption of the 2016 GWMP. These include the ability to regulate groundwater pumping and assess different types of groundwater charges. The District plans to evaluate these new authorities in cooperation with water retailers and other interested stakeholders and consider what conditions might necessitate their implementation to sustainably manage groundwater into the future.

The District will review and update the GWMP as needed, but at least every five years. This will ensure compliance with SGMA requirements for Alternatives, and provide current groundwater management information to support five-year updates of the Urban Water Management Plan (UWMP) as required by State law.

BASIN SUSTAINABILITY GOALS AND STRATEGIES

Using the District's overall water supply management objectives, the following sustainability goals related to groundwater supply reliability and protection were developed:

- Groundwater supplies are managed to optimize water supply reliability and minimize land subsidence.
- Groundwater is protected from contamination, including salt water intrusion.

These describe the overall objectives of the District's groundwater management programs. The basin management strategies below are used to meet the sustainability goals. Many of these strategies have overlapping benefits, acting to improve water supply reliability, minimize subsidence, and protect or improve groundwater quality. The strategies are listed below and are described in detail in Chapter 6 of this report.

1. Manage groundwater in conjunction with surface water.
2. Implement programs to protect and promote groundwater quality.
3. Maintain and develop adequate groundwater models and monitoring networks.
4. Work with regulatory and land use agencies to protect recharge areas, promote natural recharge, and prevent groundwater contamination.

BASIN MANAGEMENT PROGRAMS AND ACTIVITIES

The District and local partners have implemented numerous programs to protect groundwater resources that support the sustainability goals and strategies. The District's annual Protection and Augmentation of Water Supplies (PAWS) Report[7] presents detailed information on District activities to ensure sustainable groundwater supplies, as

[7] Available at www.valleywater.org.

does Chapter 5 of this GWMP. The District's Water Utility Enterprise operations and capital budget for fiscal year 2016-17 is $359 million.

The assessment of groundwater conditions relies on timely, accurate, and representative data. The District's comprehensive monitoring programs related to groundwater levels, land subsidence, groundwater quality, recharge water quality, and surface water flow are described in detail in Chapter 7 of this plan.

OUTCOME MEASURES

The District has developed the following outcome measures to gauge performance in meeting the basin sustainability goals:

1. Projected end of year groundwater storage is greater than 278,000 AF in the Santa Clara Plain, 5,000 AF in the Coyote Valley, and 17,000 AF in the Llagas Subbasin.
2. Groundwater levels are above subsidence thresholds at the Santa Clara Plain subsidence index wells.
3. At least 95% of countywide water supply wells meet primary drinking water standards and at least 90% of Coyote Valley and Llagas Subbasin wells meet Basin Plan agricultural objectives.
4. At least 90% of wells have stable or decreasing concentrations of nitrate, chloride, and total dissolved solids (TDS).

The basis for these outcome measures and a description of how they will be evaluated is presented in Chapter 6 of this plan. The measures will be assessed annually, with related results presented in the District's Annual Groundwater Report. If evaluation of the outcome measures indicates poor performance toward meeting a basin sustainability goal, the District will first evaluate potential changes to existing programs and activities prior to considering significant groundwater management changes. Any significant policy or investment decisions would be developed and evaluated in consultation with local stakeholders, as the District does in current planning and budgeting processes.

NEXT STEPS

The District's proactive groundwater management programs and activities have resulted in sustainable groundwater conditions in the Santa Clara and Llagas subbasins, and continued planning, investments, and coordination will be needed to address future water supply challenges. Groundwater demands are projected to increase in the future, and the District is coordinating with water retailers and other interested stakeholders during the development of the Water Supply Master Plan, which will recommend various actions and investments needed to address projected future shortfalls during multi-year droughts. The District is scheduled to complete the Water Supply Master Plan in 2017.

To maintain the long-term viability of groundwater resources, the following actions are recommended:

1. Maintain existing conjunctive water management programs and evaluate opportunities for enhancement or increased efficiency.
2. Continue to aggressively protect groundwater quality through District programs and collaboration with land use agencies, regulatory agencies, and basin stakeholders.
3. Continue to incorporate groundwater sustainability in District planning efforts.
4. Maintain adequate monitoring programs and modeling tools.
5. Continue and enhance groundwater management partnerships with water retailers and land use agencies.
6. Evaluate the potential new authorities provided by SGMA.

CHAPTER 1 – INTRODUCTION

For over 80 years, the Santa Clara Valley Water District (District) has managed groundwater in Santa Clara County (county) per statutory authority provided by the Santa Clara Valley Water District Act (District Act).[8] The District's comprehensive groundwater management programs and investments have resulted in sustainable groundwater conditions for many decades. In May 2016, following a public hearing, the District Board of Directors (Board) adopted a resolution to become the Groundwater Sustainability Agency (GSA) for the Santa Clara and Llagas subbasins (Appendix A). The District is also the primary water wholesaler, flood manager, and stream steward for the county.

Nearly half of the water used in the county is pumped from groundwater, with some communities relying solely on groundwater. The purpose of this 2016 Groundwater Management Plan (GWMP) is to describe basin management objectives and strategies, programs and activities that support those objectives, and outcome measures to gauge performance. This chapter provides an overview of the District and the GWMP. It also describes other partners in groundwater management and stakeholder participation in the GWMP.

1.1 GROUNDWATER MANAGEMENT PLAN 2016 OVERVIEW

The District's prior GWMP, adopted by the Board in July 2012, documented the District's comprehensive groundwater management framework, including authorities, goals, programs, and metrics to assess performance.

This 2016 GWMP is prepared pursuant to authority granted by the District Act and supersedes all previous Groundwater Management Plans. The 2016 GWMP also satisfies the objectives of the Sustainable Groundwater Management Act (SGMA). SGMA, enacted by the state legislature in 2014, and subsequent Groundwater Sustainability Plans (GSPs) Emergency Regulations have resulted in statewide requirements for basins designated as medium and high priority basins by DWR. In the basins designated by DWR as medium and high priority, local public agencies and Groundwater Sustainability Agencies (GSAs) are required to develop and implement GSPs or alternatives to GSPs (Alternative Plans). DWR has identified the Santa Clara Subbasin as a medium-priority subbasin and the Llagas Subbasin as a high-priority subbasin based on criteria that include overlying population, projected growth, number of wells, irrigation acreage, groundwater reliance, and groundwater impacts. Neither subbasin has been identified as being in overdraft.

The 2016 GWMP meets the requirements of California Water Code (Water Code) Section 10733.6, which allows for an Alternative Plan to be submitted to DWR. Specifically, the District believes the 2016 GWMP, prepared pursuant to the District Act, qualifies as an Alternative Plan per Water Code Section 10733.6(b)(1), which defines an Alternative Plan as a plan developed pursuant to other law authorizing groundwater management. The 2016 GWMP, which updates technical information from the District's previous GWMP, meets the objectives of SGMA and contains information and elements that are functionally equivalent to the elements of a GSP required by Articles 5 and 7 of the GSP Emergency Regulations. The 2016 GWMP's functional equivalence to the elements of a GSP required by the GSP Emergency Regulations is described further in Appendix B. The District's contact for groundwater management issues is:

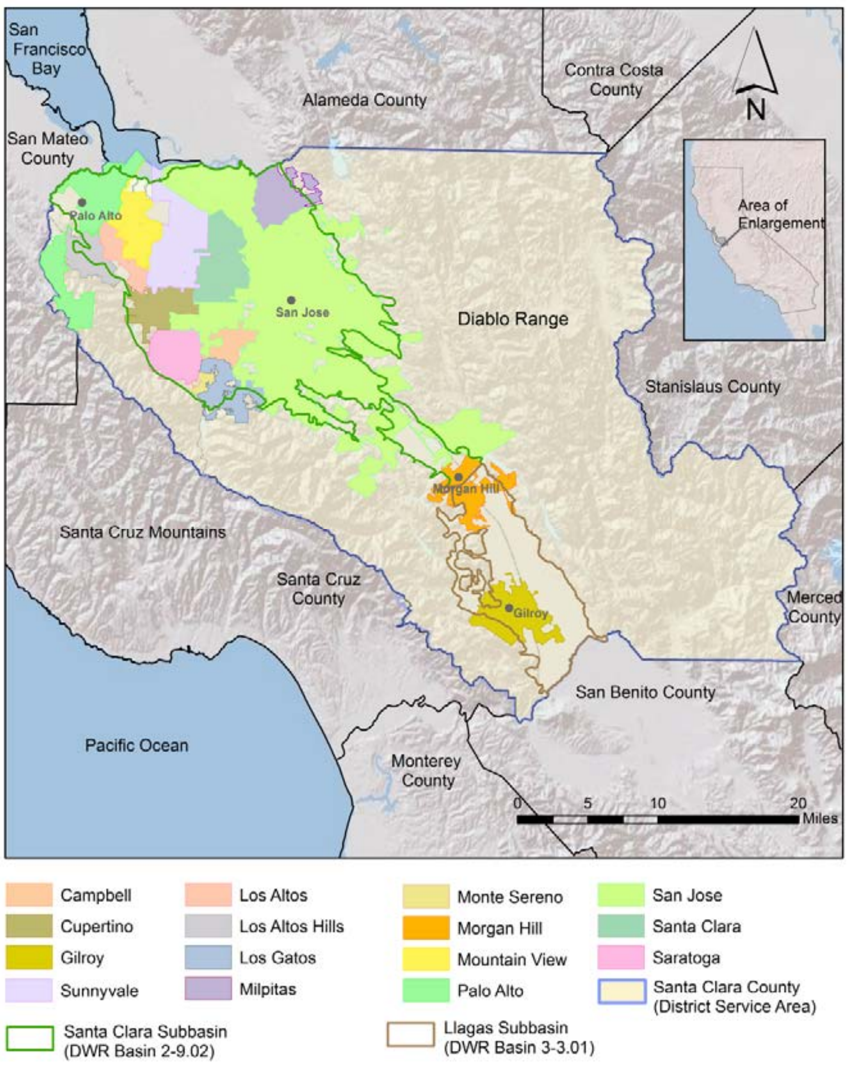
Ms. Vanessa De La Piedra, P.E.
Groundwater Monitoring and Analysis Unit Manager
5750 Almaden Expressway
San Jose, CA 95118
Telephone: (408) 630-2788
E-mail: vdelapiedra@valleywater.org

[8] Santa Clara Valley Water District Act, Water Code Appendix, Chapter 60.

1.2 DESCRIPTION OF PLAN AREA

The 2016 GWMP covers the Santa Clara and Llagas subbasins, located entirely in Santa Clara County and identified by DWR as Basins 2-9.02 and 3-3.01, respectively (Figure 1-1).[9] The Santa Clara Subbasin is part of the Santa Clara Valley Basin (Basin 2-9), which extends from southern San Jose north into Alameda, Contra Costa, and San Mateo counties. The Santa Clara Valley Basin is divided into four subbasins, including the Santa Clara Subbasin within the District's service area. Due to different land use and management characteristics, the District further delineates the Santa Clara Subbasin into two groundwater management areas: the Santa Clara Plain and the Coyote Valley as described further in Chapter 2. The Llagas Subbasin is part of the Gilroy-Hollister Valley Basin (Basin 3-3), which extends from Morgan Hill into San Benito County. The Gilroy-Hollister Valley Basin has four subbasins, including the Llagas Subbasin within Santa Clara County.

Figure 1-1. Santa Clara and Llagas Subbasins



[9] California Department of Water Resources, California's Groundwater: Bulletin 118 Update 2003.

Santa Clara County is located at the southern end of the San Francisco Bay and encompasses approximately 1,300 square miles, making it the largest of the nine Bay Area counties. The county supports a population of about 1.9 million, although that is projected to increase to over 2.4 million by 2040. Most water use occurs on the valley floor between the Santa Cruz Mountains to the west and the Diablo Range to the east. The footprint of the valley floor is essentially coincident with land overlying the Santa Clara and Llagas subbasins. Northern Santa Clara County (North County) is home to Silicon Valley and is highly urbanized. Southern Santa Clara County (South County) has some urban development, but much of the land use is still rural and agricultural. North County generally coincides with land overlying the Santa Clara Plain, while South County generally represents land over the Coyote Valley and Llagas Subbasin.

The county's Mediterranean semi-arid climate is temperate year-round, with warm and dry weather lasting from late spring through early fall. Average annual precipitation ranges from about 15 inches on the valley floor to about 45 inches along the crest of the Santa Cruz Mountains. Maximum daily temperature averaged by month in San Jose ranges from 58 to 82 degrees Fahrenheit, with average annual evapotranspiration of 49.6 inches.[10]

1.3 BASELINE AND PLANNING HORIZON

The 2016 GWMP describes the Santa Clara and Llagas subbasins based on the most recent, representative water supply, demand, and water quality conditions. Information related to groundwater budgets is presented for the period 2003 through 2012, chosen to indicate longer-term (10 year) conditions including wet, normal, and dry years, but excluding more recent, prolonged drought conditions. 2012 is used to display single-year groundwater supply information such as pumping distribution and groundwater elevation contours. Groundwater quality data, less affected by drought conditions, is presented based on the most recent data available for the ten-year period from 2006 to 2015. While this approach results in a range of time periods presented, it best represents typical groundwater conditions in the Santa Clara and Llagas subbasins.

The plan also documents the effects of the recent drought through long-term hydrographs, annual change in groundwater storage charts, and other information. Prolonged drought resulted in lower groundwater levels and storage in the Santa Clara and Llagas subbasins, prompting the District Board to call for short-term water use reduction in 2014, 2015, and 2016 in accordance with the District's Water Shortage Contingency Plan. Significant recovery of groundwater levels and storage has been observed in 2015 and 2016 due to community water use reduction, retailer shifts to treated surface water, and increased managed recharge. Detailed information on more recent groundwater conditions is available in the District's Annual Groundwater Reports prepared each calendar year. The 2015 Annual Groundwater Report is included in Appendix C.

The District ensures reliable water supplies for all types of hydrologic years through annual operations planning and long-term planning studies like the Urban Water Management Plan (UWMP) and Water Supply Master Plan. These long-term plans use over 80 years of measured or correlated local hydrologic data, are supported by information in the GWMP, have a 25-year planning horizon, and are updated every five years. The District's adaptive operational decisions and proactive long-term water supply planning and investments will ensure continued, sustainable groundwater conditions long into the future.

1.4 DISTRICT OVERVIEW

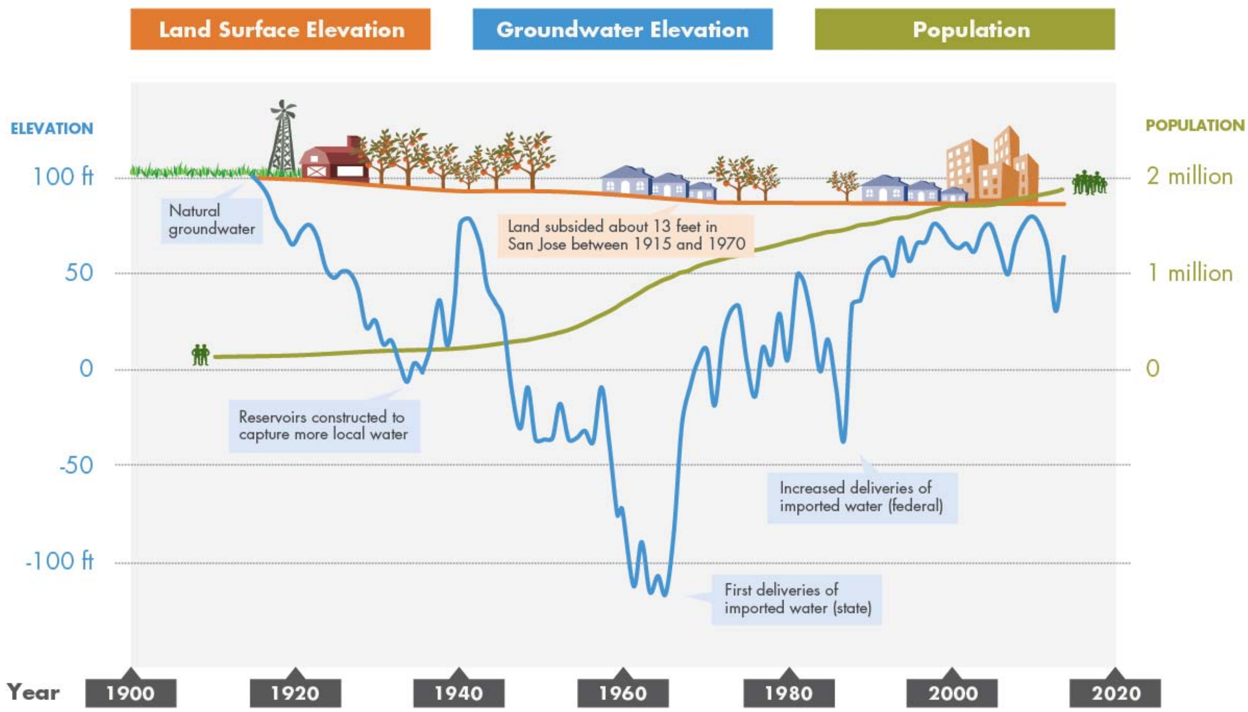
The District is an independent special district that provides wholesale water supply, groundwater management, flood protection, and stream stewardship for its service area, which includes all of Santa Clara County. The mission of the District is to provide Silicon Valley safe, clean water for a healthy life, environment, and economy.

[10] Santa Clara Valley Water District, 2015 Urban Water Management Plan.

Chapter 1 – Introduction

As described in Section 1.3.1, the District was formed in 1929 in response to groundwater overdraft and subsidence. The District has been a leader in conjunctive management for many decades, using imported and local surface water to supplement groundwater and maintain reliability in dry years. Figure 1-2 shows how the District's investments and conjunctive management programs have contributed to a sustainable groundwater supply.

Figure 1-2. Santa Clara County Groundwater History

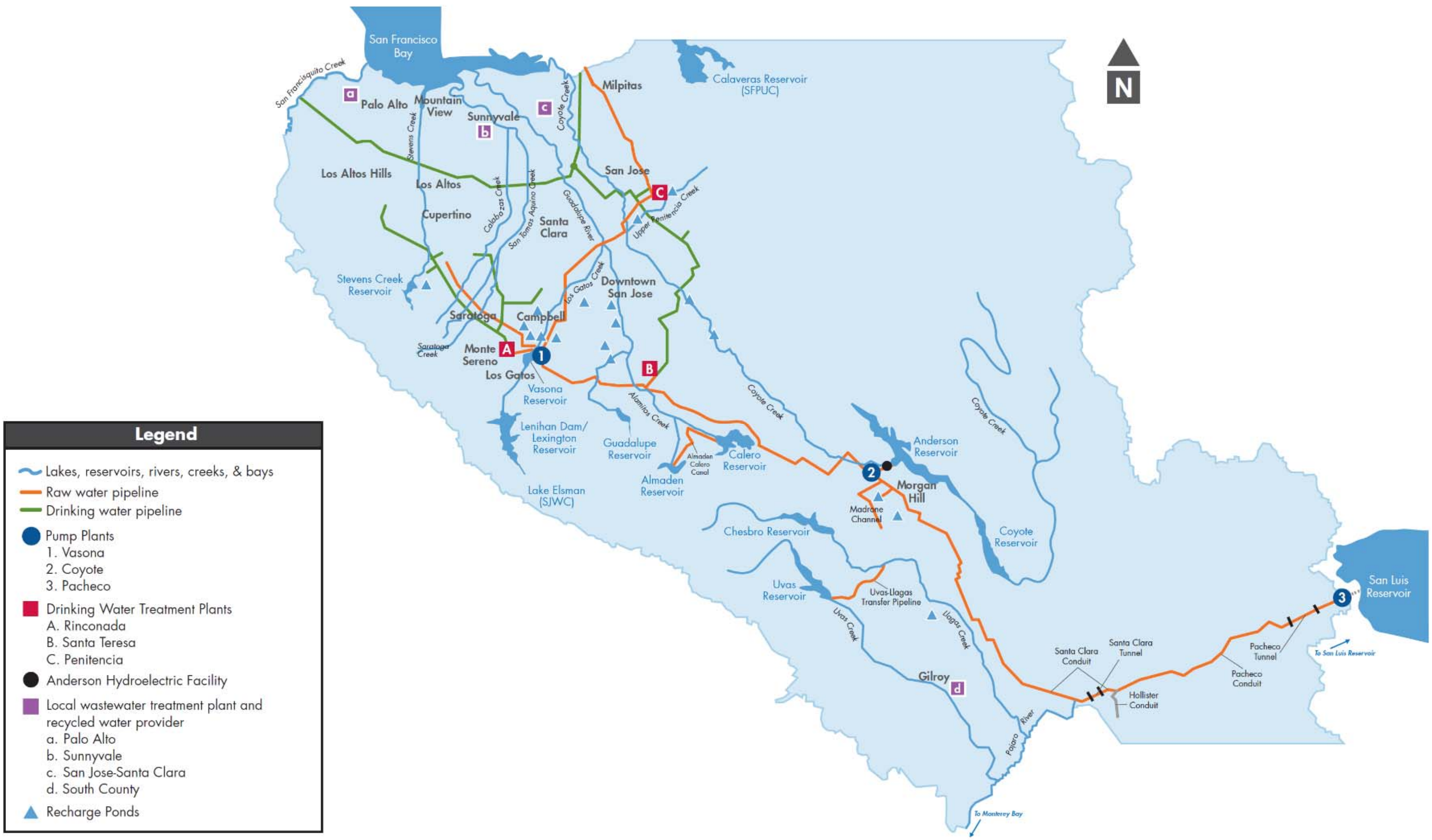


The District manages a diverse water supply portfolio, with sources including groundwater, local surface water, imported water, and recycled water. About half of the county's water supply comes from local sources and about half comes from imported sources. Imported water includes the District's State Water Project and Central Valley contract supplies and supplies delivered by the San Francisco Public Utilities Commission (SFPUC) to cities in northern Santa Clara County. Local sources include natural groundwater recharge and surface water supplies, including surface water rights held by the District, San Jose Water Company, and Stanford University. A small but growing portion of the county's water supply is recycled water. Long-term water conservation is also a key component of the District's water supply management strategy. Conservation programs saved approximately 64,000 AF in 2015 and are on target to reduce annual demands by nearly 100,000 AF by 2030.

The District supplies are distributed to recharge facilities in the Santa Clara and Llagas subbasins, the District's three drinking water treatment plants, local creeks to meet environmental needs, or directly to water users. The conjunctive management of surface water and groundwater maximizes water supply reliability, allowing the District to store surface water in local groundwater basins to help balance pumping and provide reserves for use during dry years when surface water availability is limited.

The District operates and maintains a complex infrastructure network, integrating natural and constructed systems to capture and convey raw and treated water for a reliable water supply (Figure 1-3).

Figure 1-3. District Water Supply Treatment and Distribution System



The District system delivers about 300 million gallons of raw water and 200 million gallons of treated drinking water every day (subject to water demand and hydrologic changes) and includes the following major facilities:

- 10 surface water reservoirs
- 169,000 acre-feet of total reservoir storage capacity
- 17 miles of raw surface water canals
- 393 acres of groundwater recharge ponds
- 91 miles of controlled in-stream recharge
- 142 miles of pipelines
- three pumping stations
- three drinking water treatment plants
- Silicon Valley Advanced Water Purification Center

Long-term water supply and use for the North County is shown in Figure 1-4, and for the less urbanized South County in Figure 1-5.

Figure 1-4. North County Water Supply and Use (2005 to 2015)

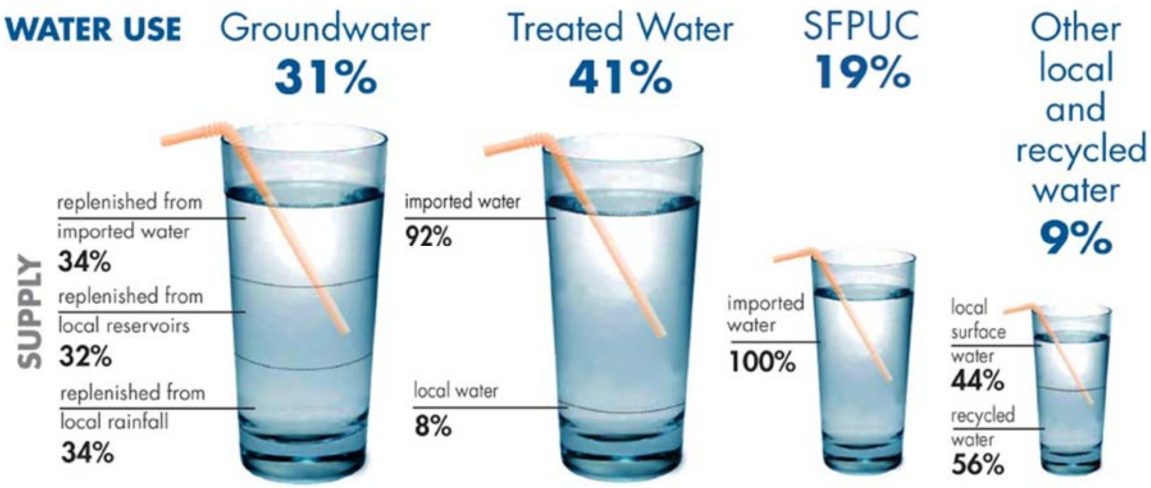
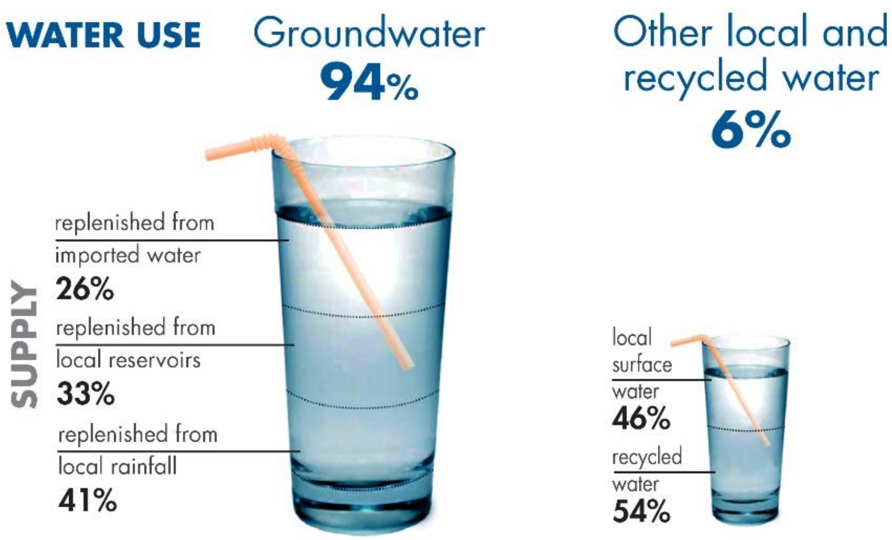


Figure 1-5. South County Water Supply and Use (2005 to 2015)



1.4.1 District History

Water has played an important part in the development of the county since the Spaniards' arrival in 1776. Unlike indigenous peoples who depended upon the availability of wild food, the Spaniards cultivated food crops and irrigated with surface water. Population growth and the United States' conquest of the area in 1846 increased agricultural demands, which forced the use of groundwater. The first well was drilled in 1854 in San Jose. Groundwater was drawn to the surface by windmill pumps or flowed up under artesian conditions.

By 1865, there were almost 500 artesian wells in the valley and already signs of potential misuse. In the valley's newspapers, a series of editorials and letters appeared which complained of farmers and others who left their wells uncapped, and blamed them for water shortages and erosion damage to the lowlands.

As a result of several dry years in the late 1890s, more and more wells were installed. Dry winters in the early 1900s were accompanied by a growing demand for the county's fruits and vegetables, which were irrigated with groundwater. The trend of increased irrigation and well drilling continued, causing groundwater levels to drop rapidly. In 1913, a group of farmers asked the federal government for relief from increased pumping costs due to a lower groundwater table. The farmers formed an irrigation district to investigate possible reservoir sites; however, the following year was wet and no action was taken. It was not until 1919 that the Farm Owners and Operators Association presented a resolution to the County Board of Supervisors expressing their strong opposition to the waste resulting from the use of artesian wells, and again raised the issue of building dams to supplement existing water supplies. By that year, subsidence of 0.4 feet had occurred in San Jose.

In 1921, a report was presented to the Santa Clara Valley Water Conservation Committee showing that far more water was being pumped than nature could replace.[11] The committee planned to form a water district differing from others in the state by providing for groundwater recharge. Their effort to form the water district failed, but they were able to implement several water capture and recharge programs. Continued overdraft resulted in a further decline in groundwater levels and additional land subsidence, increasing flood impacts in northern Santa Clara County. Between 1912 and 1932, subsidence ranged from 0.35 feet in Palo Alto to 3.66 feet in San Jose. In 1929, county voters approved the formation of the Santa Clara Valley Water Conservation District (SCVWCD), with the initial mission of stopping groundwater overdraft and subsidence.

The SCVWCD was the forerunner of today's District, which was formed through the consolidation and annexation of other flood control and water districts within Santa Clara County (Figure 1-6). By 1935, the District had completed the construction of Almaden, Calero, Guadalupe, Stevens Creek, and Vasona dams. Later dams completed include Coyote in 1936, Anderson in 1950, and Lexington in 1952. The Gavilan Water District in the southern portion of the county constructed Chesbro Dam in 1955 and Uvas Dam in 1957. These dams enabled the District to capture surface water runoff and release it for groundwater recharge.

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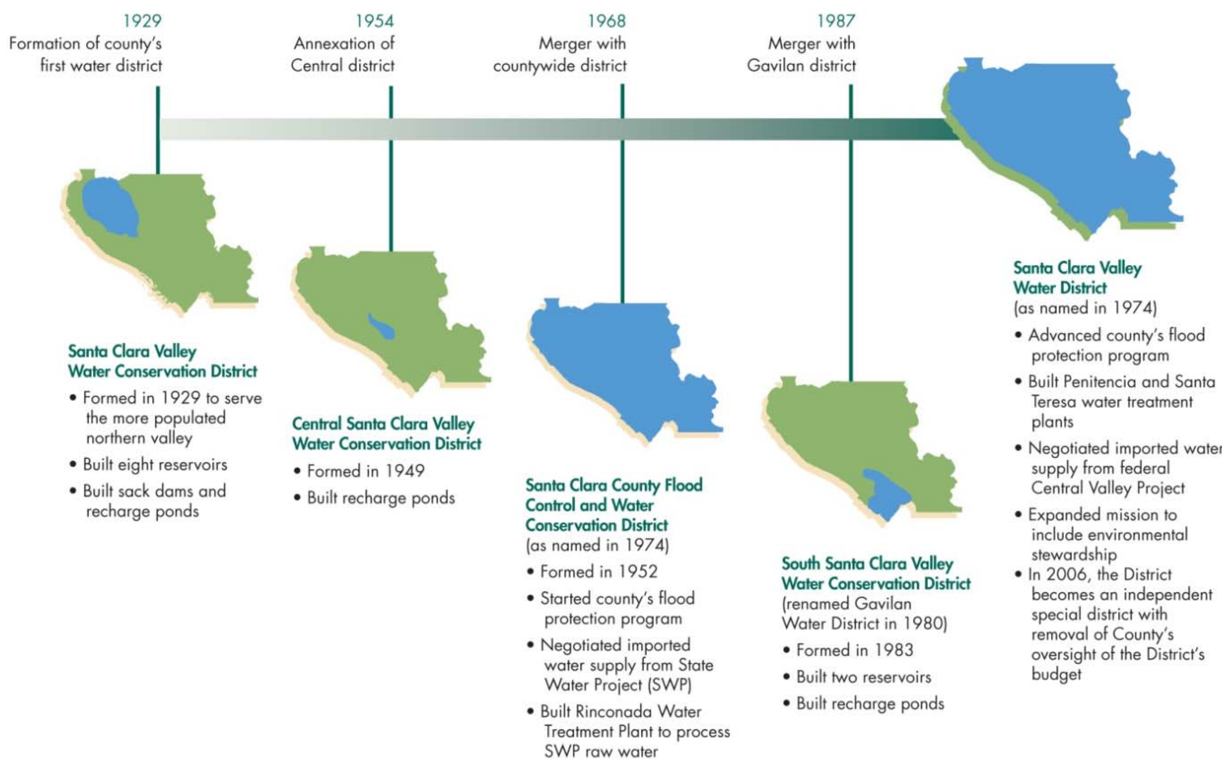
[11] Tibbets F.H. and Kiefer S.E., Santa Clara Valley Water Conservation Project, Report to the Santa Clara Valley Water Conservation Committee, 1921.

Figure 1-6. District Evolution



The late 1930s to 1947 marked a period of recovery in groundwater levels that reduced the rate of land subsidence. In 1947, conditions became dry, groundwater levels declined rapidly and subsidence resumed. In 1950 almost all of the county's water requirements were met by water pumped from the groundwater.

In 1952, the SFPUC began delivering imported water to water retailers in northern Santa Clara County through what is now called the Regional Water System;[12] however, some delivery of this supply into the county took place as early as 1939.[13] By 1960, the population of the county had doubled from that of 1950. To supply this growth, groundwater pumping increased and groundwater levels continued to decline. In addition to continued land subsidence, widespread salt water intrusion of shallow aquifers was observed adjacent to San Francisco Bay in the late 1950s.[14] By the early 1960s, it was evident that the combination of Hetch Hetchy and local water supplies could not meet the area's water demands, so the District entered into a contract with the state to receive 100,000 acre-feet (AF) of State Water Project (SWP) water per year through the South Bay Aqueduct (SBA).

With this new source of supply, the District added a new tool to its groundwater management toolbox: treated surface water sales to offset demand that would otherwise be met through groundwater pumping. The District constructed its first water treatment plant (WTP), the Rinconada WTP. In 1967, the District started delivering treated surface water to North County residents, thus reducing the need for pumping in the Santa Clara Plain. This helped lead to a recovery of groundwater levels and reduced rate of land subsidence.

[12] The Regional Water System used to be called the Hetch Hetchy southern aqueduct.
[13] Per personal communication with City of Palo Alto staff, the City of Palo Alto began receiving water from SFPUC in 1939 through a different connection.
[14] Santa Clara Valley Water District, Saltwater Intrusion Investigation, September 1980.

From 1960 to 1970, the county's population nearly doubled yet again, with the semiconductor and computer manufacturing industries contributing over 30 percent of the job growth. The growth and prosperity of the county continued, and jobs grew nearly 40 percent between 1970 and 1980. In 1974, Penitencia (the District's second WTP) started delivering treated water. In response to the 1976-1977 drought, the District began its first programs related to conservation education and outreach.

The county's explosive growth and transformation from a predominantly agricultural economy was not without its problems. In the early 1980s, groundwater contamination was brought to the forefront when large underground tanks storing solvents for computer-related manufacturing processes in south San Jose were discovered to be leaking. In 1981, Fairchild notified the District that "a substantial amount of chemicals were missing from their tanks and that a leak was suspected." Subsequent testing of a nearby public water supply well revealed significant contamination, which resulted in shutdown of the well. The District, the Regional Water Quality Control Board, and the Department of Health Services[15] worked together to sample water supply wells in the county and search for other leaking tanks, resulting in the identification of additional contaminant release sites.

In the 1980s, the District significantly increased its efforts to protect groundwater quality. The District worked with the Santa Clara County Fire Chiefs Association, the City Managers Association, and environmental groups to develop a countywide Hazardous Materials Storage Permit Ordinance. The ordinance, adopted by the Santa Clara County Intergovernmental Council, set tough new standards on hazardous material storage and handling. This first- in-the-nation ordinance served as an example and the state and federal government soon passed similar laws. The District also developed standards for the construction and destruction of wells, the majority of which were being installed for the investigation and cleanup at contaminant release sites. The District's abandoned well program was developed to address existing wells that were no longer in use and posed a threat to groundwater resources by acting as vertical conduits that could allow contaminants to migrate directly from shallow to deep aquifers.

In the late 1980s, the District began oversight of petroleum hydrocarbon leaking Underground Storage Tank (UST) sites in Santa Clara County. From 1988 through 2004, the District provided oversight for the investigation and cleanup of over 2,500 UST sites. The District's fuel leak program became nationally known for its proactive and innovative approaches and influenced the direction of the state's UST cleanup program. By the time the District transferred the program to the Santa Clara County Department of Environmental Health (DEH) in July 2004, less than 400 fuel leak cases remained open.

Groundwater pumping accounted for about half of the total water use by the mid-1980s. The rate of inelastic land subsidence was reduced to about 0.01 feet per year compared to 1 foot per year in 1961. To provide a reliable source of supply, the District contracted with the federal government for the delivery of 152,500 AF per year of imported water from the Central Valley Project (CVP) through the San Felipe Project. The county's first delivery of CVP water took place in 1987, but it was not until 1989 that the District's Santa Teresa WTP began operating to fully utilize this additional source of imported supply.

The extended drought from 1987 to 1992 led to expanded District conservation programs, including more aggressive outreach campaigns and rebate programs for residents and businesses installing water saving fixtures. In the mid-1990s, the District began offering financial and technical assistance to entities interested in expanding the use of recycled water. This included agreements with the cities of San Jose, Santa Clara, and Milpitas (the South Bay Water Recycling Program); Gilroy and Morgan Hill (the South County Regional Wastewater Authority); Sunnyvale; and Palo Alto and Mountain View. This commitment to supplementing local supplies with recycled

[15] Now the State Division of Drinking Water.

water was strengthened in 1997 when the District Board established a policy supporting the expanded use of recycled water and setting numeric targets for future recycled water use.

Nitrate and methyl tertiary butyl ether (MTBE) emerged as significant groundwater quality threats in the 1990s. Elevated nitrate from agriculture, septic systems, and animal wastes was identified as early as the 1950s; however, the concern became more acute in the early 1990s as an increasing number of wells were impacted. The District developed a comprehensive Nitrate Management Plan, which included public outreach programs to educate the residents on fertilizer use, septic system maintenance, and well location and construction. The District also offered free nitrate testing for South County residents in 1998. Later efforts included programs to reduce nitrate loading in cooperation with farmers, including programs to evaluate infield nutrient use.

In 1992, California began using oxygenates, primarily MTBE, in gasoline to satisfy federal clean air requirements, the District began investigating the potential for MTBE contamination in 1995, which led to the discovery of MTBE contamination in soil at 292 sites, primarily service stations, and at low concentrations in the District's reservoirs. The District provided the first guidelines in the state for owners of LUST sites on how to identify and clean up MTBE releases in 1997. Along with many others, the District's action and leadership in addressing MTBE led to a statewide ban in 2004.

In the 2000s, the District again demonstrated its leadership and commitment to aggressively protecting groundwater resources. Perchlorate contamination at a former flare manufacturing facility in Morgan Hill was discovered in August 2002, and further site investigation by the responsible party indicated detections in wells several miles to the south. Due to concerns that the contamination could be larger than assumed, the District sampled over 1,000 wells. Related results prompted the Central Coast Water Board to expand and expedite site investigation and cleanup activities. To ensure the safety of South County residents who rely on groundwater for their drinking water, the District also initiated a temporary bottled water program for well owners impacted by perchlorate. The District continues to work with the Central Coast Water Board, the County, the cities of Morgan Hill and Gilroy, and local residents through the Perchlorate Community Advisory Group to assure that the contaminated groundwater is cleaned up as soon as possible.

More recent efforts to ensure long-term water supply reliability include the construction and operation of the District's Silicon Valley Advanced Water Purification Center. This facility, which began operating in 2014 produces up to 8 million gallons per day of purified water by treating tertiary-treated recycled water with microfiltration, reverse osmosis, and ultraviolet light. Purified water is blended with tertiary treated recycled water to lower the salt content of recycled water used for landscape irrigation and industrial uses. This facility supports the District's goal of expanding the use of recycled water, which reduces the demand on groundwater, and sets the stage for the potential recharge of groundwater with purified water.

1.4.2 District Authority

The District is an independent special district formed by the California legislature under the District Act for the primary purpose of providing comprehensive management for all beneficial uses and protection from flooding within Santa Clara County.

1.4.2.1 Authorities Provided by the District Act

Per Sections 4 and 5 of the District Act, the District's objectives and authority related to groundwater management are to recharge groundwater basins, conserve, manage and store water for beneficial and useful purposes, increase water supply, protect surface water and groundwater from contamination, prevent waste or diminution of the District's water supply, and do any and every lawful act necessary to ensure sufficient water is available for present and future beneficial uses.

The District Act gives the Board the ability to adopt ordinances to carry out the District Act, including the objective to protect the county's groundwater resources. One such ordinance regulates the construction and destruction of wells and other deep excavations.[16]

The District Act also provides the District the authority to create zones of benefit, to levy volumetric groundwater charges, and to use those revenues to pay the costs of:

- constructing, maintaining and operating facilities that import water into the county,
- purchasing imported water,
- constructing, maintaining and operating facilities that will conserve or distribute water within the groundwater charge zones, including facilities for groundwater recharge, surface distribution, and water purification and treatment, and
- principal or interest incurred by the District for the previously listed purposes.

Per the District Act, groundwater charges are to be fixed and uniform within each zone, with the rate for agricultural water not to exceed one-quarter of the rate for non-agricultural water. A rate may be subject to proportional increases in production over a prior base period specified by the Board upon finding by the Board that conditions of drought and water shortage require the increases.[17] Proportional rates have not been implemented by the District to date.

1.4.2.2 Authorities Provided by SGMA

In addition to the broad authorities provided by the District Act, SGMA provides several new authorities that would be available upon Board adoption of the 2016 GWMP. Potential new authorities under SGMA include the ability to regulate groundwater pumping and assess different types of groundwater charges. The District plans to evaluate these new authorities in cooperation with water retailers and other interested stakeholders and consider what conditions might necessitate their implementation to sustainably manage groundwater into the future.

Effective programs, investments, and coordination with water retailers have resulted in sustainable groundwater conditions, and the District views ongoing cooperation as the most effective way to address water supply challenges. As an example, during the recent drought, nearly all water retailers supported the District's water use reduction target, which was higher than their state-mandated targets in many cases. Retailer efforts to use treated surface water and reduce pumping in certain areas were instrumental in groundwater level recovery and minimizing the risk of resumed land subsidence.

While groundwater conditions are sustainable due to a strong groundwater management framework and coordination with water retailers, risks to ongoing sustainability include prolonged drought, increased demands, reduced imported water availability, aging infrastructure, and climate change. Continued coordination and partnerships with major pumpers and other local agencies are the preferred way to deal with these and other challenges to groundwater sustainability. However, the regulation of pumping may be needed if these risks threaten to, or produce undesirable results like chronic overdraft, land subsidence, or groundwater quality impacts.

As the agency charged with ensuring groundwater sustainability, the District will further evaluate the new authorities provided by SGMA. The District plans to work with water retailers and other interested stakeholders to identify the specific basin conditions that might trigger the need to control groundwater extraction and the most effective implementation mechanisms. Importantly, authorities related to controlling pumping have certain constraints, and significant issues regarding the potential interference with water rights and liability associated with

[16] Santa Clara Valley Water District Ordinance 90-1.

[17] Santa Clara Valley Water District Act §§26.7 (3)(c).

District regulation of pumping at individual wells must be carefully considered. Working with major pumpers to develop related basin condition triggers and implementation mechanisms will help ensure these authorities can be effectively implemented should they become necessary. The District intends to begin this collaborative analysis in 2017. Potential new authorities under SGMA and related constraints are discussed further below.

Regulation of Groundwater Pumping

Per Water Code Section 10726.4, SGMA authorities related to controlling groundwater pumping include the ability to:

- impose spacing requirements on new well construction to minimize interference,
- impose reasonable operating regulations on existing wells to minimize interference, including requiring extractors to operate on a rotation basis,
- regulate, limit, or suspend groundwater extraction, construction of new wells, enlargement of existing wells, or reactivation of abandoned wells,
- establish groundwater extraction allocations,
- authorize temporary and permanent transfers of groundwater extraction allocations, and
- establish rules to allow unused groundwater extraction allocations to be carried over from one year to another and voluntarily transferred.

While these authorities are listed in SGMA, the Act also acknowledges limitations related to controlling pumping. Several related SGMA sections state that local agencies are not authorized to make a binding determination of the water rights of any person or entity.[18] Property owners and municipalities have rights to the reasonable, beneficial use of groundwater. Other pumpers have established appropriative rights, and may also claim prescriptive rights to local groundwater. The authorities granted by SGMA to regulate groundwater pumping have not been tested.

Local agencies evaluating the regulation of pumping must also consider the land use authority of cities and counties, which is not superseded by SGMA.[19] For example, any action to control extractions must be consistent with the city or county general plan unless there is insufficient sustainable yield in the basin to serve a designated land use. Groundwater extraction transfers are also subject to applicable city and county ordinances.

Collection of Various Fees

Water Code Section 10730.2 allows Groundwater Sustainability Agencies to impose fixed fees and volumetric fees, including, but not limited to, fees that increase based on the quantity of groundwater produced, the year in which the groundwater extraction commenced, and impacts to the basin. Fees imposed pursuant to SGMA must comply with the applicable provisions of Proposition 218.

The District will evaluate the various fees that can be collected pursuant to SGMA to determine if they further sustainable groundwater management. Of particular interest are fixed fees, which are used by many water retailers and may reduce volatility in revenue and rates. The District intends to evaluate the feasibility of using a fixed fee, which will include consideration of related Proposition 218 issues, in calendar year 2017.

Implementation of New SGMA Authorities

The analyses identified above will help determine whether new SGMA authorities are necessary and/or beneficial in

[18] California Water Code §§10720.5(b) and 10726.8(b).

[19] California Water Code §§ 10726.4, 10726.8(f), and 10726.9.

maintaining sustainable groundwater conditions into the future. The analyses would also identify related implementation mechanisms that would be needed, such as Board ordinance. Any proposed changes to the District's rate structure would be identified as part of the annual rate setting process. This open and transparent process includes documentation of proposed rates in the District's annual Protection and Augmentation of Water Supplies (PAWS) Report, notification to all owners of groundwater producing facilities, discussion with Board Advisory Committees and water retailers, and public hearings prior to rate adoption.

1.4.3 District Management Structure

The District is governed by an elected Board of Directors. The Board is comprised of seven members, each elected from equally-divided districts drawn through a formal process. The purpose of the Board, on behalf of Santa Clara County, is to provide Silicon Valley safe, clean water for a healthy life, environment and economy.

District Board of Directors

There are three Board Appointed Officers (BAOs): District Counsel, Clerk of the Board, and Chief Executive Officer (CEO). The executive management team is responsible for implementing the Board policies and running the day-to-day operations. At the staff level, there are three District chiefs (Chief Administrative Officer, Chief Operating Officer for Watersheds and Chief Operating Officer for the Water Utility Enterprise) that report to the CEO. The Water Utility Enterprise includes four divisions: Water Supply, Raw Water Operations and Maintenance, Water Utility Operations and Maintenance, and Water Utility Capital. The divisions and units within the Water Utility Enterprise manage District programs, facilities, and planning to ensure reliable water supplies for the county.

1.4.4 Water Utility Enterprise Financial Overview

Funding sources for the Water Utility Enterprise include charges for groundwater production, treated water, recycled water, and surface water, along with property taxes, interest earnings, reimbursements, and grants. These funds are used to operate and maintain the District's complex water supply infrastructure network, maintain water supply sources and water rights, and make capital improvements as needed to ensure water supply reliability. The Water Utility Enterprise operations and capital budget for fiscal year 2016-17 is $359 million. Detailed information on Water Utility Enterprise funding is available through the District's PAWS report, which is prepared each year in February and posted on the District website. The District's overall budget is also available at www.valleywater.org.

1.4.5 Relation to Other District Programs and Plans

The 2016 GWMP provides information on basin conditions and documents groundwater management goals, strategies, related activities, and metrics for desired basin outcomes. This information supports other District planning efforts including the:

- Urban Water Management Plan (UWMP) that evaluates water supply reliability over a 25-year period
- Water Supply Master Plan that documents the water supplies, infrastructure, investments, and operating strategies needed to ensuring long-term water supply reliability
- Annual Protection and Augmentation of Water Supplies (PAWS) Report that presents the basis for recommended groundwater production charges in accordance with the District Act
- Salt and Nutrient Management Plans that assess the loading of salt and nutrients to groundwater and identify related management strategies
- Planning to address specific water management issues that could affect groundwater management

As required by the Water Code, the District will update the GWMP at least every five years. Updating the GWMP prior to updates of the Urban Water Management Plan would provide optimal flow of information on groundwater conditions and operational considerations to assist with the evaluation of future water supply conditions. The UWMP is also on a five-year update cycle, with the next update due in 2020. The Water Supply Master Plan builds on the information in the both the GWMP and UWMP to update the District's long-term water supply strategy, and is also on a five-year update cycle.

1.5 GROUNDWATER MANAGEMENT PARTNERS AND STAKEHOLDERS

Although the District is the groundwater management agency in Santa Clara County per the District Act and is now the GSA under SGMA, many other agencies have a significant role, including local water retailers, land use agencies, and regulatory agencies.

1.5.1 Water Retailers

Local water retailers maintain facilities to distribute water directly to local residents and businesses and meet applicable regulatory standards established by the U.S. Environmental Protection Agency (USEPA) and California Division of Drinking Water (DDW). In addition to groundwater, local retailers may also serve treated water purchased from the District or potable water supplied by the SFPUC. Several retailers also maintain local surface water rights and distribute recycled water for non-potable uses. The maintenance of these supplies is critical to maintaining overall water supply reliability in the county. Every five years, the District and local water retailers coordinate to develop individual agencies' Urban Water Management Plans that evaluate water supply reliability over a 20-year period. For water retailers using groundwater, these plans show a continued reliance on groundwater in the future.

As the primary groundwater pumpers in the county, water retailers play a major part in influencing groundwater conditions through their operations. Effective District/retailer coordination with the shared goal of protecting groundwater resources has resulted in sustainable groundwater conditions over many decades. As noted previously, the ability of water retailers to significantly reduce groundwater pumping in 2015 through source shifts and water use reduction efforts was instrumental in groundwater recovery despite continued dry conditions. Ongoing strong partnership and collaboration will be essential to meet future water supply challenges.

The District and water retailers collaborate closely on operations as well as long-term planning, and meet quarterly through the Water Retailers Committee. The Water Retailers Committee has established the following subcommittees, which meet regularly to discuss specific topics in more detail:

- Water Supply
- Groundwater
- Water Quality
- Treated Water
- Fluoridation
- Water Conservation
- Recycled Water
- Finance
- Emergency Management
- Communications

1.5.2 Land Use Agencies

Land use agencies, including Santa Clara County and local cities, provide land use planning and permitting functions affecting water demand and land use, which may impact groundwater quantity and quality. General Plans adopted by land use agencies reflect each agency's policy with regard to future development and many of these plans contain goals to address water supply reliability and the protection of water resources, including groundwater. Land use agencies also review and approve Water Supply Assessments for developments meeting certain growth requirements. The District reviews General Plans and Water Supply Assessments to ensure alignment with District policy, water supply goals, and planning assumptions.

Land use agencies permit and inspect hazardous material and waste storage and handling facilities through the fire departments. The County DEH also oversees the leaking underground fuel tank cleanup program, issues permits for septic systems, and regulates drinking water systems with 5 to 14 connections. Local land use agencies also administer stormwater management programs in compliance with National Pollutant Discharge Elimination System (NPDES) requirements.

1.5.3 Local, State, and Federal Agencies

The District relies on partnerships with regulatory agencies to protect groundwater resources. Agencies, including the State Water Resources Control Board, the Department of Toxic Substances Control (DTSC), and the USEPA, regulate the cleanup of contaminants in groundwater. Regional Water Quality Control Boards (Water Boards) also define the beneficial uses and water quality objectives for groundwater basins. Two Water Boards have regulatory jurisdiction over water resources in Santa Clara County, the San Francisco Bay Water Board and the Central Coast Water Board.

Figure 1-7 shows the general authorities, roles, and functions of these various agencies with regard to groundwater resources. It should be noted that this figure is intended to provide a general overview rather than a comprehensive list of individual agencies and functions.

Figure 1-7. Overview of Groundwater Management Roles

U.S. Environmental Protection Agency

- Establishes federal drinking water standards for public water systems
- Regulates cleanup of Superfund sites

California Environmental Protection Agency
Includes: State Water Resources Control Board, Regional Water Quality Control Boards, Division of Drinking Water, Department of Toxic Substances Control

- Implements environmental protection laws that ensure clean air, clean water, clean soil, safe pesticides and waste recycling and reduction
- Allocates water rights and adjudicates water right disputes
- Develops statewide water protection plans and establishes water quality standards
- Regulates groundwater if local management efforts are inadequate under the Sustainable Groundwater Management Act (SGMA)
- Establishes state drinking water standards and regulates public drinking water systems
- Permits recycled water projects
- Regulates facilities that treat, store, and dispose of hazardous waste
- Regulates cleanup of contaminated sites

California Department of Water Resources

- Develops regulations, evaluates local groundwater sustainability planning efforts, and provides technical assistance related to SGMA
- Operates the State Water Project
- Supports local and regional water management through technical and financial assistance
- Guides development and management of water resources

Santa Clara Valley Water District

- Manages the Santa Clara and Llagas Subbasins in Santa Clara County per the District Act and SGMA
- Implements programs to protect and augment groundwater
- Conducts managed recharge and in-lieu recharge programs to offset groundwater pumping
- Permits wells and other deep excavations
- Coordinates with water retailers, land use and regulatory agencies, adjacent water agencies, and interested stakeholders

Water Retailers

- Maintain facilities to deliver water to customers
- Maintain surface water rights and/or other sources of supply
- Ensure compliance with drinking water standards
- Reduce demands during shortages and modify operations to protect groundwater

Land Use Agencies

- Develop General Plans and review Water Supply Assessments
- Permit land use and administer stormwater management programs
- Permit hazardous material storage and handling facilities
- Oversee cleanup of leaking underground tanks (County)
- Regulates septic systems and small water systems (County)

Well Owners and the Community

- Maintain, construct, and properly destroy wells (well owners)
- Use water wisely and minimize the introduction of contaminants

1.5.4 Other Stakeholders

Private well owners, non-governmental organizations, and the public are also important partners in protecting groundwater supplies. Private well owners are responsible for constructing, maintaining, and properly destroying wells so they do not act as vertical pathways for contaminants. The community also has a role in protecting groundwater supplies by using water wisely and helping reduce the introduction of contaminants from activities at the land surface.

There are also numerous statewide and national organizations engaged in issues related to groundwater, including the Association of California Water Agencies and the California Urban Water Agencies. The District works with these agencies and others on various proposals to protect groundwater resources.

The District will continue to work closely with local partners and the public using the following methods:

- Regularly scheduled meetings, including the Water Retailer Committee and Groundwater Subcommittee
- Publicly-noticed Board meetings
- Review and coordination with land use agencies on land use and development proposals as well as the development of guidelines related to specific issues (e.g., stormwater infiltration, graywater, septic systems)
- Technical coordination with regulatory agencies on contaminant release sites and policies related to groundwater
- Coordination with basin stakeholders and regulatory agencies on long-term resource planning efforts
- Outreach, including the development of fact sheets and web information and interaction with the public at open houses and other events

1.6 PUBLIC OUTREACH FOR THE 2016 GROUNDWATER MANAGEMENT PLAN

Under SGMA, Alternatives are not subject to the same outreach required during development and adoption of a GSP. However, the District has worked to provide interested stakeholders opportunities for input on the 2016 GWMP.

The District presented information on the 2016 GWMP at several meetings of the Water Retailers Committee, as well as several joint meetings of the Water Retailers Water Supply and Groundwater Subcommittees. The District has also discussed planned SGMA compliance with agencies in adjacent subbasins, including the Alameda County Water District, San Benito County Water District, and San Mateo County.

The District provided summary information on SGMA and related District plans in outreach sent to all well owners within the county in June 2016. In July 2016, the District notified water retailers, land use agencies, water management agencies in adjacent subbasins, and interested stakeholders of the District intent to prepare an Alternative to a GSP. The notice also referenced two upcoming public informational meetings, notified stakeholders of the ability to be added to an interested stakeholders list, and provided web and staff contact details for those seeking more information. The District held two public informational meetings on the 2016 GWMP: July 21, 2016 at the District headquarters and August 2, 2016 at the City of Morgan Hill Community Center.

Agenda items for regularly-scheduled and publicly-noticed Board meetings October 13, 2015, April 26, 2016, June 22, 2016, and November 8, 2016 stated the District’s intent to prepare the 2016 GWMP as an Alternative under SGMA. A public hearing on the 2016 GWMP was held at a regularly-scheduled Board meeting and public notice included advertisements in local newspapers. Related notices, Board resolutions, comments received during the public hearing, District response to comments, and environmental documentation are included in Appendix A.

1.7 PLAN CONTENT AND ORGANIZATION

This 2016 GWMP brings together important information on groundwater management goals, strategies, and related activities in Santa Clara County. The GWMP is intended to present information that will be useful to water retailers, land use planning agencies, agencies in adjacent subbasins, and community members interested in groundwater. The 2016 GWMP includes the following chapters:

- **Chapter 2 – Santa Clara Subbasin Description**: This chapter provides an overview of the Santa Clara Subbasin and current conditions.
- **Chapter 3 – Llagas Subbasin Description**: This chapter provides an overview of the Llagas Subbasin and current conditions.
- **Chapter 4 – Water Supplies, Demands, and Budget**: This chapter describes the District’s conjunctive water management system, historical and current groundwater demands, and groundwater budgets.
- **Chapter 5 – Sustainable Management Criteria**: This chapter describes the sustainability goals and sustainability criteria to measure the effectiveness of the sustainability goals.
- **Chapter 6 – Basin Management Programs and Activities**: This chapter describes District programs and activities that support the sustainability goals.
- **Chapter 7 – Groundwater Monitoring and Modeling**: This chapter summarizes District programs to monitor changes in groundwater levels, groundwater quality, land subsidence, and surface water, as well as groundwater flow models.
- **Chapter 8 – Next Steps**: This chapter describes future reporting related to the GWMP and discusses potential approaches to consider if the outcome measures indicate improvement is needed or to address future risks and changing conditions. It also includes recommendations for further work.

Chapter 2 – Santa Clara Subbasin Description

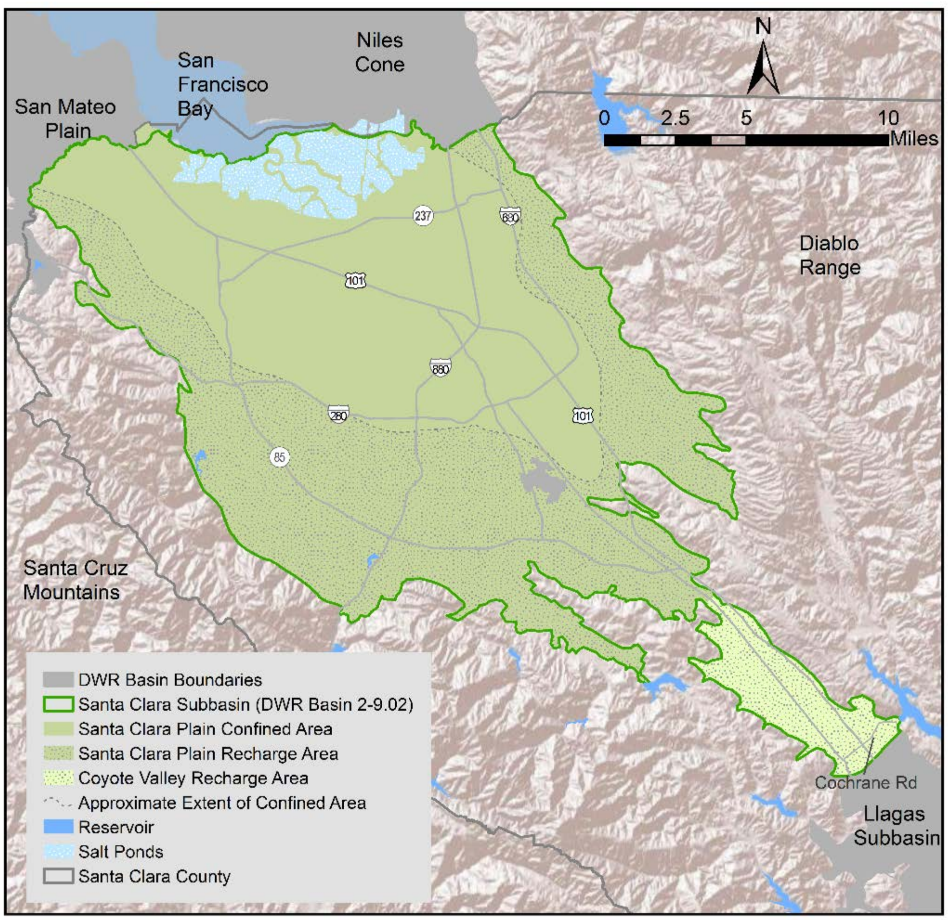
CHAPTER 2 – SANTA CLARA SUBBASIN DESCRIPTION

This chapter describes the Santa Clara Subbasin, including the physical setting and characteristics, and conditions related to groundwater elevation, water quality, land subsidence, groundwater/surface water interaction, and salt water intrusion.

2.1 BASIN SETTING

The Santa Clara Subbasin (DWR Basin 2-9.02), which includes the Santa Clara Plain and Coyote Valley, is located within the California Coast Ranges physiographic province between the San Andreas and Hayward Faults at the southern end of the San Francisco Bay (Figure 2-1). The subbasin underlies a relatively flat valley and consists of unconsolidated alluvial sediments. The Santa Clara Subbasin is part of Basin 2-9, which extends beyond Santa Clara County into San Mateo, Alameda, and Contra Costa counties and beneath San Francisco Bay, which is fringed and underlain by the estuarine San Francisco Bay mud.[20] Due to different hydrogeologic, land use and water supply management characteristics, the District further subdivides the Santa Clara Subbasin into two groundwater management areas: the Santa Clara Plain and the Coyote Valley.

Figure 2-1. Santa Clara Subbasin



[20] USGS, Physical Subdivision and Description of the Water-Bearing Sediments of the Santa Clara Valley, California, 2015.

2.1.1 Lateral Subbasin Boundaries

The Santa Clara Subbasin covers a surface area of 297 square miles and forms a northwest-trending, elongated valley bounded by the Santa Cruz Mountains to the west and the Diablo Range to the east. The basis for the lateral boundary delineation shown in Figure 2-1 is the geologic, hydrologic and topographic features in the subbasin. The western and eastern subbasin boundaries are the geologic contact between permeable to semi-permeable alluvial sediments within the Santa Clara Valley and the impermeable bedrock of the adjacent mountain ranges. These impermeable sediments include the Mesozoic marine formations and the Franciscan Assemblage of the Santa Cruz Mountains, and Franciscan greywacke and serpentinite bodies of the Diablo Range. The northern boundary with the San Francisco Bay is hydrologic. To the northwest and northeast, the subbasin borders the San Mateo and Niles Cone Subbasin, respectively, at institutional boundaries formed by county boundaries. The southern boundary with the Llagas Subbasin is the Coyote Creek alluvial fan in the Morgan Hill area, which forms a topographic and hydrologic divide between the groundwater and surface water flowing to the San Francisco Bay and water flowing to the Monterey Bay. The groundwater divide is approximately located at Cochrane Road in Morgan Hill. Based on observed water level data, the boundary moves as much as a mile to the north or south depending on local groundwater conditions.

The Santa Clara Plain covers 280 square miles, extending from southern San Francisco Bay to the Coyote Narrows, near Metcalf Road. The Coyote Valley extends from the Coyote Narrows to the boundary with the Llagas Subbasin. The Coyote Valley is much smaller than the Santa Clara Plain, covering a surface area of 17 square miles.

2.1.2 Recharge Areas

Recharge within the Santa Clara Subbasin generally occurs along the margins and southern portion of the subbasin where coarse-grained sediments predominate. The recharge area includes the alluvial fan and fluvial deposits along the edge of the subbasin where high lateral and vertical permeability allow surface water to infiltrate the aquifers. The percolation of surface water in recharge areas replenishes unconfined groundwater within the recharge area and contributes to the recharge of principal aquifers in the confined area through subsurface flow.

The Santa Clara Plain has two hydrogeologic areas, the recharge (unconfined) and confined areas. The confined area is located in the central portion where a laterally extensive, low permeability aquitard that restricts the vertical flow of groundwater and contaminants. The confined area boundary is approximate and is a simplification of natural conditions based on the extent of artesian wells.[21] There is no laterally extensive aquitard in the Coyote Valley, with generally high lateral and vertical permeability throughout the area.

2.1.3 Principal Aquifers and Aquitards

The Santa Clara Subbasin is a trough-like depression filled with Quaternary alluvium deposits of unconsolidated gravel, sand, silt and clay that eroded from adjacent mountain ranges by flowing water and were deposited into the valley (Figure 2-2). The alluvium comprises interfingering alluvial fans, stream deposits and terrace deposits.

Helley and Lajoie divided the valley fill alluvium into two major Quaternary deposits: Holocene (younger than 10,000 years old) and Pleistocene deposits (from 1.8 Million to 10,000 years old).[22] The Holocene deposits consist of the most recent sediments deposited along major stream courses and bay mud deposits along the San Francisco Bay. The Holocene alluvial sediment consists of mainly of clay, silt and sand occurring in discontinuous lenses. The majority of the subbasin alluvium is older, Pleistocene deposits of unconsolidated and interfingered lenses of clay,

[21] Clark, Ground Water in Santa Clara Valley, California, 1924.

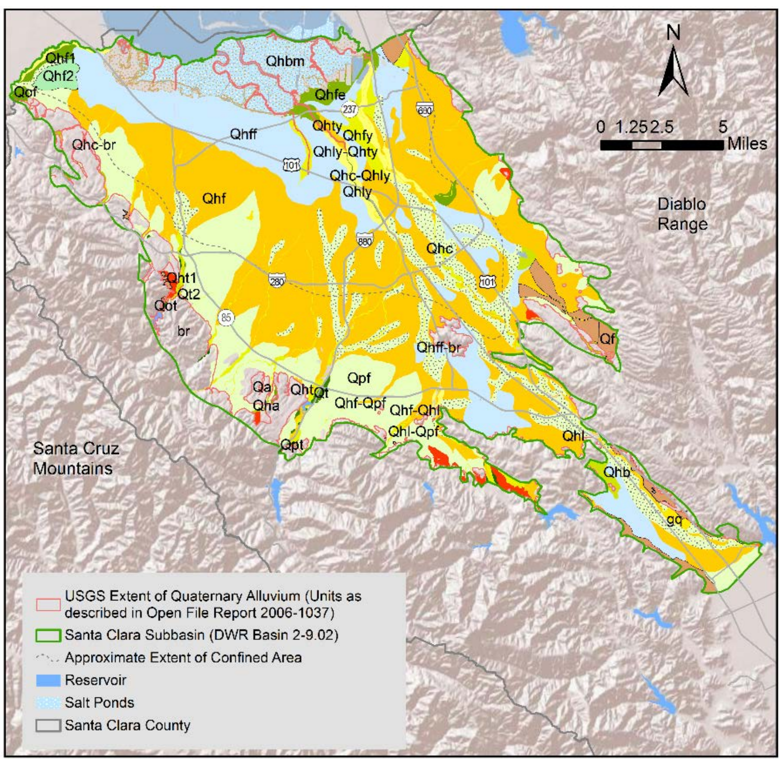
[22] Helley and Lajoie, Flatland Deposits of the San Francisco Bay Region, California: Their Geology and Engineering Properties and Their Importance to Comprehensive Planning, 1979.

silt, sand and gravel. The base of the Pleistocene deposits overlies the Santa Clara Formation in some areas of the subbasin, such as near Stevens Creek Reservoir. The Santa Clara Formation is composed of slightly or semi-consolidated alluvial deposits washed down from the upper mountainous area and deposited along the foothills beneath the unconsolidated young alluvial sediments of the subbasin.[23] A recent USGS study[24] indicated that Late Pleistocene alluvium is exposed on the heads of the alluvial fans, particularly on the west side of the valley.

The thickness of aquifer materials in the Santa Clara Plain ranges from about 150 feet near the Coyote Narrows to more than 1,500 feet in the interior of the subbasin. The alluvium thins towards the western and eastern edges of the Santa Clara Plain. The central portion of the Santa Clara Plain contains a laterally extensive, low permeability aquitard that restricts the vertical flow of groundwater. This major aquitard varies in thickness from 20 to 100 feet and typically occurs at depths between 100 to 200 feet below ground surface,[25] separating shallow and principal aquifer zones. Shallow aquifer zones generally refer to aquifers that occur within 150 feet of ground surface, while principal aquifer zones generally occur at depths below 150 feet.[26] The primary confined aquifers exist at depths between 200 and 1,000 feet.[27]

The Coyote Valley is mainly composed of thick alluvial sand and gravel deposits with interbedded thin, discontinuous clays. The aquifer sediments overlying the Santa Clara Formation vary in thickness from a few feet along the west side of the valley to more than 400 feet along the east side. Cross-sections of the Santa Clara Subbasin, including the Santa Clara Plain and Coyote Valley are shown in Figures 2-3 through 2-5.

Figure 2-2. Quaternary Alluvium Geologic Map of the Santa Clara Subbasin



[23] Dibblee, Preliminary Geologic Map of the San Jose East Quadrangle, Santa Clara County, California, 1972.
[24] USGS, Physical Subdivision and Description of the Water-Bearing Sediments of the Santa Clara Valley, California, 2015.
[25] SCVWD Standards for the Construction and Destruction of Wells and Other Deep Excavations in Santa Clara County, 1989.
[26] Iwamura, Hydrogeology of the Santa Clara and Coyote Valleys Groundwater Basins, California, 1995.
[27] Carroll, 1991; Iwamura, 1995.

Figure 2-3. Santa Clara Subbasin Cross-Section Locations

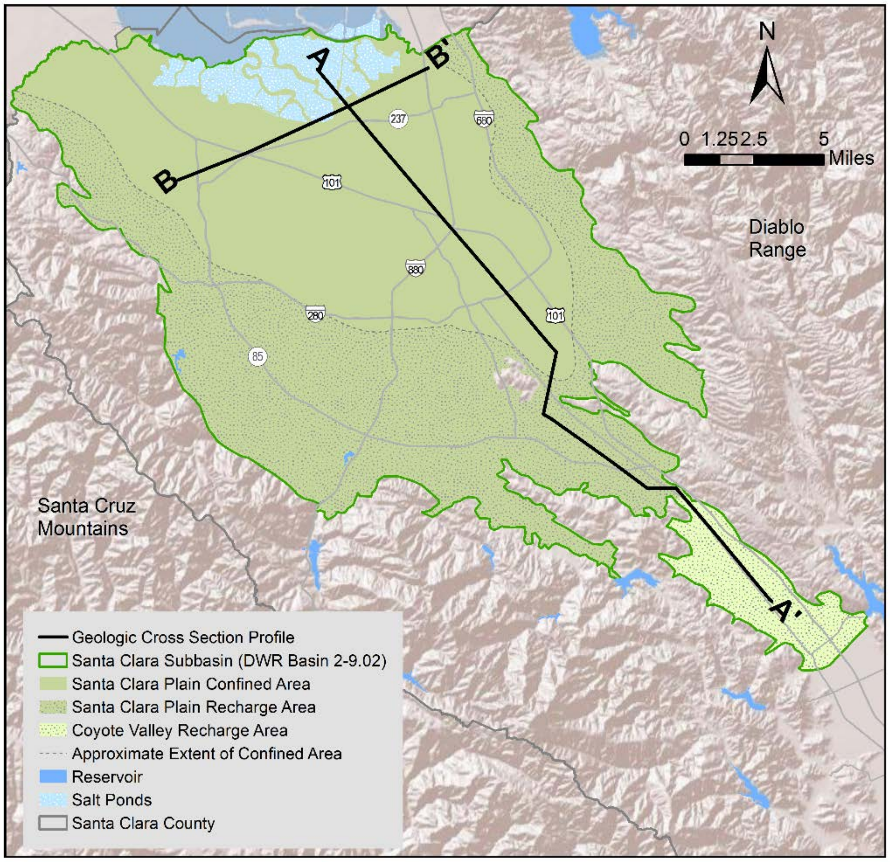


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Figure 2-4. Santa Clara Subbasin Longitudinal Cross-Section

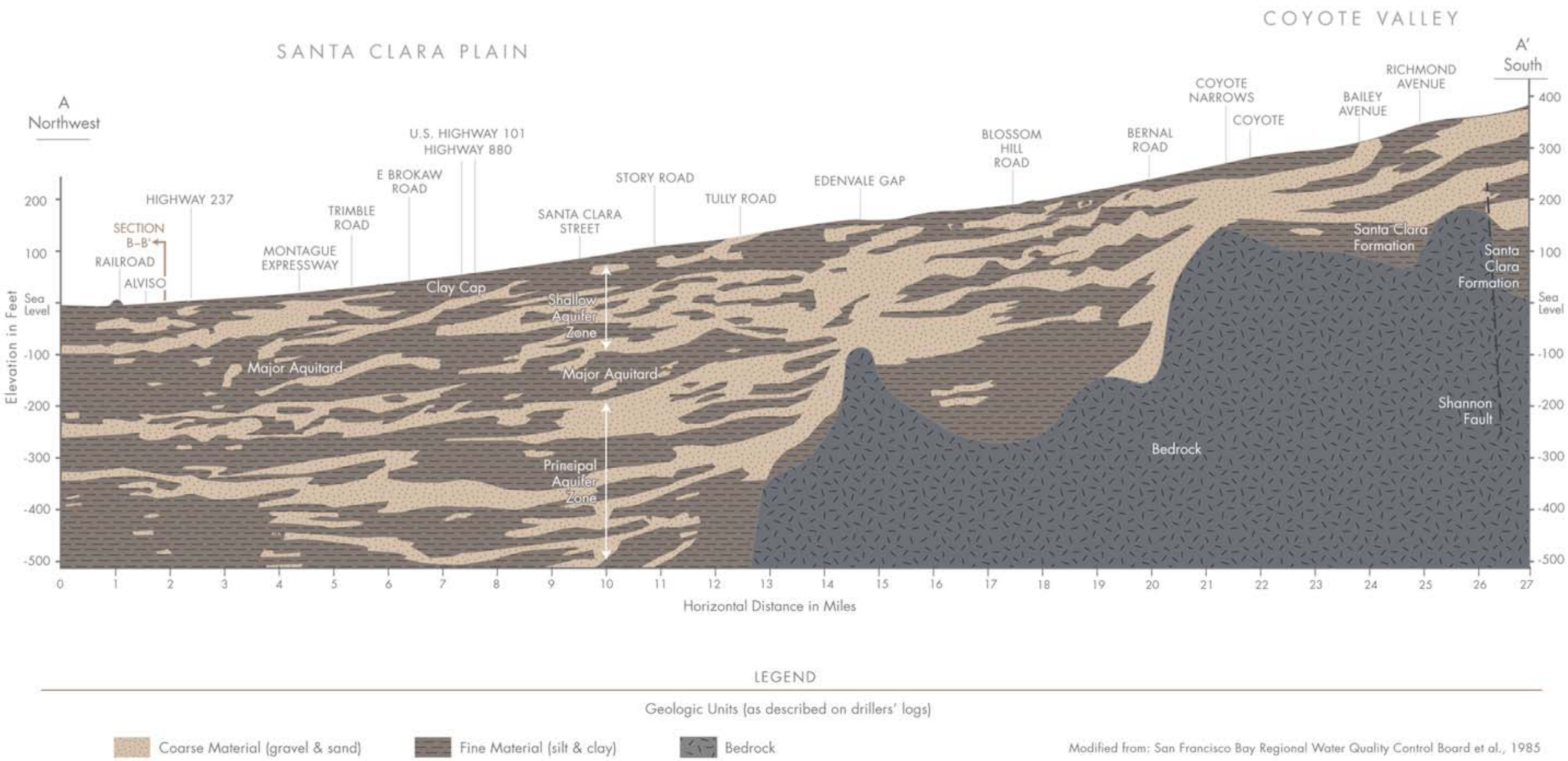
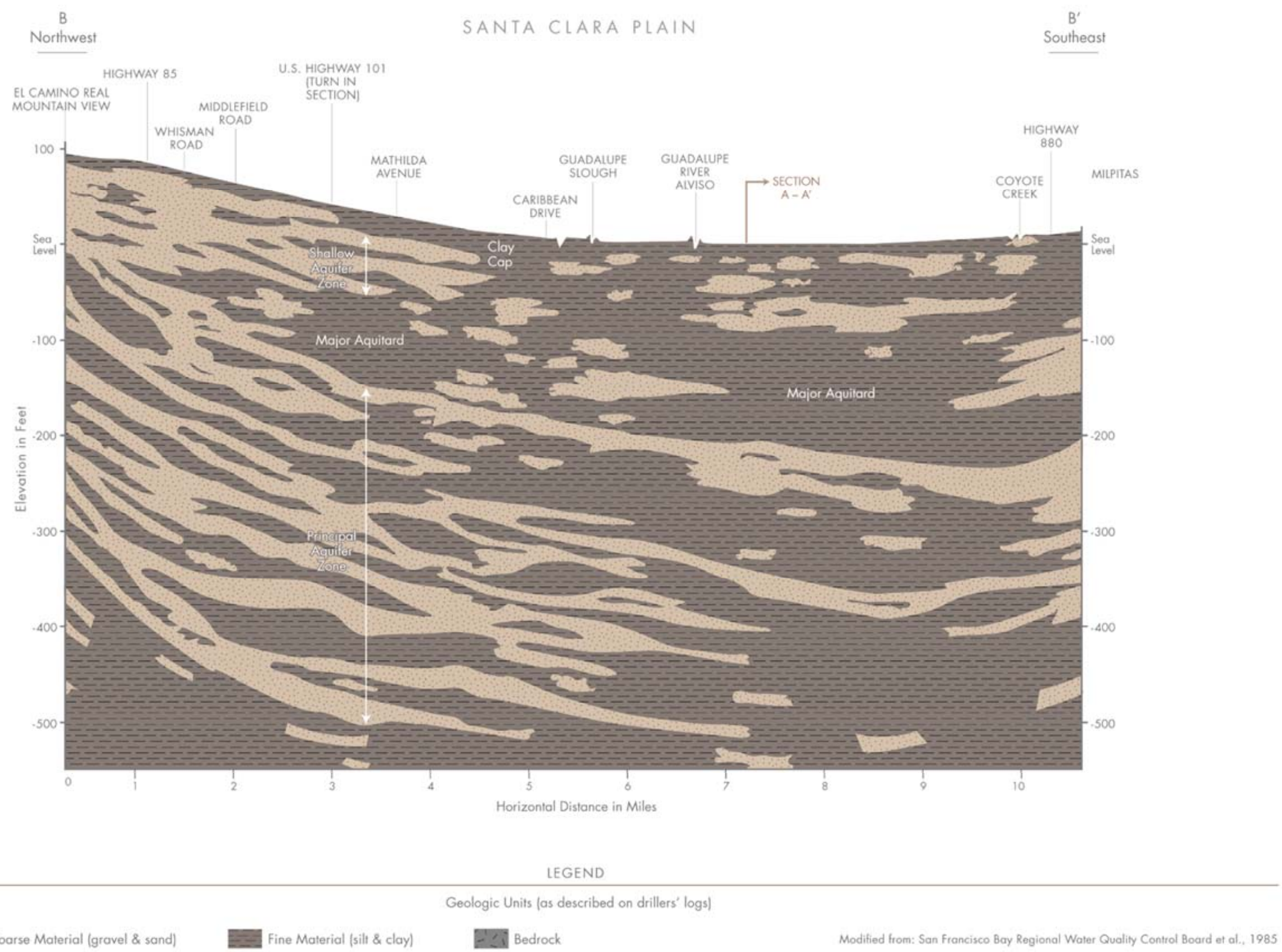


Figure 2-5. Santa Clara Subbasin Transverse Cross-Section

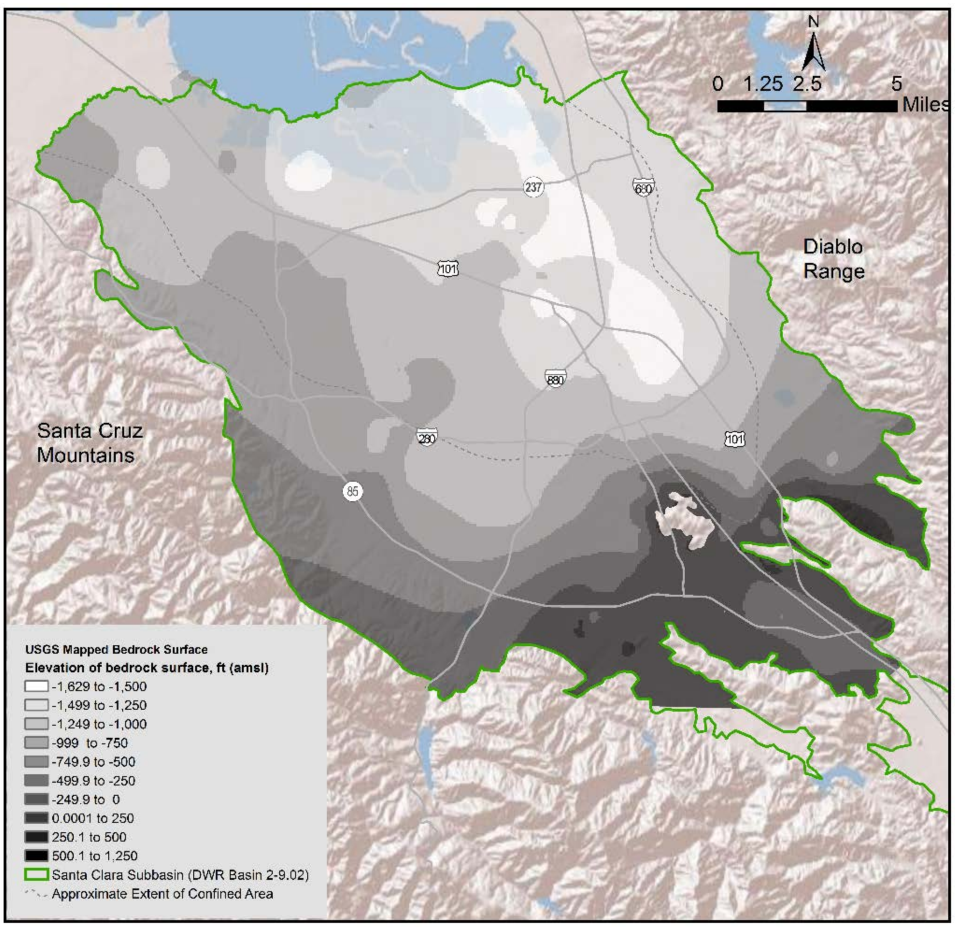


2.1.4 Subbasin Bottom

The bottom of the Santa Clara Subbasin is the contact between the unconsolidated alluvial sediments and impermeable bedrock forming an irregular surface exposed at different depths. It can be difficult to differentiate the Santa Clara Formation (which may be slightly to semi-consolidated) from the unconsolidated overlying alluvial sediments based on driller's logs. Water supply wells completed at greater depths have encountered bedrock. Limited well data indicate the boundary between unconsolidated sediments and bedrock ranges from about 150 to 200 feet near the Coyote Narrows to about 1,500 feet in the interior of the subbasin. This is supported by deep wells constructed by the District and the USGS.[28] Previous study[29] indicates a maximum alluvial thickness is in excess of 1,500 feet, including the Santa Clara Formation. The depth to bedrock decreases towards the western and eastern edges of the subbasin.

A recent USGS report[30] presents more detailed bedrock surface information for the Santa Clara Plain (Figure 2-6) based on 26 wells reaching bedrock, seismic reflection profiles, refraction profiles, and the elevation of mapped depositional contacts of alluvium and bedrock.

Figure 2-6. Santa Clara Plain Bedrock Surface



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[28] Newhouse et al., Geologic, Water-Chemistry, and Hydrologic Data from Multiple-Well Monitoring Sites and Selected Water-Supply Wells in the Santa Clara Valley, California, 1999–2003, 2004.

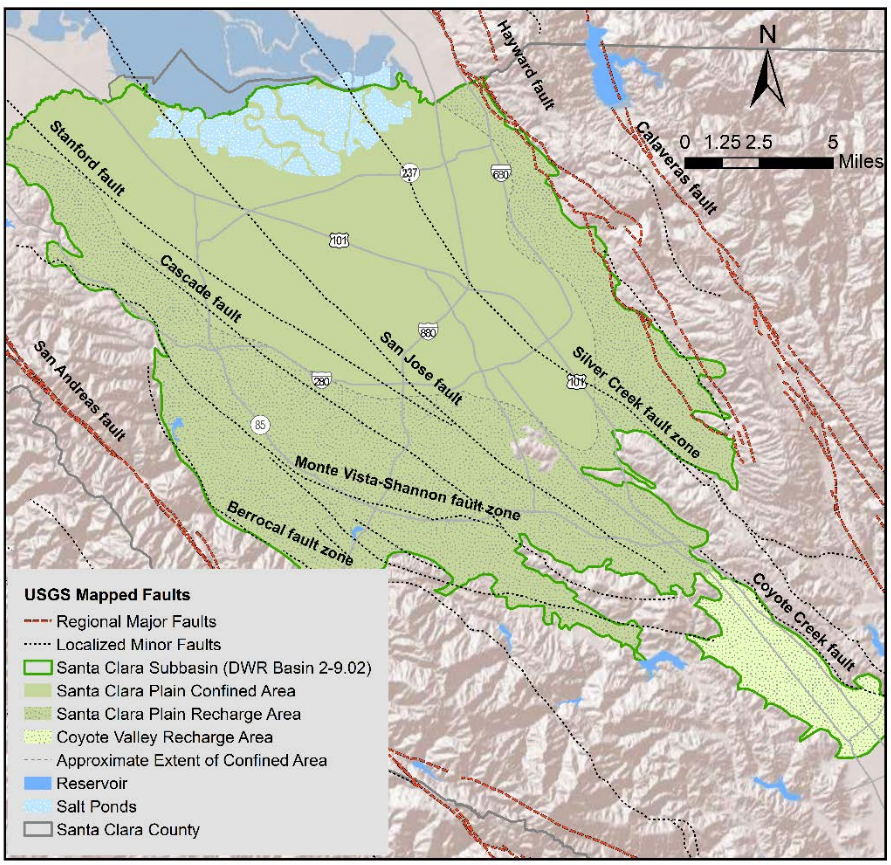
[29] Iwamura, Hydrogeology of the Santa Clara and Coyote Valleys Groundwater Basins, California, 1995.

[30] USGS, Physical Subdivision and Description of the Water-Bearing Sediments of the Santa Clara Valley, California, 2015.

2.1.5 Major Faults

The major faults in Santa Clara County are the San Andreas and Hayward/Calaveras faults that helped form the Santa Clara Subbasin by upthrusting adjacent mountains. These are right-lateral reverse oblique faults that remain active, creating significant displacement and deformation.[31] Much of the fault network that creates the structural depression in the Franciscan bedrock below the Santa Clara Subbasin is concealed beneath the overlying unconsolidated alluvium.[32] Several secondary faults, including strike slip, oblique and reverse faults are also present. These secondary faults, including but not limited to Silver Creek, San Jose, Stanford, Berrocal Monte-Vista, Shannon, Sargent, and Coyote Creek faults, help accommodate deformation from the major faults.[33] While some studies have suggested that the Silver Creek Fault impedes groundwater flow,[34] previous study in the area by Iwamura (1995) and observed water level data does not substantiate this (Figure 2-7).

Figure 2-7. Location of Major Fault Systems



[31] Simpson et al., Seismicity and the Major Strike-Slip Faults Bordering the Santa Clara Valley, California, 2005.
[32] Schmidt and Bürgmann, Time-Dependent Land Uplift and Subsidence in the Santa Clara Valley, California, from a Large Interferometric Synthetic Aperture Radar Data Set, 2003.
[33] Simpson et al., Seismicity and the Major Strike-Slip Faults Bordering the Santa Clara Valley, California, 2005.
[34] USGS, Physical Subdivision and Description of the Water-Bearing Sediments of the Santa Clara Valley, California, 2015.

2.2 SUBBASIN CONDITIONS

This section describes Santa Clara Subbasin conditions with regard to groundwater elevations, flow, quality, land subsidence, surface water/groundwater interaction, and salt water intrusion.

2.2.1 Groundwater Elevation and Flow

Groundwater movement in the Santa Clara Subbasin generally follows topographical and surface water patterns, flowing to the north/northwest toward the interior of the subbasin and San Francisco Bay. Groundwater also moves toward areas of intense pumping at the local scale. Groundwater occurs at different depths in the unconfined aquifer throughout the subbasin, and under artesian conditions in the Santa Clara Plain confined aquifer.

In the Santa Clara Plain, regional groundwater elevations are typically highest near the margins, with elevations decreasing in the subbasin interior. Several large cones of depression are present within the confined area due to concentrated pumping. Except during periods of extended drought, the vertical gradient in much of the confined area is upward. The gradient in the recharge area and near the confined area/recharge area boundary is downward. Regional groundwater elevations in the Coyote Valley are typically highest at the groundwater divide/Llagas Subbasin boundary, with a downward vertical gradient.

The groundwater elevation contour maps depict the groundwater table or potentiometric surface for spring 2012 (Figure 2-8) and fall 2012 (Figure 2-9) for the principal aquifer zone of the Santa Clara Subbasin. As indicated by the contour maps, typical seasonal patterns result in higher groundwater elevations in the spring and lower elevations in the fall. Contour maps for 2012 are included since 2012 represents the most recent year where water levels were not significantly affected by the extended drought. Recent groundwater elevation contours are included in the District's Annual Groundwater Report for 2015. Groundwater levels displayed very atypical patterns in 2015, with higher groundwater elevations in the fall as compared to the spring. This is attributed to effective drought response, including retailer source shifts to treated surface water and significant water use reduction by the community in support of the District's call for water use reduction.

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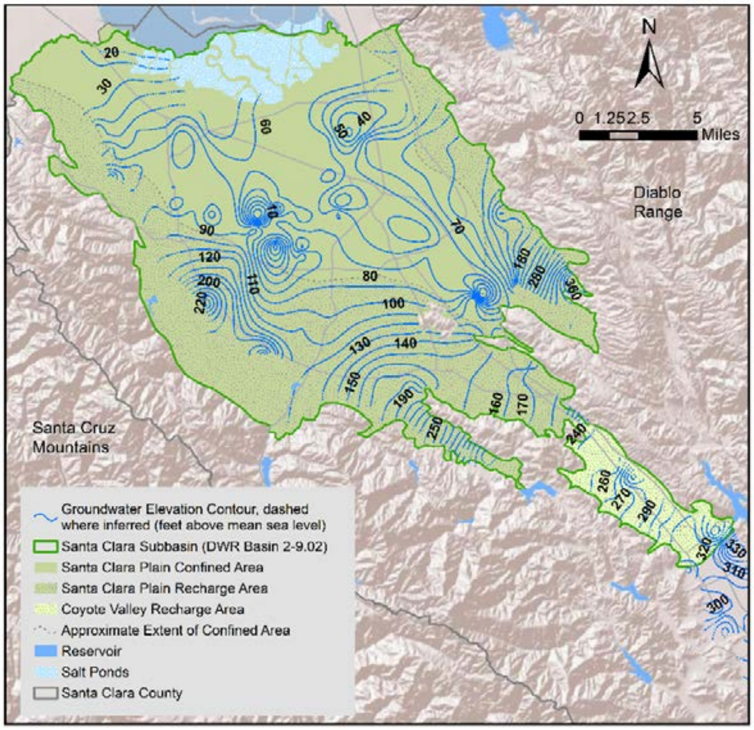
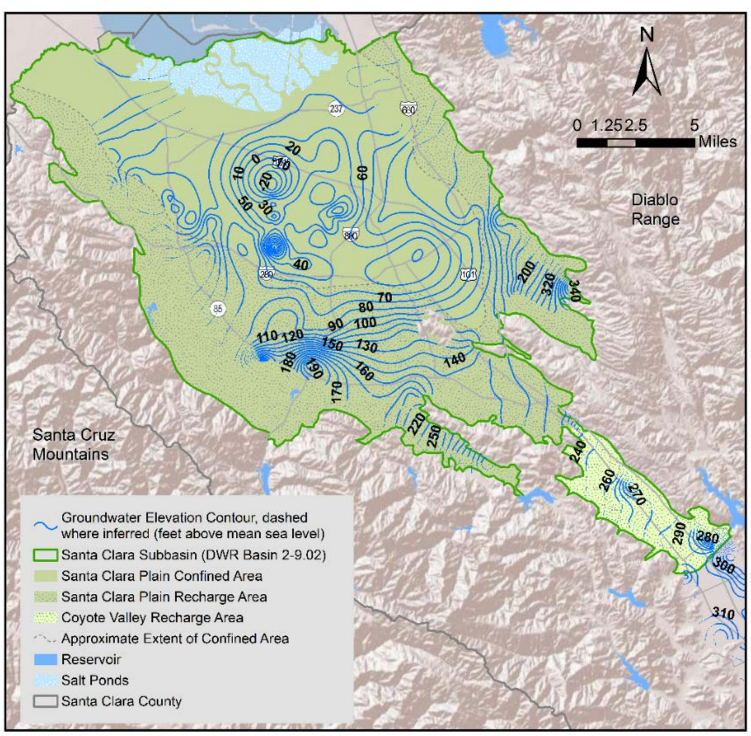
Figure 2-8. Spring 2012 Groundwater Elevation Contours



Note: 2012 chosen to represent typical groundwater elevations not significantly impacted by extended drought.

Figure 2-9. Fall 2012 Groundwater Elevation Contours



Note: 2012 chosen to represent typical groundwater elevations not significantly impacted by extended drought.

Figures 2-10 and 2-11 are long-term hydrographs for regional index wells in the Santa Clara Plain and Coyote Valley. As indicated on Figure 2-10, there has been a significant rebound in groundwater levels since the mid-1960s due to District efforts to import water and augment groundwater recharge both directly and through in-lieu recharge.

Figure 2-10. Groundwater Elevation in the Santa Clara Plain Regional Index Well (07S01W25L001)

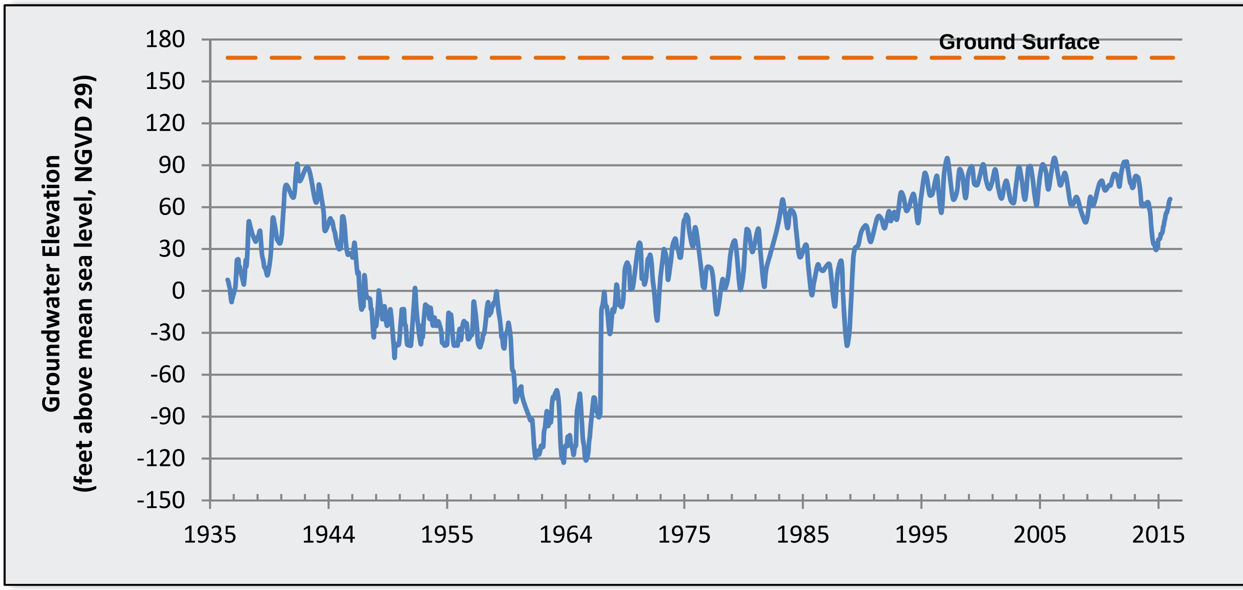
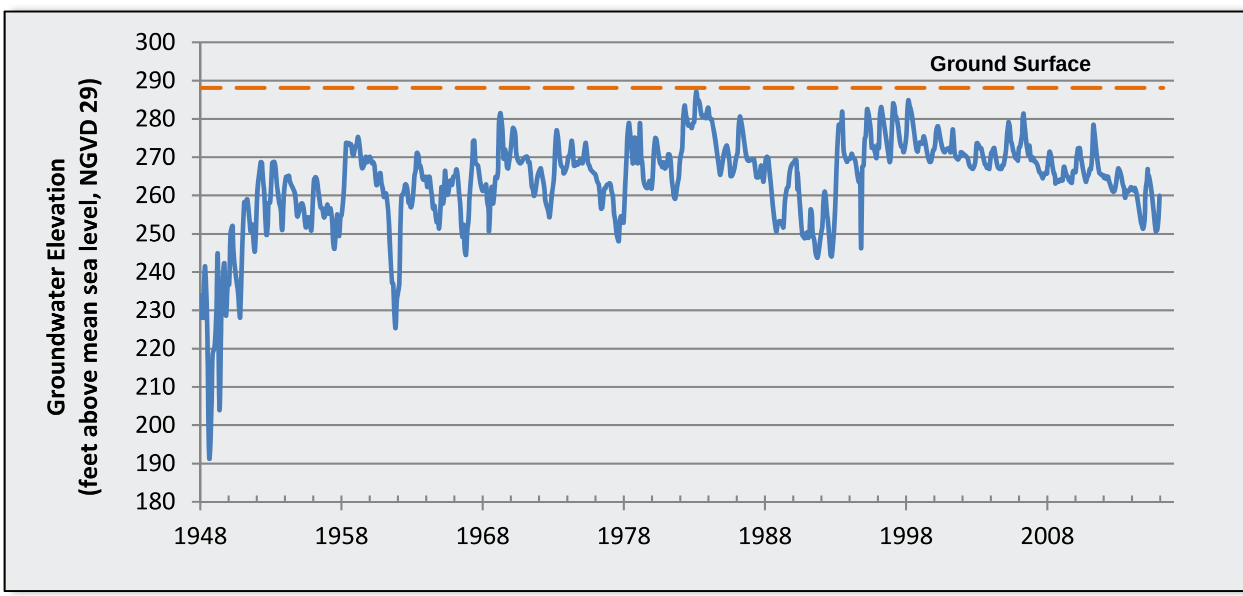


Figure 2-11. Groundwater Elevation in the Coyote Valley Regional Index Well (09S02E02J002)

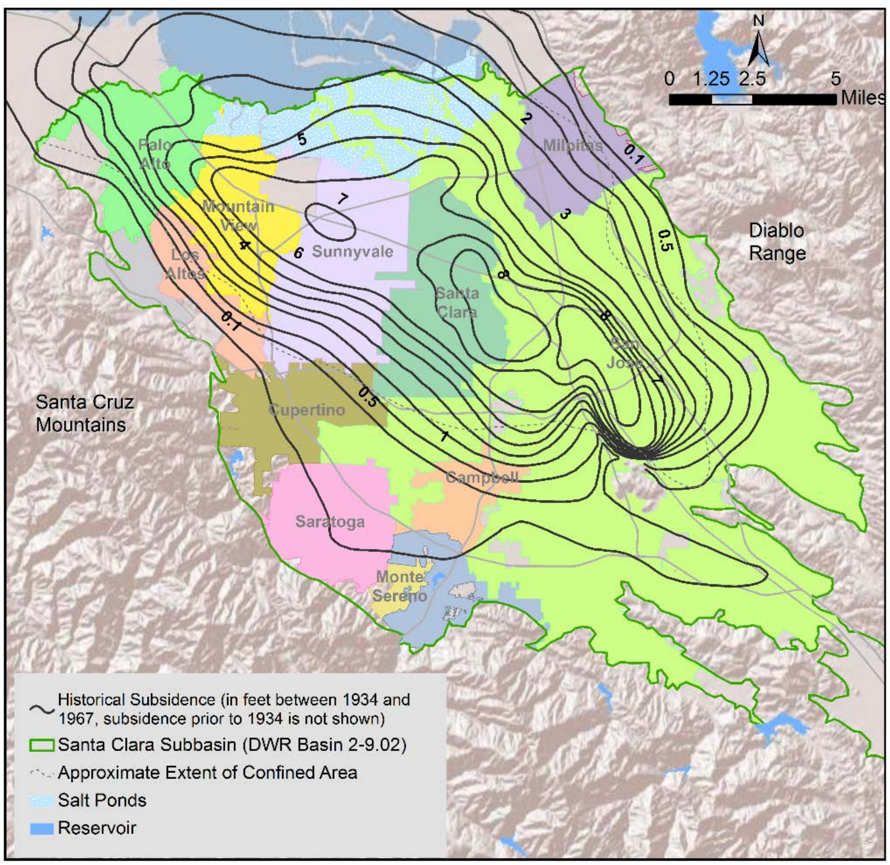


2.2.2 Land Subsidence

The northern Santa Clara Valley was the first area in the United States where permanent land subsidence due to groundwater withdrawal was recognized.[35] From about 1915 to 1966, groundwater pumping in the Santa Clara Plain increased dramatically due to growing agricultural use and population growth, resulting in a decline of groundwater levels by as much as 200 feet and long-term overdraft. Fluid pressure in the aquifers was reduced, resulting in the dewatering and compression of fine-grained materials (e.g., clays) and a broad sagging of the land surface. About 13 feet of inelastic (permanent) subsidence was observed in San Jose between 1915 and 1969. The land subsided by 3 to 6 feet over a large area encompassing north San Jose, Santa Clara, Sunnyvale, and Mountain View and subsidence of over a foot stretched over 100 square miles. Figure 2-12 shows contours of historical subsidence occurring between 1934 and 1967.

Serious problems developed as a result of subsidence, including flooding of lands adjacent to San Francisco Bay, decreased ability of local streams to carry away winter flood waters, and damage to utilities and infrastructure. It is estimated that subsidence resulted in at least $30 to $40 million in damage in 1982 dollars.[36] This necessitated the construction of additional dikes, levees, and flood control facilities to protect properties from flooding.

Figure 2-12. Historical Subsidence in the Santa Clara Plain (1934-1967)

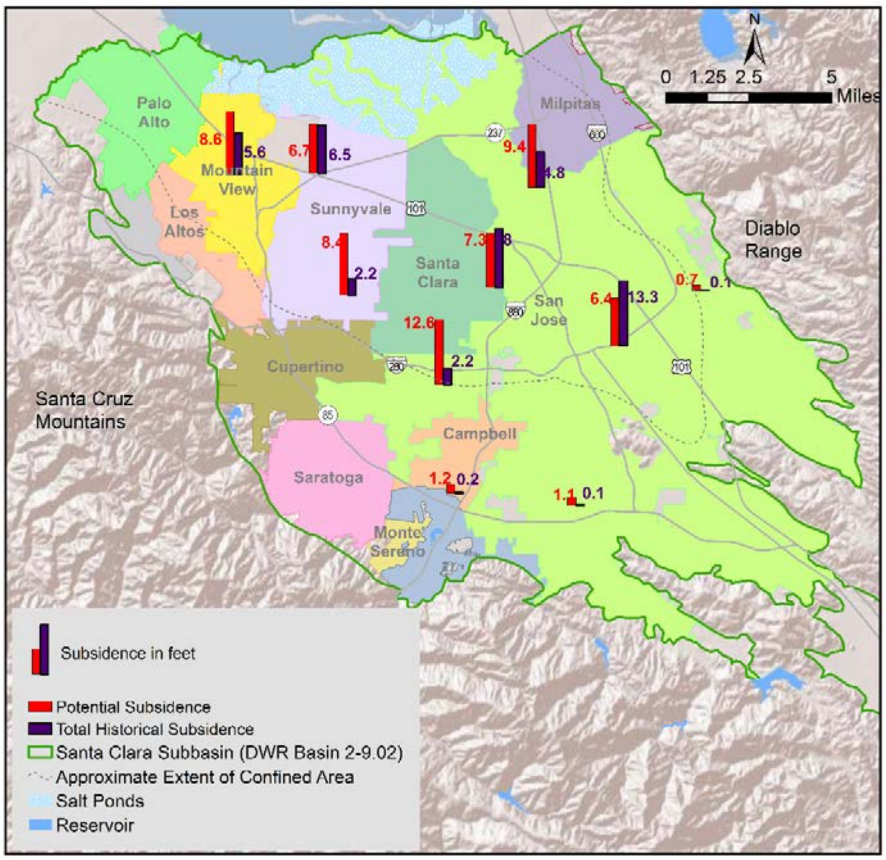


[35] Poland and Ireland, Land Subsidence in the Santa Clara Valley, California, as of 1982,1988.

[36] Poland and Ireland, Land Subsidence in the Santa Clara Valley, California, as of 1982,1988.

Significant inelastic subsidence was essentially halted by about 1970 through the District's expanded conjunctive management programs, which allowed artesian heads to recover substantially. Some amount of elastic subsidence occurs annually in response to seasonal pumping and recharge as substantiated by ground surface elevations measured with Interferometric Synthetic Aperture Radar (InSAR).[37] The District has established an acceptable subsidence rate of no more than 0.01 feet per year on average, which was endorsed by the Water Retailer Groundwater Subcommittee. The District has evaluated remaining land subsidence potential under prolonged overdraft conditions, as shown in Figure 2-13, and has established water level thresholds at ten subsidence index wells.[38] These thresholds are the groundwater levels that must be maintained to ensure a low risk of unacceptable land subsidence, as described in Chapter 6.

Figure 2-13. Historical and Potential Subsidence in the Santa Clara Plain



Even with the managed recharge of local and imported water, groundwater alone cannot support the Santa Clara Plain, which is a heavily urbanized area. Programs that reduce or offset groundwater pumping (e.g., treated water deliveries, water conservation, and water recycling) are critical to avoid long-term overdraft, additional subsidence, and salt water intrusion. The potential for renewed inelastic subsidence in the Santa Clara Plain is an ongoing concern, and the District carefully monitors and manages water supplies to minimize the risk of subsidence recurring. The Coyote Valley is predominantly composed of coarser-grained materials, and land subsidence has not been observed in the area.

[37] Schmidt and Burgmann, Time-Dependent Land Uplift and Subsidence in the Santa Clara Valley, California from a Large Interferometric Synthetic Aperture Radar Data Set, 2003.
[38] Geoscience Support Services Inc., Subsidence Thresholds in the North County Area of Santa Clara Valley, 1991.

2.2.3 Surface Water and Groundwater Interaction

The District's managed recharge program includes significant recharge through many miles of stream channels over the recharge area, indicating groundwater and surface water generally are disconnected in these reaches. As described further below, the managed recharge program helps to maintain flows in these creeks, most of which would flow only intermittently otherwise. The District is not aware of any areas where groundwater pumping has a significant or unreasonable effect on interconnected surface water.

The District has a comprehensive surface water monitoring network to measure creek flows, comply with water rights reporting and reservoir restrictions, and meet environmental requirements. Stream gauging by the District is discussed in Chapter 7. Surface water flow data can be used to evaluate which reaches of streams are gaining or losing streams with regard to groundwater. However, the District has not performed a comprehensive evaluation of the data for this purpose.

Figure 2-14 shows areas of known and suspected surface water/groundwater interaction. Identification of these areas is based on observations by District field staff. Gaining reaches are primarily located in sections of the creeks overlying the confined area of the subbasin closer to San Francisco Bay. Exceptions to this are:

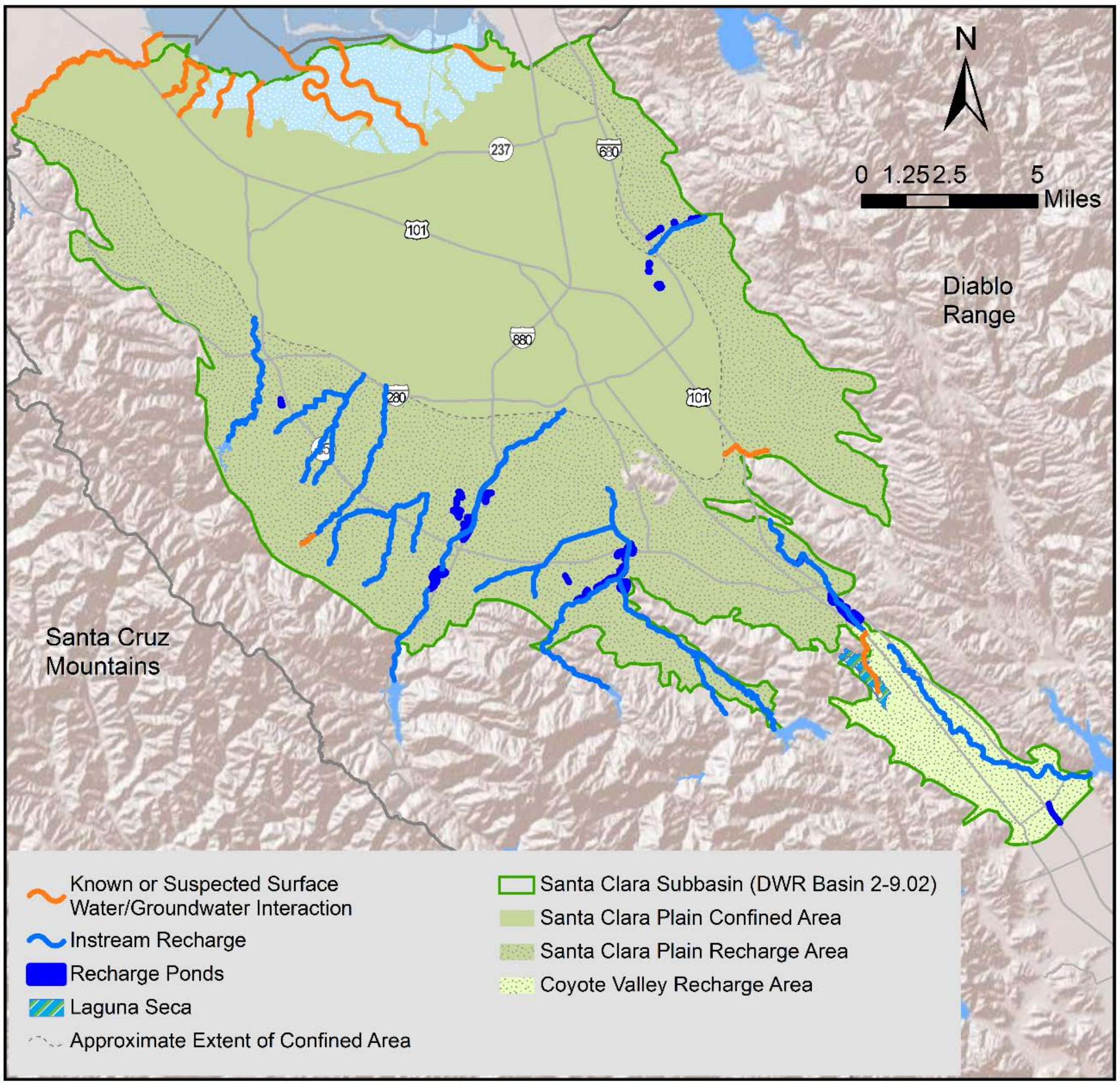
- San Francisquito Creek (northern Santa Clara Plain): Metzger studied San Francisquito Creek stream flow gains and losses between April 1996 and May 1997.[39] Stream flow losses were greatest in the reach from Sand Hill Road to Middlefield Road where the creek is underlain by coarse alluvium. Downstream of Middlefield Road, tidal effects and storm drain discharges made it difficult to quantify gains and losses. Groundwater hydrographs indicate the water table may intersect the stream bed in this reach, particularly in the winter and spring months. San Francisquito Creek was losing from Woodland Avenue to Newell Road. Downstream of Newell Road was gaining, but the source of the water could not be determined due to storm drain discharge and tidal influence. The average annual streamflow loss from San Francisquito Creek was estimated at 1,050 AF per year.
- Lower Silver Creek (eastern Santa Clara Plain): District field staff have identified a portion of Lower Silver Creek where groundwater discharges into surface water based on field observations.
- Saratoga Creek (western Santa Clara Plain): Tetrachloroethene (released into groundwater from a dry cleaning facility) has been detected in Saratoga Creek near downtown Saratoga near the subbasin's western margin. This indicates that groundwater is seeping into the creek at least intermittently.
- Fisher Creek (western Coyote Valley): Surface water in Coyote Creek recharges groundwater along the southern and east sides of the Coyote Valley. Groundwater in the area generally flows towards the northwest, where it rises and discharges into Fisher Creek due to the complex geologic and hydrogeologic conditions of the area.
- Laguna Seca Area (northwestern Coyote Valley): Laguna Seca is intermittent wetland caused by a combination of shallow groundwater and flooding. Iwamura[40] states that the Laguna Seca area, before the installation of an artificial drain, was part of the historical swampy or marshy area due to groundwater discharge to the surface and overflowed into Coyote Creek.

The portions of the Santa Clara Subbasin that are most likely to have surface water/groundwater interaction can be inferred through historical ecology and the depth to groundwater.[41] Figure 2-15 presents historical ecology mapping developed by the San Francisco Estuary Institute (SFEI), which maps areas such as wetlands, marshes, and willow

[39] Metzger, Streamflow Gains and Losses along San Francisquito Creek and Characterization of Surface-Water and Ground-Water Quality, Southern San Mateo and Northern Santa Clara Counties, California, 2002.
[40] Iwamura Hydrogeology of the Santa Clara and Coyote Valleys Groundwater Basins, California, 1995.
[41] SCVWD, GIS Coverage of Depth to First Groundwater, 2003.

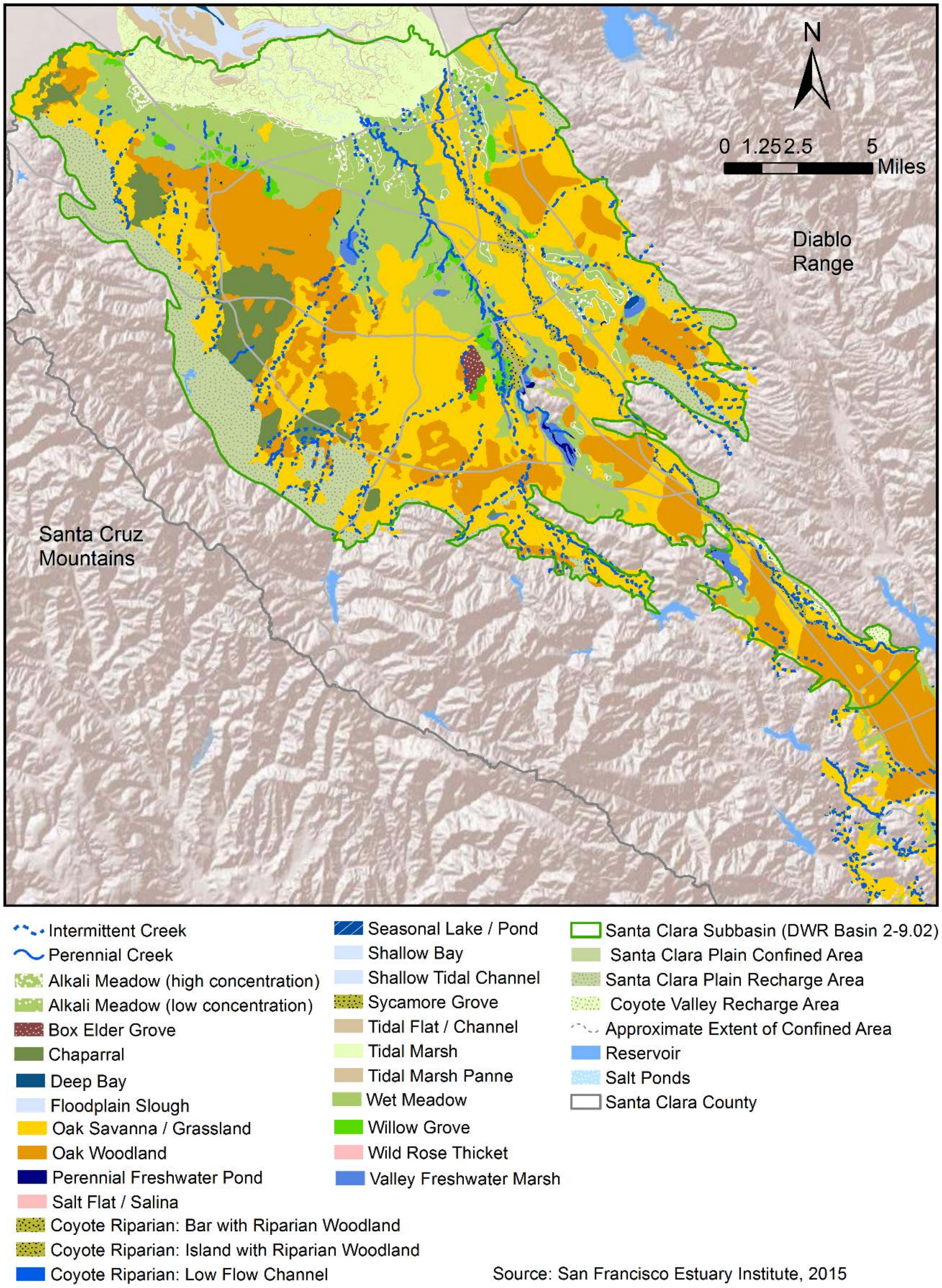
groves that may be associated with shallow groundwater.[42,43] Some of the wetland areas may have been present due to poorly draining soils rather than surface water/groundwater interaction. It is also important to note that this was the historical distribution circa the early 1800s, prior to development and does not represent current or even recent conditions. This figure also indicates that, historically, the Guadalupe River was the only perennial stream in the Santa Clara Subbasin. The other creeks were intermittent, running during the wet season, but dry in the summers.

Figure 2-14. Santa Clara Subbasin Surface Water/Groundwater Interaction



[42] Beller, et al., Historical Vegetation and Drainage Patterns of Western Santa Clara Valley: A technical memorandum describing landscape ecology in Lower Peninsula, West Valley, and Guadalupe Watershed Management Areas, 2010.
[43] Grossinger, et al., Coyote Creek Watershed Historical Ecology Study: Historical Condition, Landscape Change, and Restoration Potential in the Eastern Santa Clara Valley, California, 2006.

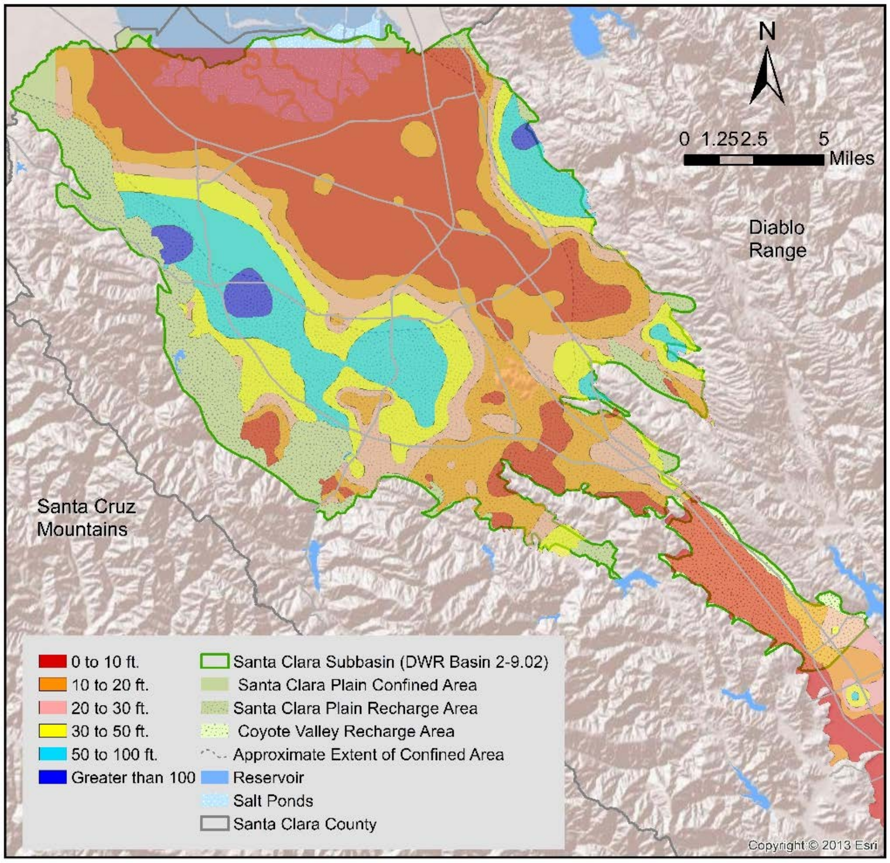
Figure 2-15. Santa Clara Subbasin Historical Ecology



Source: San Francisco Estuary Institute, 2015

Figure 2-16 is a generalized depth to first groundwater map, showing the shallowest groundwater conditions encountered at leaking underground storage tank sites. Areas exhibiting shallow groundwater would be more likely to display surface water/groundwater interaction.

Figure 2-16. Depth to First Groundwater in the Santa Clara Subbasin



Based on the most shallow water encountered at leaking underground storage tank sites as of 2003.

The District's managed recharge program relies on losing stream reaches, where water is moving out of the stream into the subsurface (Figure 2-14). Although these areas are net losing reaches, some reaches may intermittently gain during the wet season.[44]

The natural stream flow in these sections of creeks is enhanced through the District's release of local and imported water. Although many of these creeks were normally dry during the summer, the District's recharge program has resulted in extending the period of flow in the creeks. Data from the Coyote Creek Edenvale gauge, before and after the construction of Anderson Dam indicates that prior to the dam's construction, there was no flow was observed a majority of the time from May to November. After reservoir construction, flow was observed a majority of the time during the same months. Also, the number of months where daily flow was observed in Coyote Creek increased post-construction. This indicates that stream flows have increased due to District reservoir operations.

[44] Hanson, Hydrologic Framework of the Santa Clara Valley, 2015.

2.2.4 Groundwater Quality

The District has monitored and evaluated groundwater quality in the Santa Clara Subbasin for decades, with regular testing since the mid-1980s. Water quality data presented and summarized in this section represents data from the last ten-year period (2006-2015) collected by the District and other agencies. The primary source for data collected by other agencies is compliance sampling for public water supply wells submitted by water retailers to the State DDW. The District's groundwater monitoring and evaluation allows for an appraisal of current conditions and offers a consistent basis for detecting near-term and long-term trends. The Santa Clara Subbasin generally produces groundwater of good quality that does not need treatment beyond disinfection. Groundwater quality data for the Santa Clara Plain and Coyote Valley groundwater management areas are discussed separately, below.

2.2.4.1 Santa Clara Plain

Groundwater in the Santa Clara Plain is typically of very good quality, with detections of parameters above health-based MCL infrequent (Figure 2-17). Figures 2-18 and 2-19 show the relative concentrations of inorganic parameters with health-based MCLs and aesthetic-based SMCLs[45] for the period 2006 to 2015 in the principal aquifer. This appraisal is based on 10 years of compiled data consisting of District monitoring data and water quality data acquired from the Department of Drinking Water. Calcium, magnesium, and bicarbonate are the dominant dissolved constituents in the Santa Clara Plain. Variation from this includes groundwater with sodium bicarbonate, sodium chloride, and mixed cation-mixed anion character. The CY 2015 median TDS concentration in the principal aquifer zone was 400 mg/L. TDS occurs at higher concentrations at depth in some localized areas including Evergreen (southeast San Jose) and Palo Alto.

Some areas in the shallow aquifers adjacent to salt ponds and tidal creeks near San Francisco Bay have been affected by salt water intrusion, as indicated by higher chloride and other indicators in some shallow monitoring wells. This condition is discussed more in section 2.2.5.

Summary statistics for the Santa Clara Plain shallow and principal aquifer zones are presented in Tables 2-1 and 2-2, respectively. These tables include only those parameters with a health-based MCL or aesthetic-based SMCL. Many parameters have been analyzed more than once at a particular well over the ten-year analysis period; in these cases the most recent data is used. Tables 2-3 and 2-4 present the organic chemicals detected between 2006 and 2015 in the shallow and principal aquifers, respectively. Although some organic chemicals are detected in the Santa Clara Plain, detections are infrequent and are typically low concentrations.[46]

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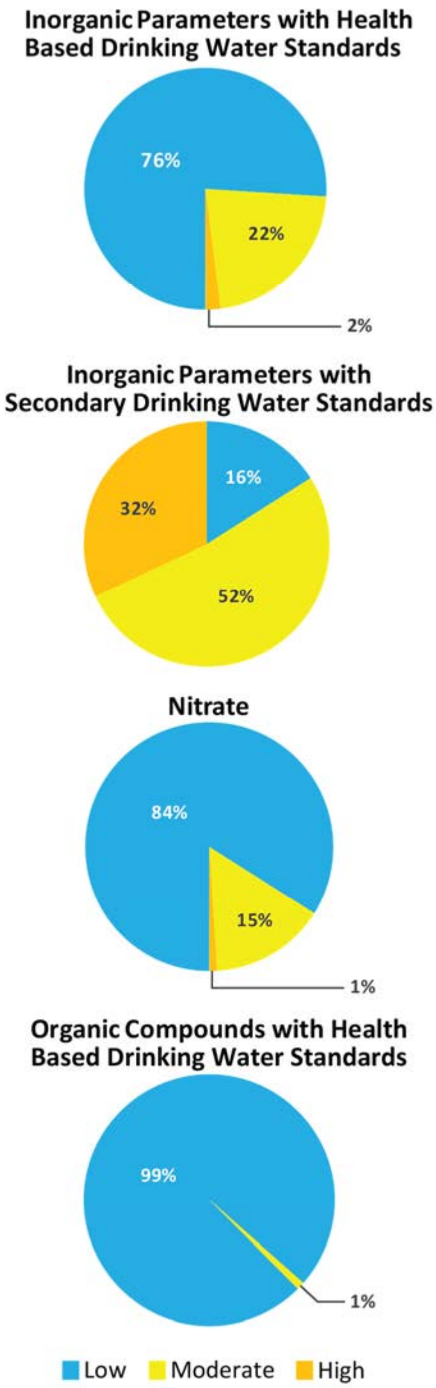
[45] Maximum Contaminant Levels are health-based drinking water standards established by the California Division of Drinking Water or U.S. Environmental Protection Agency. Secondary MCLs are aesthetic-based standards established by these agencies to address aesthetic issues such as taste and odor. Figures 2-18 and 2-19 show only those inorganic parameters detected in moderate or high concentrations relative to the MCL or SMCL.

[46] Lawrence Livermore National Laboratory, California Aquifer Susceptibility, A Contamination Vulnerability Assessment for the Santa Clara and San Mateo County Groundwater Basins, 2004.

Figure 2-17. Santa Clara Plain Principal Aquifer Frequency of Drinking Water Standard Exceedances (2006-2015)



Inorganic Parameters

Inorganic parameters include trace elements (such as metals), major ions, nutrients, and radioactive parameters. These constituents are typically naturally occurring in the Santa Clara Plain, leaching from rocks and sediments in contact with groundwater. Man-made sources include industrial and manufacturing facilities.

Water quality in principal aquifers is generally very good for inorganic parameters; over 75% of principal aquifers have low concentrations with respect to health-based Maximum Contaminant Levels (MCLs). Parameters detected in the high range include nitrate, arsenic, and aluminum. However, these detections represent a small fraction of the principal aquifer zone (2%). Parameters in the moderate range (above ½ the MCL) include aluminum, selenium, nitrate, total chromium, hexavalent chromium, and perchlorate. No radioactive parameters were detected above ½ the MCL.

While health-based drinking water standards have been established for many inorganic parameters, some constituents also have secondary MCLs based on their ability to affect the aesthetic properties of water through taste, color, odor, or by causing staining or scale formation. The SMCL for these parameters may be a single value, or a range, with a lower (recommended) and upper threshold. As shown to the left, inorganic parameters with aesthetic-based standards are found in high concentrations in about a third of the principal aquifer, and in moderate concentrations in about half the aquifer. Iron, manganese, and aluminum were detected above the SMCL.

Nitrate

Nitrate is naturally occurring in groundwater at low concentrations. However, man-made sources such as fertilizers and septic systems can impact groundwater quality. Nitrate was detected above the MCL in a small portion of the Los Altos area and in the upper portion of the Almaden Valley. This is likely a legacy issue from agricultural land use, which was widespread historically throughout the Santa Clara Subbasin.

Organic Compounds

Organic compounds include Volatile Organic Compounds (VOCs) and pesticides, and are present in many household, commercial, and industrial products. As shown to the left, groundwater quality in the principal aquifer zone is excellent with respect to organic compounds. While there are localized detections of some VOCs in the Santa Clara Plain, there are minimal impacts to deep drinking water aquifers (less than 1% of the area) despite hundreds of sites with known releases in the shallow aquifer zone.

High: greater than the MCL, SMCL, or upper SMCL threshold

Moderate: greater than ½ the MCL or SMCL, or above the lower SMCL threshold

Low: not detected, less than ½ the MCL or SMCL, or below the lower SMCL threshold

Values represent the percentage of the principal aquifer zone area with concentrations in each category based on the most recent data from 2006 to 2015.

Figure 2-18. Santa Clara Subbasin Principal Aquifer Concentrations Relative to Primary Drinking Water Standards (2006-2015)

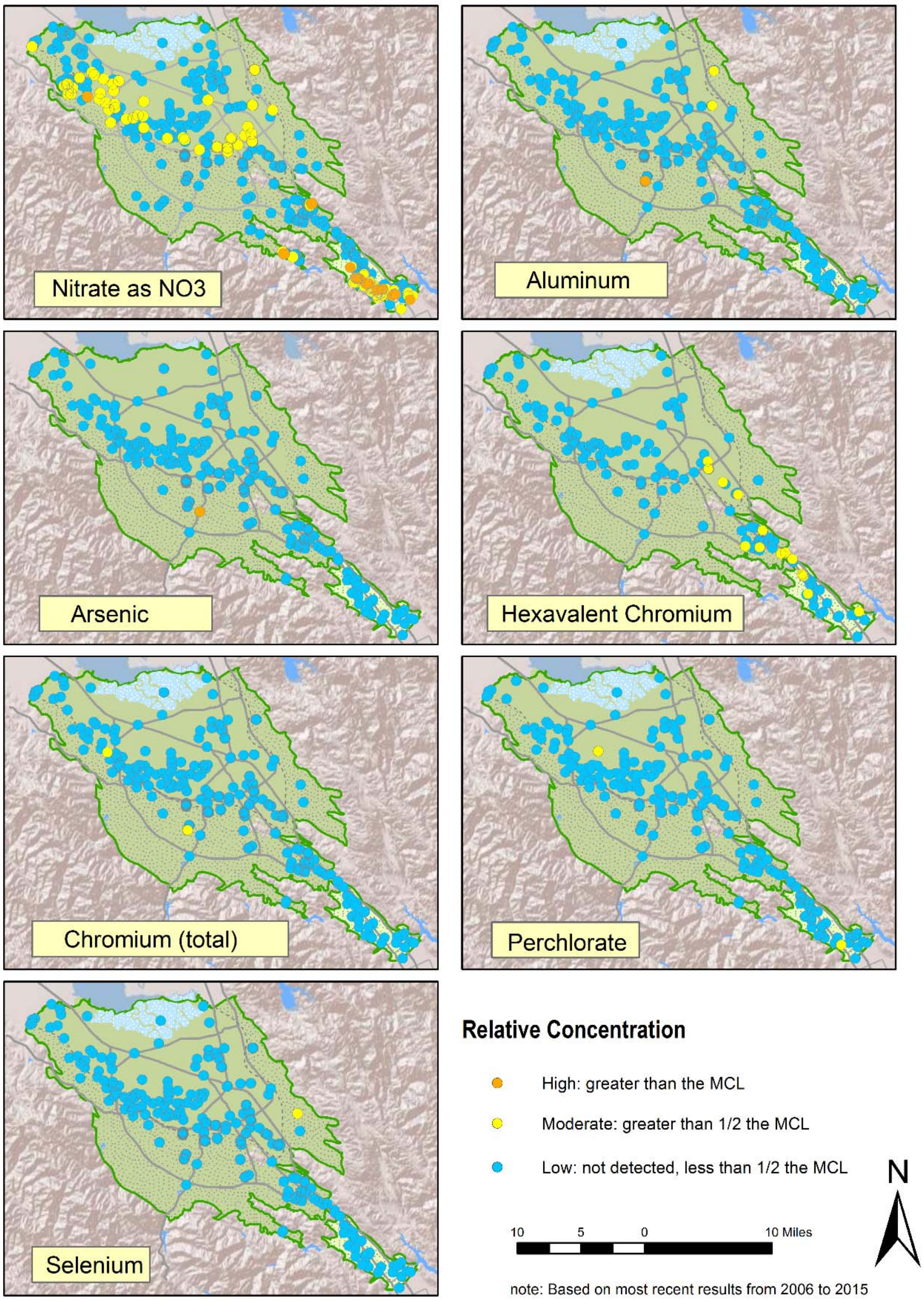


Figure 2-19. Santa Clara Subbasin Principal Aquifer Concentrations Relative to Secondary Drinking Water Standards (2006-2015)

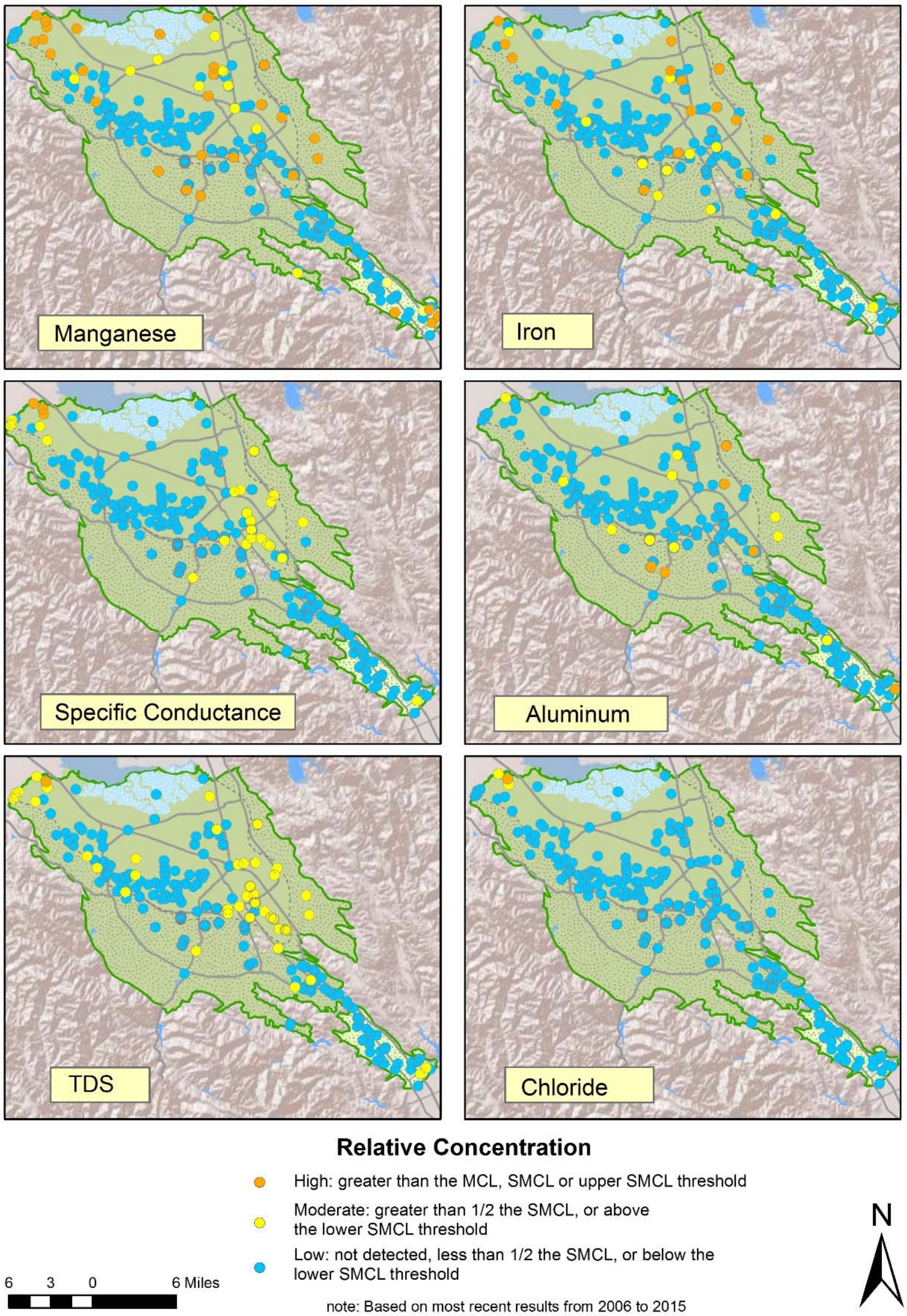


Table 2-1. Santa Clara Plain Shallow Aquifer Zone Water Quality Summary (2006-2015)

Parameter[1]	MCL[2]	SMCL[3]	n[4]	Results[5]		
				50th Percentile (median)	95th Percentile	IQR
Aluminum (ug/L)	1,000	200	39	27	139	39
Antimony (ug/L)	6	---	29	< 1	< 2	---
Arsenic (ug/L)	10	---	38	1.1	18	3.1
Asbestos (MFL)	7	---	1	<0.2	---	---
Barium (ug/L)	1,000	---	38	109	348	108
Beryllium (ug/L)	4	---	29	< 1	< 1	---
Boron (ug/L)	---	---	38	295	1,820	482
Cadmium (ug/L)	5	---	32	< 1	< 1	---
Chloride (mg/L)	---	250	30	62	133	42
Total Chromium (ug/L)	50	---	37	0.85	6.8	1.60
Chromium VI (ug/L)	10	---	15	0.88	2.9	0.91
Color (Color Units)	---	15	1	<3	---	---
Copper (ug/L)	---	1,000	36	1.7	5.1	1.6
Cyanide (ug/L)	150	---	1	<100	---	---
Fluoride (mg/L)	2	---	36	0.09	0.43	0.12
Foaming Agents (MBAS) (ug/L)	---	500	1	<0.05	---	---
Iron (ug/L)	---	300	35	7.6	1,795	71
Lead (ug/L)			37	< 2	< 5	---
Manganese (ug/L)	---	50	37	22	5,877	215
Mercury (ug/L)	2	---	37	< 1	< 1	---
Nickel (ug/L)	100	---	38	2.0	14	3.5
Nitrate as N (mg/L)	10	---	38	1.6	4.7	11
Nitrate + Nitrite (as N) (ug/L)	10,000	---	1	1,800	---	---
Nitrite (as N) (ug/L)	1,000	---	3	< 400	< 400	---
Odor - Threshold (Odor Units)	---	3	1	2	---	---
Perchlorate (ug/L)	6	---	32	< 4	< 4	---
Selenium (ug/L)	50	---	35	< 5	< 5	---
Silver (ug/L)	---	100	36	< 10	< 10	---
Specific Conductance (uS/cm)	---	600	30	934	1,924	502
Sulfate (mg/L)	---	250	30	64	301	73
Thallium (mg/L)	2	---	33	< 1	< 1	---
Total Dissolved Solids (mg/L)	---	500	30	549	1,122	274
Turbidity (NTU)	---	5	33	0.18	47	1.2
Zinc (ug/L)	---	5,000	39	< 10	< 50	---

Table includes District monitoring data from monitoring and domestic wells and public water system data reported to the CA Division of Drinking Water (DDW). The shallow aquifer zone is represented by wells primarily drawing water from depths less than 150 feet. For parameters analyzed more than once at a given well over the 10-year period, the most recent data is used.

1. mg/L = milligrams per liter; ug/L = micrograms per liter; MFL = million fibers per liter uS/cm = microSiemens per centimeter; NTU = Nephelometric Turbidity Units

2. Maximum Contaminant Level, or health-based drinking water standard, specified in Title 22 of the California Code of Regulations.

3. Secondary Maximum Contaminant Level, or aesthetic-based standard, per DDW or US EPA. For SMCLs having a range, the lower, recommended threshold is listed.

4. n = number of wells sampled for each parameter.

5. For results with multiple reporting limits, the median, Inter quartile range (IQR) and 95th percentile were computed using the Maximum Likelihood Estimate (MLE) method.

Table 2-2. Santa Clara Plain Principal Aquifer Zone Water Quality Summary (2006-2015)

Parameter [1]	MCL [2]	SMCL [3]	n[4]	Results[5]		
				50th Percentile (median)	95th Percentile	IQR
Aluminum (ug/L)	1,000	200	266	8.4	137	24
Antimony (ug/L)	6	---	265	< 6	< 6	---
Arsenic (ug/L)	10	---	265	0.39	2.3	0.63
Asbestos (MFL)	7	---	77	< 0.2	< 0.2	---
Barium (ug/L)	1,000	---	266	125	258	74
Beryllium (ug/L)	4	---	263	< 1	< 1	---
Boron (ug/L)	---	---	67	170	658	199
Cadmium (ug/L)	5	---	266	< 1	< 1	--
Chloride (mg/L)	---	250	265	46	117	17
Total Chromium (ug/L)	50	---	267	1.0	8.8	2.1
Chromium VI (ug/L)	10	---	272	1.5	6.8	2.0
Color (Color Units)	---	15	210	< 5	< 5	---
Copper (ug/L)	---	1,000	265	1.9	11	3.0
Cyanide (ug/L)	150	---	216	< 100	< 100	---
Fluoride (mg/L)	2	---	267	0.11	0.24	0.07
Foaming Agents (MBAS) (ug/L)	---	500	215	< .05	< .1	---
Iron (ug/L)	---	300	265	12	540	54
Lead (ug/L)	---	---	252	0.21	2.3	0.48
Manganese (ug/L)	---	50	264	1.4	209	11
Mercury (ug/L)	2	---	266	< 1	< 1	---
Nickel (ug/L)	100	---	266	0.55	4.2	1.0
Nitrate as N (mg/L)	10	---	278	2.9	6.4	13
Nitrate + Nitrite (as N) (ug/L)	10,000	---	189	3,000	6,900	2,700
Nitrite (as N) (ug/L)	1,000	---	217	< 400	< 400	---
Odor - Threshold (Odor Units)	---	3	211	0.73	1.4	0.99
Perchlorate (ug/L)	6	---	262	<4	<4	--
Selenium (ug/L)	50	---	266	1.2	4.9	1.5
Silver (ug/L)	---	100	259	< 10	< 10	--
Specific Conductance (uS/cm)	---	600	265	680	1,085	235
Sulfate (mg/L)	---	250	265	47	80	27
Thallium (mg/L)	2	---	265	< 1	< 1	---
Total Dissolved Solids (mg/L)	---	500	265	410	648	155
Turbidity (NTU)	---	5	257	0.26	2.7	0.58
Zinc (ug/L)	---	5,000	265	4.5	28	7.4

Table includes District monitoring data from monitoring and domestic wells and public water system data reported to the CA Division of Drinking Water (DDW). The principal aquifer zone is represented by wells primarily drawing water from depths greater than 150 feet. For parameters analyzed more than once at a given well over the 10-year period, the most recent data is used.

1. mg/L = milligrams per liter; ug/L = micrograms per liter; MFL = million fibers per liter; uS/cm = microSiemens per centimeter; NTU = Nephelometric Turbidity Units
2. Maximum Contaminant Level, or health-based drinking water standard, specified in Title 22 of the California Code of Regulations.
3. Secondary Maximum Contaminant Level, or aesthetic-based standard, per DDW or US EPA. For SMCLs having a range, the lower, recommended threshold is listed.
4. n = number of wells sampled for each parameter.
5. For results with multiple reporting limits, the median, Inter quartile range (IQR) and 95th percentile were computed using the Maximum Likelihood Estimate (MLE) method.

Table 2-3. Santa Clara Plain Shallow Aquifer Zone Organic Parameter Detections (2006-2015)

Parameter	Primary MCL (ug/L)	Wells Tested	Percent of Wells Tested with Detection (%)	Maximum Concentration (ug/L)
1,1,1 -Trichloroethane	---	32	6	2.1
1,1,2- Trichloro-1,2,2-Trifluoroethane (Freon 113)	1,200	32	3	4.6
Bromomethane	---	32	3	0.63
Chloromethane	---	32	3	0.60
Di(2-ethylhexyl)phthalate	4	6	17	0.50
Diethyl phthalate	---	5	20	97
N-nitrosodi-n-butylamine (NDBA)	---	18	33	5.7

The shallow aquifer zone is represented by wells primarily drawing water from depths less than 150 feet.
"---" indicates no MCL is established.

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Table 2-4. Santa Clara Plain Principal Aquifer Zone Organic Parameter Detections (2006-2015)

Parameter	Primary MCL (ug/L)	Wells Tested	Percent of Wells Tested with Detection (%)	Maximum Concentration (ug/L)
1,1,1-Trichloroethane	200	260	10	5.8
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon 113)	1,200	260	1	18
1,1,2-Trichloroethane	5	260	< 1	2.7
1,1-Dichloroethene	6	260	3	6.3
1,2,3-Trichlorobenzene	---	247	< 1	0.58
1,2,3-Trichloropropane	---	184	< 1	1.0
Acetone	---	11	9	5.0
Bromodichloromethane (THM)	---	250	3	2.6
Bromoform (THM)	---	250	4	11
Chloroform (THM)	---	250	5	35
Chloromethane	---	142	< 1	0.51
Di(2-ethylhexyl) phthalate	4	209	< 1	3.2
Dibromoacetic Acid (DBAA)	---	37	2.7	1.0
Dibromochloromethane (THM)	---	250	3	6.5
Dibromochloropropane (DBCP)	0.02	216	< 1	0.01
Dichloroacetic Acid (DCAA)	---	37	3	13
Dichlorodifluoromethane (Freon 12)	---	248	< 1	13
Dichloromethane (Methyl Chloride)	5	260	< 1	1.1
Diisopropyl Ether	---	141	< 1	3.0
HAA5 - Haloacetic Acids	60	29	7	26
Naphthalene	---	248	< 1	1.0
N-Nitrosodi-N-Butylamine(NDBA)	---	16	25	4.1
P-Isopropyltoluene	---	241	2	0.5
Tetrachloroethene	5	260	< 1	0.8
Toluene	150	260	< 1	0.55
Total Trihalomethanes	80	160	16	37
Trichloroacetic Acid (TCAA)	---	37	3	13
Trichloroethene	5	260	< 1	1.2
Trichlorofluoromethane (Freon 11)	150	260	< 1	5.0
Xylenes (Total)	1,750	254	< 1	0.5

The principal aquifer zone is represented by wells primarily drawing water from depths greater than 150 feet.
"---" indicates no MCL is established.

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2.2.4.2 Coyote Valley

Groundwater in the Coyote Valley is typically of good quality. The primary exception is nitrate, which is detected above the MCL in some wells due to historic and ongoing sources. Unlike the Santa Clara Plain, the Coyote Valley is largely rural and agricultural, with ongoing nitrate sources including synthetic fertilizers and septic systems. (Figure 2-20) provides an overview of water quality in the Coyote Valley. Figures 2-18 and 2-19 show the relative concentrations of inorganic parameters with health-based MCLs and aesthetic-based SMCLs for the period 2006 to 2015. Calcium, magnesium, and bicarbonate are the dominant dissolved constituents. The CY 2015 median TDS concentration was 380 mg/L.

Summary statistics for the Coyote Valley are presented in Table 2-5 for parameters with a health-based MCL or aesthetic-based, SMCL. Many parameters have been analyzed more than once at a particular well over the ten-year analysis period; in these cases, the most recent data is used. Tables 2-6 shows organic chemicals detected between 2006 and 2015. Although some organic chemicals are detected in the Coyote Valley, detections are infrequent and are typically low concentrations.

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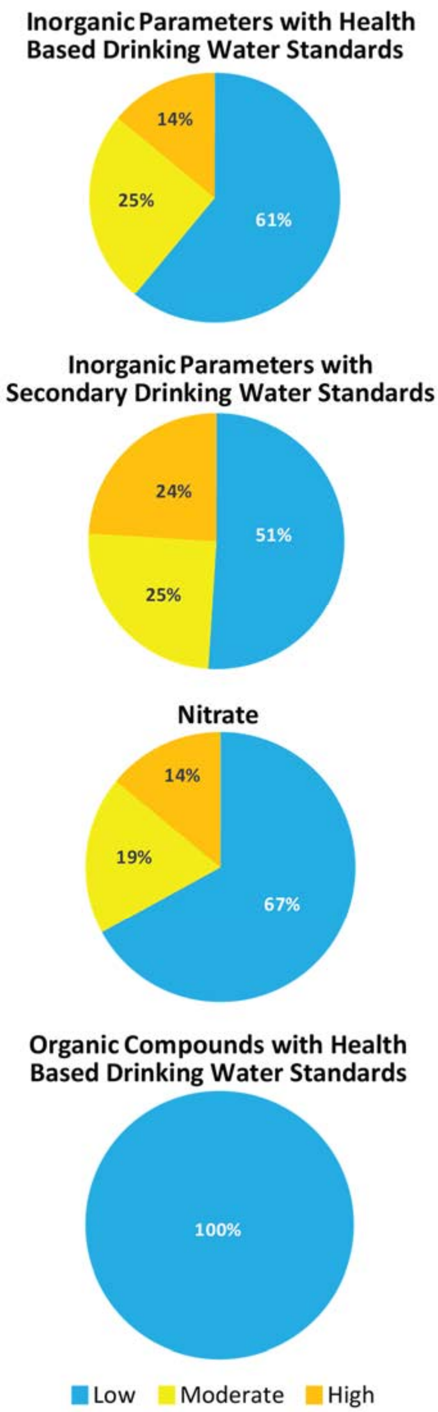
Figure 2-20. Coyote Valley Principal Aquifer Frequency of Drinking Water Standard Exceedances (2006-2015)



Inorganic Parameters

Inorganic parameters include trace elements (such as metals), major ions, nutrients and radioactive parameters. Trace and minor elements and radioactive parameters are typically naturally occurring, leaching from rocks and sediment in contact with groundwater. Anthropogenic sources of these constituents include industrial and manufacturing facilities.

Water quality in principal aquifers is generally very good for inorganic parameters; over 60% of principal aquifers have low concentrations with respect to health-based Maximum Contaminant Levels (MCLs). Other than nitrate, no inorganic compounds were detected above their health-based drinking water standard. Hexavalent chromium and perchlorate exceeded ½ of their MCL in localized areas within the Coyote Valley. No radioactive parameters were detected above ½ the established MCLs.

Some parameters affect the aesthetic properties of water, such as taste, color, and odor, or may cause staining or scale formation but do not represent a health concern. These parameters are given a Secondary MCL. The SMCL for these parameters may be a single value, or a range, with a lower (recommended) and upper threshold. As shown to the left, inorganic parameters with aesthetic-based standards are found in high concentrations in about a quarter of the principal aquifer, and in moderate concentrations in about a quarter the aquifer. Manganese and aluminum were detected above the SMCL. TDS, specific conductance, iron, aluminum, and manganese were found at moderate concentrations in localized areas.

Nitrate

Nitrate is naturally occurring in groundwater at low concentrations. However, man-made sources such as fertilizers and septic systems can impact groundwater quality. Nitrate was found above its MCL over 14% of the Coyote Valley. The source of nitrate is historical and ongoing agricultural practices and use of septic systems.

Organic Compounds

Organic compounds include Volatile Organic Compounds (VOCs) and pesticides, and are present in many household, commercial, and industrial products. As shown to the left, groundwater quality in the principal aquifer zone is excellent with respect to organic compounds. There were localized detections of some VOCs in the Coyote Valley, but none exceeding ½ their MCL.

High: greater than the MCL, SMCL, or upper SMCL threshold

Moderate: greater than ½ the MCL or SMCL, or above the lower SMCL threshold

Low: not detected, less than ½ the MCL or SMCL, or below the lower SMCL threshold

Values represent the percentage of the principal aquifer zone area with concentrations in each category based on the most recent data from 2006 to 2015.

Table 2-5. Coyote Valley Groundwater Quality Summary (2006-2015)

Parameter [1]	MCL [2]	SMCL [3]	n[4]	Results [5]		
				50th Percentile (median)	95th Percentile	IQR
Aluminum (ug/L)	1,000	200	35	11	103	23
Antimony (ug/L)	6	---	34	< 2	< 6	---
Arsenic (ug/L)	10	---	34	< 2	< 2	---
Asbestos (MFL)	7	---	6	< 0.2	< 0.2	---
Barium (ug/L)	1,000	---	34	106	220	64
Beryllium (ug/L)	4	---	33	< 1	< 1	---
Boron (ug/L)	---	---	16	110	280	87
Cadmium (ug/L)	5	---	35	< 1	< 1	---
Chloride (mg/L)	---	250	33	40	94	18
Total Chromium (ug/L)	50	---	35	2	13.4	3.2
Chromium VI (ug/L)	10	---	25	1.9	6.9	2.1
Color (Color Units)	---	15	14	1.2	6.7	2.0
Copper (ug/L)	---	1,000	31	1.5	5.2	1.6
Cyanide (ug/L)	150	---	18	< 100	< 100	---
Fluoride (mg/L)	2	---	35	0.12	0.21	0.07
Foaming Agents (MBAS) (ug/L)	---	500	13	< .05	< .1	---
Iron (ug/L)	---	300	31	17	363	55
Lead (ug/L)	---	---	33	< 5	< 5	---
Manganese (ug/L)	---	50	31	2	204	13
Mercury (ug/L)	2	---	35	< 1	< 1	---
Nickel (ug/L)	100	---	35	1.4	2.8	---
Nitrate (as N) (mg/L)	10	---	37	4.2	10.9	5.6
Nitrate + Nitrite (as N) (ug/L)	10,000	---	15	4,700	12,000	5,900
Nitrite (as N) (ug/L)	1,000	---	19	230	430	120
Odor - Threshold (Odor Units)	---	3	15	0.7	2.4	0.70
Perchlorate (ug/L)	6	---	35	< 4	< 4	---
Selenium (ug/L)	50	---	35	< 5	< 5	---
Silver (ug/L)	---	100	31	< 10	< 10	---
Specific Conductance (uS/cm)	---	600	32	580	977	143
Sulfate (mg/L)	---	250	31	38	63	22
Thallium (mg/L)	2	---	34	< 1	< 1	---
Total Dissolved Solids (mg/L)	---	500	33	360	548	104
Turbidity (NTU)	---	5	27	0.3	2.2	0.54
Zinc (ug/L)	---	5,000	31	29	110	67

Table includes District monitoring data from monitoring and domestic wells and public water system data reported to the CA Division of Drinking Water (DDW). For parameters analyzed more than once at a given well over the 10-year period, the most recent data is used.

1. mg/L = milligrams per liter; ug/L = micrograms per liter; MFL = million fibers per liter; uS/cm = microSiemens per centimeter; NTU = Nephelometric Turbidity Units

2. Maximum Contaminant Level, or health-based drinking water standard, specified in Title 22 of the California Code of Regulations.

3. Secondary Maximum Contaminant Level, or aesthetic-based standard, per DDW or US EPA. For SMCLs having a range, the lower, recommended threshold is listed.

4. n = number of wells sampled for each parameter.

5. For results with multiple reporting limits, the median, Inter quartile range (IQR) and 95th percentile were computed using the Maximum Likelihood Estimate (MLE) method.

Table 2-6. Summary of Organic Parameters Detected in the Coyote Valley (2006 to 2015)

Parameter	Primary MCL (ug/L)	Wells Tested	Percent of Wells Tested with Detection (%)	Maximum Concentration (ug/L)
Chloroform (THM)	---	30	3.3%	5.3
Toluene	150	30	3.3%	0.56
Dichloromethane (Methylene Chloride)	5	30	3.3%	1.0
Tert-Butyl Alcohol	---	22	4.5%	4.1
N-nitrosodi-n-butylamine (NDBA)	---	8	12.5%	2.3
Xylenes (Total)	1,750	20	5.0%	0.82
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon 113)	1,200	30	3.3%	2.2
Total Trihalomethanes (THMs)	80	13	7.7%	6.0

" ---" indicates no MCL is established.

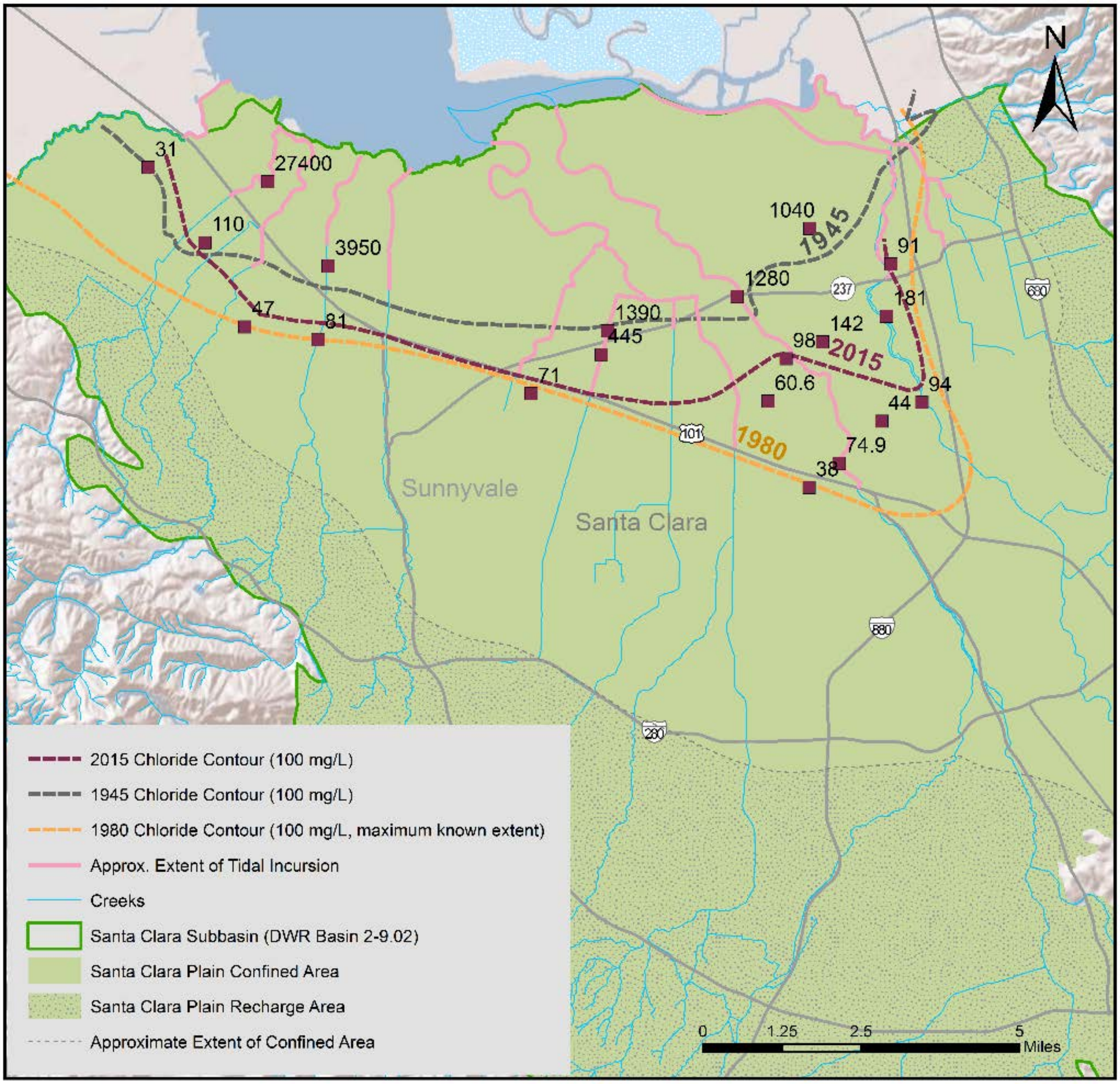
2.2.5 Salt Water Intrusion

Due to high groundwater pumping and land subsidence, particularly in the years following World War II, salt water intrusion has been observed in the shallow aquifer of the Santa Clara Plain (Figure 2-21). Saline intrusion in the shallow aquifer is attributed to incursion of sea water into the tidal reaches of creeks and subsequent transport to shallow groundwater through streambed percolation, improperly abandoned wells, cathodic protection wells, and other vertical conduits. Salt water intrusion was exacerbated by land subsidence, which decreased the elevation of the land surface adjacent to San Francisco Bay, causing further inland movement along tidal creeks. The degree of salt water intrusion in the shallow aquifer zone is gauged by the chloride content in monitoring wells located in the baylands area adjacent to southern San Francisco Bay. The District uses a chloride concentration of 100 mg/L to indicate the first sign of influence from salt water. This is a conservative threshold, since the aesthetic-based MCL for chloride is 250 mg/L.

Wells in which chloride is over 100 mg/L are located in a narrow band adjacent to the former salt evaporation ponds, except in the areas adjacent to Guadalupe River and Coyote Creek. In these areas, a larger portion of the shallow aquifer is affected due to tidal incursion in these channels that occurs due to historic land subsidence. A significant increase in chloride content is observed near the levee system that defines the former salt evaporation ponds with some samples having chloride content of several thousand parts per million.

Historically, salt water intruded only a small portion of the principal aquifer zone, and the chloride concentrations noted were relatively low. The mechanism of intrusion into the lower aquifer zone is believed to be due to inter-aquifer transfer through improperly destroyed wells or other deep borings. Presently, the monitoring network in the Baylands area has limited coverage of the principal aquifer zone.

Figure 2-21. Extent of Salt Water Intrusion in the Santa Clara Plain Shallow Aquifer Zone



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Chapter 3 – Llagas Subbasin Description

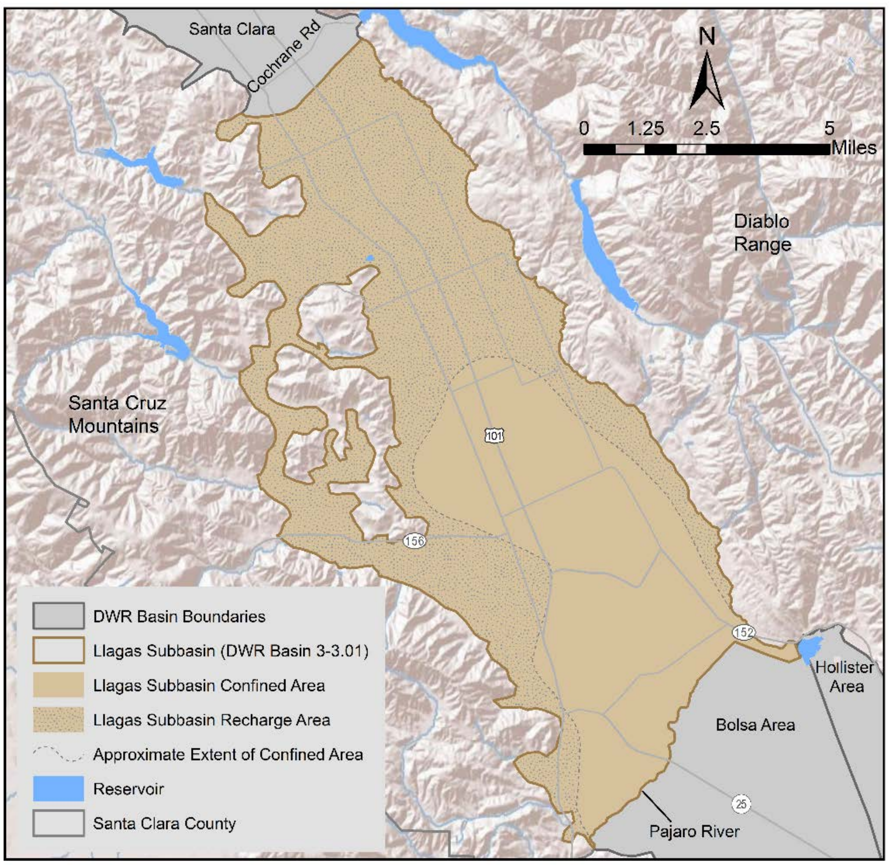
CHAPTER 3 – LLAGAS SUBBASIN DESCRIPTION

This chapter describes the Llagas Subbasin, including the physical setting and characteristics, and conditions related to groundwater elevation, water quality, land subsidence, groundwater/surface water interaction, and salt water intrusion.

3.1 BASIN SETTING

The Llagas Subbasin (DWR Basin Number 3-3.01) is located within the California Coast Ranges physiographic province between the San Andreas and Calaveras Fault zones. The subbasin is part of the larger Gilroy-Hollister Valley Groundwater Basin (Basin 3-3), which extends into San Benito County to the south. Similar to the Santa Clara Subbasin, the Llagas Subbasin underlies a relatively flat valley and consists of unconsolidated alluvial sediments.

Figure 3-1. Llagas Subbasin



3.1.1 Lateral Subbasin Boundaries

The Llagas Subbasin covers a surface area of about 88 square miles and forms a northwest-trending, elongated valley bounded by the Santa Cruz Mountains to the west and the Diablo Range to the east. The Llagas Subbasin is about 15 miles long in the northwest/southeast direction and 3 to 6 miles wide. The basis for the lateral boundary delineation is the geologic, hydrologic and topographic features in the subbasin.

The Llagas Subbasin is the northern extension of the Gilroy-Hollister Valley Groundwater Basin, which was created by offset along the major faults. The western and eastern subbasin boundaries are the geologic contact between

permeable to semi-permeable alluvial sediments within the valley and the impermeable bedrock of the adjacent mountain ranges. The Santa Cruz Mountains and Diablo Range on either side of the subbasin are primarily composed of sedimentary, metamorphic, and volcanic rocks of Jurassic, Cretaceous and Tertiary age.[47] The northern boundary with the Santa Clara Subbasin is the Coyote Creek alluvial fan in the Morgan Hill area, which forms a topographic and hydrologic divide between the groundwater and surface water flowing to the San Francisco Bay and water flowing to the Monterey Bay. The groundwater divide is approximately located at Cochrane Road area in Morgan Hill. Based on observed water level data, the boundary moves as much as a mile to the north or south depending on local groundwater conditions. The subbasin's southern boundary is institutional, coincident with the boundary between Santa Clara and San Benito counties and adjacent to the Bolsa Subbasin.

3.1.2 Recharge Areas

Like the Santa Clara Subbasin, the Llagas Subbasin has two hydrogeologic areas, the recharge area where groundwater is generally unconfined, and the confined area. The recharge area is located at the north, western, and eastern edges of the subbasin and is the area where active groundwater recharge takes place due to high lateral and vertical permeability. Fine-grained materials are not laterally continuous in the recharge area, though localized confined conditions can occur.

In the southern and central portion of the subbasin, clays and silts become more vertically and laterally extensive creating confined artesian conditions, especially in the southern portion near the Pajaro River. Within the confined area, low permeability units restrict the vertical flow of groundwater and divide the subbasin into shallow and principal aquifer zones. The boundary between the recharge and confined areas was originally defined based on flowing artesian wells.[48] The boundary is gradual and broad, and not as precise as its depiction on maps and figures implies.

3.1.3 Principal Aquifers and Aquitards

The Llagas Subbasin is a structural depression filled with Quaternary alluvium deposits of unconsolidated gravel, sand, silt and clay that eroded from adjacent mountain ranges by flowing water and were deposited into the valley (Figure 3-2). As in the Santa Clara Subbasin, the alluvium comprises interfingering alluvial fans, stream deposits and terrace deposits.

The Llagas Subbasin is comprised of unconsolidated alluvial sediments, with intercalated and discontinuous layers of gravel and sand (aquifer materials) and clay and silt (confining units) at various depths beneath the ground surface. The subbasin ranges in thickness from about 500 feet at the northern boundary to over 1,000 feet thick beneath the Pajaro River. The major aquitard forming the regional confining layer is commonly encountered between 20 and 100 feet below ground surface, and ranges in thickness from 40 to 100 feet.[49] Shallow aquifer zones generally refer to aquifers that occur within 150 feet of ground surface, while principal aquifer zones generally occur at depths below 150 feet. Cross-sections of the Llagas Subbasin are presented in Figures 3-3 through 3-6.

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[47] Graymer, et al., Geologic Map of the San Francisco Bay Region, 2006.
[48] Clark, Ground Water in Santa Clara Valley, California, 1924.
[49] Santa Clara Valley Water District, Standards for the Construction and Destruction of Wells and Other Deep Excavations in Santa Clara County, 1989.

Figure 3-2. Quaternary Alluvium Geologic Map of the Llagas Subbasin

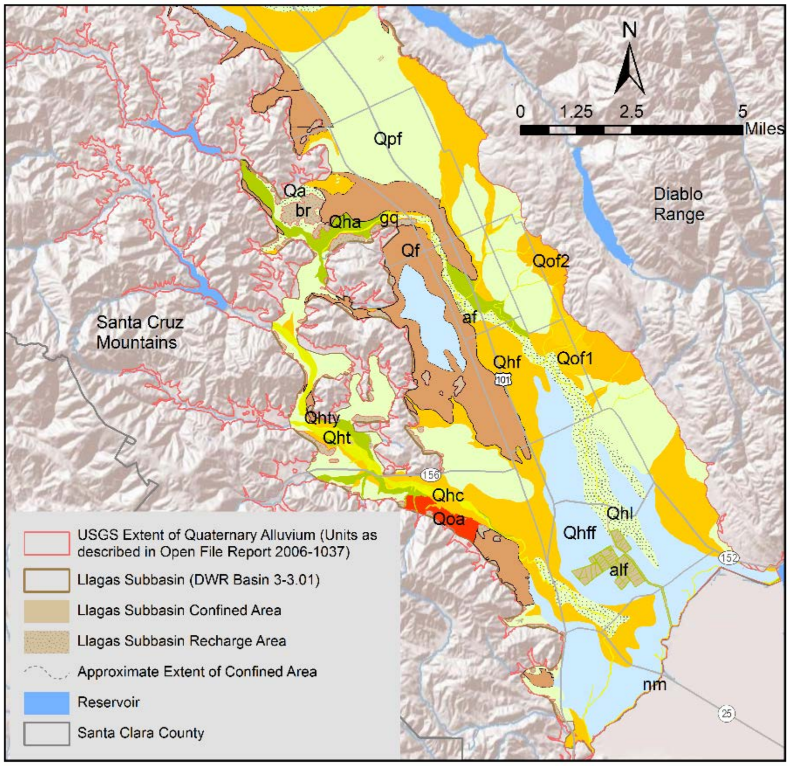


Figure 3-3. Llagas Subbasin Cross-Section Locations

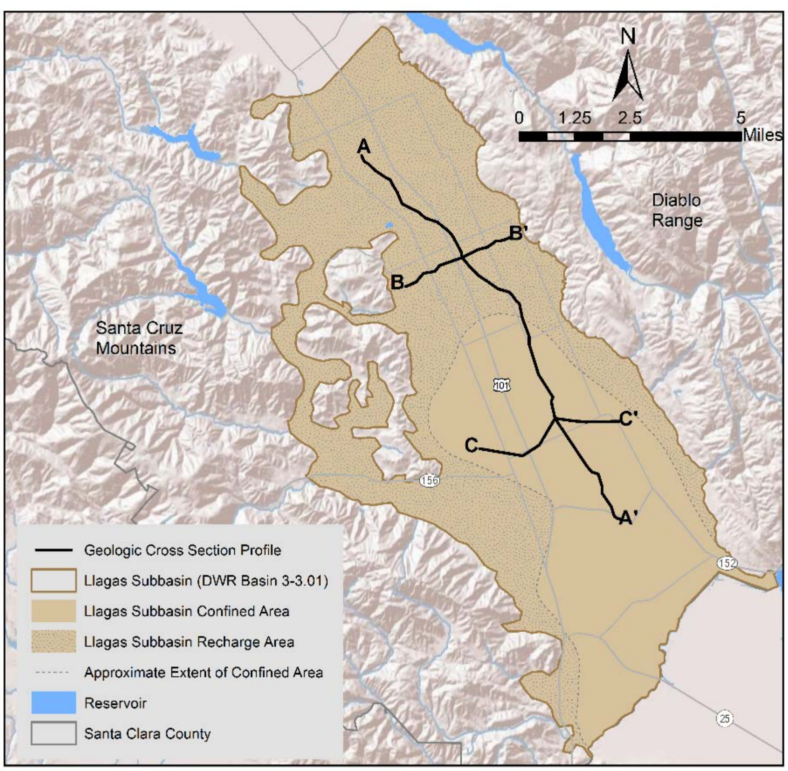


Figure 3-4. Llagas Subbasin Longitudinal Cross-Section

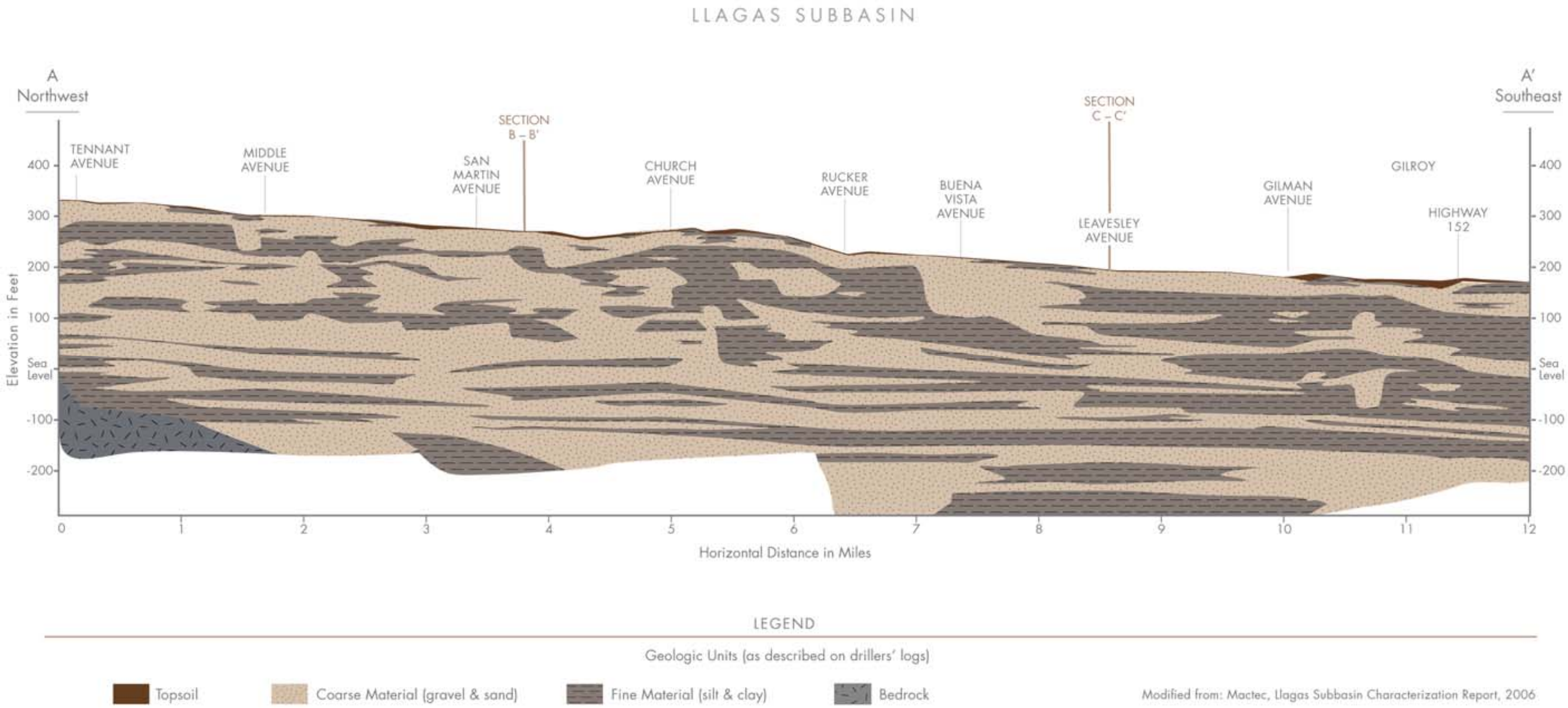


Figure 3-5. Llagas Subbasin Northern Transverse Cross-Section

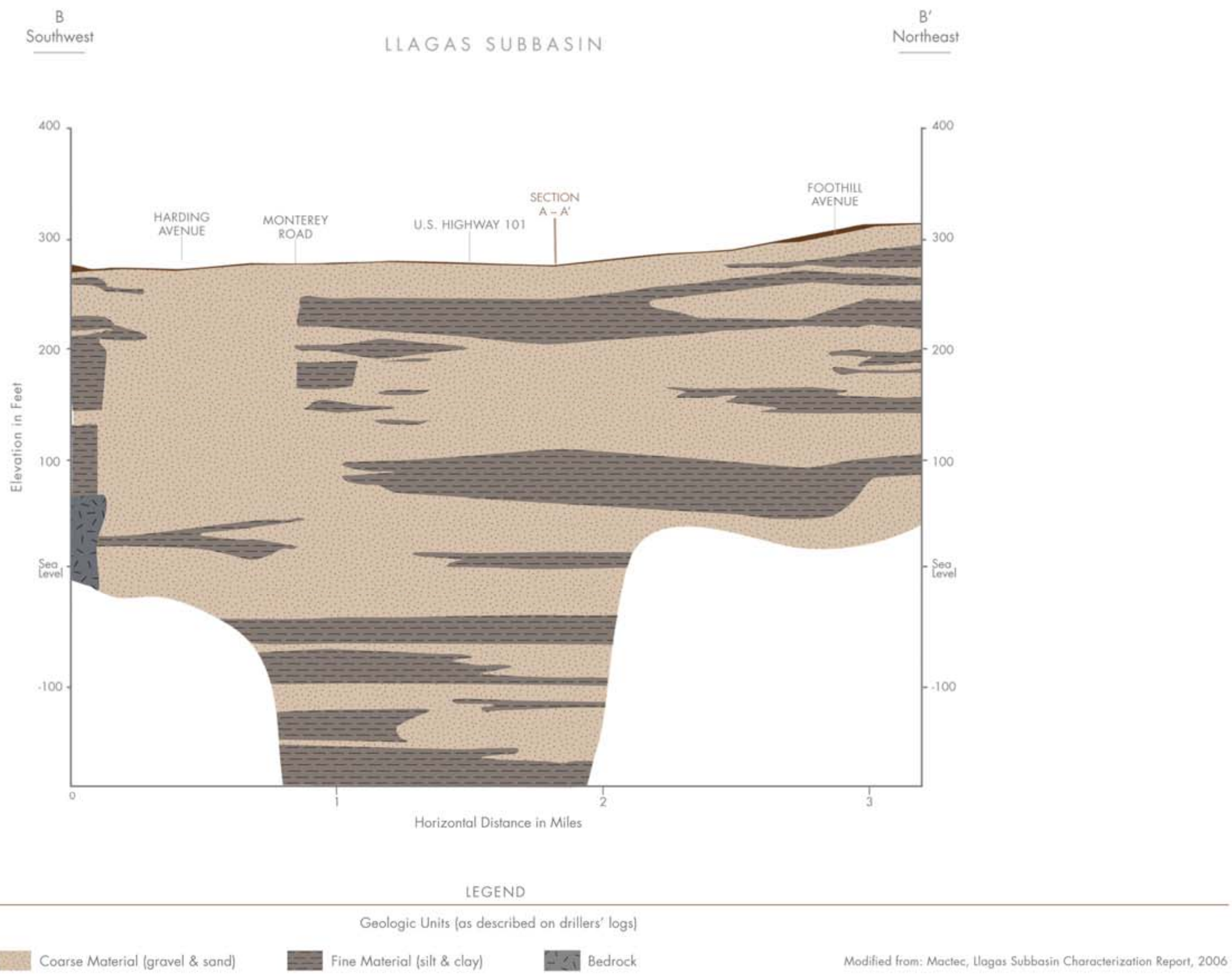
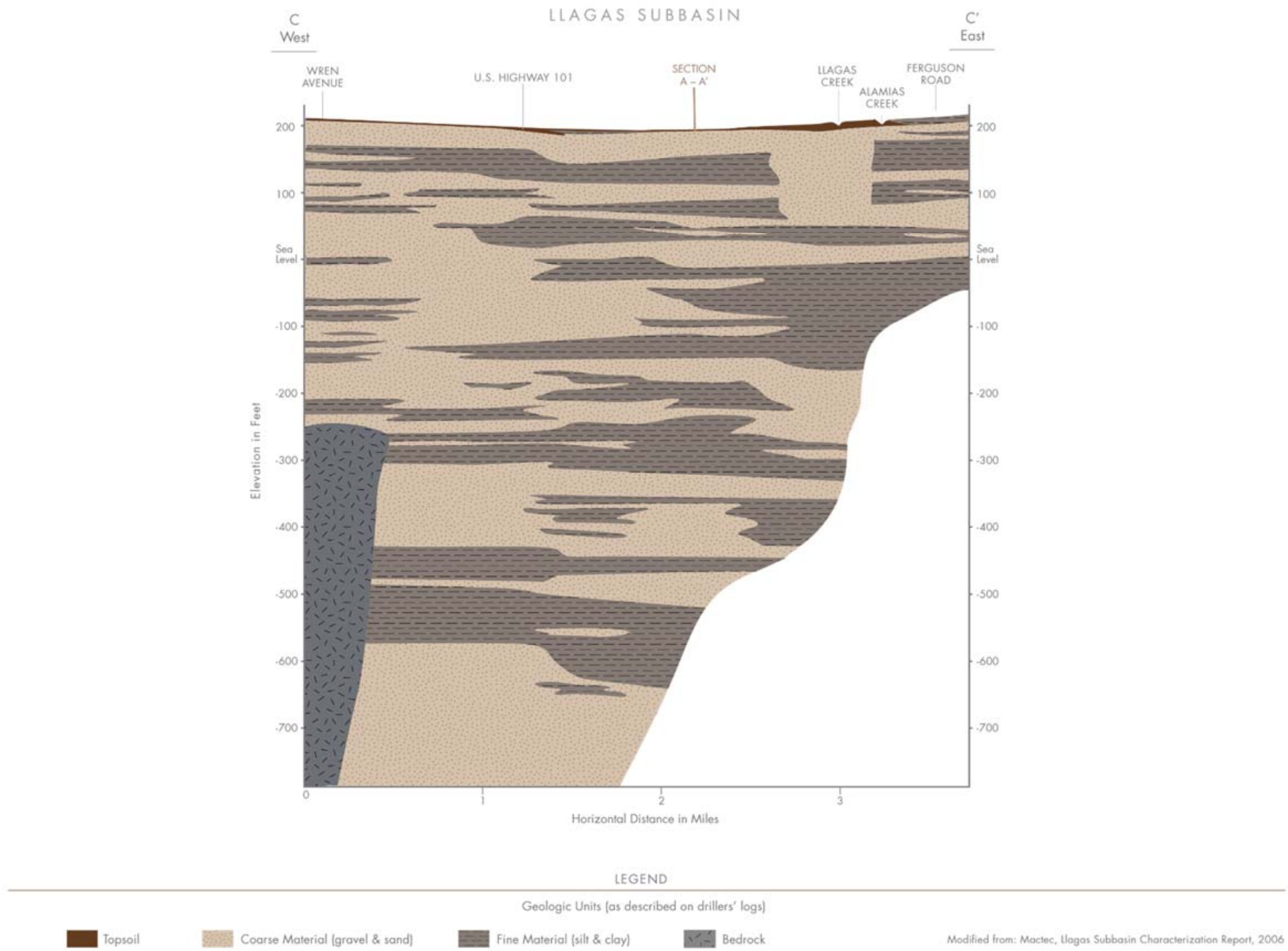


Figure 3-6. Llagas Subbasin Southern Transverse Cross-Section



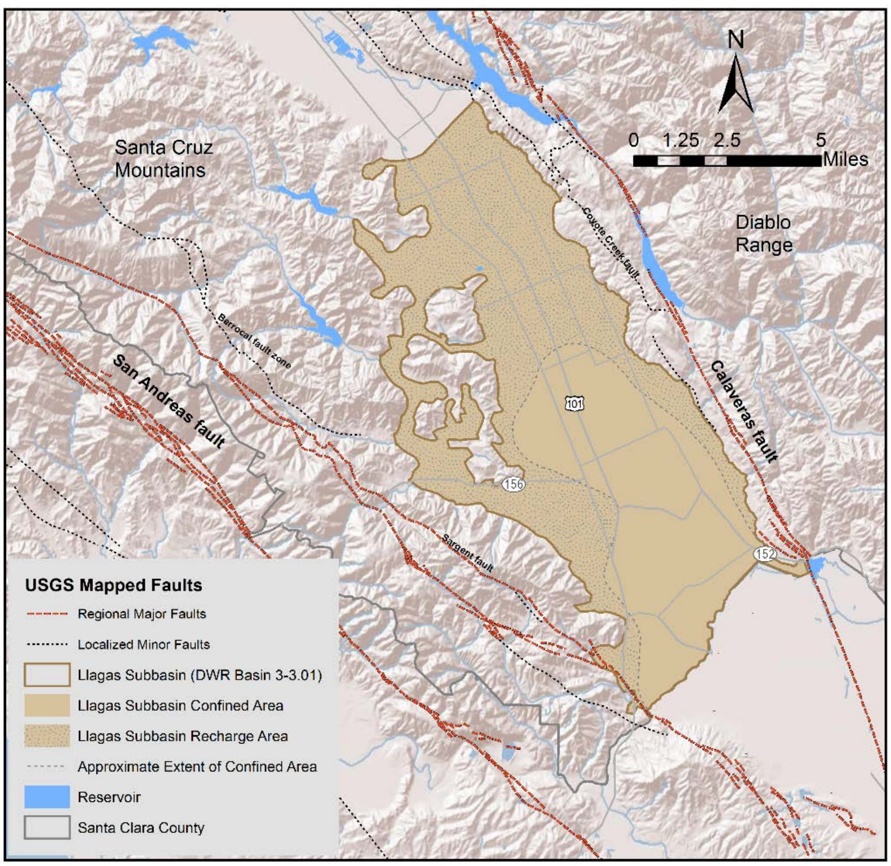
3.1.4 Subbasin Bottom

The bottom of the Llagas Subbasin is the geologic contact between unconsolidated alluvium and bedrock, an irregular surface occurring at varying depths. The alluvium thickness ranges from a few feet at the western and eastern edges of the subbasin to about 500 feet at the apex of the Coyote Creek alluvial fan in Morgan Hill and deepens to over 1,000 feet beneath the Pajaro River. Based on available drillers logs, most water supply and groundwater monitoring wells do not encounter bedrock, including a well recently drilled to a depth 1,015 feet at the southern center of the subbasin. Borehole data suggest that the depth to bedrock is highly variable throughout the subbasin.

3.1.5 Major Faults

Major northwest trending faults flank the structural trough that is the Llagas Subbasin, including the San Andreas Fault system in the Santa Cruz Mountains and the Calaveras and Coyote Creek Faults east of the subbasin in the Diablo Range (Figure 3-7).

Figure 3-7. Major Faults



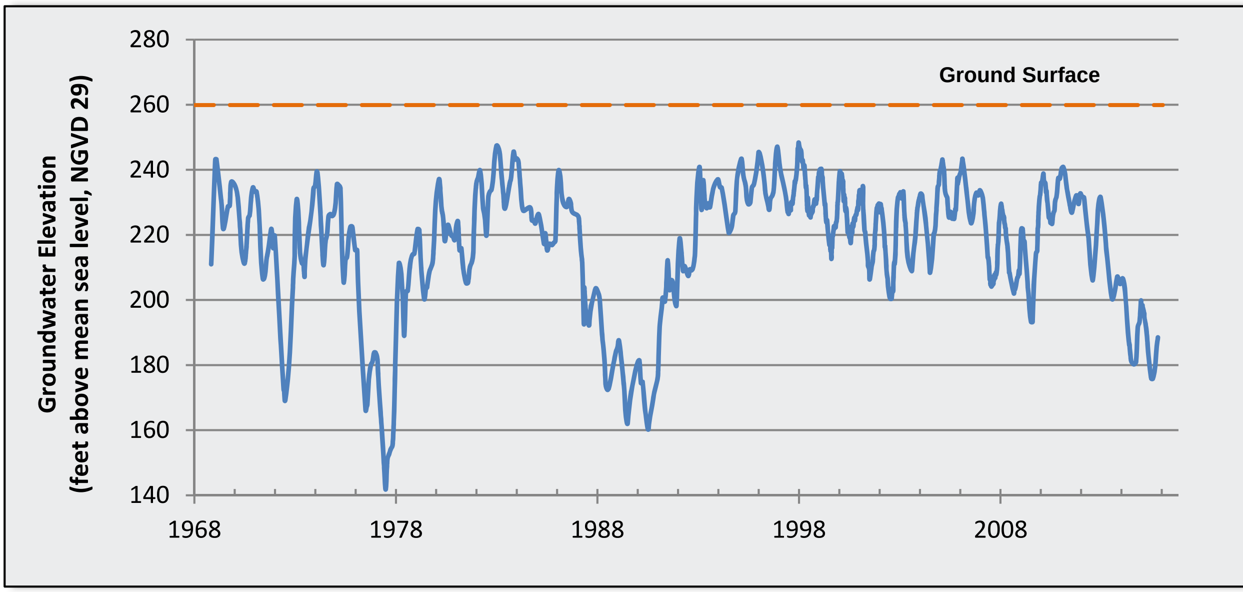
3.2 SUBBASIN CONDITIONS

This section describes Llagas Subbasin conditions with regard to groundwater elevation, flow, quality, land subsidence, surface water/groundwater interaction, and salt water intrusion.

3.2.1 Groundwater Elevation and Flow

Groundwater movement in the Llagas Subbasin generally follows surface water patterns, draining south toward the Pajaro River at the boundary with San Benito County. Locally, groundwater also moves toward areas of intense pumping. Vertical gradients in the subbasin are predominately downward, although several monitoring wells at the southern end of the subbasin are flowing artesian. Historic marshes located east of Gilroy and south of Pacheco Highway indicate an area of upward flow and groundwater discharge. Figure 3-8 is a long-term hydrograph for a regional index wells in the Llagas Subbasin.

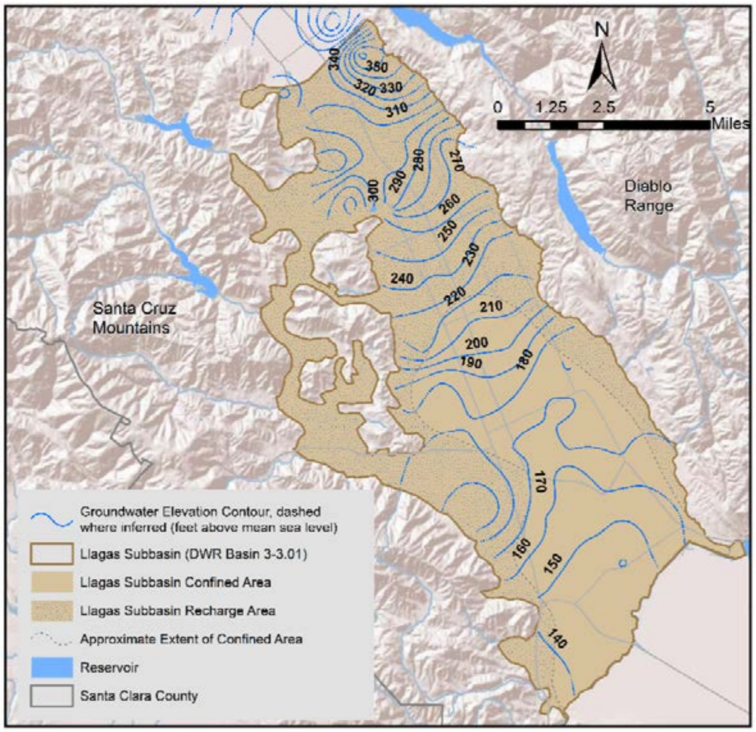
Figure 3-8. Groundwater Elevation in the Llagas Subbasin Regional Index Well (10S03E13D003)



Groundwater elevation contour maps depict the groundwater table or potentiometric surface associated with spring 2012 (Figure 3-9) and fall 2012 (Figure 3-10) for the Llagas Subbasin. Groundwater flows from north to south or slightly southeast, generally following the topography. The groundwater elevation is highest near Cochrane Road in Morgan Hill in the north, while the lowest elevation is typically found in the southernmost part of the subbasin near the Pajaro River. In the upper part of the subbasin, there are some flows from mountain or hill areas.

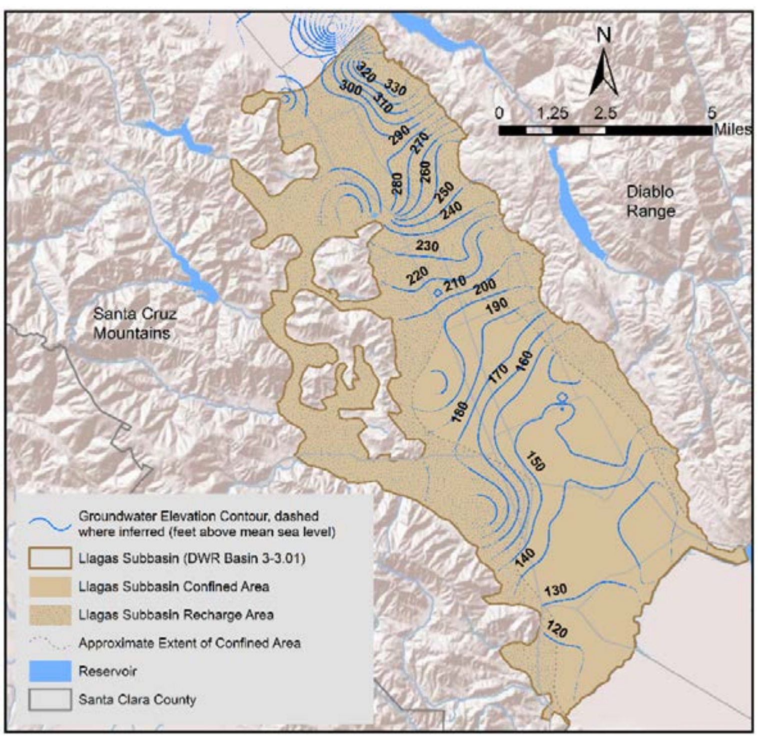
As indicated by the contour maps, typical seasonal patterns result in higher groundwater elevations in the spring and lower elevations in the fall. Contour maps for 2012 are included since 2012 represents the most recent year where water levels were not significantly affected by the extended drought. Recent groundwater elevation contours are included in the District's Annual Groundwater Report for 2015.

Figure 3-9. Spring 2012 Groundwater Elevation Contours



Note: 2012 chosen to represent typical groundwater elevations not significantly impacted by extended drought.

Figure 3-10. Fall 2012 Groundwater Elevation Contours



Note: 2012 chosen to represent typical groundwater elevations not significantly impacted by extended drought.

3.2.2 Land Subsidence

Inelastic land subsidence has not been observed in the Llagas Subbasin. The District partnered with U.C. Berkeley researchers to use satellite imagery (InSAR) to evaluate the potential for subsidence in the Llagas Subbasin.[50] Using satellite imagery from 1992 to 2000, they concluded that there was no evidence of long-term subsidence. Seasonal ground surface movement was observed; rising and lowering by the same amount between the wet and dry seasons.

3.2.3 Surface Water and Groundwater Interaction

The District's managed recharge program includes significant recharge through many miles of stream channels over the recharge area, indicating groundwater and surface water generally are disconnected in these reaches. As described further below, the managed recharge program helps to maintain flows in these creeks, most of which would flow only intermittently otherwise. The District is not aware of any areas where groundwater pumping has a significant or unreasonable effect on interconnected surface water.

The District has a comprehensive surface water monitoring network to measure creek flows, comply with water rights reporting and reservoir restrictions, and meet environmental requirements. Stream gauging by the District is discussed in Chapter 7. Surface water flow data can be used to evaluate which reaches of streams are gaining or losing streams with regard to groundwater. However, the District has not performed a comprehensive evaluation of the data for this purpose.

The portions of the Llagas Subbasin that are most likely to have surface water/groundwater interaction can be inferred through historical ecology maps prepared by the SFEI and the depth to shallow groundwater.[51] Figure 3-11 presents the historical ecology which maps areas such as wetlands, marshes, and willow groves that may be associated with shallow groundwater.[52] Some of these areas may have been present due to poorly draining soils rather than surface water/groundwater interaction. It is also important to note that this was the historical distribution prior to development and does not represent current or even recent conditions. The Uvas-Carnadero wetlands are located in the southwestern corner of the Llagas Subbasin. This area is the exit for all groundwater flowing towards San Benito County. Groundwater upwells in this area and maintains the wetlands. Along the southeast side of the Llagas Subbasin in the Soap Lake area is another large area of wetlands. The wetlands in this area are believed to be primarily due to flooding and poorly draining soils.

Figure 3-12 presents the extent of shallow groundwater in the Llagas Subbasin. This map shows the minimum depth to shallow groundwater (shallow groundwater condition) based on monitoring data from leaking underground storage tank investigations. Surface water/groundwater interactions would be most expected in the areas exhibiting a shallow depth to groundwater.

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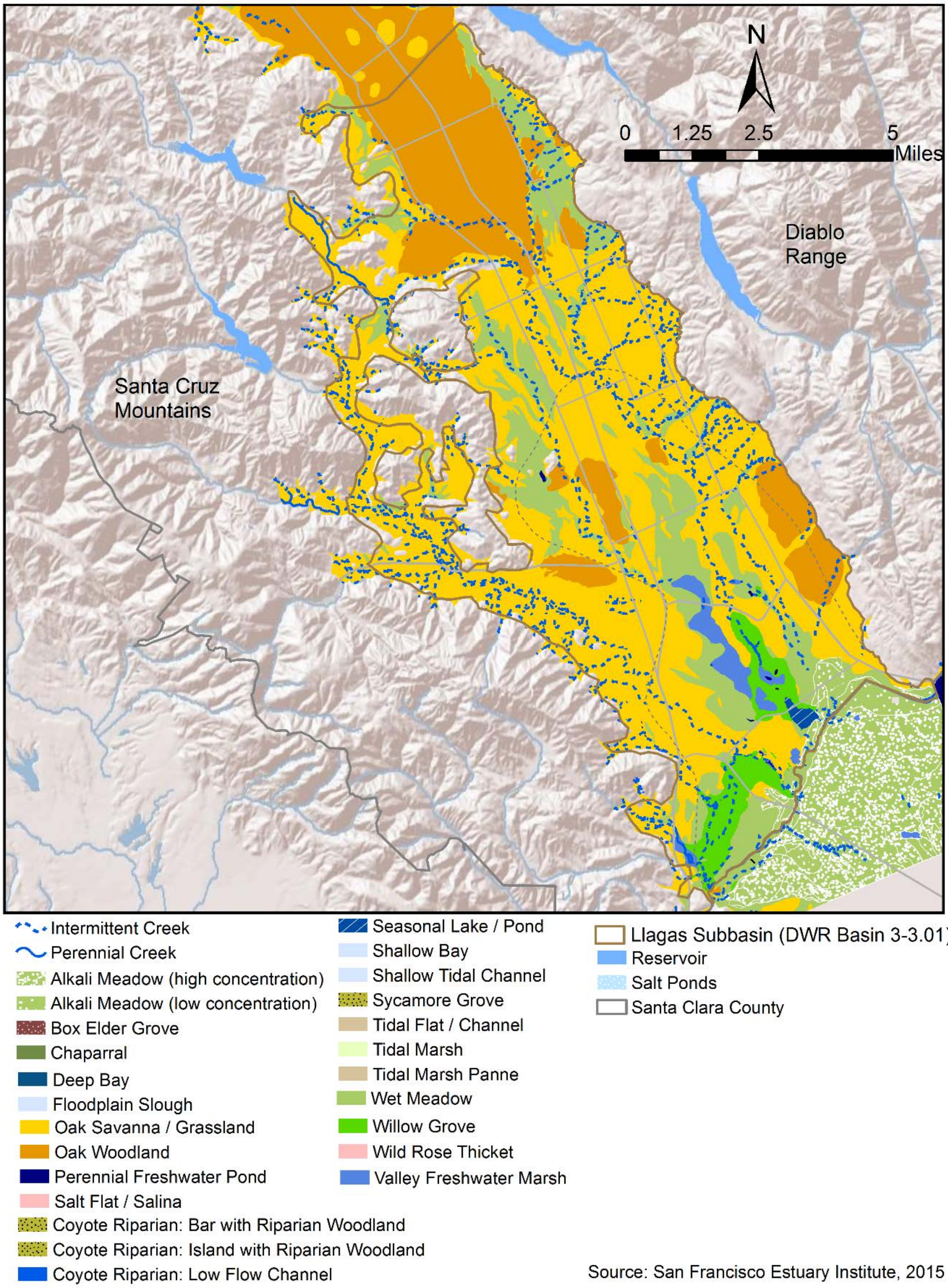
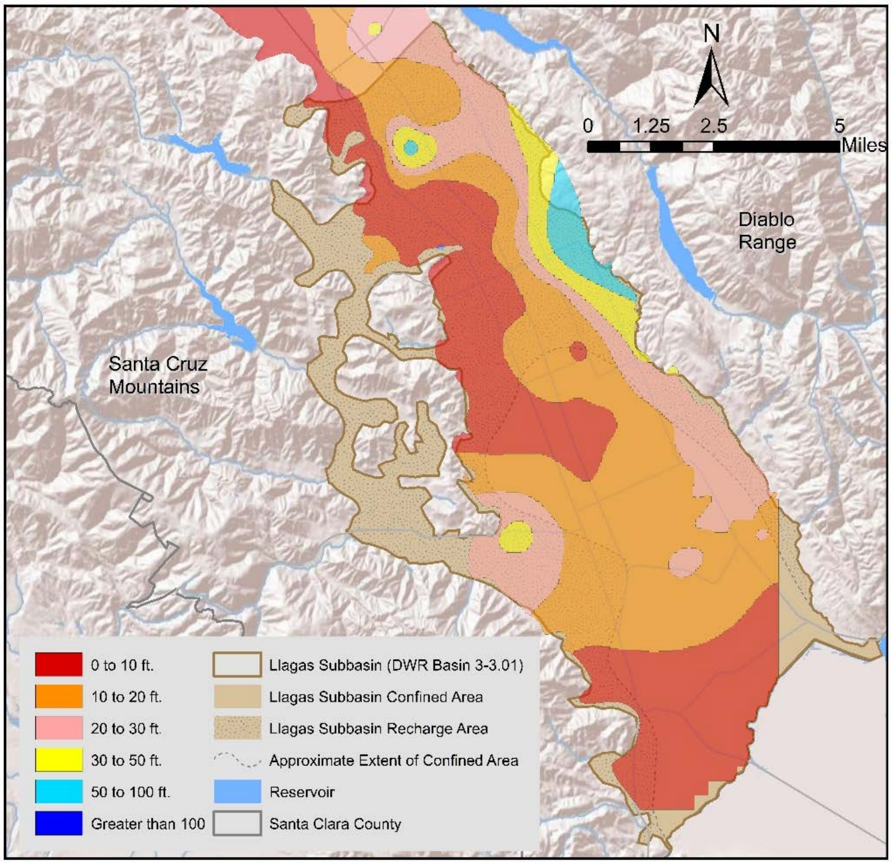
[50] Bürgmann and Johanson, South County Subsidence Study – Phase I and Phase II, University of California, Berkeley, 2005.
[51] SCVWD, GIS Coverage of Depth to First Groundwater, 2003.
[52] Grossinger et al., South Santa Clara Valley Historical Ecology Study, including Soap Lake, the Upper Pajaro River, and Llagas, Uvas-Carnadero, and Pacheco Creeks, 2008.

Figure 3-11. Llagas Subbasin Historical Ecology



Source: San Francisco Estuary Institute, 2015

Figure 3-12. Depth to First Groundwater in Llagas Subbasin



Based on most shallow water encountered at leaking underground storage tank sites as of 2003.

3.2.4 Groundwater Quality

The District has monitored and evaluated groundwater quality in the Llagas Subbasin for decades, with regular testing since the 1980s. Water quality data presented and summarized in this section represents data from the last ten-year period (2006-2015) collected by the District and other agencies. The primary source for data collected by other agencies is compliance sampling for public water supply wells submitted by water retailers to the State DDW. The District's groundwater monitoring and evaluation allows for an appraisal of current conditions and offers a consistent basis for detecting near-term and long-term trends.

The Llagas Subbasin generally produces groundwater of good quality that does not need treatment beyond disinfection at public water supply wells. However, the presence of elevated nitrate and perchlorate is an ongoing groundwater protection challenge, particularly in domestic wells, as presented in Figure 3-13 and described further in this section. Figures 3-14 and 3-15 show the relative concentrations of inorganic parameters with health-based MCLs (including nitrate and perchlorate) and aesthetic-based SMCLs[53] for the period 2006 to 2015 in the principal aquifer. Calcium, magnesium, and bicarbonate are the dominant dissolved constituents in the Llagas Subbasin.

[53] Maximum Contaminant Levels are health-based drinking water standards established by the California Division of Drinking Water or U.S. Environmental Protection Agency. Secondary MCLs are aesthetic-based standards established by these agencies to address aesthetic issues such as taste and odor. Figures 3-14 and 3-15 show only those inorganic parameters detected in moderate or high concentrations relative to the MCL or SMCL.

Variation from this includes groundwater with sodium bicarbonate and mixed cation-mixed anion character. The principal aquifer zone median TDS concentration was 371 mg/L in 2015.

Summary statistics for the Llagas Subbasin shallow and principal aquifer zones are presented in Tables 3-1and 3-2, respectively. These tables include only those parameters with a health-based MCL or aesthetic-based SMCL. Many parameters have been analyzed more than once at a particular well over the ten-year analysis period; in these cases, the most recent data is used. Tables 3-3 and 3-4 present the organic chemicals detected between 2006 and 2015 in the shallow and principal aquifers, respectively. Although some organic chemicals are detected in the Llagas Subbasin, detections are infrequent and are typically low concentrations.

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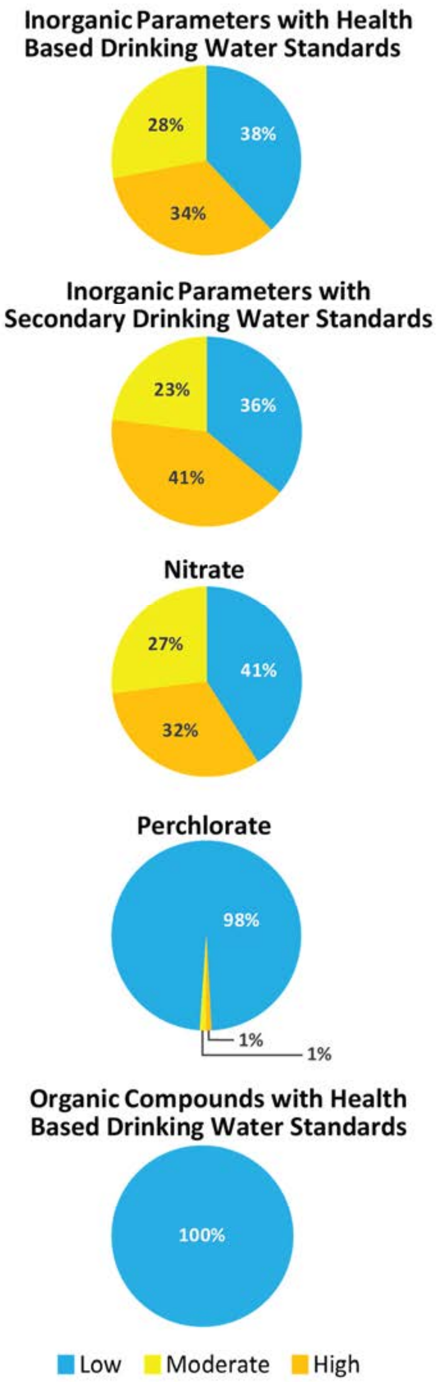
Figure 3-13. Llagas Subbasin Frequency of Drinking Water Standard Exceedances (2006-2015)



Inorganic Parameters

Inorganic parameters include trace elements (such as metals), major ions, nutrients, and radioactive parameters. These constituents are typically naturally occurring in the Llagas, leaching from rocks and sediments in contact with groundwater. Man-made sources include industrial and manufacturing facilities.

Water quality in principal aquifers is generally good for inorganic parameters with regard to health-based parameters, with the exception of nitrate, which is described further below. Perchlorate was detected above the MCL in one well sampled by the District or public water suppliers.

While health-based drinking water standards have been established for many inorganic parameters, some constituents also have secondary MCLs based on their ability to affect the aesthetic properties of water through taste, color, odor, or by causing staining or scale formation. The SMCL for these parameters may be a single value, or a range, with a lower (recommended) and upper threshold. As shown to the left, inorganic parameters with aesthetic-based standards are found in high concentrations in about a quarter of the principal aquifer, and in moderate concentrations in about 40% of the aquifer. Aluminum, iron, manganese, and specific conductance were detected above the SMCL.

Nitrate

Nitrate is naturally occurring in groundwater at low concentrations. However, man-made sources such as fertilizers and septic systems have impacted groundwater quality in the Llagas Subbasin and many other areas of California. Nitrate was detected above the MCL over a wide area of the Llagas Subbasin due to historic and ongoing agricultural use and septic systems. Nearly all detections of nitrate above the MCL occurred in domestic wells, which are not subject to regular testing or state drinking water standards. The District works with local stakeholders and regulatory agencies to reduce nitrate loading to groundwater and to reduce well owner exposure to elevated nitrate in drinking water.

Perchlorate

The occurrence of perchlorate in the Llagas Subbasin from a former highway safety flare plant has been substantially reduced due to ongoing managed recharge, removal of perchlorate from the source area, and ongoing remediation efforts. The perchlorate plume, which once extended about 10 miles from Morgan Hill to Gilroy, now extends approximately 3 miles to the San Martin Airport. Fewer than 10 domestic wells require treatment systems or replacement water.

Organic Compounds

Organic compounds include Volatile Organic Compounds (VOCs) and pesticides, and are present in many household, commercial, and industrial products. As shown to the left, groundwater quality in the principal aquifer zone is excellent with respect to organic compounds. There were some localized detections of VOCs in the Llagas Subbasin, but none were above ½ the MCL.

High: greater than the MCL, SMCL, or upper SMCL threshold

Moderate: greater than ½ the MCL or SMCL, or above the lower SMCL threshold

Low: not detected, less than ½ the MCL or SMCL, or below the lower SMCL threshold

Values represent the percentage of the principal aquifer zone area with concentrations in each category based on the most recent data from 2006 to 2015.

Figure 3-14. Llagas Subbasin Principal Aquifer Concentrations Relative to Primary Drinking Water Standards (2006-2015)

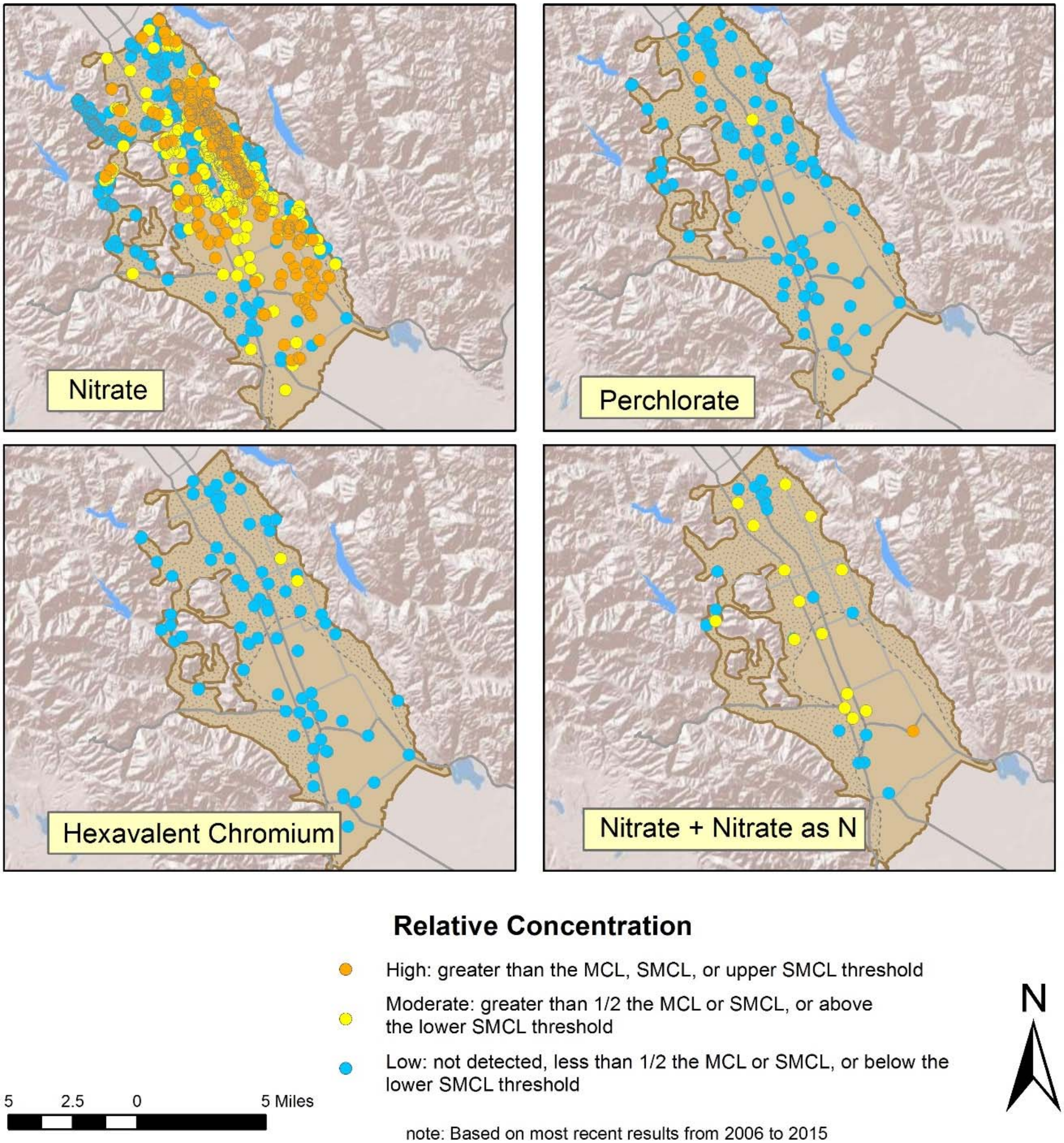


Figure 3-15. Llagas Subbasin Principal Aquifer Concentrations Relative to Secondary Drinking Water Standards (2006-2015)

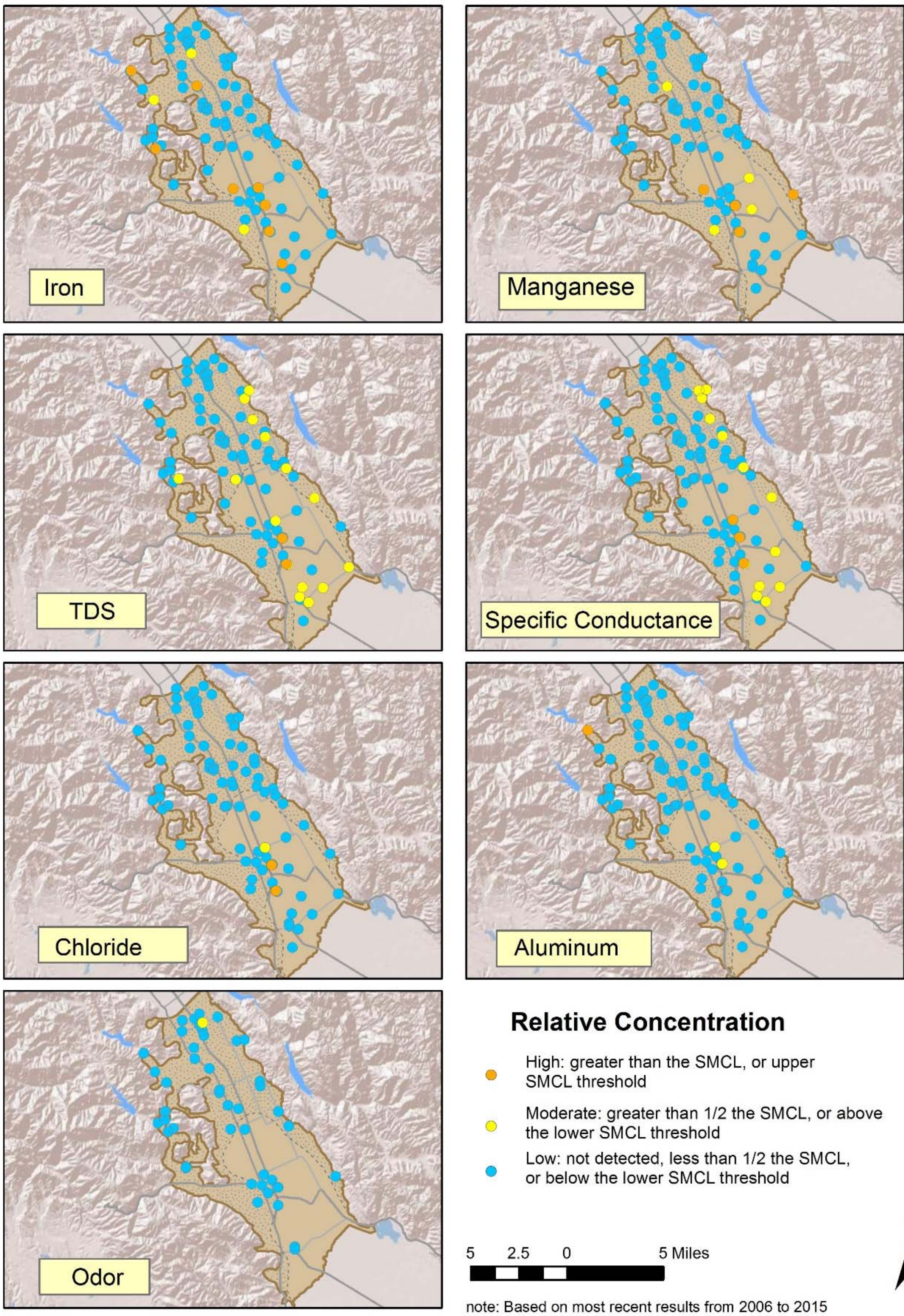


Table 3-1. Llagas Subbasin Shallow Aquifer Zone Water Quality Summary (2006-2015)

Parameter[1]	MCL[2]	SMCL[3]	n[4]	Results[5]		
				50th Percentile (median	95th Percentile	IQR
Aluminum (ug/L)	1,000	200	28	29	133	39
Antimony (ug/L)	6	---	28	< 2	< 2	---
Arsenic (ug/L)	10	---	28	< 2	< 2	---
Asbestos (MFL)	7	---	0	---	---	---
Barium (ug/L)	1,000	---	28	100	365	112
Beryllium (ug/L)	4	---	28	< 1	< 1	---
Boron (ug/L)	---	---	28	116	308	173
Cadmium (ug/L)	5	---	28	< 1	< 1	---
Chloride (mg/L)	---	250	28	38	168	43
Total Chromium (ug/L)	50	---	28	1.4	6.4	1.9
Chromium VI (ug/L)	10	---	13	1.1	3.4	1.1
Color (Color Units)	---	15	0	---	---	---
Copper (ug/L)	---	1,000	28	2.2	6.8	2.1
Cyanide (ug/L)	150	---	0	---	---	---
Fluoride (mg/L)	2	---	28	0.09	0.18	0.08
Foaming Agents (MBAS) (ug/L)	---	500	0	---	---	---
Iron (ug/L)	---	300	28	13	180	34
Lead (ug/L)	---	---	28	0.15	1.1	0.27
Manganese (ug/L)	---	50	28	3.0	99	12
Mercury (ug/L)	2	---	28	< 1	< 1	---
Nickel (ug/L)	100	---	28	2.2	11	3.1
Nitrate (as N) (mg/L)	10	---	28	10.7	43.2	12.7
Nitrate + Nitrite (as N) (ug/L)	10,000	---	0	---	---	---
Nitrite (as N) (ug/L)	1,000	---	0	---	---	---
Odor - Threshold (Odor Units)	---	3	0	---	---	---
Perchlorate (ug/L)	6	---	28	< 4	< 4	---
Selenium (ug/L)	50	---	28	< 5	< 5	---
Silver (ug/L)	---	100	28	< 1	< 10	---
Specific Conductance (uS/cm)	---	600	27	709	1,340	488
Sulfate (mg/L)	---	250	28	52	142	49
Thallium (mg/L)	2	---	28	< 1	< 1	---
Total Dissolved Solids (mg/L)	---	500	28	461	813	212
Turbidity (NTU)	---	5	24	0.27	4.1	1.1
Zinc (ug/L)	---	5,000	28	1.8	40	5.9

Table includes District monitoring data from monitoring and domestic wells and public water system data reported to the CA Division of Drinking Water (DDW). The shallow aquifer zone is represented by wells primarily drawing water from depths less than 150 feet. For parameters analyzed more than once at a given well over the 10-year period, the most recent data is used.

1. mg/L = milligrams per liter; ug/L = micrograms per liter; MFL = million fibers per liter; uS/cm = microSiemens per centimeter; NTU = Nephelometric Turbidity Units
2. Maximum Contaminant Level, or health-based drinking water standard, specified in Title 22 of the California Code of Regulations.
3. Secondary Maximum Contaminant Level, or aesthetic-based standard, per DDW or US EPA. For SMCLs having a range, the lower, recommended threshold is listed.
4. n = number of wells sampled for each parameter.
5. For results with multiple reporting limits, the median, Inter quartile range (IQR) and 95th percentile were computed using the Maximum Likelihood Estimate (MLE) method.

Table 3-2. Llagas Subbasin Principal Aquifer Zone Water Quality Summary (2006-2015)

Parameter[1]	MCL[2]	SMCL[3]	n[4]	Results[5]		
				50th Percentile (median	95th Percentile	IQR
Aluminum (ug/L)	1,000	200	99	14	66	19
Antimony (ug/L)	6	---	99	< 2	< 6	---
Arsenic (ug/L)	10	---	94	0.60	2.4	0.72
Asbestos (MFL)	7	---	8	< 0.2	< 0.2	---
Barium (ug/L)	1,000	---	96	99	305	95
Beryllium (ug/L)	4	---	93	< 1	< 1	---
Boron (ug/L)	---	---	46	111	304	94
Cadmium (ug/L)	5	---	98	< 1	< 1	---
Chloride (mg/L)	---	250	92	42	158	35
Total Chromium (ug/L)	50	---	99	1.5	6.7	2.0
Chromium VI (ug/L)	10	---	78	1.2	3.1	1.6
Color (Color Units)	---	15	43	0.58	15	2.0
Copper (ug/L)	---	1,000	90	2.4	22	5.0
Cyanide (ug/L)	150	---	59	< 100	< 100	---
Fluoride (mg/L)	2	---	99	0.08	0.29	0.09
Foaming Agents (MBAS) (ug/L)	---	500	46	0.01	0.10	0.02
Iron (ug/L)	---	300	94	11	551	52
Lead (ug/L)	---	---	98	< 5	< 5	---
Manganese (ug/L)	---	50	90	2.2	71	8.6
Mercury (ug/L)	2	---	98	< 1	< 1	---
Nickel (ug/L)	100	---	98	0.95	5.1	1.4
Nitrate (as N) (mg/L)	10	---	118	5.6	14.2	7.1
Nitrate + Nitrite (as N) (ug/L)	10,000	---	36	3,950	11,400	3,525
Nitrite (as N) (ug/L)	1	---	71	< 0.400	< 0.400	---
Odor - Threshold (Odor Units)		3	49	0.90	1.2	0.20
Perchlorate (ug/L)	6	---	106	< 4	<4	---
Selenium (ug/L)	50	---	98	< 5	< 5	---
Silver (ug/L)	---	100	91	< 10	< 10	---
Specific Conductance (uS/cm)	---	600	105	590	1,216	227
Sulfate (mg/L)	---	250	91	35	87	13
Thallium (mg/L)	2	---	99	< 1	< 1	---
Total Dissolved Solids (mg/L)	---	500	93	370	759	137
Turbidity (NTU)	---	5	87	0.30	3.6	0.70
Zinc (ug/L)	---	5,000	92	6.9	120	20

Table includes District monitoring data from monitoring and domestic wells and public water system data reported to the CA Division of Drinking Water (DDW). The principal aquifer zone is represented by wells primarily drawing water from depths greater than 150 feet. For parameters analyzed more than once at a given well over the 10-year period, the most recent data is used.

1. mg/L = milligrams per liter; ug/L = micrograms per liter; MFL = million fibers per liter; uS/cm = microSiemens per centimeter; NTU = Nephelometric Turbidity Units
2. Maximum Contaminant Level, or health-based drinking water standard, specified in Title 22 of the California Code of Regulations.
3. Secondary Maximum Contaminant Level, or aesthetic-based standard, per DDW or US EPA. For SMCLs having a range, the lower, recommended threshold is listed.
4. n = number of wells sampled for each parameter.
5. For results with multiple reporting limits, the median, Inter quartile range (IQR) and 95th percentile were computed using the Maximum Likelihood Estimate (MLE) method.

Table 3-3. Llagas Subbasin Shallow Aquifer Zone Organic Parameter Detections (2006-2015)

Parameter	Primary MCL (ug/L)	Wells Tested	Percent of Wells Tested with Detection (%)	Maximum Concentration (ug/L)
Chloroform (THM)	---	26	8	18
1,1,1-Trichloroethane	200	26	4	0.80
Methyl-Tert-Butyl-Ether (MTBE)	13	26	4	0.70
N-Nitrosodi-n-butylamine (NDBA)	---	20	10	3.4

The shallow aquifer zone is represented by wells primarily drawing water from depths less than 150 feet.
"---" indicates there is no established MCL.

Table 3-4. Llagas Subbasin Principal Aquifer Zone Organic Parameter Detections (2006-2015)

Parameter	Primary MCL (ug/L)	Wells Tested	Percent of Wells Tested with Detection (%)	Maximum Concentration (ug/L)
Bromodichloromethane (THM)	---	90	1	2.2
Bromoform(THM)	---	90	4	3.6
Dibromochloromethane (THM)	---	90	4	3.3
Chloroform (THM)	---	90	1	1.0
Chloromethane	---	88	1	0.97
N-Nitrosodimethylamine (NDMA)	---	23	4	2.1
Tetrachloroethene (Perchloroethene)	5	90	3	4.2
1,2-Dichloropropane	5	90	1	1.1
Dichlorodifluoromethane (Freon 12)	---	88	1	0.9
Trichloroethene	5	90	1	21
Tert-Butyl Alcohol	---	87	2	3.9
N-Nitrosodi-n-butylamine(NDBA)	---	23	22	6.2
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon 113)	1,200	90	2	3.9
Total Trihalomethanes (THM)	80	18	22	9.7

The principal aquifer zone is represented by wells primarily drawing water from depths greater than 150 feet.

"---" indicates there is no established MCL.

3.2.5 Salt Water Intrusion

There are no salt water bodies near the Llagas Subbasin, so no salt water intrusion has been observed and the subbasin is not vulnerable to salt water intrusion.

Chapter 4 – Water Supplies, Demands and Budget

CHAPTER 4 – WATER SUPPLIES, DEMANDS AND BUDGET

This section presents information on current water demands, supplies, and groundwater budget for the Santa Clara and Llagas subbasins, as well as future demands.

4.1 COUNTYWIDE WATER SUPPLY SOURCES

Santa Clara County has a diverse water supply portfolio, with sources including local surface water, natural groundwater, imported water, and recycled water.

4.1.1 Local Surface Water

The District currently has 20 appropriative water rights licenses and 1 filed water right permit with the State Water Resources Control Board totaling over 227,000 acre-feet per year (AFY). Local rainfall runoff is captured in the District's reservoirs and is sent to drinking water treatment plants or diverted downstream for groundwater recharge. The total storage capacity of the District's reservoirs is about 169,000 AF, though several are operating at restricted capacity due to seismic stability concerns. Table 4-1 summarizes reservoir capacities, restrictions, and impacts from restrictions.

Table 4-1. Santa Clara County Reservoir Capacities

Reservoir/ Dam	Reservoir Capacity (Acre-feet)	Restricted Capacity (Acre-feet)	Restricted Capacity (%)	Use
Anderson	90,373	61,810	68	Groundwater recharge, Treated for drinking water
Coyote	23,244	12,382	53	Groundwater recharge, Treated for drinking water
Almaden	1,586	1,472	93	Groundwater recharge, Treated for drinking water
Calero	9,934	4,585	46	Groundwater recharge, Treated for drinking water
Guadalupe	3,415	2,218	65	Groundwater recharge
Stevens Creek	3,138	No restriction	N/A	Groundwater recharge
Lexington	19,044	No restriction	N/A	Groundwater recharge
Chesbro	7,945	No restriction	N/A	Groundwater recharge
Uvas	9,835	No restriction	N/A	Groundwater recharge
Vasona	495	No restriction	N/A	Groundwater recharge
TOTAL	**169,009**	**122,924**		

Most of the reservoirs are sized for annual operations, storing water in winter for use in summer and fall. The exception is the Anderson-Coyote reservoir system, which provides valuable carryover of supplies from year to year.

In addition, San Jose Water Company and Stanford University have surface water rights that contribute to local surface water availability for their customers.

4.1.2 Groundwater

The groundwater subbasins provide multiple benefits to residents and businesses in Santa Clara County. Although most of the groundwater pumped is a result of District managed recharge programs, the subbasins provide some groundwater supply resulting from the percolation of rainfall in the recharge areas and natural seepage through local creeks and streams (natural groundwater recharge). In addition, the groundwater subbasins serve as an extensive conveyance network, allowing water to move from the recharge areas to individual groundwater wells. The groundwater subbasins also provide some natural filtration of surface water as it percolates through the soil and rock. Unlike surface water, most groundwater in the county can be used for drinking water without additional treatment. Lastly, the groundwater subbasins provide water storage, allowing water to be carried over from the wet season to the dry season and even from wet years to dry years.

4.1.3 Imported Water

District imported water is conveyed through the Sacramento-San Joaquin Delta and then pumped and delivered to the county through the South Bay Aqueduct, which carries water from the SWP, and through the San Felipe Division, which brings in water from the federal CVP.

The District has a contract for 100,000 AFY from the SWP and a contract for 152,500 AFY from the CVP. The actual amount of water delivered is typically less than these contractual amounts and depends on hydrology, conveyance limitations, and environmental regulations. Supplemental imported water is acquired through transfers and exchanges as needed and available. In addition, the District is able to put some imported water supplies into carryover and Semitropic Groundwater Bank for later withdrawal and use. Imported supplies are delivered to the District's three drinking water treatment plants, groundwater recharge facilities, and raw water irrigation customers.

Eight retailers in the county have contracts with the SFPUC to receive water from the SFPUC Regional Water System. The eight retailers, considered to be wholesale customers of SFPUC, are the cities of Palo Alto, Mountain View, Sunnyvale, Santa Clara, San José, and Milpitas; Purissima Hills Water District; and Stanford University. In addition, NASA-Ames is considered a retail customer of SFPUC. The District does not control or administer SFPUC supplies in the county, but the supply reduces the demands on District sources of supply.

4.1.4 Recycled and Purified Water

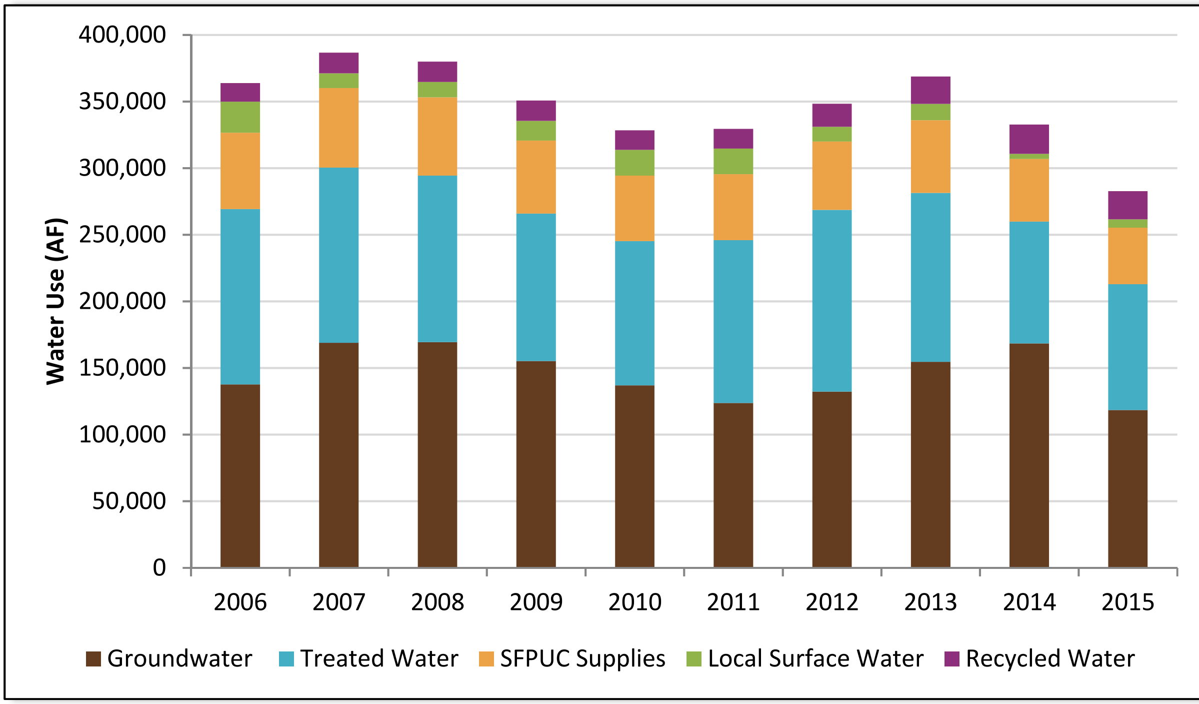
A growing source of water supply for Santa Clara County is recycled and purified water. Using recycled water helps augment drinking water and groundwater supplies through in-lieu recharge; provides a reliable, drought-proof, locally-controlled water supply; and reduces reliance on imported water. Recycled water is currently about 5 percent (or about 20,000 AFY) of the county's supply and is distributed for non-potable uses such as landscape and agricultural irrigation, industrial cooling, and dual plumbed facilities. This recycled water is produced at the four wastewater plants in the county – Palo Alto, Sunnyvale, San Jose/Santa Clara, and South County Regional Wastewater Authority (SCRWA).

In addition, the District is in the process of developing at least 20,000 AFY and up to 45,000 AFY of potable reuse capacity. The District is currently in the process of developing a countywide recycled and purified water master plan that will outline its approach to achieving its target - that recycled water, including both non-potable and potable reuse, is 10 percent of the county's water supply by 2025.

4.2 WATER USE

Annual countywide water use from 2006 to 2015 averages 347,000 acre-feet, with groundwater pumping, treated water deliveries, and SFPUC supplies accounting for about 90% of water used (Figure 4-1).

Figure 4-1. Countywide Water Use by Source (2006 to 2015)



4.3 CONJUNCTIVE WATER MANAGEMENT

The District does not typically deliver groundwater to customers, but does have some limited emergency groundwater pumping capacity. Instead, it manages the groundwater subbasins for the benefit of its groundwater customers and the county at large. The District's water supply strategy since the 1930s has been to maximize conjunctive use, the coordinated management of surface and groundwater supplies, to enhance water supply reliability and avoid undesirable results like chronic overdraft, land subsidence, and salt water intrusion.

Local groundwater resources make up the foundation of the county's water supply, but they need to be augmented by the District's comprehensive water management activities in order to reliably meet the needs of county residents, businesses, agriculture, and the environment. These activities include managed recharge of imported and local supplies and in-lieu groundwater recharge through the provision of treated surface water and raw water, acquisition of supplemental water supplies, and water conservation and recycling.

4.3.1 Managed Recharge

The District's managed recharge program uses both runoff captured in local reservoirs and imported water delivered by the raw water conveyance system to recharge groundwater through more than 390 acres[54] of recharge ponds

[54] The District operates many recharge ponds (Appendix D) with a total water surface area of approximately 265 acres. The total effective percolation area, however, is around 390 acres.

and over 90 miles of local creeks (Figure 4-2).

On average, the District recharges about 100,000 AF of local and imported water each year. Managed recharge accounts for the majority of groundwater used in the county as shown in Figure 4-3. A detailed description of the District's managed recharge facilities can be found in Appendix D.

The estimated operational storage capacity of the groundwater subbasins is up to 548,000 AF. The District's managed recharge capacity is up to about 144,000 AFY. Maintaining the District's active managed recharge program requires ongoing operational planning for the distribution of local and imported water to recharge facilities; maintenance and operation of reservoirs, diversion facilities, distribution systems, and recharge ponds; and the maintenance of water supply contracts, water rights, and relevant environmental clearance.

Figure 4-2. Managed Recharge Facilities

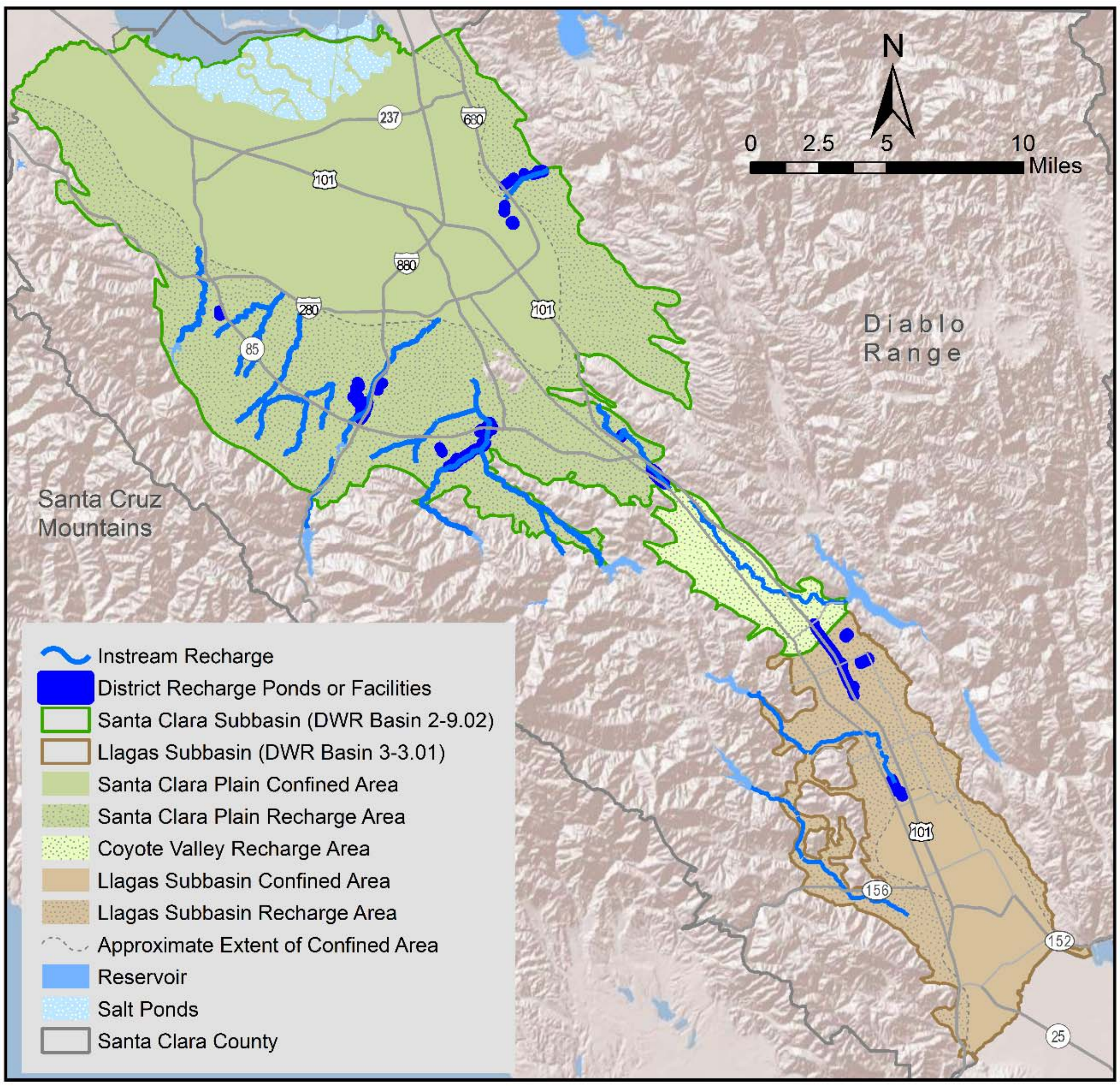
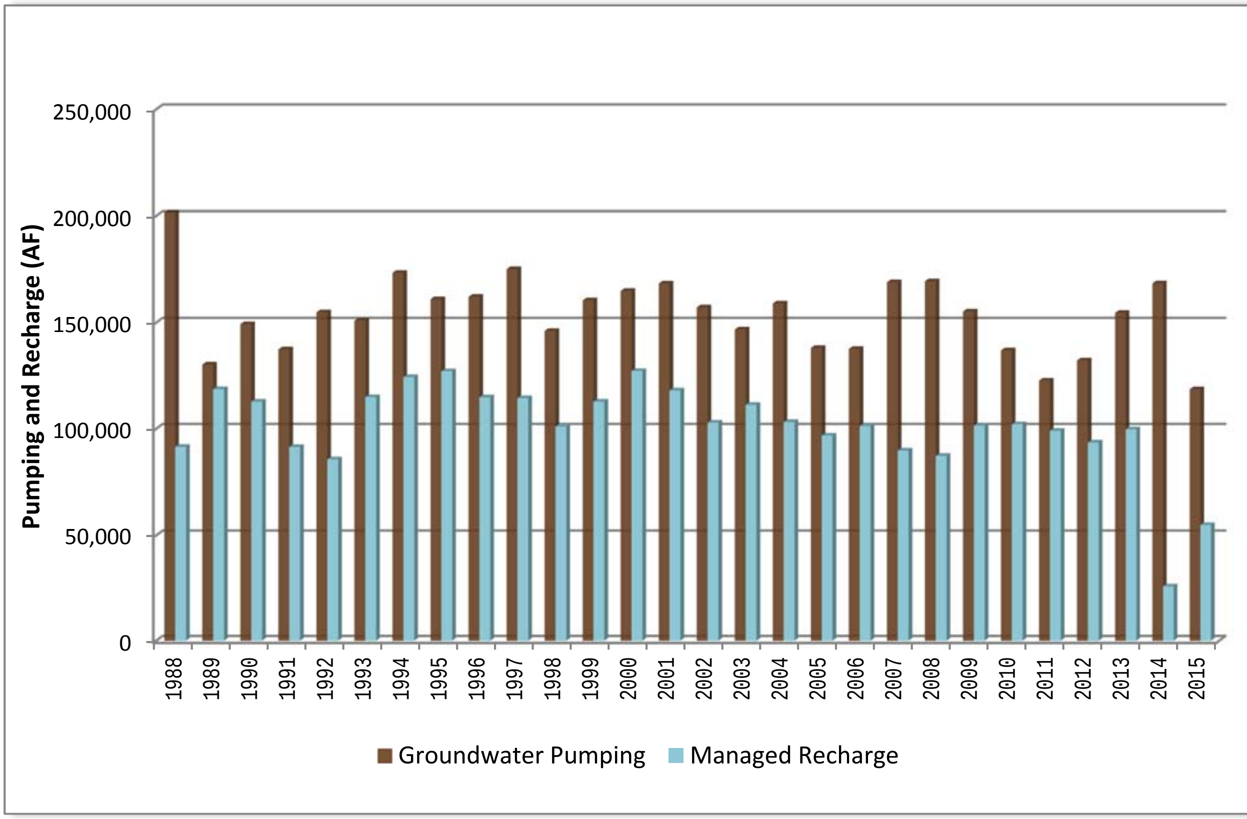


Figure 4-3. Santa Clara County Groundwater Pumping and Managed Recharge



4.3.2 In-Lieu Recharge

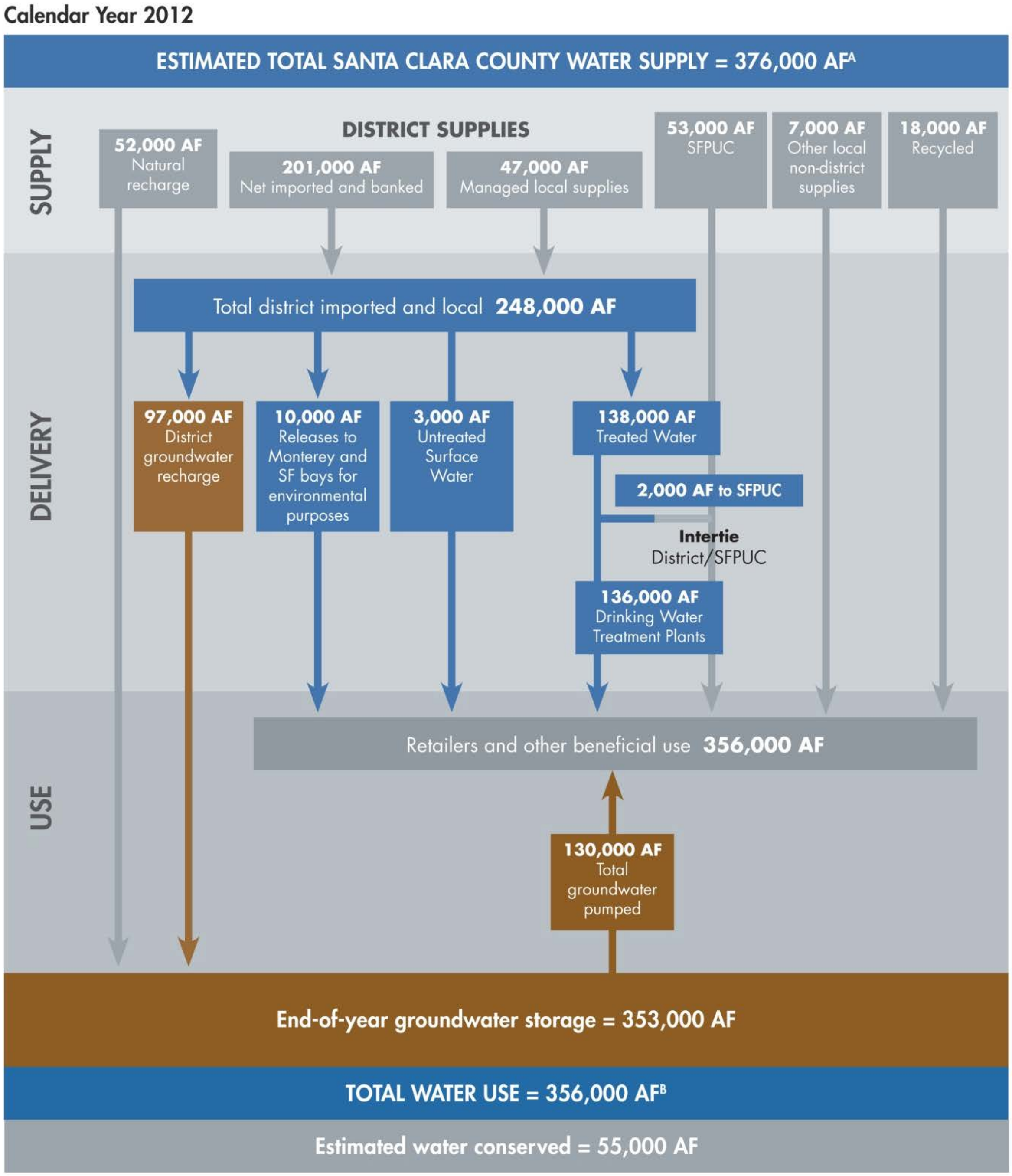
Just as important as direct replenishment through managed recharge are in-lieu recharge programs, including treated water deliveries, water recycling, and water conservation. These activities help maintain groundwater levels and storage by reducing pumping demands. By meeting demands that would otherwise be met by groundwater, these programs provide in-lieu recharge as if the groundwater subbasins had been recharged by that amount.

The District owns and operates three drinking water treatment plants, distributing treated surface water to 7 of the 13 water retailers in the Santa Clara Plain. Combined, the District treatment plants have a processing rate of over 200 million gallons per day, with treated water deliveries approaching 130,000 AFY in a normal year. SFPUC deliveries to several retailers and surface water delivered by the District, San Jose Water Company, and Stanford University also reduce the need for pumping.

The District encourages recycled water development in the county through partnerships with the four local wastewater agencies and through technical assistance. An estimated 21,000 AF of recycled water was used in 2015, offsetting demands that might otherwise have been met through other potable supplies such as additional groundwater pumping. Similarly, in fiscal year 2016, the District's water conservation program saved an estimated 69,000 AF of water.

Figure 4-4 shows the supply and distribution of District and other water supplies in Santa Clara County.

Figure 4-4. Santa Clara County Supplies and Water Use



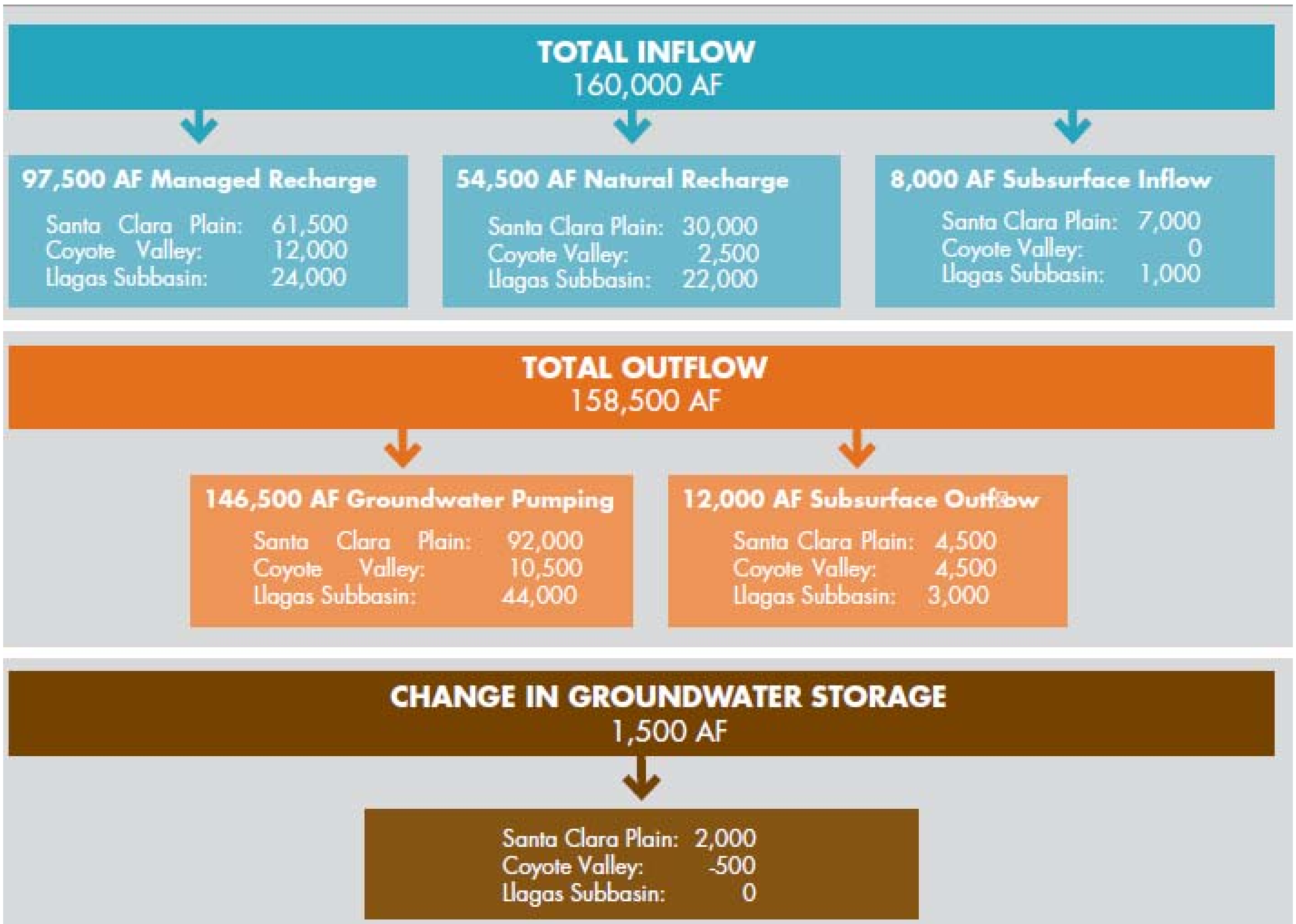
[A] Includes net district and non-district surface water supplies and estimated rainfall recharge to groundwater basins.
[B] Includes municipal, industrial, agricultural and environmental uses.

From FY 13-14 Protection and Augmentation of Water Supplies Report (District, 2013)
Calendar Year 2012 represents the most recent year not significantly affected by extended drought.

4.4 GROUNDWATER BUDGET

This section presents detailed groundwater budgets for the Santa Clara and Llagas subbasins for calendar years 2003 through 2012. This period was chosen to represent recent longer-term conditions that include wet, normal, and dry years but are not significantly affected by recent, exceptionally dry years. As shown in Figure 4-5, groundwater pumping far exceeds natural replenishment and District managed recharge is needed to ensure a balanced water budget. The average change in storage over this period is 1,500 AF for the Santa Clara Subbasin and zero for the Llagas Subbasin, indicating the subbasins are in long-term balance.

Figure 4-5. Groundwater Budget for the Santa Clara and Llagas Subbasins (2003-2012)



4.4.1 Santa Clara Subbasin

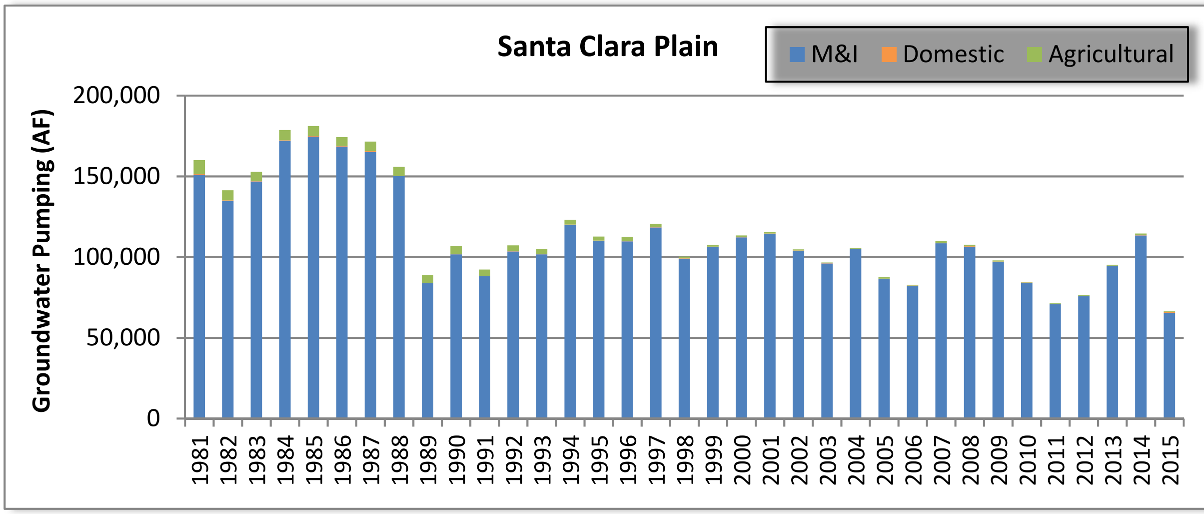
Groundwater is an important water supply source in the Santa Clara Subbasin, particularly in the Coyote Valley, which is entirely reliant on groundwater with the exception of minor surface water use. This section presents detailed information on the water budget for the Santa Clara Subbasin.

4.4.1.1 Groundwater Pumping

The long-term average groundwater pumping in the Santa Clara Subbasin is 103,000 AFY, including the Santa Clara Plain and Coyote Valley. This is based on average pumping from 2003 to 2012, which was chosen to represent typical conditions not significantly affected by drought.

Average 2003 to 2012 groundwater pumping in the Santa Clara Plain is 92,000 AFY, with maximum and minimum annual pumping of 110,000 AF and 71,000 AF, respectively. Nearly all groundwater used in the Santa Clara Subbasin (99%) is for municipal and industrial uses with only 1% for agriculture and domestic purposes (Figure 4-6). Pumping by water retailers accounts for over 90% of pumping in the Santa Clara Plain.

Figure 4-6. Santa Clara Plain Groundwater Pumping by Use



Groundwater serves nearly all beneficial uses in the Coyote Valley, with only small amounts of raw surface water used. Average 2003 to 2012 pumping is 11,000 AFY, with maximum and minimum annual amounts of 14,000 AF and 7,000 AF, respectively. Most groundwater used (66%) supports municipal and industrial uses, with 32% used for agriculture, and 2% for domestic purposes (Figure 4-7). Pumping by water retailers accounts for about 55% of pumping in the Coyote Valley.

Figure 4-7. Coyote Valley Groundwater Pumping by Use

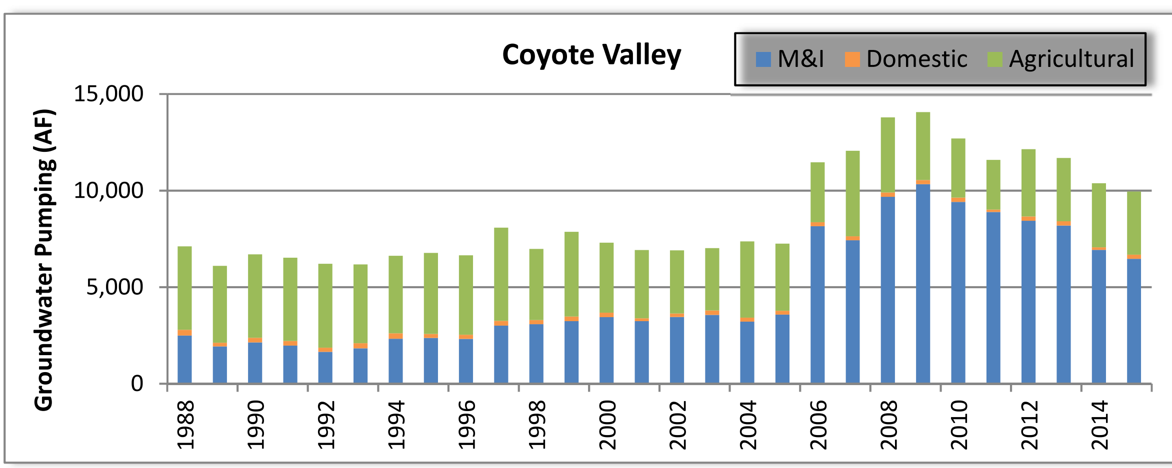
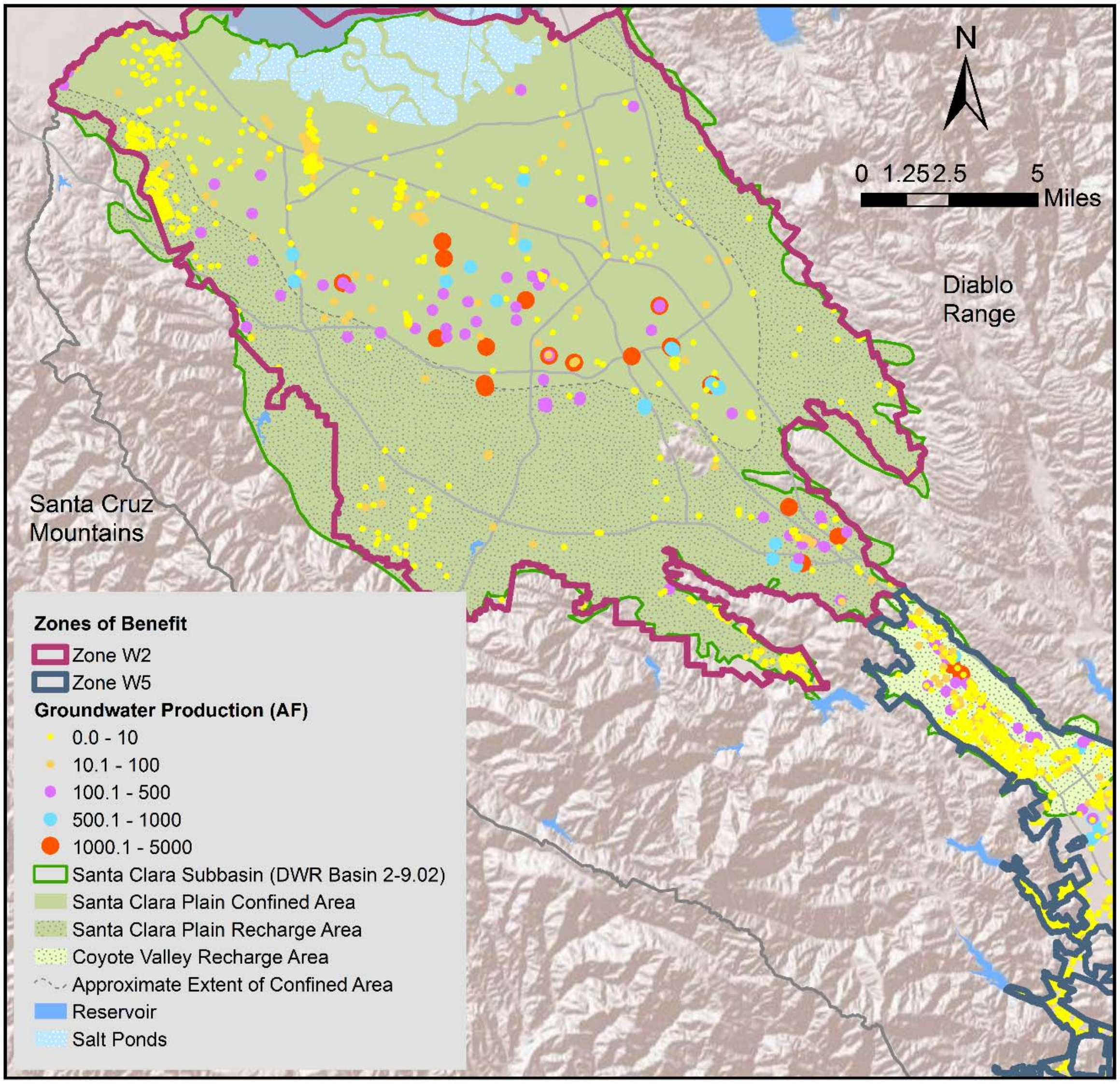


Figure 4-8 shows the distribution of pumping in the Santa Clara Subbasin based on 2012 (the most recent year not significantly affected by the extended drought).

Figure 4-8. Santa Clara Subbasin Pumping Distribution (2012)



SGMA defines the sustainable yield as 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.[55] Quantifying sustainable yield is challenging as it is highly dependent on hydrology, available water supplies, managed recharge, site-specific pumping, and basin conditions. While sustainable yield is defined as the maximum amount that may be withdrawn annually, estimating this highly complex concept with a single value may imply that volume can be pumped every year while maintaining sustainable conditions. Certainly, this is not the case.

[55] California Department of Water Resources website: http://water.ca.gov/groundwater/sgm/definitions.cfm

Previous analysis has estimated that annual Santa Clara Plain pumping should not exceed 200,000 AF in any one year,[56] and current production does not exceed this limit. While that volume could potentially be pumped within a year without causing land subsidence, the District does not rely on this estimate for annual operations or long-term water supply planning. There is no similar estimate for the Coyote Valley, which is small, relatively shallow, and transmissive, with limited storage capacity.

The District does not manage to a particular value for sustainable yield, but instead manages groundwater to maintain sustainable conditions through annual operations and long-term water supply planning. Annual operations planning considers available water supplies and projected demands in determining the source and volume of water to be delivered for managed recharge, drinking water treatment, or other use. Each year, the District evaluates the projected end of year groundwater storage to determine if short-term water use reduction is needed in accordance with the Water Shortage Contingency Plan. The District's long-term water supply planning efforts account for maintaining adequate groundwater supplies and reserves in related water system modeling and analysis.

The Santa Clara Subbasin is not in a condition of chronic overdraft, and the hydrographs presented in Chapter 2 and balanced water budgets in this chapter demonstrate that long-term average yields are sustainable. The District makes investments, implements programs, and modifies water supply operations as needed to maintain sustainable conditions now and in the future.

4.4.1.2 Groundwater Recharge

Recharge sources in the Santa Clara Subbasin include District managed recharge and natural, or uncontrolled, recharge from the deep percolation of rainfall, septic system and irrigation return flows, and natural seepage through creeks. The District's managed recharge systems in the Santa Clara Subbasin are summarized below in Table 4-2, with more detail provided in Appendix D.

Table 4-2. Santa Clara Subbasin Managed Recharge Facility Summary

Managed Recharge System	Approximate Recharge Capacity (AFY)	Water Supply Sources	Year Operations Began
Guadalupe	25,000	Local watersheds, SWP, CVP	1932
Los Gatos	30,000	Local watersheds, SWP, CVP	1934
Penitencia	7,000	Local watersheds, SWP	1934
West Side	15,000	Local watersheds, SWP, CVP	1935
Coyote	27,000[1]	Local watersheds, CVP	1934

1. The Coyote Recharge System can also provide water to the Llagas Subbasin.

Natural, or uncontrolled, recharge from precipitation, return flows, seepage from creeks, and mountain front recharge is estimated to range between 15,000 and 61,000 AFY for the Santa Clara Subbasin.

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[56] Santa Clara Valley Water District, Operational Storage of Santa Clara Valley Groundwater Basin, 1999.

4.4.1.3 Groundwater Storage

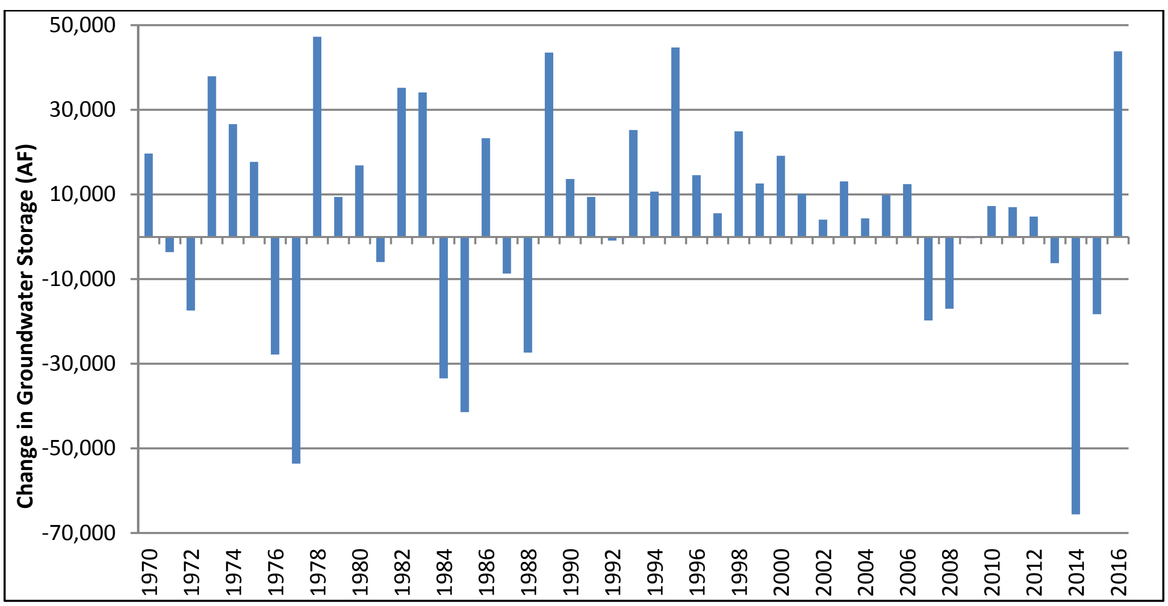
Large amounts of water can be stored in the Santa Clara Subbasin, with total storage capacity estimated to be as high as 1.9 million AF.[57] However, only a fraction of this water can be extracted practically using wells and without causing undesirable results like land subsidence and salt water intrusion.

The District has estimated the operational storage capacity of the Santa Clara Plain to be 350,000 AF using iterative simulations of water supply system models and the groundwater flow model.[58] Using hydrology, demands, and operational data for the period of 1967-1996, this represents the maximum cumulative storage in the Santa Clara Plain without initiating land subsidence or causing high groundwater nuisance conditions. The District will evaluate this estimate using updated data and the calibrated groundwater flow model to determine if it needs to be refined.

The District has previously estimated the operational storage capacity of the Coyote Valley to range between 23,000 and 33,000 AF.[59] This represents the product of specific yield,[60] area, and the elevation difference between high and low groundwater surfaces. Groundwater level data for 1982-1983 was used for the high surface and 1976-1977 for low conditions. While the District developed a groundwater flow model for the Coyote Valley since operational storage capacity was last estimated, pumping and recharge data is not available before 1987 when the District assumed groundwater management of the Coyote Valley. The District will evaluate the estimate of operational storage capacity to determine if it needs to be refined.

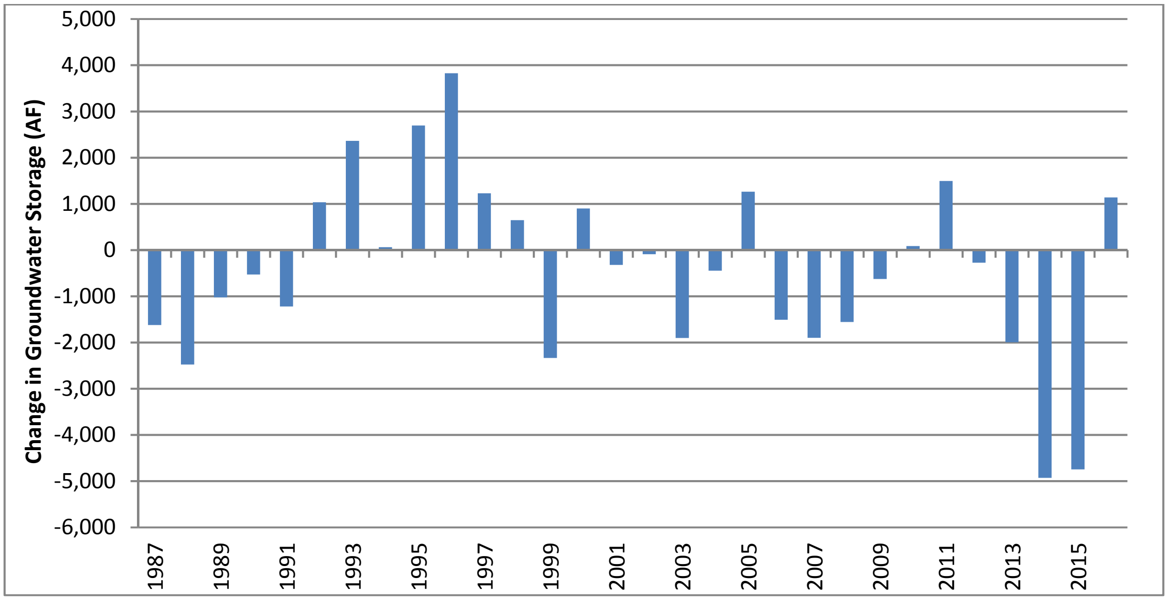
Figures 4-9 and 4-10 show the estimated annual change in groundwater storage in the Santa Clara Plain and Coyote Valley, respectively. The former figure starts with the year 1970 and the latter with 1987 because the data in Coyote Valley only became available after the District merged with the Gavilan Water District.

Figure 4-9. Annual Change in Storage in the Santa Clara Plain (1970-2016)



[57] California State Water Resources Board, Santa Clara Valley Investigation, 1955.
[58] Santa Clara Valley Water District, Operational Storage of Santa Clara Valley Groundwater Basin, 1999.
[59] Santa Clara Valley Water District, Operational Storage Capacity of the Coyote and Llagas Groundwater Subbasins, April 2002.
[60] Specific yield essentially represents the amount of water that can be released from a certain volume of aquifer.

Figure 4-10. Annual Change in Storage in the Coyote Valley (1987-2016)



4.4.1.4 Water Budget

A water budget for the Santa Clara Plain for calendar years 2003 through 2012 is shown in Table 4-3. The water budget is based on the District groundwater flow model for the Santa Clara Plain, and represents inflows and outflows for the principal aquifer. On average, about two-thirds of inflows to groundwater in the Santa Clara Plain come from the District's managed recharge program. Although the water budget can vary significantly from year to year, on average, there was a slight annual increase in storage by about 2,000 AFY for the Santa Clara Plain over this 10-year period.

Table 4-3. Santa Clara Plain Principal Aquifer Budget (2003-2012)

Water Budget Component	Acre-Feet per Year
Inflow	
Managed Recharge[1]	61,500
Natural Recharge[2]	30,000
Subsurface Inflow[3]	7,000
Total Inflow	98,500
Outflow	
Groundwater Pumping[4]	92,000
Subsurface Outflow[5]	4,500
Total Outflow	96,500
Change in Storage	2,000

1. Managed recharge represents direct replenishment by the District using local and imported water.
2. Natural recharge includes the deep percolation of rainfall, natural seepage from creeks, and subsurface inflow from surrounding hills (mountain front recharge).
3. Subsurface inflow represents inflow from adjacent aquifer systems, including the Coyote Valley
4. Pumping is based on metered pumping volumes, or pumping reported by well owners.
5. Subsurface outflow represents outflow to adjacent aquifers in San Mateo County, Alameda County, and beneath San Francisco Bay.

A water budget for the Coyote Valley for calendar years 2003 to 2012 is presented in Table 4-6. The water budget is based on the District groundwater flow model for the Coyote Valley, and represents inflows and outflows for the aquifer system. Recharge from rainfall is estimated to be small compared to the District's managed recharge in Upper Coyote Creek and natural recharge along Fisher Creek. Annual recharge is estimated to be about 14,500 AF per year, with approximately 80 percent of that coming from the District's managed recharge.

The primary Coyote Valley outflows are groundwater pumping and flow to the Santa Clara Plain, the latter of which is necessary to maintain water levels in the Santa Teresa area of the Santa Clara Plain. Over the 10-year period evaluated, the Coyote Valley has seen a slight decrease in storage by about 500 AF annually. However, based on measured water levels and pumping data, no negative impacts are observed in Coyote Valley where groundwater conditions are sustainable in large part due to the District's managed recharge program.

Table 4-4. Coyote Valley Principal Aquifer Budget (2003-2012)

Water Budget Component	Acre-Feet per Year
Inflow	
Managed Recharge[1]	12,000
Natural Recharge[2]	2,500
Subsurface Inflow[3]	0
Total Inflow	14,500
Outflow	
Groundwater Pumping[4]	10,500
Subsurface Outflow[5]	4,500
Total Outflow	15,000
Change in Storage	-500

1. Managed recharge represents direct replenishment by the District using local and imported water.
2. Natural recharge includes all uncontrolled recharge, including the deep percolation of rainfall, septic system and/or irrigation return flows, and natural seepage through creeks.
3. Subsurface inflow represents inflow from adjacent aquifer systems.
4. Pumping is based on metered pumping volumes, or pumping reported by well owners.
5. Subsurface outflow represents outflow to adjacent aquifer systems, including outflow to the Santa Clara Plain.

4.4.2 Llagas Subbasin

Groundwater is the primary water supply source in the Llagas Subbasin and is the sole source for drinking water. A small, but growing, portion of water use is served by recycled water, and there is also a small amount of raw surface water put to beneficial use. This section presents detailed information on the water budget.

4.4.2.1 Groundwater Pumping

The long-term average groundwater pumping in the Llagas Subbasin is 44,000 AFY. This is based on average pumping from 2003 to 2012, which was chosen to represent typical conditions not significantly affected by drought. The maximum annual pumping during that period was 48,000 AF and the minimum pumping was 39,000 AF. Groundwater use in the Llagas Subbasin is nearly evenly split between agricultural uses (50%) and municipal and industrial uses (45%), with 5% used for domestic purposes (Figure 4-11). Pumping by water retailers accounts for about 34% of pumping in the Llagas Subbasin.

Figure 4-11. Llagas Subbasin Groundwater Pumping by Use

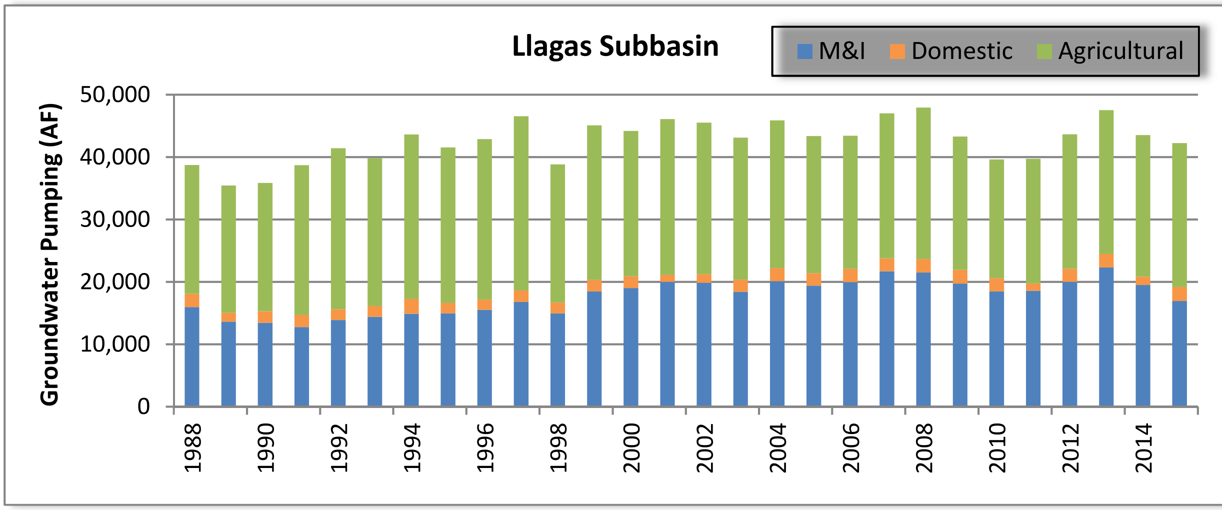
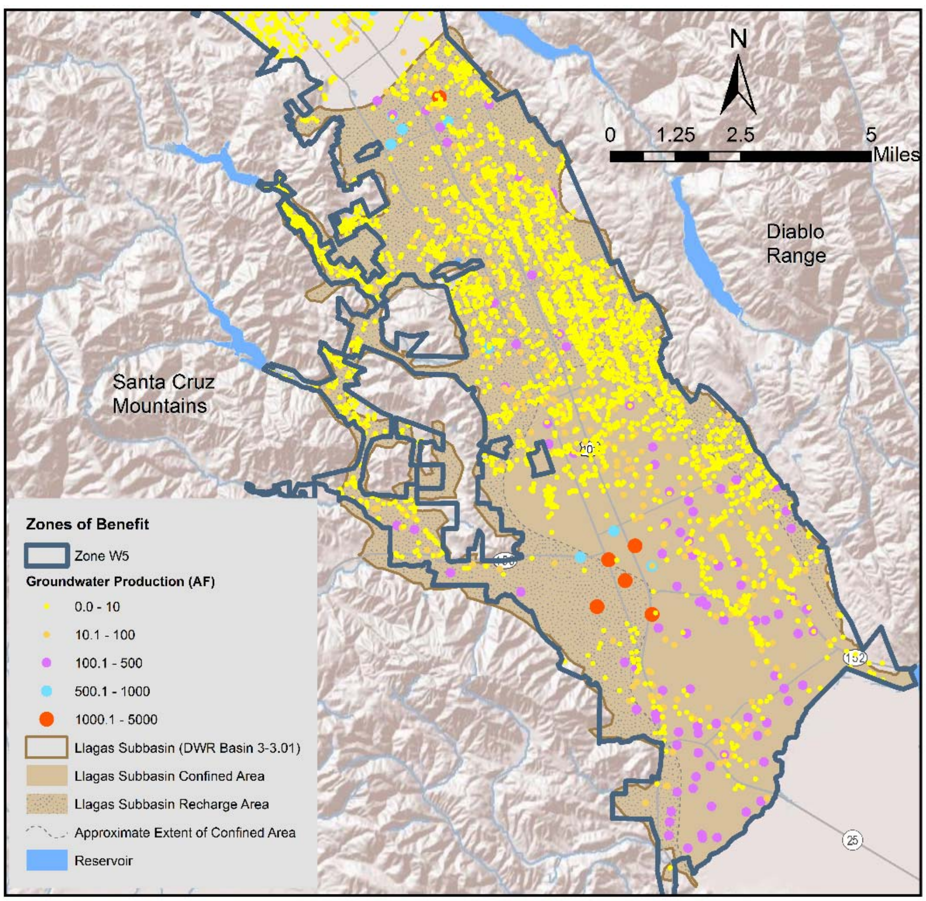


Figure 4-12 shows the distribution of pumping in the Santa Clara Subbasin based on 2012 (the most recent year not significantly affected by the extended drought).

Figure 4-12. Llagas Subbasin Pumping Distribution (2012)



SGMA defines the sustainable yield as 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.[61] Quantifying sustainable yield is challenging as it is highly dependent on hydrology, available water supplies, managed recharge, site-specific pumping, and basin conditions. While sustainable yield is defined as the maximum amount that may be withdrawn annually, estimating this highly complex concept with a single value may imply that volume can be pumped every year while maintaining sustainable conditions. Certainly, this is not the case.

The District does not manage to a particular value for sustainable yield, but instead manages groundwater to maintain sustainable conditions through annual operations and long-term water supply planning. Annual operations planning considers available water supplies and projected demands in determining the source and volume of water to be delivered for managed recharge or other use. Each year, the District evaluates the projected end of year groundwater storage to determine if short-term water use reduction is needed in accordance with the Water Shortage Contingency Plan. The District's long-term water supply planning efforts account for maintaining adequate groundwater supplies and reserves in related water system modeling and analysis.

The Llagas Subbasin is not in a condition of chronic overdraft, and the hydrographs presented in Chapter 3 and balanced water budget in this chapter demonstrate that long-term average yields are sustainable. The District makes investments, implements programs, and modifies water supply operations as needed to maintain sustainable conditions now and in the future.

4.4.2.2 Groundwater Recharge

Recharge sources in the Llagas Subbasin include District managed recharge and natural, or uncontrolled, recharge from the deep percolation of rainfall, septic system and/or irrigation return flows, and natural seepage through creeks. The District's managed recharge systems in the Llagas Subbasin are summarized below in Table 4-5, with more detail provided in Appendix D.

Table 4-5. Llagas Subbasin Managed Recharge Facility Summary

Managed Recharge System	Approximate Recharge Capacity (AFY)	Water Supply Sources	Year Operations Began
Coyote	27,000[1]	Local watersheds, CVP	1934
Lower Llagas	21,000	Local watersheds	1955
Upper Llagas	19,000	Local watersheds, CVP	1955

1. The Coyote Recharge System also provides water to the Santa Clara Subbasin.

Natural, or uncontrolled, recharge from precipitation, return flows, seepage from creeks, and mountain front recharge is estimated to range between 15,000 and 30,000 AFY for the Llagas Subbasin.

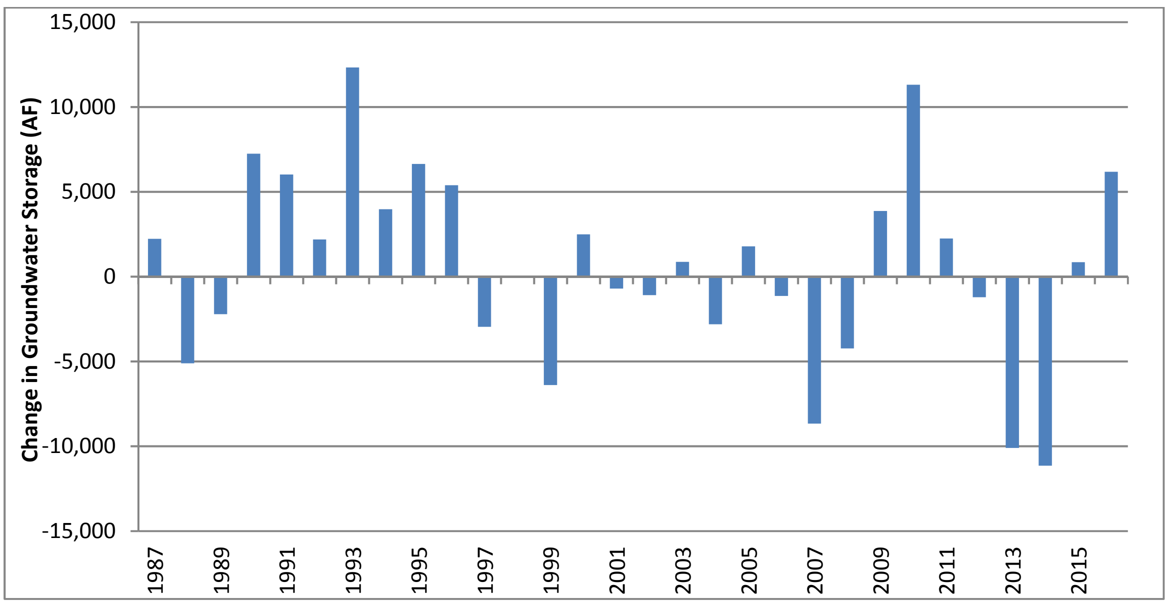
[61] California Department of Water Resources website: http://water.ca.gov/groundwater/sgm/definitions.cfm

4.4.2.3 Groundwater Storage

The District has previously estimated the operational storage capacity of the Llagas Subbasin to range between 152,000 and 165,000 AF.[62] The operational storage capacity is less than total storage capacity as it accounts for the avoidance of adverse impacts. The estimate is based on the product of specific yield,[63] area, and the elevation difference between high and low groundwater surfaces. Groundwater level data for 1982-1983 was used for the high surface and 1976-1977 for low conditions. While the District developed a groundwater flow model for the Llagas Subbasin since operational storage capacity was last estimated, pumping and recharge data is not available before 1987 when the District assumed groundwater management of the Llagas Subbasin. The District will evaluate the estimate of operational storage capacity to determine if it needs to be refined.

Figure 4-13 shows the estimated annual change in groundwater storage in Llagas Subbasin from 1987 (the year the District assumed management of the subbasin) to present.

Figure 4-13. Annual Change in Storage in the Llagas Subbasin (1987-2016)



4.4.2.4 Water Budget

A water budget for the Llagas Subbasin for calendar years 2003 to 2012 is presented in Table 4-6. This budget is based on the District groundwater flow model for the Llagas Subbasin and represents general subbasin inflows and outflows. Recharge is estimated to be 46,000 AF per year, with about half coming from the District's managed recharge of local and imported water, and the other half from natural recharge.

The major outflow is groundwater pumping, which averages 44,000 AFY. The subsurface outflow, which includes flows to the Bolsa Subbasin in San Benito County, is estimated to be about 3,000 AF per year. The average annual change in storage between 2003 and 2012 is approximately zero, indicating inflows and outflows are generally balanced over the ten-year period.

[62] Santa Clara Valley Water District, Operational Storage Capacity of the Coyote and Llagas Groundwater Subbasins, April 2002.
[63] Specific yield essentially represents the amount of water that can be released from a certain volume of aquifer.

Table 4-6. Llagas Subbasin Principal Aquifer Budget (2003-2012)

Water Budget Component	Acre-Feet per Year
Inflow	
Managed Recharge[1]	24,000
Natural Recharge[2]	22,000
Subsurface Inflow[3]	1,000
Total Inflow	47,000
Outflow	
Groundwater Pumping[4]	44,000
Subsurface Outflow[5]	3,000
Total Outflow	47,000
Change in Storage	0

1. Managed recharge represents direct replenishment by the District using local and imported water.
2. Natural recharge includes all uncontrolled recharge, including the deep percolation of rainfall, septic system and/or irrigation return flows, and natural seepage through creeks.
3. Subsurface inflow represents inflow from adjacent aquifer systems, including inflow from the Bolsa Subbasin in San Benito County.
4. Pumping is based on metered pumping volumes, or pumping reported by well owners.
5. Subsurface outflow represents outflow to adjacent aquifer systems, including outflow to the Bolsa Subbasin in San Benito County.

4.5 FUTURE DEMANDS

The District's 2015 Urban Water Management Plan includes a comprehensive assessment of projected future water supplies and demands in Santa Clara County. Estimating future demands allows the District to manage the county's water supply and appropriately plan infrastructure investments.

The following sections describe projected demands in the Santa Clara and Llagas subbasins, based on data used to develop the District's 2015 UWMP. Due to large projected increases in water use by several water retailers, the UWMP projects future water supply shortfalls during multi-year droughts.

The UWMP recognizes that the near-term and potentially long-term water demand may be considerably affected by the recent and unprecedented statewide drought conditions of 2012 to 2016. This event has already affected demand as the public has changed attitudes and as water use restrictions have been put in place. Some of the water use efficiency successes and changed behavior will last into the future. But if the past is a guide, some rebound of water use will likely occur within a few years of removing water use restrictions. This drought and the local and statewide efforts to date may likely lead to new policy or technological enhancements that may reduce future demands in ways that cannot be currently predicted.

Groundwater demands in the Santa Clara Subbasin are projected to increase from 2020 to 2040 as shown in Table 4-7. Compared to average pumping of 103,000 AFY for the period 2003-2012, future projections show a drop of around 5% by 2020, followed by a steady increase.

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Table 4-7. Projected Future Groundwater Demands (AF)

Subbasin/Management Area	2020	2025	2030	2035	2040
Santa Clara Subbasin	**98,000**	**105,000**	**111,000**	**118,000**	**123,000**
Santa Clara Plain	86,000	92,000	97,000	103,000	107,000
Coyote Valley	12,000	13,000	14,000	15,000	16,000
Llagas Subbasin	**47,000**	**49,000**	**52,000**	**53,000**	**53,000**

Projections rounded to nearest 1,000 AF.

Future groundwater demands in the Llagas Subbasin are projected to increase from 2020 to 2035, then level out through 2040 as shown in Table 4-7. Future pumping is projected to increase by around 7% in 2020 relative to the current long-term average pumping of 44,000 AFY. Agricultural and independent (non-retailers) pumping are assumed to remain constant over the UWMP planning horizon.

Projected pumping in Table 4-7 is based primarily on demand projections provided by water retailers prior to April 2016. Several retailers have updated their demand projections since the District's 2015 UWMP analysis was completed. The District is coordinating with water retailers and other interested stakeholders during development of the Water Supply Master Plan to ensure future assumptions about growth and demand are aligned as much as possible. The Water Supply Master Plan will recommend various actions and investments needed to address projected future shortfalls during multi-year droughts. The District is scheduled to complete the Water Supply Master Plan in 2017.

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CHAPTER 5 – SUSTAINABLE MANAGEMENT CRITERIA

This chapter presents the District's groundwater sustainability goals, basin management strategies, and outcome measures.

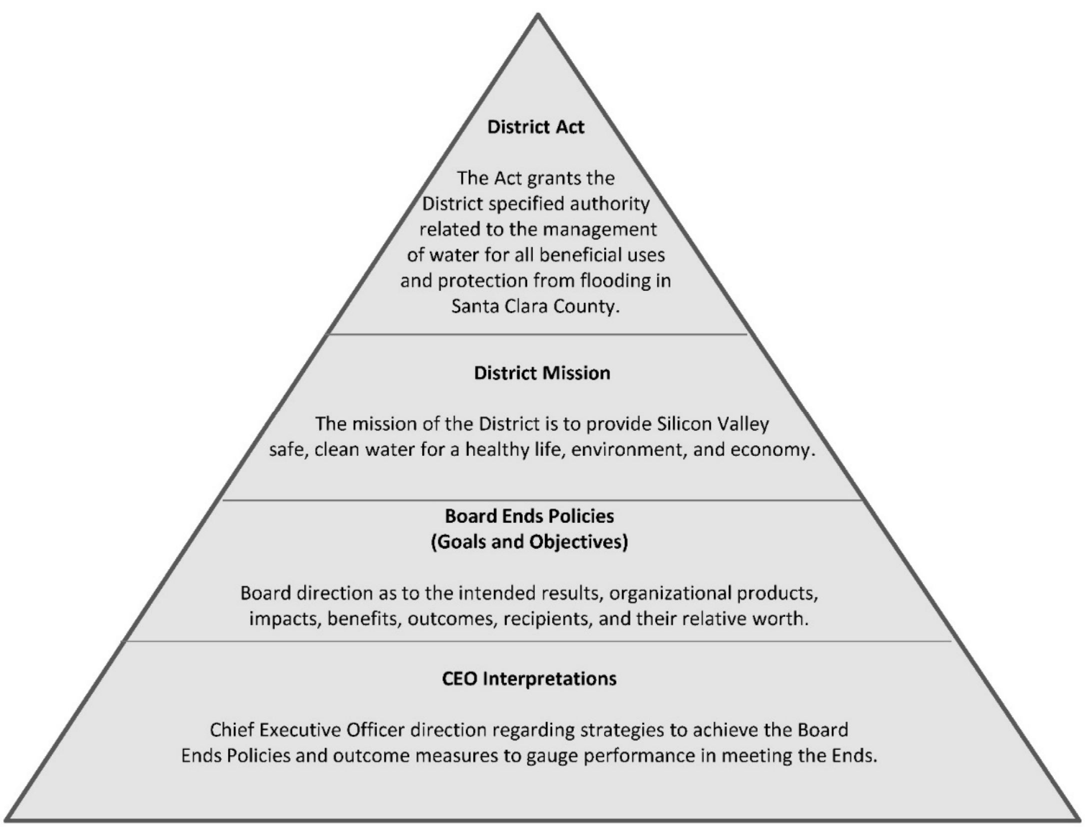
5.1 SUSTAINABLE MANAGEMENT CRITERIA

The District manages the Santa Clara and Llagas subbasins as an integrated component of the overall water supply, and as such, the goals and strategies for groundwater management are based on the existing District Board of Directors Ends Policies listed below.

- Board Water Supply Goal 2.1: Current and future water supply for municipalities, industries, agriculture, and the environment is reliable.
- Board Water Supply Objective 2.1.1: Aggressively protect groundwater from the threat of contamination and maintain and develop groundwater to optimize reliability and to minimize land subsidence and salt water intrusion.

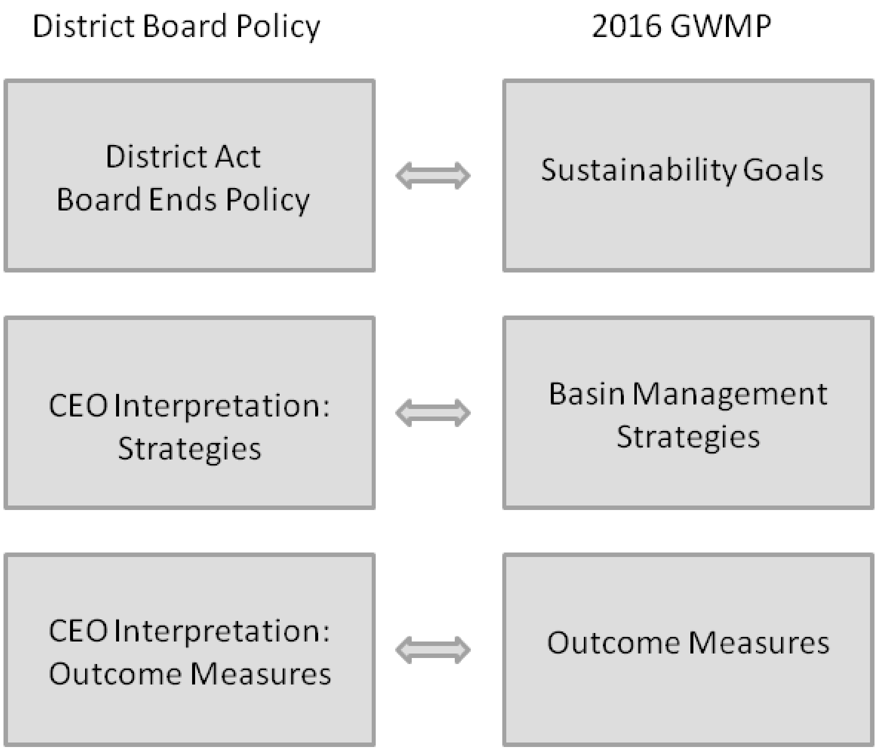
District programs and activities are developed in accordance with the District Act objectives and based on policy guidance from the Board of Directors. The CEO has also developed CEO Interpretations, which include direction, strategies, and outcome measures. Outcome measures are specific, measurable goals to gauge performance toward meeting the Board Ends Policies. The relationship of the District Act, Board policies, and CEO Interpretations is shown below in Figure 5-1 with each level taking direction from the level above.

Figure 5-1. District Policy Framework



The sustainability goals and strategies in this 2016 GMWP are developed within this policy framework and share a parallel structure. The relationship between the District Act, District Policies, the sustainability goals, and District groundwater programs are shown in Figure 5-2. The goals, strategies, and performance measurement are described below.

Figure 5-2. Relation Between District Policy and 2016 GWMP



5.2 SUSTAINABILITY GOALS

Using the District's overall water supply management objectives, the following sustainability goals related to groundwater supply reliability and protection were developed:

- Groundwater supplies are managed to optimize water supply reliability and minimize land subsidence.
- Groundwater is protected from contamination, including salt water intrusion.

These sustainability goals describe the overall objectives of the District's groundwater management programs. The rationale and meaning of these objectives, as well as their relationship to District policies, are discussed below.

5.2.1 Groundwater Supply Reliability

Goal: Groundwater supplies are managed to optimize water supply reliability and minimize land subsidence.

Local groundwater resources are the foundation of the county's water supply, but they need to be augmented by the District's comprehensive water supply management activities in order to reliably meet the needs of county residents, businesses, agriculture and the environment. The District relies on groundwater for a significant portion of the county's water supply, particularly in South County where groundwater provides more than 90% of supply

for all beneficial uses and 100% of the drinking water supply. The District manages groundwater in conjunction with surface water to reliably meet the county's water demands now and in the future.

As described previously, significant subsidence occurred historically in the Santa Clara Plain due to chronic overdraft, but was essentially halted by about 1970 through the District's expanded conjunctive management programs. The District's goal of minimizing land subsidence is combined with the water supply reliability goal since the actions taken to address one also addresses the other. Preventing additional permanent subsidence has been a major driver for the District over its history given the extremely high costs associated with reduced carrying capacity of flood control structures, damage to infrastructure, and salt water intrusion.

5.2.2 Groundwater Quality Protection

Goal: Groundwater is protected from contamination, including salt water intrusion.

While surface water goes through significant treatment processes before being served as drinking water, groundwater from the Santa Clara and Llagas subbasins typically does not require any treatment other than disinfection. Although the District does not serve groundwater directly to consumers, as the local groundwater management agency the District works to ensure that the groundwater used by the residents and businesses of Santa Clara County is of reliably high quality.

In highly urbanized areas such as the Bay Area, there are numerous threats to groundwater quality including urban runoff, industrial chemical spills, illegal dumping, and leaking underground storage tanks. Agricultural and residential use of pesticides and nitrogen-based fertilizers can also impact groundwater quality. As surface water percolates through soil layers, some natural filtration occurs; however, this natural process is not effective for all contaminants.

Groundwater degradation may lead to costly treatment or even make groundwater unusable, resulting in the need to secure additional supplies. Preventing groundwater contamination is more cost effective than cleaning up polluted groundwater, a process that can take many decades depending on the nature and extent of the contamination. Notable contamination sites in the county requiring significant groundwater cleanup include large solvent releases at the IBM and Fairchild sites in south San Jose in the 1980s and the Olin perchlorate release in Morgan Hill, which was discovered in the early 2000s.

Historically, salt water intrusion has been observed in the shallow aquifers of the Santa Clara Subbasin adjacent to San Francisco Bay during periods of higher groundwater pumping and land subsidence. Significant increases in groundwater pumping or sea level rise due to climate change could lead to renewed salt water intrusion.

The goal of the District's groundwater quality protection programs is to ensure that groundwater is a viable water supply for current and future beneficial uses. In addition to the principal, deep drinking water aquifers, the District works to protect the quality of all aquifers. Although not typically used for beneficial purposes, shallow groundwater is also a potential future source for drinking water or other beneficial use.

Section 5 of the District Act authorizes the District to prevent the pollution and contamination of District surface water and groundwater supplies. This sustainability goal is consistent with the District Act and with Board Water Supply Objective 2.1.1.

5.3 BASIN MANAGEMENT STRATEGIES

The basin management strategies are the methods that will be used to meet the sustainability goals. Many of these strategies have overlapping benefits to groundwater resources, acting to improve water supply reliability,

minimize subsidence, and protect groundwater quality. The strategies are listed below and described in detail in this section.

1. Manage groundwater in conjunction with surface water.
2. Implement programs to protect and promote groundwater quality.
3. Maintain and develop adequate groundwater models and monitoring networks.
4. Work with regulatory and land use agencies to protect recharge areas, promote natural recharge, and prevent groundwater contamination.

Strategy 1: Manage groundwater in conjunction with surface water.

The desired goal of this strategy is to have a sustainable, reliable groundwater supply and minimize the potential for salt water intrusion and land subsidence. The primary mechanisms for implementing this strategy are the District's managed and in-lieu recharge programs. The county relies on local groundwater subbasins to help meet water demands, naturally transmit water over a wide area, and provide critical storage reserves for emergencies such as droughts or other outages. Because groundwater pumping far exceeds what is replenished naturally, the District manages groundwater and surface water in conjunction to ensure the groundwater subbasins remain an important component in meeting current and future water demands.

Maintaining the District's comprehensive managed recharge program using both local and imported waters is critical to sustaining groundwater supplies. This requires maintaining local water rights, water supply sources, and existing recharge facilities. The strategy also relies on developing additional recharge facilities and sources to help support future needs as identified in the District's Water Supply Master Plan. Currently, several of the District reservoirs have restricted storage capacity due to limitations imposed by Division of Safety of Dam (DSOD). Resolving dam safety issues that currently restrict reservoir storage is also an essential component of this strategy.

Just as important as managed recharge, are the availability of SFPUC supplies to the county, the District's treated water deliveries, and water conservation and water recycling programs, which provide in-lieu recharge by reducing groundwater demands. Together these programs help to maintain adequate groundwater storage, keep groundwater levels above subsidence thresholds, and maintain flow gradients. This, in turn, supports groundwater pumping and minimizes risks related to land subsidence and salt water intrusion. The District's managed recharge and in-lieu programs are described in detail in Chapter 6.

Strategy 2: Implement programs to protect and promote groundwater quality.

Groundwater in Santa Clara County is generally of very high quality, with few public water systems requiring treatment beyond disinfection prior to delivery to customers. The District evaluates groundwater quality and potential threats so that changes in groundwater quality can be detected and appropriate action can be taken to protect the quality of groundwater resources. This includes assessing regional conditions and trends, evaluating threats to groundwater quality including emerging contaminants, conducting technical studies such as vulnerability assessments, and implementing strategies to protect groundwater from contaminant sources.

Because the District does not have regulatory or land use authority, this strategy is focused on identifying potential concerns and implementing programs to reduce contaminant loading or consumer exposure. Efforts to coordinate with land use and regulatory agencies are described in Strategy 4 below. Groundwater protection programs are described in detail in Chapter 6.

Strategy 3: Maintain and develop adequate groundwater models and monitoring networks.

Monitoring programs provide critical data to understand groundwater conditions and support operational decisions, including the timing and location of managed recharge. The District has implemented programs to regularly monitor

groundwater levels, groundwater quality (including monitoring near recycled water irrigation sites), recharge water quality, surface water flow, and land subsidence. Local water retailers also collect groundwater quality data for compliance with DDW regulations and monitor groundwater levels. Data from these programs is essential to evaluating current conditions, preventing groundwater overdraft and subsidence, and measuring the effectiveness of basin management programs and activities. These monitoring programs and related monitoring protocols are described in Chapter 7.

The District has also developed models to support operational decisions and long-term planning. These include operational and water supply system models, as well as groundwater flow models. The District has developed calibrated flow models for the Santa Clara Plain, Coyote Valley, and the Llagas Subbasin, which are used to evaluate groundwater storage and levels under various operational and hydrologic conditions. These models are used to support decisions on recharge and other water supply operations, the evaluation of potential projects, and long-term water supply planning. Maintaining calibrated models that can reasonably forecast groundwater conditions is an important part of the District's groundwater management strategy.

Strategy 4: Work with regulatory and land use agencies to protect recharge areas, promote natural recharge, and prevent groundwater contamination.

Since the 1950s, land use in the Santa Clara Plain has changed from largely rural and agricultural to a highly developed urban area. The increased amount of land covered by impervious materials has increased surface water runoff and reduced natural recharge. Although not as urbanized as the Santa Clara Plain, the Llagas Subbasin serves the growing cities of Morgan Hill and Gilroy, and significant development has been considered in the Coyote Valley. This strategy calls for working with land use agencies to maximize natural recharge by protecting groundwater recharge areas and supporting the use of low-impact development.

Increased urbanization also increases the risk of contamination, particularly in groundwater recharge areas which are more vulnerable due to the presence of highly permeable sediments. The District coordinates with land use agencies with regard to potentially contaminating land use activities and resource protection. Regulatory agencies play a critical groundwater protection role by establishing water quality objectives and overseeing the cleanup of contaminated sites. The District will continue to work with these agencies and identify opportunities for enhanced cooperation to minimize impacts from existing contamination and prevent additional contamination from occurring. This includes the development of technical studies, participation in policy development, and coordination on proposed development.

5.4 OUTCOME MEASURES

This section describes key performance measures in meeting the following sustainability goals: (1) Groundwater supplies are managed to optimize water supply reliability and minimize land subsidence; and (2) Groundwater is protected from contamination, including salt water intrusion. These outcome measures, described in detail in this chapter, are as follows:

1. Projected end of year groundwater storage is greater than 278,000 AF in the Santa Clara Plain, 5,000 AF in the Coyote Valley, and 17,000 AF in the Llagas Subbasin.
2. Groundwater levels are above subsidence thresholds at the Santa Clara Plain subsidence index wells.
3. At least 95% of countywide water supply wells meet primary drinking water standards and at least 90% of Coyote Valley and Llagas Subbasin wells meet Basin Plan agricultural objectives.
4. At least 90% of wells have stable or decreasing concentrations of nitrate, chloride, and total dissolved solids (TDS).

The basis for these outcome measures and a description of how they will be measured is presented below.

5.4.1 Groundwater Storage

Outcome Measure: Projected end of year groundwater storage is greater than 278,000 AF in the Santa Clara Plain, 5,000 AF in the Coyote Valley, and 17,000 AF in the Llagas Subbasin.

Groundwater storage is a critical consideration in water supply reliability and is the county's best protection against drought or facility outage. The end of year groundwater storage is projected to support operational decisions, including the timing and location of reservoir releases and managed recharge, and decisions related to imported water such as short-term water exchanges or out of county banking.

The District's Urban Water Management Plan[64] contains a water shortage contingency plan that uses groundwater storage to indicate potential water shortages and outlines the overall strategy for dealing with water shortages, including contingency actions. The "normal" stage where no contingency action is needed occurs when the projected end of year groundwater storage is above 300,000 AF in the Santa Clara and Llagas subbasins combined.

While the UWMP provides an overall storage target of 300,000 AF in both the Santa Clara and Llagas subbasins, more specificity is needed with regard to the management of individual subbasins and groundwater management areas. Based on groundwater storage observed historically, the end of year storage targets established in this GWMP are 283,000 AF in the Santa Clara Subbasin (278,000 AF in the Santa Clara Plain and 5,000 AF in the Coyote Valley) and 17,000 AF in the Llagas Subbasin.

5.4.2 Groundwater Levels and Land Subsidence

Outcome Measure: Groundwater levels are above subsidence thresholds at the subsidence index wells.

Significant inelastic land subsidence occurred in the Santa Clara Plain through the 1960s due to long-term overdraft. Permanent subsidence was essentially halted by about 1970 through the District's expanded conjunctive use programs, which allowed a substantial recovery in groundwater levels. The avoidance of inelastic land subsidence has been and continues to be a major driver for the District given the extremely high costs associated with damaged infrastructure, reduced carrying capacity of flood control structures, and salt water encroachment into fresh water aquifers.

In 1991, the District evaluated the remaining land subsidence potential so as to avoid additional inelastic subsidence due to groundwater overdraft.[65] Based on the findings of this study, the District has established an acceptable subsidence rate of no more than 0.01 feet per year on average. This rate was presented to and endorsed by the Water Retailer Groundwater Subcommittee following the 1991 study, and the related subsidence thresholds have been used historically to measure performance in meeting Board policy. Monitoring data indicates that the subsidence target has generally been met. Ten index wells throughout the Santa Clara Subbasin were selected as control points for subsidence model calibration and prediction and the tolerable rate of 0.01 feet per year of inelastic subsidence was applied to determine threshold groundwater levels for these wells. These subsidence thresholds are the groundwater levels that must be maintained to ensure a low risk of unacceptable land subsidence.

This outcome measure relies on continued observation of groundwater levels at the subsidence index wells and comparison to subsidence thresholds to ensure groundwater levels are maintained above these thresholds

[64] Santa Clara Valley Water District, Urban Water Management Plan, 2015.
[65] Geoscience Support Services Inc. for Santa Clara Valley Water District, Subsidence Thresholds in the North County Area of Santa Clara Valley, 1991.

(Table 5-1). Since inelastic subsidence is irreversible, it is critical that it is prevented rather than observed. Therefore, to be proactive, the District also performs scenario modeling to project future groundwater conditions so changes in operations or groundwater management can be made to avoid inelastic subsidence before it occurs. It should be noted that a few wells shown in Table 5-1 differ from those in the 1991 study due to well destruction or loss of access. Replacement wells are chosen such that they are in close proximity to and display similar water level patterns as the original well.

Table 5-1. Subsidence Thresholds

Subsidence Index Well Number	State Well ID	Threshold Elevation (feet above mean sea level)	Location
1	08S01W03K013	166	Near Division St./Dell Ave. in Campbell
2	08S01E05N002	-23	Near Jarvis Ave./Gerlach Dr. in South San Jose
3	07S01E02J021	-146	Near Story Rd./Moginess Ave. in East San Jose
4	06S01W24H015	-18	Near Montague Expy/Seely Ave. in Milpitas
5	07S01W22E002	-45	Near San Tomas Expy/Williams Ave. in West San Jose
6	07S01W08D003	-47	Near Kensington Ave./Lochinvar Ave. in Santa Clara
7	06S02W22G005	-26	Near Middlefield Rd./Tyrella Ave. in Mountain View
8	06S02W24C010	-30	Near Hwy 101/Hwy 237 in Sunnyvale
9	07S01W02G024	-35	Near El Camino Real/Benton St. in Santa Clara
10	07S01E16C006	-40	Near Hwy 280/12th St. in downtown San Jose

5.4.3 Water Quality

Outcome Measure: At least 95% of countywide water supply wells meet primary drinking water standards and at least 90% of Coyote Valley and Llagas Subbasin wells meet Basin Plan agricultural objectives.

Water supply reliability depends on maintaining both an adequate supply of water and protecting water quality. While surface water goes through significant treatment before being served as drinking water, groundwater from public water supply wells does not typically require wellhead treatment beyond disinfection before being delivered to consumers. This makes protecting groundwater quality all the more critical. The Santa Clara and Llagas subbasins have good water quality overall, but maintaining that quality is not without its challenges. Threats to groundwater quality come from a variety of sources and include urban, rural, and agricultural activities. Elevated nitrate is widespread throughout the South County, and there are typically a few detections above maximum contaminant levels each year for constituents such as perchlorate and aluminum.

To protect the quality of groundwater for beneficial uses, this outcome measure evaluates the percentage of water supply wells that meet all primary MCLs and South County wells that meet agricultural objectives for irrigation. Since the focus of this outcome measure is on groundwater currently used and most of the groundwater extracted is from deeper aquifers, data from water supply wells in the principal aquifer zone are used for this measure. This outcome measure will be evaluated annually using data collected at water supply wells by the District and water

retailers. Data from dedicated monitoring wells will not be used as it is less representative of water being pumped for beneficial use.

The target percentage for water supply wells meeting primary MCLs is set high (95%) since these are health-based regulatory standards that must be met by public water systems. This measure is not set at 100% for several reasons. Some of the wells monitored by the District are private domestic wells, which are assumed to have less stringent wellhead protection, maintenance, and testing. The water quality at these wells may be more influenced by local land use and conditions near the well as they are typically shallower than public water supply wells and domestic wells are not subject to drinking water standards. Also, DDW does not consider a single detection of a contaminant to be indicative of contamination and would not consider a single detection to be an actual finding without a follow-up detection. Water served to customers may not have had the contaminant present at that concentration since water systems may perform treatment or blending prior to service.

The target percentage for the Coyote Valley and Llagas Subbasin water supply wells meeting Basin Plan agricultural objectives for irrigation is set at 90%. The lower target for the agricultural outcome measure reflects the less serious consequences; not meeting this target does not adversely impact human health but may reduce plant yield. Ideally, the measurement would rely on agricultural wells, however the District has monitoring access to very few of these wells. Agricultural wells are assumed to have similar construction as water supply wells (multiple screened intervals) so water supply wells are used as a proxy. This measure is only applicable to water supply wells in the Coyote Valley and Llagas Subbasin since there is very little remaining agriculture in the Santa Clara Plain. Water quality data will be compared to agricultural objectives for irrigation per the San Francisco Bay Basin Plan for the Coyote Valley and the Central Coast Basin Plan for the Llagas Subbasin.

Outcome Measure: At least 90% of wells in both the shallow and principal zones have stable or decreasing concentrations of nitrate, chloride, and total dissolved solids (TDS).

The timely identification of adverse trends is important so that appropriate action can be taken to protect groundwater resources. This outcome measure will evaluate long-term trends in groundwater quality for nitrate, chloride, and TDS on an annual basis using ten years of data from both water supply and dedicated monitoring wells. This will help the District to better understand how groundwater quality is changing over time and highlight areas that may warrant further study or action to protect the beneficial use of groundwater.

Nitrate trends will be evaluated because nitrate affects the largest number of wells in the county. Common sources of nitrate in groundwater are synthetic fertilizers, septic systems, and animal wastes. Elevated nitrate is common in the Llagas Subbasin and parts of the Coyote Valley due to historic and ongoing sources; however, there are also localized areas with nitrate concerns in the Santa Clara Subbasin. Chloride is used to measure potentially adverse trends related to salt water intrusion, which has occurred historically adjacent to San Francisco Bay. Evaluating long-term trends will help assess the potential for renewed intrusion. TDS is used as an indicator of salt loading and of overall water quality. The salts from applied irrigation water remain in the soil layer, and can eventually be leached into groundwater by rainfall or over-irrigation.

This outcome measure tracks the trend in nitrate, chloride, and TDS concentrations to evaluate potentially adverse conditions. The measure evaluates both the shallow and principal aquifer zone wells since changes in shallow wells might be detectable before changes appear in deeper wells. Trends will be analyzed for all available wells, including both water supply and dedicated monitoring wells. The outcome measure uses a target percentage of 90% to serve as a broad indicator of trends in these constituents, while recognizing that groundwater quality can fluctuate at any given well over time due to hydrology, pumping, or other factors. Also, the mere presence of a statistically significant increasing trend does not necessarily indicate a problem; the magnitude of change also needs to be considered. While the target percentage of 90% will serve as an overall indicator of trends in groundwater quality, the magnitude of the trend will also be evaluated to identify potential areas of concern so that additional action can be taken if necessary to protect groundwater resources.

Chapter 6 – Basin Management Programs and Activities

CHAPTER 6 – BASIN MANAGEMENT PROGRAMS AND ACTIVITIES

District programs to protect and augment water supplies are implemented under powers granted by the District Act,[66] which authorizes the District to provide comprehensive water management for all beneficial uses within Santa Clara County. The District Act authorizes the District to take the following actions to protect and augment water supplies:

- Conserve and manage water for beneficial and useful purposes, including spreading, storing, retaining, and groundwater recharge.
- Protect, save, store, recycle, distribute, transfer, exchange, manage, and conserve water.
- Increase and prevent the waste or diminution of the water supply.
- Obtain, retain, protect, and recycle water for beneficial uses.
- To do any and every lawful act necessary to be done that sufficient water may be available for any present or future beneficial use or uses of the lands or inhabitants within the district.

The District has many programs and activities that protect groundwater supplies and quality. Other agencies also implement programs to protect groundwater resources in the county. This chapter describes programs developed to maintain a reliable water supply, prevent inelastic (permanent) land subsidence, and protect groundwater quality, both now and in the future. Monitoring programs are described in Chapter 7.

In addition to the programs described in this chapter, the District monitors emerging policies and regulations, collaborates with key decision makers and stakeholders to effect policy change, cultivates relationships, and works with federal, state, and local government representatives on pending legislation and regulatory standards related to the protection of groundwater resources. The purpose of these activities is to ensure that District interests are communicated and considered in legislative and regulatory processes.

This chapter focuses on operations projects or ongoing basin management activities programs implemented by the District and other agencies. The District also implements capital projects as needed to protect and augment groundwater resources. These projects are described in the District's Capital Improvement Program.[67]

6.1 PROGRAMS TO MAINTAIN A RELIABLE GROUNDWATER SUPPLY

The groundwater subbasins are a critical component of the overall water supply of the District. The District manages water resources, including groundwater and imported water, and wholesales treated water to water retailers in Santa Clara County to achieve overall water supply reliability. By maintaining groundwater levels and sufficient storage, these programs prevent undesirable results including long-term groundwater overdraft, inelastic land subsidence, and salt water intrusion. Related programs and activities are described in detail below.

6.1.1 Managed Recharge

To offset groundwater withdrawals and ensure the long-term sustainability of groundwater resources, the District replenishes the groundwater subbasins with local and imported surface waters in District recharge facilities. This section focuses on managed recharge operations; however it should be noted that the managed recharge program depends upon many other District programs, including programs related to dam maintenance, the administration and management of imported water contracts, local water rights management, groundwater analysis, and

[66] Santa Clara Valley Water District Act, Water Code Appendix Chapter 60.

[67] Santa Clara Valley Water District, 5-Year Capital Improvement Program, 2017-2021.

maintenance of the raw water conveyance system.

By releasing locally-conserved and imported water from local reservoirs or the District's raw water distribution system, the District significantly increases groundwater recharge. On average, the District's managed recharge program replenishes twice the amount of water replenished naturally. District recharge facilities are designed for rapid infiltration based on their permeability and hydraulic characteristics. Through the District's managed recharge operations, an average of 98,000 AF was recharged annually between 2003 and 2012. This water came from a variety of sources, including watershed stormwater runoff captured in the county's 10 local reservoirs and water imported from both the State Water and Central Valley Projects. Managed recharge was scaled back during the recent drought due to limited surface water availability. In 2015, managed recharge was around 54,000 AF. During periods of limited surface water availability, priority for managed recharge is typically given to highly groundwater-dependent areas such as the Coyote Valley and Llagas Subbasin.

Recharge facilities are closely monitored using a computerized control system and field observation. The raw water control system provides for remote operation of water distribution facilities and real-time system performance data. Operations technicians perform daily inspections of recharge facilities and record flows and water levels. Operations include daily monitoring of forecasts, inflows, and storage levels to plan releases for water supply operations, dam safety and bank stability, habitat management, and flood potential reduction.

6.1.1.1 Reservoirs and Diversions

The District constructed 10 reservoirs and five stream diversions to enable appropriation of water supplies under the District's water rights. The primary function of the District's surface water reservoirs is to store local and imported water for groundwater recharge. Dams are operated under certificates of approval from the State Division of Safety of Dams and reservoirs and diversions are operated in accordance with the California Fish and Game Code. Total storage capacity of the District's reservoirs is 169,000 acre-feet. The District is currently assessing the seismic stability of its reservoirs, and several reservoirs are currently subject to operating restrictions that reduce reservoir storage capacity until upgrades are implemented. These operating restrictions may impact groundwater recharge for facilities that depend on local water supplies since the amount of local water that can be captured is reduced.

Most of the stored water released from the reservoirs is delivered to streams below the dams. As the water flows downstream, some of it percolates through the streambed and recharges the groundwater subbasins. Some water may be diverted downstream for recharge in off-stream recharge facilities. The District also operates and maintains several systems that divert water to recharge facilities and enhance recharge. Additional detail on District recharge facilities is in Appendix C.

6.1.1.2 In-Stream Managed Recharge

The District conducts in-stream managed recharge operations in more than 90 miles of stream channel.[68] About two-thirds of the District's managed recharge occurs through in-stream recharge facilities, with over 60,000 AF recharged from District releases into creeks in most years. In 2015, a drought year, in-stream managed recharge was reduced to around 27,000 AF. In addition to ongoing planning, monitoring, and inspection of facilities, the District also coordinates operations for flashboard dams and spreader dams with the California Department of Fish and Wildlife (DFW) under related agreements.

District recharge operations along streams have been modified in recent years to reflect environmental concerns, including the protection of aquatic habitats. In 1996, the Guadalupe Coyote Resources Conservation District (GCRCD) filed a complaint with the State Water Board alleging that District water supply operations impact fish and aquatic

[68] Santa Clara Valley Water District, FY 2017-2021 Water Utility Enterprise Operations Plan.

habitat in Coyote and Stevens Creeks, and the Guadalupe River tributaries.

In 2003, settlement negotiations with GCRCD as well as the National Marine Fisheries Service (NMFS), US Fish and Wildlife Service (FWS), DFW, and other interested non-governmental organizations resulted in the Fisheries and Aquatic Habitat Collaborative Effort (FAHCE) settlement agreement. The agreement set forth a pathway to resolve the water rights complaint through changes to District reservoir reoperations, scientific studies, and restoration measures once the complaint is withdrawn. Although the District is not yet required to implement FAHCE measures, it has moved forward with restoration measures for the protection of fish and wildlife resources consistent with Board policies. In conjunction with flood protection efforts, the District has removed 22 fish passage barriers, laddered and screened water diversions, and collected data to provide a foundation to support fish and aquatic habitat restoration to fulfill elements of the FAHCE Settlement Agreement.

In May 2015, the District submitted fifteen Petitions for Change to the State Water Board to address the water rights in the FAHCE settlement agreement. The proposed change in the purpose of use from domestic and irrigation to municipal more accurately reflects current and future use of local water for groundwater recharge and conjunctive use.

6.1.1.3 Off-Stream Managed Recharge

The District conducts off-stream managed recharge operations in over 70 recharge ponds that range in size from less than 1 acre to more than 20 acres. Recharge through off-stream ponds accounts for about a third of the District's managed recharge, with over 30,000 AF of water delivered to recharge ponds in most years. In 2015, off-stream managed recharge was around 27,000 AF due to limited surface water supplies. Ongoing maintenance of off-stream ponds is conducted by removing accumulated fine sediments to maintain optimal recharge rates.

6.1.1.4 Injection Well Pilot

The District's San Tomas Injection Well is a full-scale pilot direct injection facility, with a capacity of 750 AF per year. This facility is able to receive treated water from the District's Rinconada Water Treatment Plant via the District's Campbell Distributary. It provides an additional element that improves the flexibility of the District's conjunctive management program. The injection well is not currently in operation.

6.1.1.5 Treated Groundwater Reinjection Program

Over the years, hundreds of thousands of acre-feet of groundwater have been extracted in Santa Clara County to control or mitigate contamination plumes caused by spills or leaks of hazardous materials. To facilitate the cleanup of contamination sites, protect groundwater resources, and minimize the discharge of local waters to storm drains or sanitary sewers, the District adopted Resolution 94-84 to encourage the reuse or recharge of treated groundwater from groundwater contamination cleanup projects. This program includes the review of applications against specific criteria to ensure that groundwater quality is protected and provides a financial incentive for qualifying projects. The program criteria are stringent to ensure compliance with the District Act; most parties extracting groundwater for environmental remediation do not meet the criteria.

6.1.1.6 Indirect Potable Reuse

The District's 2012 Water Supply Master Plan recommended developing 20,000 acre-feet per year of advanced treated recycled water for indirect potable reuse by 2030. The District is considering expanding the potable reuse program identified in the Water Supply Master Plan as part of an Expedited Purified Water Program, with potential potable reuse capacity up to 45,000 AFY. The District anticipates using fully advanced treated recycled water (purified water) for managed recharge, similar to the highly successful Groundwater Replenishment System

operated by the Orange County Water District. However, additional feasibility studies, stakeholder and community input, technology testing, and research are necessary prior to beginning project-specific planning work.

6.1.2 In-Lieu Recharge

The District's in-lieu recharge programs play a critical role in maintaining groundwater basin storage and preventing undesirable results by meeting water demand that would otherwise be met by groundwater pumping.

6.1.2.1 Treated Water Operations

The District operates three drinking water treatment plants, which operate 24 hours a day, 7 days a week and provide in-lieu recharge by reducing groundwater demands. The Rinconada Water Treatment Plant, which was constructed in 1967, has a maximum flow rate of 80 million gallons per day (MGD). The Penitencia Water Treatment Plant was constructed in 1974 and has a maximum flow rate of 40 MGD. The Santa Teresa Water Treatment Plant can process 100 MGD and has been on line since 1989. The long-term average treated water delivery is 119,000 AF per year for the period 2003 to 2012. The annual treated water delivery ranges from a maximum of 136,000 AF to a minimum of 76,000 AF for the same period. In 2015, a drought year, treated water delivery was about 94,500 AF.[69]

6.1.2.2 Water Banking and Supplemental Water Supplies

The District also stores imported water used for in-lieu and managed recharge in the Semitropic Groundwater Bank in Kern County for withdrawal when needed. This involves conveyance of the District's SWP and/or CVP water to the bank, which operates a conjunctive use program. Storage in the bank occurs when water is physically delivered to recharge ponds, or when surface water deliveries are used by the banking partner in-lieu of groundwater pumping. Return of stored water is accomplished when the banking partner uses groundwater in place of surface supplies, or physically pumps groundwater into the surface conveyance system for use by DWR for the SWP. The District is then delivered imported water from the Delta that would have otherwise been delivered to the banking partner or to other SWP contractors.

If water supplies are insufficient to meet needs, the District may also purchase transfer water or participate in exchanges to supplement supplies; both transfer and exchange supplies are conveyed to Santa Clara County from the Delta. During the recent drought, both Semitropic Bank withdrawals and the acquisition of supplemental imported water supplies helped to ensure groundwater sustainability. Between 2013 and 2015, withdrawals from the Semitropic bank totaled approximately 126,000 AF.[70]

6.1.2.3 Water Conservation

Per the Board adopted 2012 Water Supply Master Plan, the District's long-term water savings goal is 98,800 acre-feet per year by 2030. To achieve these aggressive long-term goals and the additional Water Conservation Act of 2009 requirements, the District and most major retail water providers partner in implementation of nearly 20 different ongoing water conservation programs that use a mix of incentives and rebates, free device installation, home visits, site surveys, and educational outreach to reduce water consumption in homes, businesses and agriculture. Recent program expansion includes a new gray water system rebate program and increased rebates for turf removal. These programs are designed to achieve sustainable, long-term water savings and are implemented regardless of water supply conditions.

These programs help the District to meet long-term water supply reliability goals as well as short-term demands

[69] Santa Clara Valley Water District, FY 2016-17 Protection and Augmentation of Water Supplies.
[70] Santa Clara Valley Water District, FY 2016-17 Protection and Augmentation of Water Supplies.

placed on the water supply system during critical dry periods and/or other shortages. They reduce flows to Bay Area wastewater treatment plants, avoiding or deferring facility expansions while protecting the Bay's salt marsh habitat. Water conservation saves energy, reduces greenhouse gas emissions, and reduces the need for short-term water use reduction by water retailers. The District's water conservation program saved an estimated 64,000 AF of water in 2015.

6.1.2.4 Water Recycling

Recycled water is a locally-controlled, drought-resistant source of supply used for non-potable uses such as landscape irrigation and industrial cooling. The District partners with the four recycled water producers in the county to expand recycled water use. Approximately 21, 000 AF of recycled water was used in 2015. About 30,000 acre-feet of year 2035 demands are projected to be met with non-potable recycled water. The District's Silicon Valley Advanced Water Purification Center, which uses microfiltration, reverse osmosis, and ultraviolet disinfection to produce up to 8 million gallons of purified recycled water a day, went on-line in 2014. Water from this facility is currently blended into existing recycled water provided by South Bay Water Recycling to improve overall recycled water quality for irrigation and industrial purposes. This facility also allows demonstration of advanced treatment technologies, and sets the stage for potential potable reuse.

6.1.3 Protection of Natural Recharge

The District's managed recharge program augments natural recharge since natural replenishment is insufficient to meet groundwater demands. However, protecting natural recharge capacity is also important. Natural recharge is defined here as any type of recharge not controlled by the District, including: rainfall, subsurface seepage from surrounding hills, net irrigation return flows, net leakage from water distribution systems, storm drains, sewer lines, and septic systems, and net seepage into the groundwater basin. Natural recharge to deep drinking water aquifers is about 55,000 AF per year on average based on estimates from 2003 to 2012. In 2015, a drought year, natural recharge was estimated to be 39,000 AF.[71]

The District Act limits agricultural groundwater production charges to no more than 25% of non-agricultural charges, and Board policy further limits it to no more than 10% in order to preserve open space. The preservation of open space supports agriculture and natural recharge capacity. The District uses non-rate revenue (e.g., 1 percent ad valorem property tax revenue) to offset related lost agricultural revenue for each customer class.

District staff reviews land use plans for local cities and the county, encouraging the preservation of natural infiltration and reduction of impervious surfaces in the areas that contribute groundwater recharge to the principal aquifers.

6.1.4 Groundwater Production Management

The subbasins in Santa Clara County are not adjudicated and the District has not historically controlled the operation of groundwater wells or the amount of groundwater that wells can produce. The groundwater recharge program, treated water sales, recycled water partnerships and aggressive water conservation programs all offset demand on groundwater resources. District tools to influence groundwater production are discussed below.

6.1.4.1 Groundwater Production Measurement

The amount of groundwater pumped from the groundwater subbasins is recorded in accordance with the District Act, which requires owners to register all wells within the District's groundwater management zones and to file

[71] Santa Clara Valley Water District, FY 2016-17 Protection and Augmentation of Water Supplies.

production statements with the District on either an annual, semi-annual or monthly basis depending on the amount of water produced.

By District Board Resolution, meters are only installed at those sites determined to be economically feasible per approved criteria or as required to facilitate the complete and accurate collection of groundwater production revenue. In the Santa Clara Plain, meters are required for facilities producing more than 4 AF of agricultural water or more than 1 AF of non-agricultural water annually. Within the Coyote Valley or Llagas Subbasin, meters are required for facilities producing more than 20 AF of agricultural water or more than 2 AF of non-agricultural water.[72]

Metered wells extract the vast majority of the groundwater used, as shown in Table 6-1 below. Where meters are not used, crop factors are used to determine agricultural water use and average values are used to estimate domestic use.

Table 6-1. District Well Metering Summary (FY 2016)

Groundwater Charge Zone[1]	Number of Metered Wells	Metered Well Production (AF)	Number of Non-Metered Wells	Non-Metered Well Production (AF)
W2	938	58,000	409	200
W5	1,253	35,800	2,708	2,100
Total	**2,191**	**93,800**	**3,117**	**2,300**

1. Groundwater charge zone W2 largely coincides with the Santa Clara Plain, while charge zone W-5 is largely coincident with the Coyote Valley and Llagas Subbasin.
2. Production values are rounded to the nearest 100 AF.

The District also tracks surface water, treated water and recycled water production within the county, and charges users volumetric rates. Water meter testing and maintenance are performed on a regular basis to ensure meters are performing accurately. When problems are discovered, meters are repaired or replaced. Meters are also replaced on a regular basis for testing and rebuilding.

6.1.4.2 Retailer Coordination on Source Shifts and Shortage Response

An essential component of water supply reliability is the cooperation between the District and the water retailers, particularly in the implementation of programs that offset groundwater pumping such as treated water use and water use efficiency. This cooperation has been critical during times of shortage per the examples below.

In 2014, the Board asked retail water agencies, local municipalities and the County of Santa Clara to implement mandatory measures as needed to achieve a 20 percent water use reduction compared to 2013. In the Santa Clara Plain, increased reliance on groundwater reserves caused water levels to approach or temporarily fall below subsidence thresholds at several index wells. The District worked with several retailers to reduce pumping in key areas, which resulted in improved conditions.

Due to the continued extreme drought, in March 2015 the Board increased the water use reduction target to 30% compared to 2013 use and asked that outdoor watering be limited to no more than two days per week. Nearly all water retailers supported the District's water use reduction target, which was higher than their state-mandated targets in many cases. Coordinated community outreach, such as consistent messaging on outdoor watering, lead to an impressive 27% countywide savings in potable water use compared to 2013. Retailer efforts to use treated

[72] Santa Clara Valley Water District, Board of Directors Resolution 91-53.

surface water and reduce pumping in certain areas were also instrumental in groundwater level recovery and minimizing the risk of resumed land subsidence.

6.1.4.3 Groundwater Zones and Groundwater Charges

The District has the authority to establish a zone or zones within which it can levy charges for all groundwater-producing facilities. The purpose of these charges is to fund District activities that protect and augment the water supplies for users within the zones. Creation or modification of charge zones can allow different levels of service within the District's service area, with water users in each zone paying appropriately for the services received. Per the District Act, groundwater charges can be used to pay for costs associated with for the following activities, as well as the principal or interest related to these costs:

- Constructing, maintaining and operating facilities to import water,
- Purchasing water for importation, and
- Constructing, maintaining and operating facilities to conserve or distribute water, including facilities for groundwater recharge, surface distribution, and the purification and treatment of water.

6.1.4.4 Pricing Policies

In creating zones and setting water rates, the District utilizes several concepts as presented in Resolution 99-21, including water pooling and water resource management strategies. Under the District's pooling approach, water is considered a single commodity irrespective of the water's source or costs since all users benefit from the availability of multiple sources of water. The costs of the treated water facilities are pooled with all other costs within the zone of benefit, and recouped primarily through the basic user charge assessed to all water pumped from the groundwater subbasins or provided by District treated water deliveries. The treated water surcharge, paid by treated water users in addition to the basic user charge, is set by the District to influence its retailers in the choice between treated water purchases and groundwater extraction. For example, the District may offer treated water above contract delivery amounts at a discount to encourage retailers to take more treated water rather than pump groundwater. This approach allows the greatest flexibility in water resources management for the overall benefit of all water users in the county, including those that do not receive treated water.

6.1.5 Water Accounting

As described in Section 5.1.1, the District uses local and imported surface water to conduct an active managed recharge program. Many other District programs are needed to support managed recharge, including those related to dam maintenance, the administration and management of imported water contracts, local water rights management, and maintenance of the raw water conveyance system.

To reconcile all measured imported water, reservoir inflows and releases, and changes in surface water storage, a periodic water balance is performed. The results of this balance become the final accounting for distribution and facility processing. The data is used for water rights reporting, accounting for usage of federal water, for facility performance measurement purposes, and for the groundwater subbasin water budget, which is integral to the District's annual PAWS Report. This report establishes the recommended water rates for the next year based on anticipated costs to meet the projected water need.

6.1.6 Groundwater Level and Storage Assessment

District staff evaluates current groundwater levels and storage, and projects future groundwater supply conditions under various water supply scenarios. This analysis supports the District's conjunctive management programs,

water supply operations, and water supply planning efforts. Specific activities include the use and maintenance of groundwater models as well as groundwater level and subsidence databases.

District programs that monitor, track, and evaluate rainfall, surface flows, recharge, and reservoir operations allow the preparation of a detailed surface water balance, which provides data for groundwater models, including stream stage and flow data, managed recharge estimates, and rainfall data. Along with groundwater pumping data, these data allow the District to project groundwater elevations and storage under different operations scenarios.

6.1.6.1 Operations Planning to Meet Near-Term Needs

The District conducts ongoing operational planning to meet demands, protect groundwater reserves, and ensure adequate carryover supplies. Each fall, the District initiates the annual operations planning process. Imported and local supplies are estimated and operations scenarios are developed for the following calendar year, using different hydrologic projections. During the process, imported water deliveries, out-of-county water bank withdrawals or deposits, managed recharge operations, and local water releases to streams and the Bay are projected. Typically by late spring, there is more certainty with regard to hydrologic conditions, and therefore imported water deliveries, reservoir inflows, and local demands. If it appears that groundwater reserves will be drawn down below operational targets, then managed recharge operations may be increased where needed or treated water deliveries may be encouraged to offset groundwater pumping. During droughts, the District also works with water retailers to set demand reduction targets and increase conservation promotions to help protect the groundwater subbasins from overdraft. As the water year progresses and more information becomes available, the operations plans are revised accordingly to optimize local water supply reliability.

6.1.6.2 Contingency Planning

The District's UWMP[73] includes water shortage contingency planning that recognizes groundwater carryover storage as a critical consideration in water supply reliability. An important component of meaningful shortage response is the ability to recognize a pending shortage before it occurs, early enough so that multiple options remain available and before supplies that may be crucial later have been depleted.

Given the operational priorities of the District, projected end of the year groundwater carryover storage serves as the best single indicator of possible impending water shortages. The UWMP proposes guidelines for shortage response, based on groundwater storage. If the projected end of year total groundwater storage is anticipated to drop below 300,000 AF, then shortage response is called for, such as short-term water demand reduction measures. These short-term water demand reduction measures are in addition to ongoing water conservation programs. The focus of the UWMP is not to define operating targets, but rather to identify at what point demand cutbacks or other response measures may be needed. Chapter 5 of this GWMP includes a breakdown of the 300,000 AF storage target by groundwater management area.

6.1.6.3 Planning to Meet Future Needs

The District's water supply plans, the UWMP and the Water Supply Master Plan, evaluate water supply reliability under future scenarios. Every five years, urban water suppliers must prepare an UWMP assessing their water demands, supplies, and potential shortfalls over the next 20 years. The 2015 UWMPs show a continued reliance on groundwater in the future, with the Cities of Morgan Hill and Gilroy projecting significant increases in groundwater use.[74]

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[73] Santa Clara Valley Water District, Urban Water Management Plan, 2015.

[74] Per individual 2015 Urban Water Management Plans for water retailers in Santa Clara County.

The District has increased its efforts to coordinate the water supply projections of its retailers, trying to reconcile the individual projections into a combined water supply future that meets the District's countywide water reliability goals. Water retailers deliver over 85% of the total water used in the county and nearly 95% of the water used in the Santa Clara Plain in northern Santa Clara County. The District's UWMP evaluates whether the projected groundwater use can be sustained over a 25-year planning horizon without risking depletion of groundwater reserves or failing to meet water supply reliability targets. The UWMP (and Water Supply Master Plan described below) use over 80 years of measured or correlated local hydrologic data and are supported by information in the GWMP. The District's UWMP highlights the importance of groundwater reserves, which are critical to meet demands in dry years. Multiple dry years pose the greatest challenge to the District's water supply as storage reserves become depleted.

The purpose of the District's Water Supply Master Plan is to identify and plan the new water supply projects and programs that will be needed to ensure future water supply reliability and groundwater sustainability over a 25-year planning horizon. Preparing the Water Supply Master Plan includes developing objectives based on Board policy; performing a baseline system analysis to determine water supply and infrastructure needs; developing a recommended portfolio of projects and programs to meet those needs; conducting appropriate environmental analysis; engaging water retailers and interested stakeholders in plan development; and preparing a schedule and budget for implementing the recommended portfolio. The Water Supply Master Plan will be updated at least every five years to reflect current conditions.

District staff also coordinates with land use agencies to review certain Environmental Impact Reports, land use proposals, and Water Supply Assessments required for development decisions that meet certain thresholds.[75] The District has been working closely with retailers and cities to address these water supply assessments and other water supply issues.

Projections of future groundwater levels and storage are also performed to support other District planning efforts, including the evaluation of the feasibility of indirect potable reuse and wetland projects.

6.1.7 Asset Management

Maintaining the integrity of the District's existing infrastructure is essential for water supply reliability. This includes maintaining recharge facilities and all District facilities, such as reservoirs, treatment plants, and conveyance and distribution infrastructure. The District maintains a rigorous asset management program to optimize asset renewal strategies and minimize the total cost of owning assets while providing expected service levels and operating at an acceptable level of risk. The program seeks to reduce unplanned infrastructure failure and service disruptions and improve reliability of water supply infrastructure. The program helps to optimize asset lifecycle costs, enable accurate financial planning to sustainably deliver services, and capture and transfer asset-specific knowledge.

6.2 PROGRAMS TO PROTECT GROUNDWATER QUALITY

This section describes activities by the District and other entities that address groundwater quality protection in Santa Clara County. In addition, the District monitors emerging policy and regulatory trends; collaborates with key decision makers and stakeholders to affect policy change; and works with federal, state, and local government representatives on pending legislation or regulatory standards related to the protection of groundwater quality. The purpose of these activities is to ensure that District interests are communicated and considered in legislative and regulatory processes.

[75] California Water Code Section 10610.

6.2.1 Well Ordinance Program

The District Act authorizes the District to prevent the contamination, pollution, or otherwise rendering unfit for beneficial use the surface or subsurface water used or useful in the county.[76] As part of its efforts in exercising this authority, the District developed a well ordinance to protect groundwater resources from contamination. The objective of the Well Ordinance Program is to ensure that wells and other deep excavations are properly constructed, maintained, and destroyed so that they will not allow the vertical transport of waters of poor quality into deeper aquifers used for drinking water. Abandoned and unused wells are required to be sealed in accordance with the District Well Ordinance.[77] The District is authorized to take civil action to abate a public nuisance caused by wells creating a water contamination hazard.

Each year, the District permits and inspects approximately 1,800 exploratory borings, well destructions, and water supply and monitoring well installations under the Well Ordinance Program.[78] Through this program, the District:

- Develops standards for the proper construction, maintenance, and destruction of wells and other deep excavations,
- Informs the public, including contractors, consultants and other government agencies about the Well Ordinance and the well standards,
- Verifies that wells are properly constructed, maintained, and destroyed using a permitting and inspection mechanism,
- Takes enforcement action against violators of the Well Ordinance, and
- Maintains a database and well mapping system to document information about well permitting, well construction and destruction details, a well's location, and well status.

6.2.2 Domestic Well Testing Program

Although public water supply systems are required to regularly test their wells for compliance with DDW regulations, no such regulation exists for private domestic wells. Elevated nitrate is an ongoing groundwater protection challenge due to historic and ongoing sources including fertilizers, septic systems, and animal waste. To better understand the occurrence of nitrate and to help well owners better understand their water quality, the District has implemented a free domestic well testing program for private well owners within the District's groundwater charge zones.

In 1998, the District sampled over 600 private wells to obtain data on nitrate contamination and found that over half of the wells tested provided water that exceeded the DDW Maximum Contaminant Level of 10 milligrams per liter[79] of nitrate as nitrogen. In 2011, the District started the free domestic well testing program in the southern part of the county, which was subsequently expanded to the northern part of the county in 2012. Over 1,300 private well tests have been conducted by the District under this program, which also includes other basic water quality parameters like electrical conductivity, hardness, and bacteria. The program benefits the District by providing more localized information on nitrate and other parameters to supplement regional groundwater monitoring data.

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[76] Santa Clara Valley Water District Act, Water Code Appendix, Chapter 60, Section 5(5).
[77] Santa Clara Valley Water District Ordinance 90-1.
[78] Santa Clara Valley Water District, FY 2017-2021 Water Utility Enterprise Operations Plan.
[79] Santa Clara Valley Water District, Private Well Water Testing Nitrate Data Report, 1998.

6.2.3 Salt and Nutrient Management

Nitrate is the most significant non-point source contaminant in Santa Clara County due to historic and ongoing sources, including synthetic fertilizer and septic systems. Since the 1990s, the District has implemented nitrate management activities in the Coyote Valley and Llagas Subbasins to ensure the long-term viability of groundwater as a healthful water supply. The goal of these efforts is to reduce the public's exposure to high nitrate concentrations, reduce further loading of nitrate, and monitor the occurrence of nitrate. The District's recharge operations serve to dilute existing nitrate concentrations and focused outreach materials and workshops related to rural land use and groundwater protection also support the District's nitrate management objectives. District programs for conservation in the agricultural sector augment the salt and nutrient management efforts since improved irrigation efficiency may reduce the transport of these constituents to groundwater. Major District efforts related to salt and nutrient management are described below.

6.2.3.1 Salt and Nutrient Management Plans

In 2009, the State Water Board adopted a policy for water quality control for recycled water.[80] A major component of this policy is the requirement for regional Salt and Nutrient Management Plans (SNMPs) as "the appropriate way to address salt and nutrient issues." The SNMPs address salt and nutrient loading to groundwater subbasins that may arise from use of recycled water, imported water, agricultural activity, and other sources, and evaluate the overall salt balance in the groundwater subbasins.

The District worked with local stakeholders to develop two SNMPs, one for the Santa Clara Subbasin (in coordination with the San Francisco Bay Water Board)[81] and one for the Llagas Subbasin (in coordination with the Central Coast Water Board).[82] The SNMPs determine whether salt and nutrient loading to the groundwater subbasins from all sources will cause a net increase in salt and nutrient concentrations in groundwater over the 25-year period ending in 2035. The SNMPs provide the framework for confirming that the groundwater subbasins will be protected from water quality degradation from salt and nutrient loading from all sources, including recycled water projects. The analysis prepared to complete the SNMPs facilitates evaluation of potential impacts or benefits from specific recycled water project proposals.

Projected groundwater concentrations of salts and nutrients (total dissolved solids and nitrate) in groundwater remain within water quality thresholds established in the Water Board Basin Plans for the Santa Clara and Llagas subbasins. Nitrate is projected to decrease in both subbasins, while salt is projected to increase in the Santa Clara Plain area of the Santa Clara Subbasin and decrease in the Coyote Valley area. Salt concentrations are projected to remain relatively unchanged in the Llagas Subbasin. Use of recycled water for irrigation introduces only a minor portion of total salt loading and is supported by the anti-degradation analysis in the SNMPs.

6.2.3.2 Recycled Water Irrigation Evaluation

Recycled water generally has a higher concentration of salts, nutrients, disinfection byproducts, and emerging contaminants than groundwater or treated water, and these contaminants may be introduced to groundwater through landscape irrigation. Recycled water is currently used only for non-potable uses like landscape irrigation, agriculture, and industry. Recycled water undergoes tertiary treatment, except for the South Bay Water Recycling (SBWR) system as described below. With the exception of the Evergreen and Edenvale areas of San Jose and portions of the Llagas Subbasin in Gilroy, all current use of recycled water is limited to the confined areas, where

[80] State Water Board Resolution 2009-0011.
[81] Santa Clara Valley Water District, Revised Final Salt and Nutrient Management Plan: Santa Clara Subbasin, 2016.
[82] Todd Groundwater for Santa Clara Valley Water District, Final Salt and Nutrient Management Plan: Llagas Subbasin, 2014.

significant clays and silts offer a measure of natural protection to deeper drinking water aquifers.

Several groundwater monitoring efforts and studies provide data to help assess potential changes to groundwater quality resulting from the irrigation of recycled water. The District evaluates groundwater monitoring data collected by SBWR, which indicates increasing trends for several inorganic constituents, including chloride and boron, following recycled water application.[83]

In August 2011, the District completed the Recycled Water Irrigation and Groundwater Study[84] to evaluate the potential effects of recycled water used for irrigation on groundwater quality in the Santa Clara Plain and Llagas Subbasin and to identify best management practices to protect groundwater. The study included laboratory testing of soils irrigated with recycled water and an 18-month field study at a site using recycled water for irrigation in the Santa Clara Plain. The study found no significant change in groundwater quality for most constituents monitored. However, some changes were noted, including the presence of a few constituents not previously found in shallow groundwater at the site. A common by-product of the water disinfection process, N-Nitrosodimethylamine (NDMA), was detected in groundwater 30 feet below the surface at trace levels of 3 to 4 parts per trillion (ppt) during the study. Subsequent sampling has found levels of up to 18 ppt, and low-level detections of perfluorinated compounds and other emerging contaminants have been observed in shallow groundwater near other recycled water irrigation sites in the county. The study findings suggest that best management practices and/or changes in recycled water treatment may be warranted when irrigating with recycled water over sensitive parts of the Santa Clara Plain or Llagas Subbasin.

In 2014, the District completed construction of the Silicon Valley Advanced Water Purification Center (SVAWPC). The advanced treated water from the SVAWPC is blended with tertiary treated water from the Santa Clara/San Jose Water Pollution Control Plant (WPCP) and distributed to SBWR recycled water customers. The District continues to monitor groundwater for recycled water impacts and is evaluating whether improvements to shallow groundwater are observed because of blending operations.

As the shallow and unconfined Coyote Valley is highly vulnerable to contamination, the District has determined that all recycled water applied in that area must be advanced treated to avoid groundwater quality impacts. This determination was made during District review of the Coyote Valley Specific Plan, a large proposed development in the Coyote Valley that has since been postponed indefinitely.

6.2.4 Nitrate Treatment System Rebate Program

In November 2012, Santa Clara County voters passed Measure B - the Safe, Clean Water and Natural Flood Protection Program. This 15-year program includes projects to address five priorities, including Priority A: Ensure a safe, reliable water supply. As part of Priority A, the District is offering rebates for nitrate treatment systems to improve water quality and safety for private well users not served by public water systems.

Based on the data collected from domestic well testing program, it is estimated that approximately 1/3 of the domestic wells in the southern portion of the county have nitrate levels above the MCL (in the north this number is less than 10%). To help reduce exposure to elevated nitrate, the water district is offering rebates of up to $500 to private well users that purchase and install nitrate treatment systems. Since program inception, the District has awarded over $3,400 in rebates to eligible well owners. The District continues to perform outreach to potentially affected residents in the county.

[83] Santa Clara Valley Water District, City of San Jose South Bay Water Recycling Groundwater Data Evaluation, May 2008.
[84] Locus Technologies for Santa Clara Valley Water District, Recycled Water Irrigation and Groundwater Study, Santa Clara and Llagas Groundwater Subbasins, Santa Clara County, California, August 2011.

6.2.5 Vulnerability Assessment

Numerous groundwater vulnerability assessments for groundwater and wells have been conducted in the Santa Clara and Llagas subbasins as described below.

6.2.5.1 Groundwater Vulnerability Studies

In 1985, the San Francisco Bay Water Board completed a vulnerability study,[85] which rated 105 hazardous materials release sites in terms of groundwater pollution potential based on the distance to wells and depth to water as well as the severity of the contamination. The study focused on existing contamination sites and did not consider potentially contaminating activities.

In 1999, the District completed an evaluation of the sensitivity of the groundwater subbasins based on its intrinsic or hydrogeologic characteristics using the USEPA DRASTIC methodology.[86] The DRASTIC evaluation resulted in a GIS coverage which presents the relative sensitivity of different parts of the subbasins to contamination.[87]

In 2007, the District completed a study partially funded by the San Francisco Bay Water Board on the potential for groundwater contamination from past dry cleaner operations. The District ranked hundreds of operating and former dry cleaning operations for their potential to contaminate water supply wells based on the age and duration of dry cleaning operations, hydrogeologic factors, and municipal well construction. The study found that despite the high number of dry cleaning operations in the county, the impact on deep drinking water aquifers has been very limited.[88]

In October 2010, the District completed a comprehensive groundwater vulnerability study to assess the vulnerability of groundwater subbasins to land use activities.[89] This study updated the previous sensitivity study, incorporating recent hydrogeologic data and a statistical (rather than subjective) weighting approach. It also evaluated the vulnerability of the subbasins to different land uses. The study findings and related GIS tool have been used to help prioritize District work (including the review of high-threat contamination sites) and optimize the groundwater quality monitoring network. The District also met with several land use and regulatory agencies to discuss the potential use of the GIS tool to assist in their groundwater protection efforts.

6.2.5.2 Drinking Water Source Assessment and Protection Program (DWSAP)

The goals of the state's DWSAP required under the 1996 reauthorization of the federal Safe Drinking Water Act are as follows:

- Protect public water systems,
- Improve drinking water quality and support effective water resources management,
- Inform public and drinking water systems of contaminants and potential contaminating activities that have the

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[85] San Francisco Bay Water Board, Sanitary Engineering and Environmental Health Research Laboratory, University of Berkeley, and Santa Clara Valley Water District, Assessment of Contamination from Leaks of Hazardous Materials in Santa Clara Groundwater Basin, 205j Report, June 1985.
[86] USEPA, DRASTIC: A Standardized System for Evaluating Ground Water Pollution Potential Using Hydrogeologic Settings, 1987.
[87] Santa Clara Valley Water District, An Analysis of the Sensitivity to Contamination of the Santa Clara Valley Groundwater Aquifers Based on the USEPA DRASTIC Methodology, 1999.
[88] Santa Clara Valley Water District, Study of Potential for Groundwater Contamination from Past Dry Cleaner Operations in Santa Clara County, 2007
[89] Todd Engineers and Kennedy/Jenks Consultants for the Santa Clara Valley Water District, Revised Final Groundwater Vulnerability Study, Santa Clara County, California, October 2010.

potential to affect drinking water,

- Promote a proactive approach to protecting drinking water quality and enable communities and drinking water systems to protect water quality,
- Refine and focus drinking water source monitoring requirements, and
- Focus pollution prevention and cleanup on areas that are subject to more serious threats.

The District assisted many of the local water retailers in their initial compliance with the state's DWSAP requirements in 2002 and 2003. The assessments included delineating well protection areas, inventorying possible contaminating activities, and analyzing the vulnerability of the source. The District developed a GIS based application, which was used to delineate protection areas in accordance with state guidelines. In addition, the District shared the application with the state DWSAP data advisory committee, on which the District was an active participant during development of the DWSAP implementation guidelines. Local water retailers are responsible for completing the DWSAP for all newly installed wells, and the District provides assistance upon request.

6.2.6 Coordination with Land Use Agencies

As land uses intensify, so does the potential for contaminating the underlying groundwater. In highly urbanized areas such as the Bay Area, there are numerous threats to groundwater resulting from commercial, industrial, and residential development. These threats include urban runoff, industrial chemical spills, and leaking underground storage tanks. Residential and agricultural use of nitrogen based fertilizers and pesticides can also impact groundwater quality. Coordination with land use agencies helps ensure groundwater quality is protected.

6.2.6.1 Land Use Review

Most land use decisions fall under the authority of local cities and the county. These agencies, the District, and the water retailers all desire to maintain high-quality water resources to serve current and future uses. These agencies work together to try to ensure that groundwater is adequately protected from potentially contaminating activities. Of particular concern are potentially contaminating activities over groundwater recharge areas, which are more vulnerable to contamination due to the presence of high permeability soils and higher groundwater flow rates.

The District reviews some local land use and development plans to identify threats to groundwater and watercourses that are under District jurisdiction. The District also provides review and comment on environmental documents, and city and County General Plans. The District has also worked with land use agencies to develop guidelines or model ordinances for specific issues such as the permitting of graywater systems. The District works with the project and regulatory stakeholders to try to ensure that these projects are implemented such that groundwater resources are protected.

6.2.6.2 Onsite Wastewater Treatment Systems (Septic Systems)

The installation of Onsite Wastewater Treatment Systems (OWTS, or septic systems) is generally overseen by the County DEH under the Local Agency Management Plan (LAMP) as delegated by the Water Board. Permits are only issued in those areas of the county where a sanitary sewer is not available within 300 feet of the property line. An OWTS cannot be used if soil conditions, topography, high groundwater table, or other factors indicate that this method of sewage disposal is unsuitable. The County developed a wastewater disposal system ordinance that describes the requirements for development, site evaluation, septic system siting, installation, maintenance, and reporting.[90] Various permits are required to install a septic system and the systems are inspected prior to approving

[90] County of Santa Clara Ordinance No. NS-517.85, Onsite Wastewater Treatment Systems, December 2013.

completion of the installation.

6.2.7 Coordination with Regulatory Agencies

Sites with releases of solvents, toxics, fuels, or other contaminants pose a threat to groundwater quality since contamination may migrate laterally or vertically into areas or zones that were previously unaffected. If allowed to migrate, such contamination may eventually impact groundwater production wells, forcing well operators to cease operation, implement expensive wellhead treatment, or blend the affected water with other sources of water to dilute the contaminant. In addition, the degradation in water quality can limit the water's beneficial uses and alter plans for production well siting or design.

6.2.7.1 Hazardous Material Handling and Storage Oversight

The primary causes of groundwater contamination at hazardous material release sites are the improper handling of hazardous materials or leaking storage tanks. Permitting and inspection related to the handling and storage of hazardous materials is overseen by the local or county fire department. The fire departments also oversee the installation, operation, and removal of all underground and above ground storage tanks and associated piping, and notify the County DEH and/or Water Boards if contamination is discovered.

6.2.7.2 Contaminant Release Sites

There are more than 3,150 sites with environmental releases within the Santa Clara and Llagas subbasins, as summarized in Table 6-2. Most these releases (over 2,300) are leaking underground fuel tank (LUFT) sites. Fuel leak cases are overseen by the County DEH while the oversight agencies for the non-fuel leak sites vary, as shown in Table 6-3.

Table 6-2. Status of Contaminant Release Sites

Case Status	Santa Clara Subbasin		Llagas Subbasin	
	Cleanup Program Site	LUFT Cleanup Site	Cleanup Program Site	LUFT Cleanup Site
Site Assessment	68	32	2	1
Assessment and Interim Remediation	25	4	3	
Remediation	90	24	3	2
Verification Monitoring	34	23	1	
Eligible for Closure	11	28		
Inactive	105		1	
Open	333	111	10	3
Closed	309	2,231	10	151
Total	642	2,342	20	154

Table 6-3. Oversight of Contaminant Release Sites

	Santa Clara Subbasin	Llagas Subbasin
County DEH	2,289	131
San Francisco Bay Water Board (Region 2)	730	
Central Coast Water Board (Region 3)		30
City of Gilroy		15
US Environmental Protection Agency	12	
Department of Toxic Substances Control	2	2
State Water Resources Control Board	1	

Open and closed contaminant release sites in the Santa Clara and Llagas subbasins are shown in Figures 6-1 and 6-2, respectively. These figures include data available through the State Water Board's GeoTracker system, and do not represent all contaminant release sites in the county. As the county's groundwater management agency, the District works with these agencies to protect groundwater resources. Current District interaction with regulatory agencies on point-source cases is mainly focused on the highest threat cases in the county, or is in response to specific requests from the agencies.

Figure 6-1. Contaminant Release Sites in the Santa Clara Subbasin

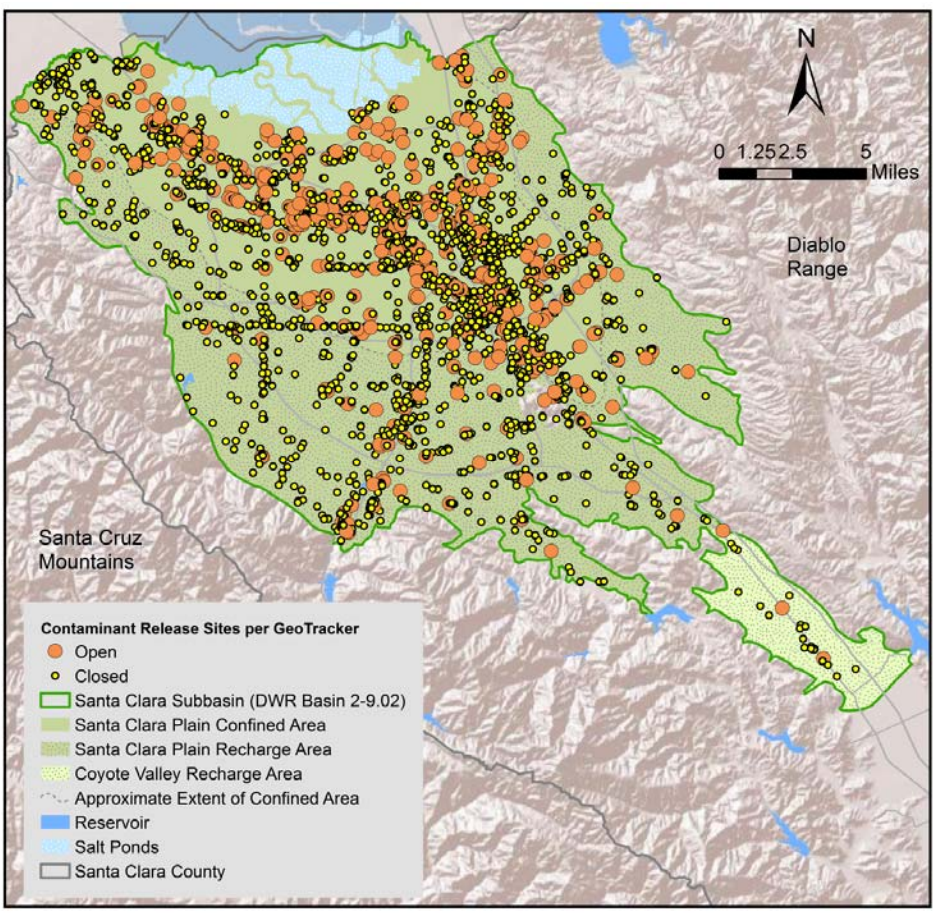
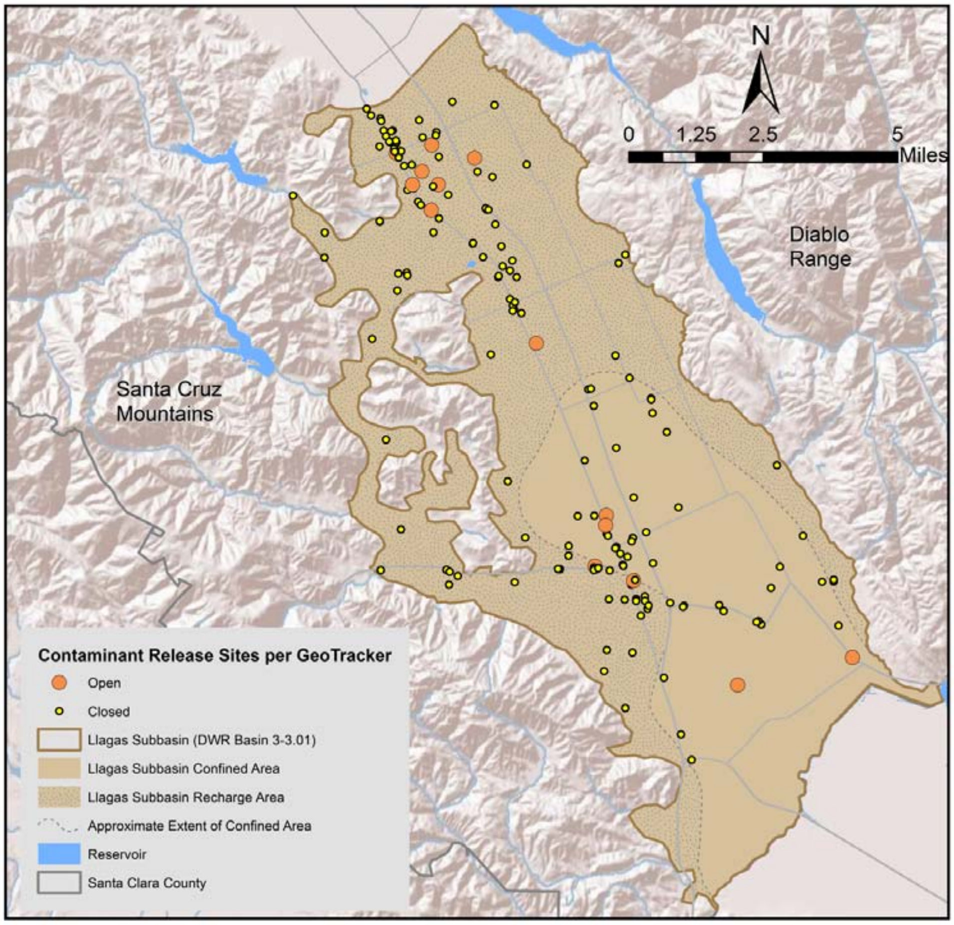


Figure 6-2. Contaminant Release Sites in the Llagas Subbasin



6.2.8 Public Outreach

Public outreach is an important component of the District's groundwater protection efforts. Because groundwater is far removed from the public's view, it can be a challenge to make the connection that actions occurring on the land surface can impact groundwater quality. To increase public awareness of groundwater resources, the District conducts active public outreach programs, which are described in this section. Also, each year, the District celebrates Groundwater Awareness Week, which is an annual observation of the importance of groundwater and is celebrated by the National Groundwater Association, the U.S. Environmental Protection Agency, and other organizations advocating groundwater protection.

6.2.8.1 Outreach Materials

The preparation of pamphlets, fact sheets, and summary reports helps to transmit key messages related to groundwater. The District's Guide for the Private Well Owner, which is provided to all new well owners in the county, describes the basics of proper well construction, maintenance, and testing. The District also produces fact sheets to address specific issues, such as nitrate or perchlorate, or to summarize the results of groundwater studies, like the Recycled Water Irrigation and Groundwater Study.

6.2.8.2 School Program

The District believes it is never too early for children to begin understanding and appreciating their local water resources. To help promote that awareness, the District offers a full range of educational programs for both teachers and students. From puppet plays for kindergarteners to workshops for educators, school outreach projects provide effective, hands-on learning experiences that meet new state standards. Through the District's educational programs, students can tour a groundwater recharge facility, create a simulated pond or explore the plant and animal life in a creek. All activities are geared for specific grade levels, from pre-kindergarten to college.

6.2.8.3 Groundwater Guardian Program

The Groundwater Guardian Program is sponsored by the Groundwater Foundation, a not-for-profit education organization that strives to increase groundwater awareness. Groundwater Guardian is an annually earned designation for communities and affiliates that take voluntary, proactive steps toward groundwater protection. The District has been designated a Groundwater Guardian based on such activities as conducting irrigation and nutrient management seminars, creating a prototype zone of contribution delineation tool for wellhead protection areas, and conducting the school program. The District will continue to participate in the program by submitting annual work plans for groundwater protection activities and submitting reports documenting our groundwater protection efforts. The District was designated as Groundwater Guardian Affiliate in 2000 and has maintained that designation each year since then.

6.3 PROGRAMS RELATED TO SURFACE WATER/GROUNDWATER INTERACTION

The District has been conducting managed recharge of the Santa Clara and Llagas subbasins with locally captured and imported water for many decades. The District’s managed recharge program is an important management tool that has contributed to groundwater storage recovery, cessation of inelastic land subsidence, prevention of salt water intrusion, and improved water quality. A reliable water supply for the county depends on this interaction between surface water and groundwater, and as such, the District closely monitors recharge operations.

The addition of water through managed or incidental recharge can change groundwater quality. This may be for the better by diluting existing contaminants in the aquifer, or for the worse by introducing contaminants. Incidental recharge includes water applied to landscape and agriculture in excess of plant uptake (irrigation return flows), as well as infiltration from stormwater and septic systems.

District programs related to surface water/groundwater interaction are described below.

6.3.1 In-Stream Releases of Surface Water

As described in Section 6.1.1, the District conducts active in-stream managed recharge operations along approximately 110 miles of stream channel in over 30 creeks. About two-thirds of the District’s managed recharge occurs through in-stream recharge facilities, with over 60,000 AF recharged as a result of District releases into creeks in most years. In 2015, a drought year, in-stream managed recharge was reduced to around 27,000 AF. The District also coordinates operations for flashboard dams and spreader dams under agreements with the DFW. District recharge operations along streams have been modified in recent years to reflect environmental regulations and concerns, including the protection of native fisheries.

6.3.2 Stormwater Management

To reduce the amount of runoff to creeks and other surface water bodies, urban runoff programs are increasingly promoting the infiltration of stormwater into the groundwater instead of facilitating its runoff into creeks. Infiltration of runoff helps reduce peak flows and protect surface water quality. Stormwater can also be a beneficial

source of groundwater recharge in some areas, but there are potential groundwater quality impacts. Stormwater can pick up pollutants as it runs over the ground surface, which can then migrate to groundwater via soil infiltration.

The District is part of the Santa Clara Valley Urban Runoff Management Program, which was formed in 1990 to develop and implement efficient and uniform approaches to control non-point source pollution in stormwater runoff that flows to the South San Francisco Bay. The District has worked with the other co-permittees of the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) to develop guidelines that allow stormwater infiltration while being adequately protective of both surface water and groundwater resources.

There are three main types of controls that promote infiltration. They are site design measures, indirect infiltration methods, and direct infiltration methods. Site design measures involve laying out a development site to reduce the amount of impervious area and routing drainage to landscaped areas. Indirect infiltration methods include directing runoff to bioretention areas, vegetated buffer strips, and to unlined detention ponds. These methods rely on the shallow soil to “filter” the water before it reaches groundwater.

The third method, direct infiltration, sometimes referred to as stormwater infiltration devices (SWIDs), uses devices that bypass the surface soils, thereby bypassing the filtration effects of the surface soils. Types of direct infiltration devices include dry wells, injection wells, and french dry wells are a type of SWID that reduce or eliminate the vertical separation between the infiltration point and groundwater. Because they bypass natural filtering capacity of soils, dry wells are of special concern. Specific standards for direct infiltration devices are being developed by the State of California. The purpose of revising the policy is to unify permitting and construction standards so that all devices that bypass natural protection processes are subject to standards for protecting groundwater, and to simplify the process by which SWIDs are permitted.

6.3.3 Salt Water Intrusion Prevention

The movement of saline water into a freshwater aquifer constitutes salt water intrusion. This potential exists in groundwater basins adjacent to the sea or other bodies of saline water – in this case, the southern portion of San Francisco Bay. Once freshwater aquifers experience severe salt water intrusion, it is extremely difficult and costly to reclaim them. Classic salt water intrusion is driven by overpumping that reverses the normal seaward flow of groundwater. Locally, however, the mechanism of intrusion is quite different since aquifers underlying the bay do not outcrop offshore and are not directly connected to the bay. Rather, the aquifers are blanketed by a very fine-grained fully saturated clay formation known as ‘Bay Mud’ which effectively seals them from classic salt water intrusion regardless of the direction of groundwater flow.

The northern portion of the Santa Clara Plain experienced an atypical mode of salt water intrusion, which primarily affects the shallow aquifer and has created a wide mixed transition zone between fresh groundwater and salinity impacted groundwater. With long-term groundwater overdraft inducing high rates of land subsidence in the decades following World War II, salt water contamination of the shallow aquifer was being observed. By the 1980s, mild salt water intrusion encompassed a substantial area bounded on the south, west, and east by Highway 101 and Interstate 880. Flattened stream gradients caused by land subsidence resulted in increased inland migration of saline bay water through tidal creeks. This saline water was subsequently transported to groundwater through streambed percolation and the presence of abandoned wells and other deep excavations.

Historically, the District conducted an extensive program of locating and properly destroying old abandoned wells in the northern Santa Clara Subbasin along the bay so that these wells would not act as conduits for salt water intrusion of the principal aquifer. Ordinance 85-1 gave the District authority to require owners of wells determined to be “public nuisances” to seal and destroy the wells or upgrade them to active or standby status. A more comprehensive well sealing program was in place from 1984 to 2005 that provided financial assistance to properly destroy abandoned wells near areas of known contamination to prevent the tainting of drinking water supplies.

Although this assistance program has now ended, abandoned or unused wells are still required to be sealed in accordance with District and State well standards.

The resumption of land subsidence and sea level rise are perhaps the greatest potential threat to aggravating salt water intrusion. Land subsidence would further depress the land surface fronting the Bay. Both land subsidence and sea level rise would expose a larger portion of the shallow aquifer to intrusion from increased inland tidal incursion of bay water. A lowering of the hydraulic head in the principal aquifer zone may also increase the potential for salinity intrusion if there were leakage or breaches through the Bay Mud. The District's managed recharge program is critical to maintaining adequate pressure in the principal aquifer zone adjacent and underlying the southern portions of the Bay, which helps protect the long-term viability of the resource. As described below in Chapter 7, land subsidence, groundwater elevations, and groundwater quality are actively monitored to minimize risks related to salt water intrusion.

6.3.4 Watershed Management

The District captures large volumes of upper watershed stormwater runoff in local reservoirs and manages flows in creeks. Because groundwater sustainability depends on the recharge of local watershed water, the protection of these source waters is essential. The protection of the watersheds' water quality is also vital to assuring a healthy environment for their inhabitants. The District seeks to balance watershed uses, such as the rights of private property owners and public recreational activities, with the protection and management of natural resources. The District recognizes that preserving beneficial watershed uses can benefit reservoir water quality, which in turn benefits the quality of the water delivered to the District treatment plants and recharged into the groundwater subbasins.

The District works to protect the water quality and water supply reliability of the District's reservoirs through regular monitoring, coordination with other agencies on water quality issues, and through activities to protect local reservoirs from potentially contaminating activities. The District also implements projects to address pollutants affecting freshwater, such as mercury contamination.

The District has also developed guidelines and standards for land use near streams. These guidelines were developed in cooperation with local cities, the county, local businesses, agriculture, streamside property owners, and environmental groups through the Water Resources Protection Collaborative.

The District's One Water Plan integrates the water supply, flood protection, and stream stewardship missions of the District at the watershed scale. Drawing from detailed existing programs and plans, One Water seeks to find the nexus between these three mission components for new opportunities in integrated water resources management. One Water does not replace the substantial existing planning in place by the District's Water Utility Enterprise and the Watersheds Division but instead looks for opportunities to further protect and enhance water resources. The One Water Plan is a long-term endeavor that seeks to build up to long-term improvements in water resources management and watershed conditions. One Water will operate under the current commitments, regulations, and existing restrictions and challenges that drive District operations and day-to-day work. This means that not all strategies will be practicable and not all goals and objectives can be carried out simultaneously. In the end, however, the established framework called out in the One Water Plan identifies a roadmap for integrated water resources management for the future. Not all District activities can be integrated, nor all activities managed under One Water, but all types of water will be considered in building upon past successes to manage these valuable resources as One Water.[91]

[91] https://onewaterplan.wordpress.com/about-2/

Chapter 7 – Groundwater Monitoring and Modeling

CHAPTER 7 – GROUNDWATER MONITORING AND MODELING

The District conducts a wide range of activities to maintain a reliable water supply, protect groundwater quality, and avoid further land subsidence. Assessing how well these activities are meeting the basin sustainability goals requires effective monitoring. This chapter describes programs to monitor groundwater levels, land subsidence, groundwater quality, and surface water, and provides information on the availability of related data.

The District's network of water level and water quality monitoring wells is the product of an adaptive and opportunistic regional data collection effort that has evolved over many decades. The network includes wells installed by the District, existing wells the District has obtained, and privately-owned wells for which the District has secured monitoring access. Consequently, it is unlike a network one might expect if it were designed from the ground up such as at a contaminated site. While the District network covers the groundwater subbasins, the wells are not evenly distributed due to the constraints of the existing built environment. The District supplements data collected through this network with data collected by water retailers as described further below.

For all monitoring, the District works to ensure the monitoring locations and data collected provide adequate information to facilitate a comprehensive understanding of groundwater conditions and support informed decision-making. This includes ongoing assessment of data gaps or redundancy, monitoring protocols, and data management, evaluation, and reporting. Specific wells or locations monitored may vary and evolve over time due to issues with well condition or access, but the overall programs provide strong and comprehensive data to assess conditions and trends within the Santa Clara and Llagas subbasins.

7.1 GROUNDWATER LEVEL MONITORING

This section describes the methodology, data collection, data analysis, and reporting for the District's groundwater level monitoring, which includes District wells and privately-owned wells. The data collected is supplemented by data provided by water retailers.

7.1.1 Groundwater Monitoring Network and Frequency

The District measures depth to water at several hundred wells and receives data from water retailer wells. In some locations, the District has collected regular water level data for up to 70 years and third-party data has been collected continuously since 1936 in downtown San Jose. Available historical data include several one-time collection efforts. Monitoring locations and frequencies have evolved over time to support groundwater supply assessment and forecasting, recharge operations, efforts to monitor concentrated pumping and land subsidence, and other purposes.

Currently, the District measures 216 wells regularly, including 158 wells in the Santa Clara Subbasin and 58 in the Llagas Subbasin. To assist in the District's regional evaluation of groundwater conditions, several water retailers provide water level data from over 100 production wells, all of which were measured quarterly, monthly, or more frequently in 2016. This data is entered in the District's database for inclusion in regional condition and trend analysis. Groundwater level monitoring frequency is summarized in Table 7-1, with well locations shown in Figures 7-1 and 7-2. Appendix E includes detailed information on well location, construction, and measurement.

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Table 7-1. Groundwater Level Monitoring Frequency

Frequency	Santa Clara Subbasin: District-Monitored Wells	Santa Clara Subbasin: Retailer-Monitored Wells[1]	Llagas Subbasin: District-Monitored Wells	Total
Daily	69	0	14	83
Weekly or Biweekly	4	8	0	12
Monthly	85	92	43	220
Bimonthly	0	3	1	4
Quarterly	0	6	0	6
Total	158	109	58	325

1. Indicates the number of retailer wells for which data is provided to the District.

Figure 7-1. Santa Clara Subbasin Groundwater Level Monitoring Wells

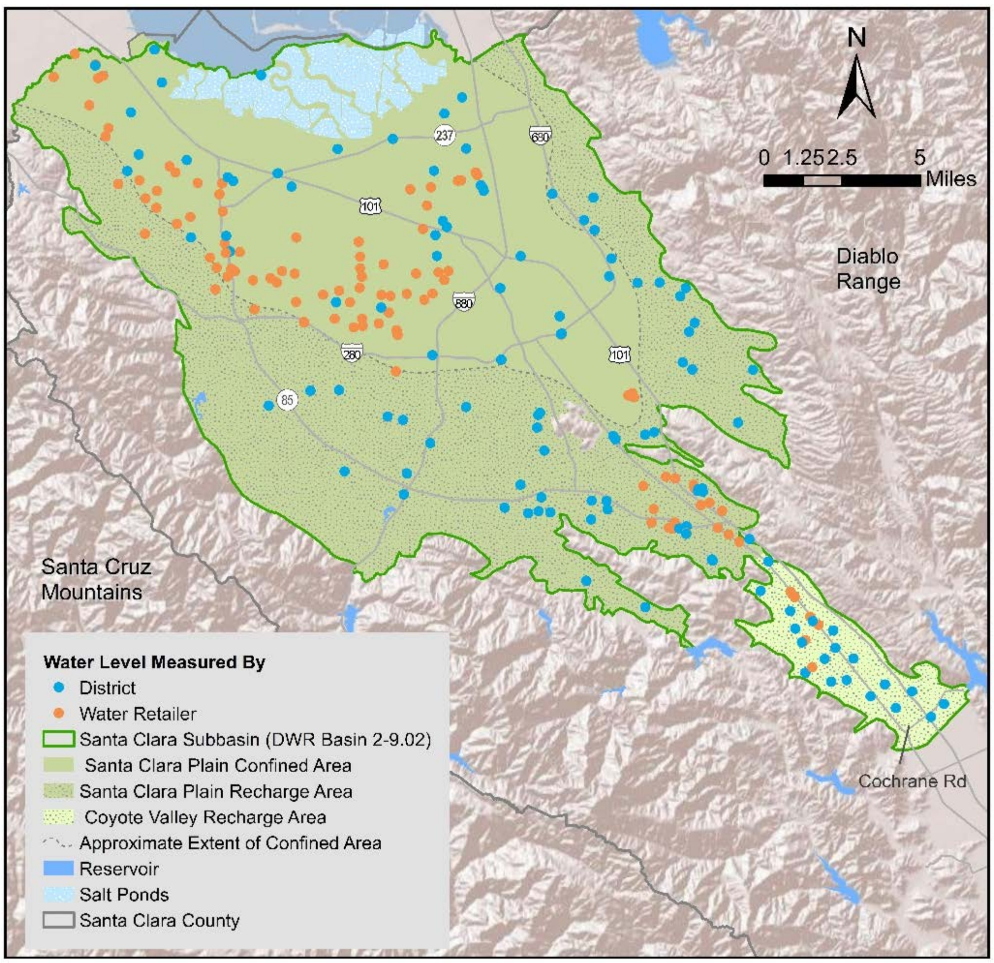
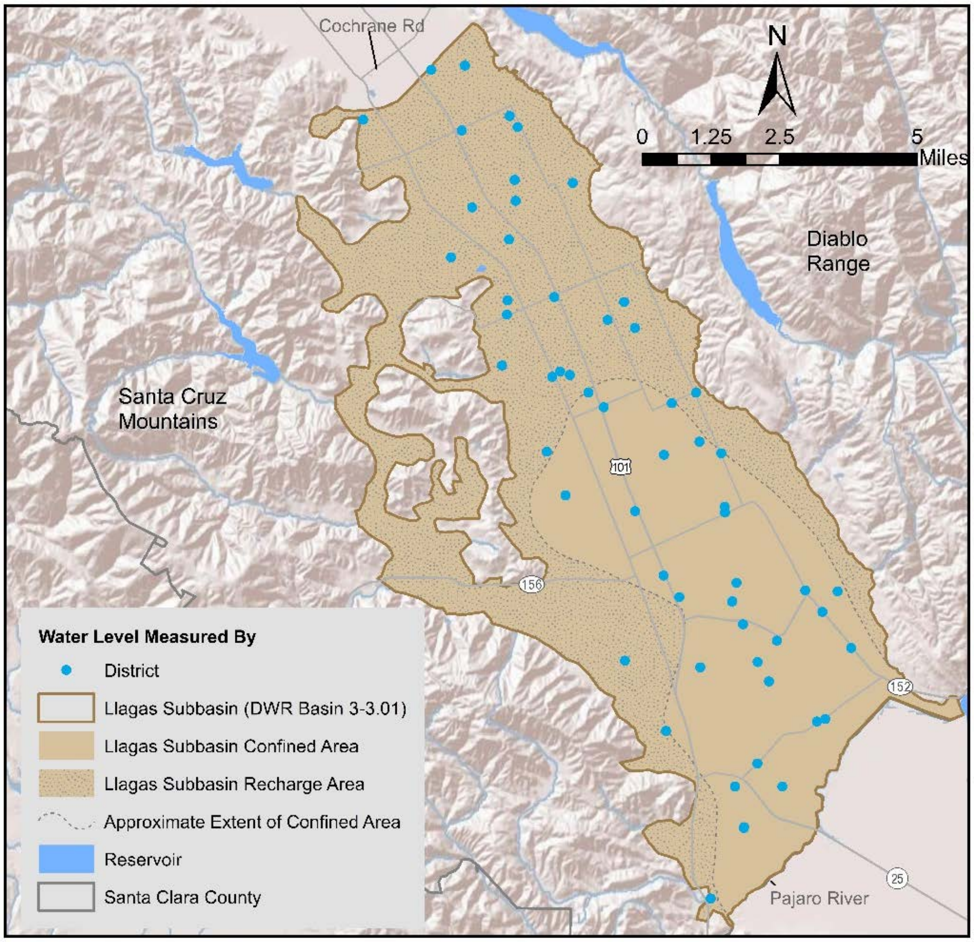


Figure 7-2. Llagas Subbasin Groundwater Level Monitoring Wells



7.1.2 Measurement Methodology

This section presents the District methodology to measure groundwater levels, including information on reference points, depth to water measurements, and instrument calibration.

7.1.2.1 Ground Surface and Measuring Point Elevation Measurement

Ground surface elevations at wells monitored are determined by land surveys or are interpolated from topographic and LIDAR (Light Imaging, Detecting, and Ranging) maps. The accuracy of the map interpolations ranges from ± 1.5 feet for LIDAR maps to ± 5 feet for the topographic maps. The land survey accuracy is ± 0.05 feet. The approximate breakdown of ground surface elevation methods for water level monitoring wells is follows: land survey (50%), LIDAR (30%), topographic maps (20%). The District is working to have all groundwater level monitoring well elevations surveyed as resources allow.

Depending on the well monitored, the depth to water reading may be taken from various measuring points, including the top of the well casing, utility vault, or other point. Measuring point elevations are determined by either land surveying or manual measurement from the ground surface.

7.1.2.2 Manual Depth to Water Measurement

Manual depth to groundwater measurements are obtained with the use of electric sounders, steel tapes, air lines, and pressure gauges. Whenever possible, depth to groundwater is measured in wells that have not been pumped recently; otherwise the measurement is flagged as a pumping water level. More than 98% of the nearly half million water level records maintained in the District's database are static measurements made at wells that have not been pumping. Pumping readings are obtained from water retailers and at agricultural wells. Subtracting the depth to water from the measuring point elevation provides the groundwater elevation with respect to mean sea level. Table 7-2 summarizes the measurement methods used by the District and the accuracy of each.

Electric sounders are the method most commonly employed by the District to obtain groundwater level readings. These sounders use a long tape measure/wire on a reel attached to a weighted electric sensor. The sensor is lowered to contact water standing in a well to complete a circuit and sound an audible alarm. Once the alarm sounds, the technician records the water depth from an established measuring point as indicated on a graduated tape. The accuracy of this method is generally ±0.1 feet in production wells and can be within 0.05 feet in monitoring wells.

Table 7-2. Manual Depth to Water Measurement Methods and Accuracy

Device	Accuracy (feet)
Airline	± 1
Electric Sounder	± 0.05 to ±0.1
Pressure Gauge	± 0.5
Pressure Transducer	± 0.01
Steel Tape	± 0.1

Electric sounders, pressure gauges and pressure transducers are the most common District water level measurement methods. Approximately fifty wells are under artesian pressure during at least part of the year, particularly during years with above-average rainfall. Artesian pressure is measured by attaching a pressure gauge to a fitting on the wellhead. The pressure is measured in PSI (pounds per square inch) and converted to feet of equivalent head of water above ground surface using a multiplier of 2.307 ft per PSI. This is the level the water would rise to if the well casing extended that far above the ground. However, it is not the level to which water would rise if the well were uncapped, as pressure quickly dissipates and well efficiency impedes high pressure flows. The District has equipped several of the artesian monitoring wells with pressure transducers, dataloggers, and telemetry equipment. All artesian wells are equipped with fittings to allow pressure readings when they are under artesian pressure.

In some cases, the District measures depth to water using steel tapes, which are weighted, graduated lines. The end of the line is chalked so that the field technician can confirm contact with water. If lubricating oil is floating on the well water, electric sounders are ineffective. In a small number of actively monitored wells, a steel tape is used to measure depth to water beneath the oil layer. The oil layer thickness is not measured, but is not expected to significantly affect the data.

Air lines are used by some water retailers to apply air pressure to a calibrated tube whose end is submerged in the well. In the airline method, water level is determined by calculating the head corresponding to the maximum air pressure required to displace water in the tube.

7.1.2.3 Automated Depth to Water Measurement

The District deploys pressure transducers and data loggers in 87 wells. Telemetry equipment has been installed at 23 locations, comprising 33 wells or discrete-depth monitoring points, allowing remote data retrieval by cellular phone. Pressure transducer data must be corrected to remove the influence of atmospheric pressure. Using a barometer connected to a data logger and telemetry installation, raw data are merged with barometric data prior water levels recorded by transducers. The District's water level automation system permits the collection of nearly continuous data to observe responses to hydrologic events such as rainfall, recharge operations, and pumping, while also reducing staff time required for collecting water level data.

Pressure transducers provide more precise measurements of relative water level changes than can be obtained by electric sounders or pressure gauges. To obtain absolute measurements relative to a common datum, pressure transducer data is integrated with land survey data and electric sounder measurements. Pressure transducer measurements are validated against manual measurements as described below.

7.1.2.4 Water Level Instrument Calibration

Water level measurement accuracy depends on the accuracy of the measuring instruments. Staff periodically checks water measurement equipment for accuracy and calibrates if necessary. Electric sounders are generally highly accurate and reliable, with little changes in accuracy over time. However, the District checks the calibration every few years or after repair to ensure their accuracy is within the acceptable tolerance of ± 0.1 feet per hundred feet. If electric sounders are found to be out of calibration, a correction factor is applied to the measurements. Pressure gauges are checked against an in-house standard gauge. A correction factor is added to the pressure measurements as needed. Staff controls for potential instrumental drift in pressure transducers by comparing their readings to either the readings of the electric sounders or the pressure gauges, depending on whether the well is artesian or not. The pressure transducers are checked for drift monthly as new electric sounder or pressure gauge measurements are obtained. During the conversion of the pressure reading from PSI to feet, a correction factor is applied offset the drift and bring the transducer measurements in line with the manual depth to water readings.

7.1.3 Data Management

District water level data management includes converting the raw data to groundwater elevation, validating and approving the data, and storing the data in a secure database.

Data conversion involves transforming depth to water and pressure measurements to groundwater elevations. For depth to water measurements, the field readings are subtracted from the measuring point elevations to get groundwater elevations. To measure artesian wells, pressures are converted into feet of water (head) above the measurement points. These heads are then added to the measuring point elevations to get groundwater elevations. Converting pressure transducer measurements in non-artesian wells involves several steps. First, atmospheric pressure (recorded within an hour of the measurement) is removed from the total pressure to obtain the water pressure above the transducer. These water pressures are then converted to feet of water above the sensor. Using the measured depth of the sensor, head readings are converted to groundwater elevations.

To ensure data is accurate, the District validates groundwater level data collected in the field prior to database upload. The District compares new measurements to historic water levels as an initial screening criterion, and tentatively validates manual measurements that are within historic norms. Values that fall outside of the historic data are further inspected to determine if there were collection errors. Elevations generated by transducers are checked by comparing them to concurrent manual depth to water measurements. When discrepancies are detected, new conversion factors are generated and the data is reprocessed to bring the data within ± 0.5 feet of the manual measurement. As a final step in validation, the new data is graphed with recent historic data to look for

outliers and continuity. Suspect data points are investigated for validity. The valid data is then transferred to an Electronic Data Deliverable (EDD).

Data approval involves spot checking EDD data for accuracy. If errors are found, the data for that well is reprocessed. Once all known errors are corrected, the data is uploaded to a permanent, secure database.

7.1.4 Reporting and Communication

Water level data is reported or made available in a variety of formats. The District's monthly Water Tracker includes high-level information on regional index wells in the Santa Clara Plain, Coyote Valley, and Llagas Subbasin. The monthly Groundwater Condition Report provides more detail, presenting water levels for 11 regional index wells, as well as monthly estimates of pumping and recharge. The District generates potentiometric surface maps (groundwater elevation contour maps) for the spring and fall each year for inclusion in the District's Annual Groundwater Report. This report also provides information on current water level conditions compared to the previous year and long-term conditions. The District is also the Designated Monitoring Entity for Santa Clara County under the CASGEM program, and updates the DWR CASGEM database with water levels from 106 wells quarterly. District reports are available at www.valleywater.org. All water levels in the District's water level database are available through an online portal, which allows users to find data by entering a location or well number, or by using the map feature.[92]

7.2 LAND SUBSIDENCE MONITORING

The District maintains and monitors a land subsidence monitoring network in the northern portion of the Santa Clara Subbasin (Santa Clara Plain) to determine if land subsidence is occurring or threatening to exceed established subsidence thresholds. Land subsidence monitoring includes annual level surveys along three established routes and continuous measurement of vertical ground movement at two extensometers (also called compaction recorders). Groundwater level monitoring is an integral part of the land subsidence monitoring program since long-term overdraft and water level decline was the driving force of historical land subsidence in the Santa Clara Plain. Water levels in ten subsidence index wells are measured at least monthly.[93] Figure 7-3 presents the District's land subsidence monitoring network, including the leveling circuits, extensometers, and water level wells used to track the potential for subsidence.

7.2.1 Annual Benchmark Elevation Surveys

Periodic level surveys of land elevation have been conducted in northern Santa Clara County to gauge land subsidence induced by groundwater overdraft since 1934.[94] The District conducts annual surveys each fall to determine the elevations of about 150 survey benchmarks along two east-west circuits and one north-south circuit in the Santa Clara Plain. Changes in benchmark elevations are tracked year to year, and are evaluated with data collected at extensometers and subsidence index wells.

7.2.2 Extensometer Monitoring

The District collects data from two extensometers installed by the USGS in 1960 to monitor the magnitude and rate of subsidence in the Santa Clara Plain. The USGS terminated its field monitoring in 1983, at which time monitoring was transferred to the District. The two extensometer sites are continuously monitored; one in Sunnyvale near

[92] https://gis.valleywater.org/GroundwaterElevations/

[93] One retailer well used as a subsidence index well was destroyed in September 2016 and will be replaced by a nearby well with similar water level patterns.

[94] Poland and Ireland, Land Subsidence in the Santa Clara Valley, California, as of 1982, 1988.

Moffett Field ("Sunny") and the other near downtown San Jose ("Martha"). Water level measurements are also recorded at both extensometer sites.

The extensometers measure vertical ground motion relative to a point 1,000 feet deep using a pipe set beneath the water-bearing aquifers that have the potential to compress and cause subsidence. To measure the change in land surface elevation, it is assumed that the pipe is fixed at the bottom and that the soil between the pipe bottom and the land surface is expanding or compressing. To accurately measure these land surface changes, the District uses several redundant instruments. The primary instrument is a linear potentiometer, which is calibrated to convert voltage readings into land surface elevation changes with an accuracy of ± 0.00001 feet. Hourly readings (averaged from 10 minute measurements) are stored in a data logger that sends the data to the District via cellular-based telemetry. The District also records readings from a dial gauge, which has an accuracy of ± 0.0001 feet, and a graduated tape that has an accuracy of ± 0.01 feet. Lastly, a paper drum chart continuously records land elevation changes. Readings from the linear potentiometer and the dial gauge are entered into a District database. Figure 7-4 shows the San Jose extensometer.

Figure 7-3. District Land Subsidence Monitoring in the Santa Clara Plain

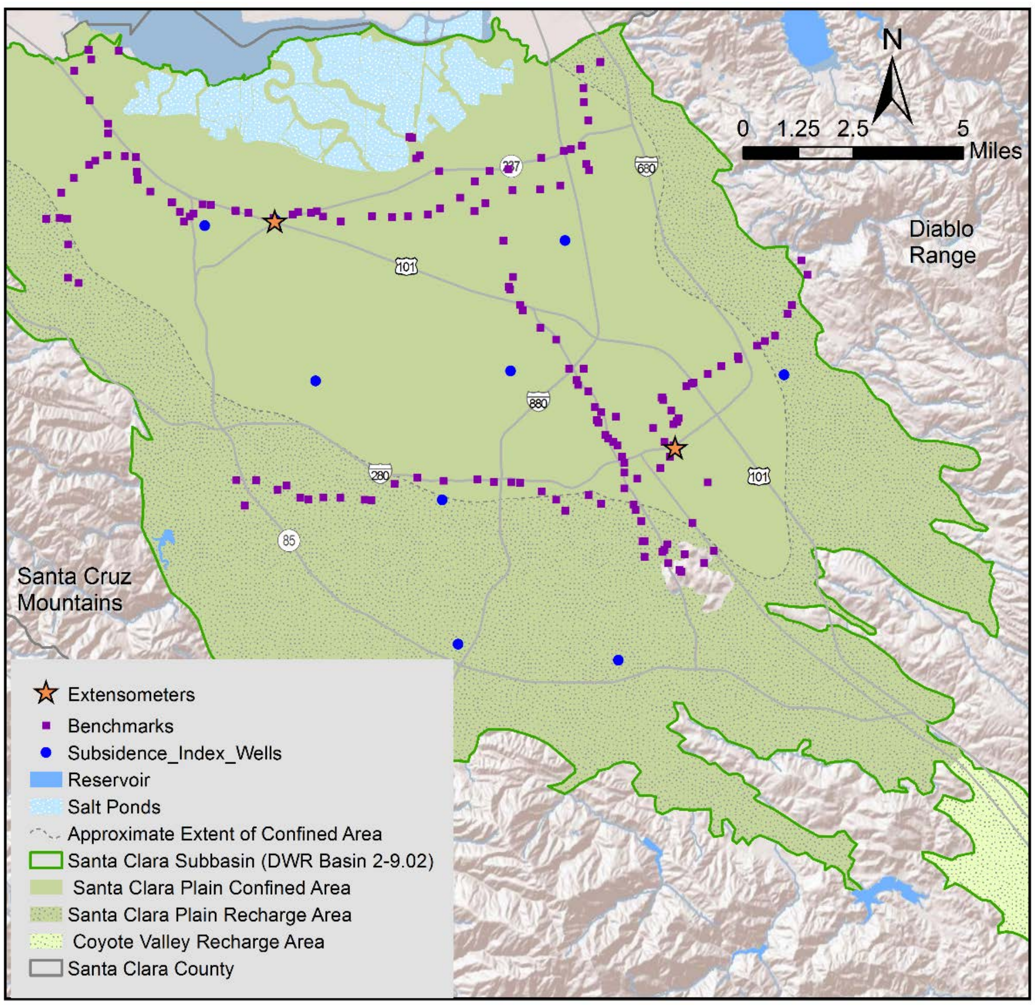


Figure 7-4. San Jose ("Martha") Extensometer

7.3 GROUNDWATER QUALITY MONITORING

The District conducts ongoing monitoring to assess groundwater quality in the Santa Clara and Llagas subbasins, including regional monitoring, domestic well sampling, and focused monitoring near recycled water irrigation sites and areas of historic salt water intrusion. This section describes the District monitoring, including wells monitored, parameters analyzed, monitoring frequency, and reporting. It also provides information on monitoring by water retailers and other agencies.

The goal of the District's monitoring is to collect data to support the evaluation of the following:

- Regional groundwater quality conditions for the shallow and principal aquifers of the Santa Clara and Llagas subbasins
- The extent and severity of contamination, including the presence of contaminants above drinking water standards,
- Changes in water quality over time,
- Potential threats to the long-term viability of groundwater resources, and
- Groundwater Management Plan outcome measures.

7.3.1 Regional Groundwater Quality Monitoring

For regional groundwater quality monitoring, the District characterizes two aquifer systems, the shallow and the principal aquifer zones. The shallow aquifer combines all water-bearing zones above a depth of 150 feet, which is approximately the base of regional confining layers in both the Santa Clara and Llagas subbasins. There are some exceptions, but generally wells completed in the shallow aquifer are not used for drinking water. The principal aquifer is comprised of wells greater than 150 feet deep, where most water supply wells are screened.

7.3.1.1 District Groundwater Quality Monitoring Network and Frequency

Like the District's water level monitoring network, wells included in the groundwater quality monitoring network include District-installed monitoring wells, monitoring wells the District has obtained, and privately-owned wells, including active domestic, agricultural wells, and other water supply wells. The District constructed multi-level nested monitoring wells at 9 locations in the Santa Clara Plain in cooperation with the USGS. These wells allow depth-discrete sampling to discern water quality variation with depth, with the deepest casings at some wells extending below 1,000 feet.

The groundwater quality monitoring network in the Santa Clara Subbasin comprises 55 wells, the distribution of which is presented in Table 7-3 and Figures 7-5 and 7-6. The Santa Clara Plain Baylands is the area near San Francisco Bay that has historically been affected by salt water intrusion. The Llagas Subbasin monitoring network is comprised of 36 wells as shown in Table 7-4 and Figures 7-7 and 7-8. This data is augmented by data collected by water retailers at over 200 wells each year as described in Section 7.3.2. Detailed information on the location and construction of all wells monitored by the District is in Appendix E.

Table 7-3. Santa Clara Subbasin Groundwater Quality Monitoring Summary

Area	Shallow Aquifer Zone	Principal Aquifer Zone	Total
Santa Clara Plain Baylands	18	--	18
Santa Clara Plain	12	20	32
Coyote Valley	--	5	5
Total	30	25	55

Table 7-4. Llagas Subbasin Groundwater Quality Monitoring Summary

Area	Shallow Aquifer Zone	Principal Aquifer Zone	Total
Llagas Subbasin	15	21	36

The District collects samples from all groundwater quality monitoring wells annually in the fall. The frequency of analysis for specific parameters varies per a fixed schedule depending on persistence or variability of that constituent as shown in Table 7-5 and described further in the next section.

Figure 7-5. Santa Clara Subbasin Shallow Aquifer Groundwater Quality Monitoring Network

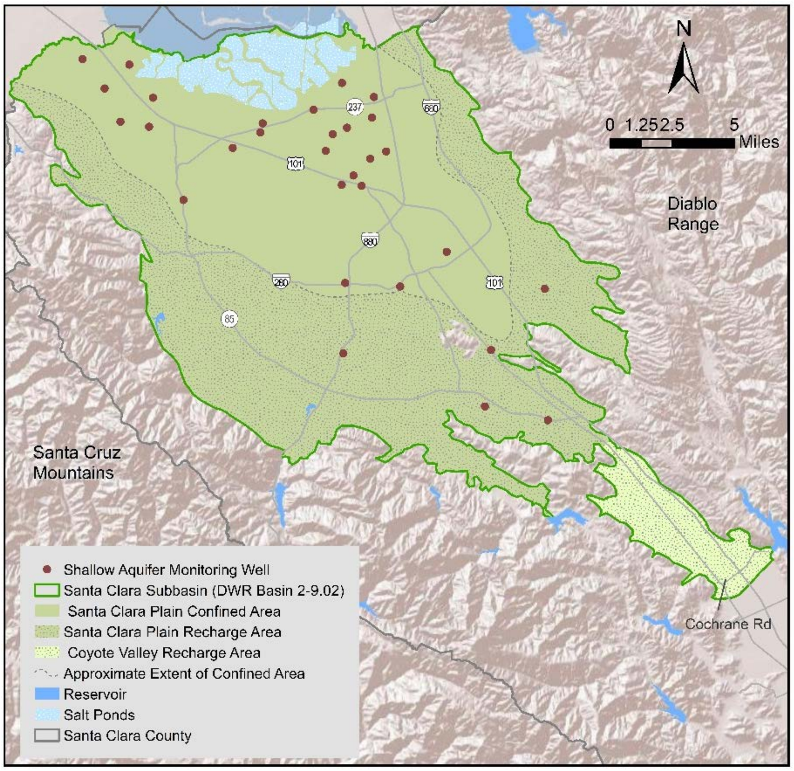


Figure 7- 6. Santa Clara Subbasin Principal Aquifer Groundwater Quality Monitoring Network

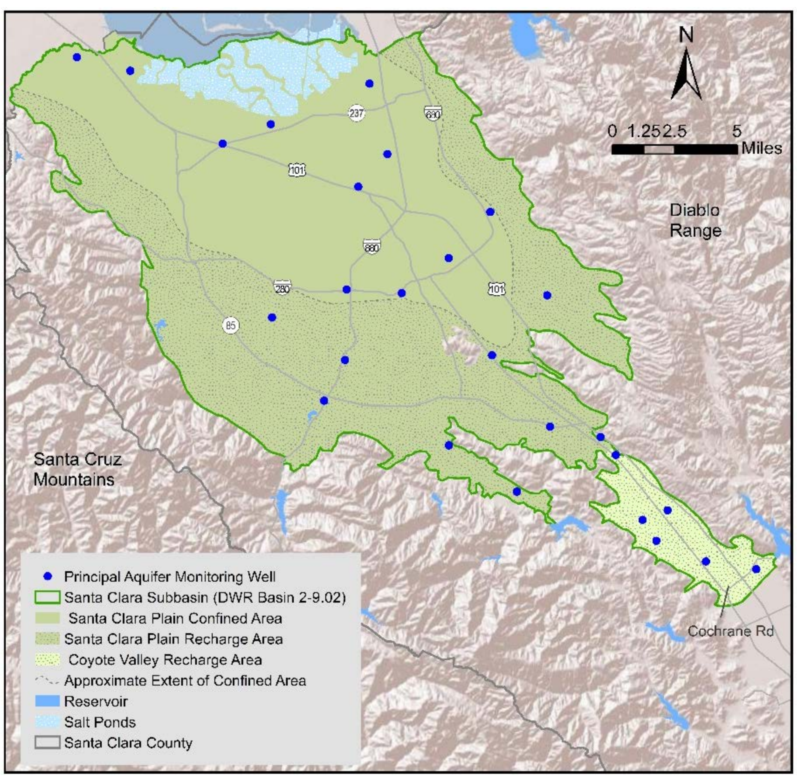


Figure 7-7. Llagas Subbasin Shallow Aquifer Groundwater Quality Monitoring Network

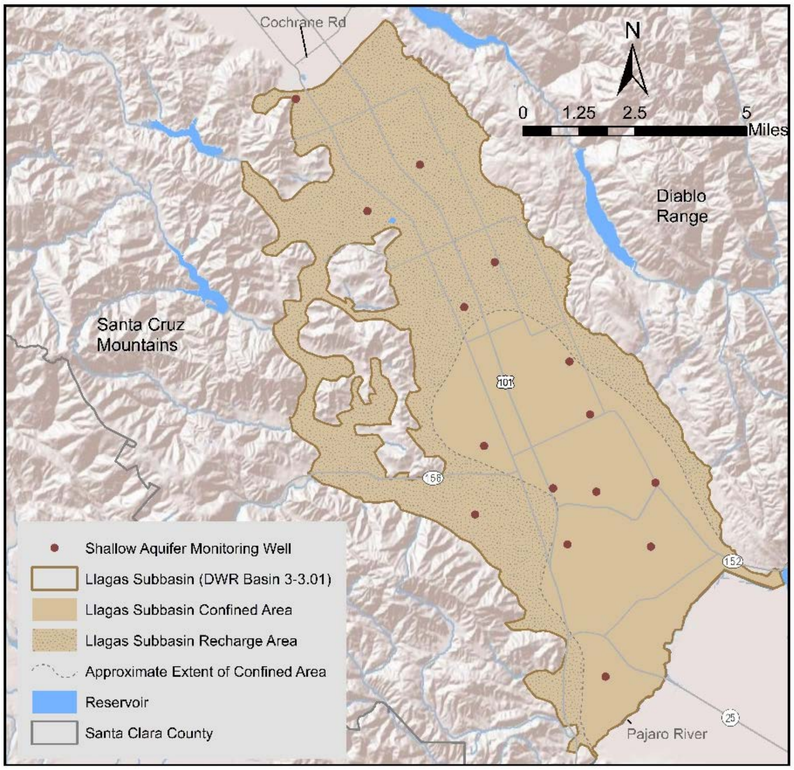
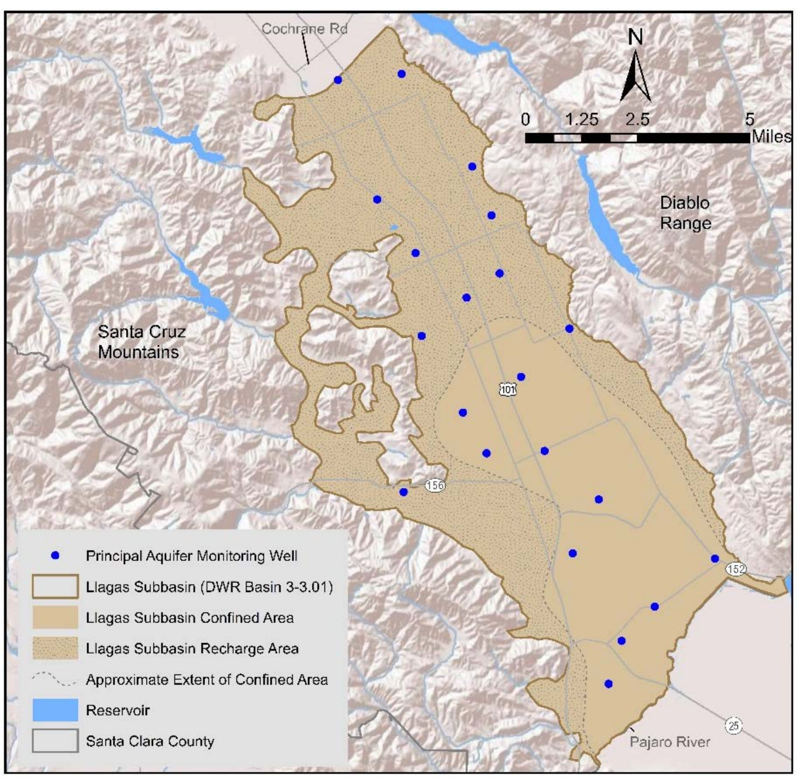


Figure 7-8. Llagas Subbasin Principal Aquifer Groundwater Quality Monitoring Network



7.3.1.2 Monitoring Parameters

Each fall, the District analyzes major and minor ions and nutrients at all wells. Major inorganic parameters analyzed include calcium, magnesium, sodium, potassium, bicarbonate, chloride, sulfate, and silica. These common parameters account for the vast majority of all dissolved matter in water derived from natural sources. The District also analyzes common metals, nutrients, salts, and field parameters as shown in Table 7-6.

Every three years, the District monitors volatile organic compounds (VOCs) at all wells. Although detections of VOCs are rare in the principal aquifer zone, with many VOC contaminant release sites in the county, it is prudent to occasionally analyze the water for them.

Local groundwater has been analyzed for pesticides in the past by the District and water retailers. The results have been primarily non-detect with only sporadic, isolated detections at very low levels. The need for future pesticide analysis by the District will be evaluated over time based on changes in drinking water standards, changes in land use, and public water system sampling results.

Table 7-5 presents the monitoring schedule and parameters to be tested in each regional well monitored by the District, with associated analytical methods in Table 7-6. The list of parameters monitored is expected to be somewhat dynamic as new information becomes available. Additional contaminants may be analyzed as necessary to evaluate specific threats or concerns as they arise. Analysis of some constituents may be discontinued if multiple sampling events show the analytes are not present.

Table 7-5. District Groundwater Quality Monitoring Analytical Schedule

Monitoring Wells	Parameters Groups Monitored and Frequency				
	Major Ions	Nutrients	Trace Elements	VOCs	Chloride, pH, EC
Regional Monitoring Wells	Annual	Annual	Annual	Triennial	--
Salt Water Intrusion Monitoring Wells	Triennial	Triennial	Annual	--	Annual

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Table 7-6. District Regional Groundwater Quality Monitoring Parameters and Analytical Methods

Parameter Group	Parameter	Analytical Method
Trace Elements	Aluminum, Boron, Iron, Lithium, Zinc	EPA 200.7
	Antimony, Arsenic, Barium, Beryllium, Chromium (Total), Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Selenium, Silver, Thallium, Vanadium	EPA 200.8
	Mercury	EPA 245.1
	Chromium 6	EPA 218.7
Ions	Alkalinity, Bicarbonate	SM2320B
	Total Dissolved Solids	SM2540C
	Chloride	SM4500-Cl
	Calcium, Magnesium, Potassium, Silica, Sodium	EPA 200.7
	Fluoride, Bromide, Sulfate	EPA 300.0
	Hardness	SM2340 C
	Perchlorate	EPA 314.0
Nutrients	Nitrate, Phosphate	EPA 300.0
Field	pH, Specific Conductance, Temperature	Field
VOCs	All VOCs included in method EPA 524 (analyzed every three years)	EPA 524

7.3.2 Public Water Supplier Monitoring

Local water retailers and other public water suppliers serving groundwater analyze well water samples to comply with DDW requirements and support operational decisions. In general, compliance monitoring is completed at least once every three years following a schedule set by DDW. Each year, the District obtains groundwater quality data from DDW for all public water systems in Santa Clara County, including water retailers and mutual water companies subject to DDW monitoring. This District uploads this data to the District database and uses it with District collected data in the annual evaluation of groundwater quality in the Santa Clara and Llagas subbasins. In 2015, the District obtained DDW water quality compliance data from 225 production wells, as shown on Figure 7-9.

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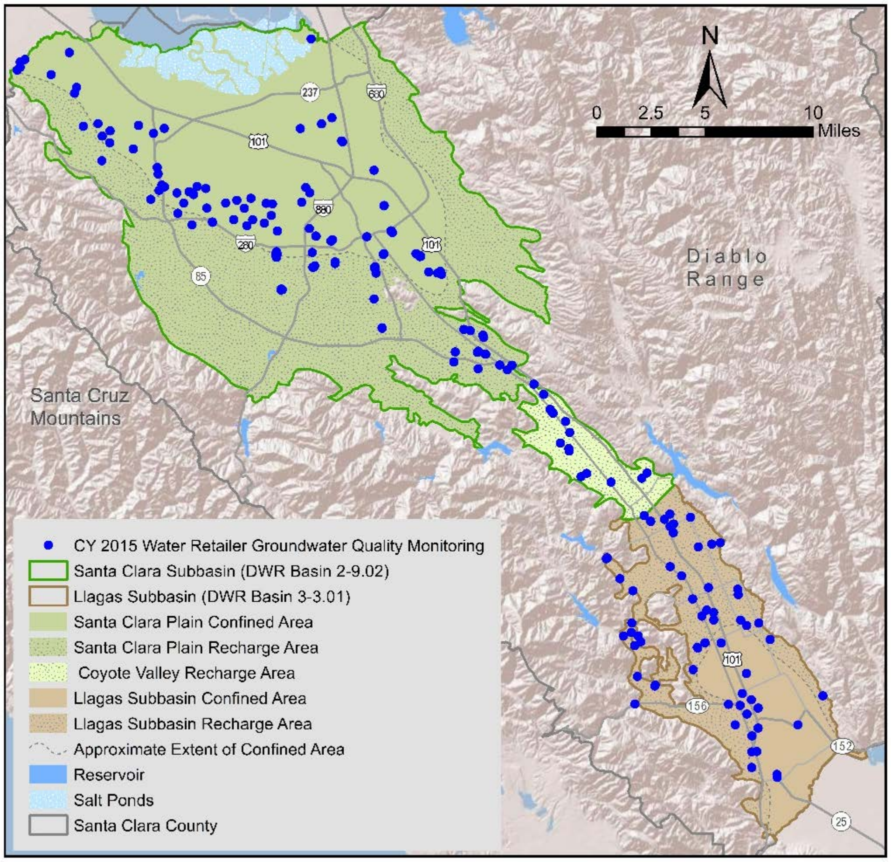
Figure 7-9. Public Water Supplier Groundwater Quality Monitoring (2015)



7.3.3 Domestic Well Testing Program

The District offers free basic water quality testing once a year to eligible domestic well owners within the District's groundwater charge zones. In 2015, the District tested more than 200 domestic wells for basic water quality parameters including nitrate, bacteria, electrical conductivity, and hardness. Domestic well data helps improve the District's understanding of the occurrence of common contaminants and helps well owners understand their well water quality. Because it is a voluntary program, the wells tested vary each year. Figure 7-10 presents the locations sampled in calendar year 2015.

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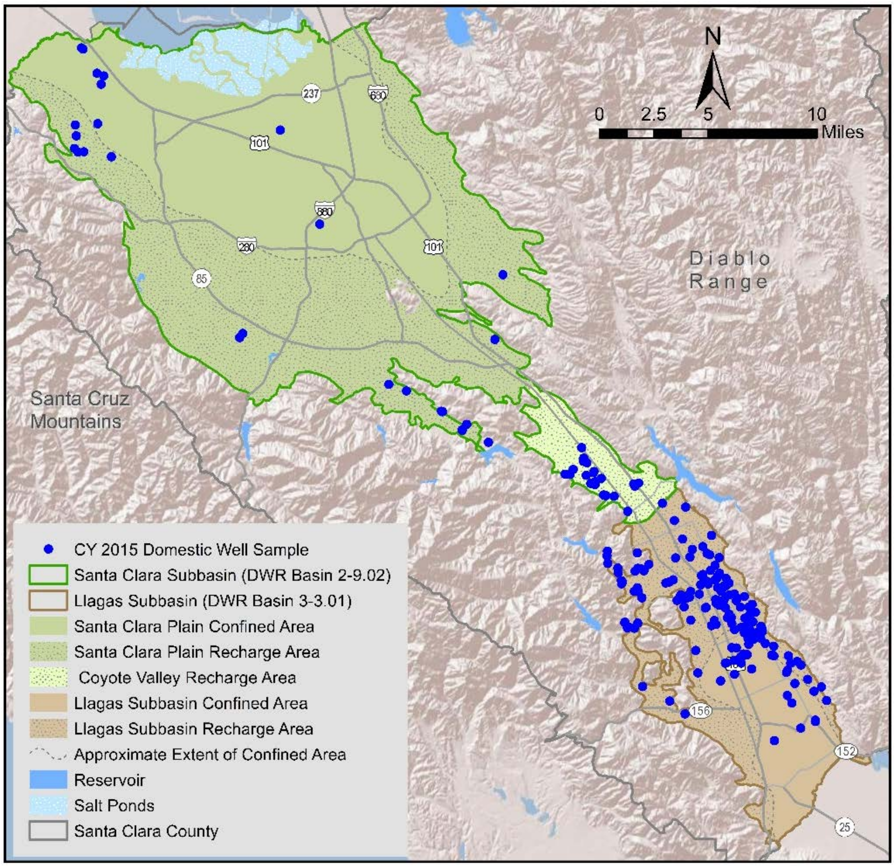
Figure 7-10. District Domestic Well Testing Locations (2015)



7.3.4 Monitoring Near Recycled Water Irrigation Sites

Tertiary-treated recycled water generally has a higher concentration of salts, nutrients, disinfection by-products, and emerging contaminants than local groundwater or treated potable water. Recycled water is used for non-potable uses like landscape irrigation, agriculture, and industry. To ensure groundwater resources are protected as recycled water use expands, the District monitors several sites in the Llagas Subbasin and the Integrated Device Technology (IDT) site in the Santa Clara Subbasin. The District also evaluates data collected by IDT and South Bay Water Recycling (SBWR) as described in this section.

7.3.4.1 District Recycled Water Irrigation Site Monitoring Network and Frequency

Following completion of the Recycled Water Irrigation and Groundwater (RWIG) Study,[95] which indicated low-level detections of contaminants including perfluorochemicals (PFCs) and N-Nitrosodimethylamine (NDMA) at the IDT site, the District and IDT began collecting ongoing monitoring data. The District also monitors several sites in the Llagas Subbasin to support expanded recycled use per the South County Recycled Water Supply Master Plan Project Environmental Impact Report (EIR).[96] Figures 7-11 and 7-12 show the location of monitoring wells near sites using recycled water for irrigation.

[95] Locus Technologies for Santa Clara Valley Water District, Recycled Water Irrigation and Groundwater Study, Santa Clara and Llagas Groundwater Subbasins, Santa Clara County, California, August 2011.

[96] Santa Clara Valley Water District, 2011 South County Recycled Water Master Plan Project: Environmental Impact Report.

Figure 7-11. Santa Clara Subbasin Groundwater Quality Monitoring Near Recycled Water Irrigation Sites

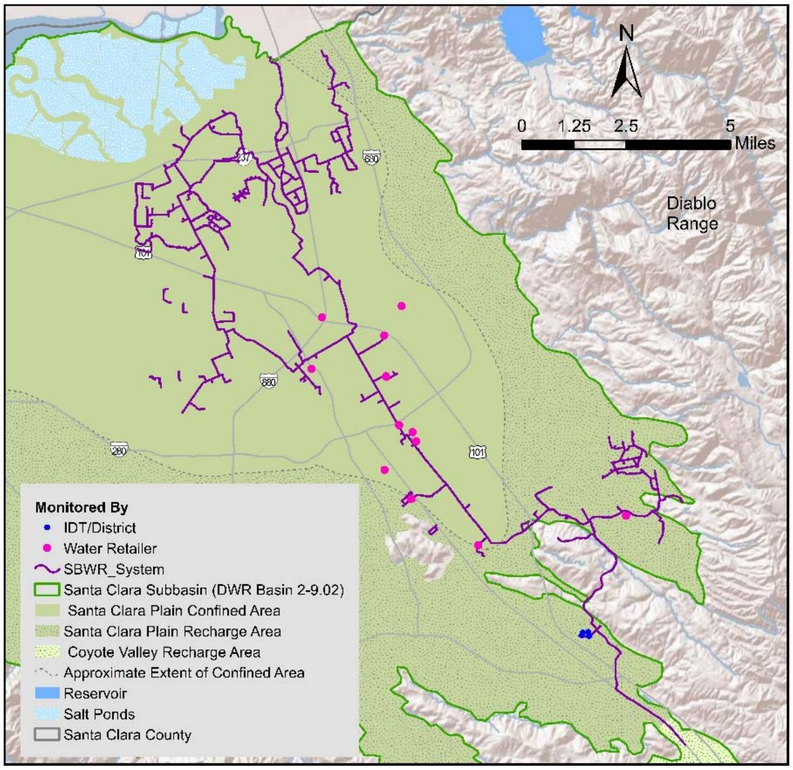
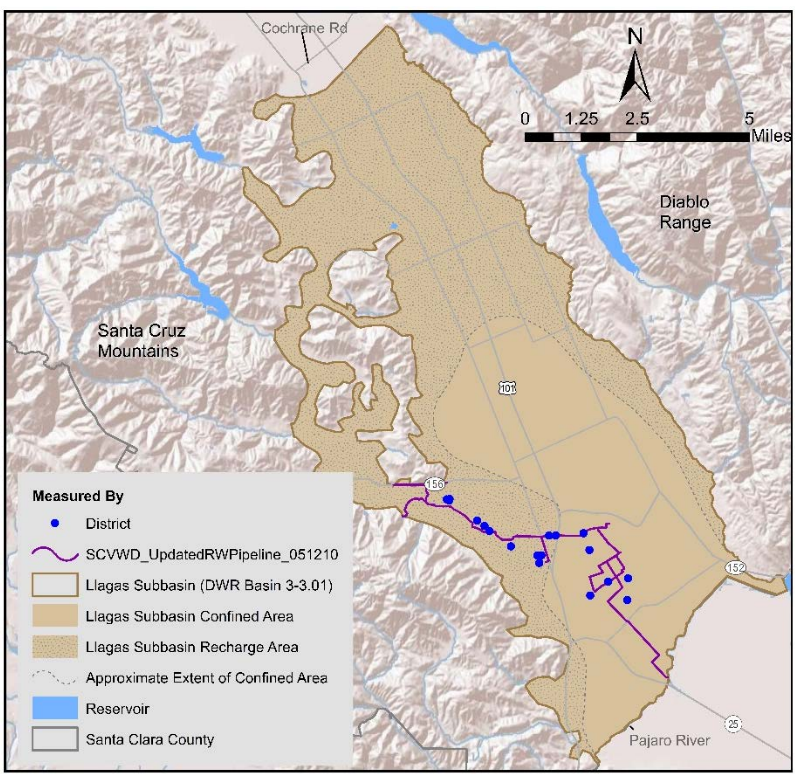


Figure 7-12. Llagas Subbasin Groundwater Quality Monitoring Near Recycled Water Irrigation Sites



Over the past few years, the District has monitored three sites where recycled water is used for irrigation, one in the Santa Clara Subbasin and two in the Llagas Subbasin. As part of recycled water expansion in the Llagas Subbasin, five new monitoring wells were added in 2014, and nine were added in 2015 to establish baseline groundwater quality prior to recycled water use. The following general guidelines were used to choose monitoring locations and design monitoring wells:

- Data collected from the monitoring wells should allow for the evaluation of water quality changes due to the use of recycled water for irrigation.
- Shallow wells (generally less than 100 feet deep) were favored for early detection of potentially adverse impacts.
- Wells within the recharge area were spaced to provide a representative sample of recycled water use and control areas.
- Within the recharge area, wells were constructed with screens at the water table and at deeper intervals Monitoring wells were constructed to provide representative samples of ambient groundwater quality.

Wells near recycled water irrigation sites are monitored quarterly. For some wells monitored, the District does not have true baseline water quality data prior to the use of recycled water for irrigation. Therefore, the data obtained reflects changes occurring after the initiation of monitoring. Once the spatial and temporal changes in water quality can be determined, the monitoring frequency may be refined. Dynamic water quality conditions might warrant more frequent monitoring whereas stable water quality may warrant a reduction in frequency. Further considerations for refining the sampling frequency will include the nature and type of contaminants observed, historical results, and trends. Appendix E presents the basic well construction details for District recycled water irrigation site monitoring wells.

7.3.4.2 District Monitoring Parameters

Parameters analyzed by the District for well and recycled water source samples are shown in Table 7-7, and are based on the District's RWIG Study recommendations. Together, these parameters have chemical characteristics that are likely to provide reliable indication of changes resulting from the use of recycled water for irrigation. The selected parameters fall into three general categories: basic water quality parameters, disinfection by-products, and other parameters of interest.

Basic water quality parameter data allows the District to determine existing quality and the geochemical make-up of groundwater at each site. If recycled water is affecting shallow groundwater, this will likely shift the geochemical make-up of shallow groundwater. Shallow groundwater is typically dominated by calcium, magnesium and bicarbonate, whereas recycled water tends to be dominated by sodium, chloride, and bicarbonate. A gradual shift in the geochemical make-up of groundwater to one in which salts dominate could suggest changes due to recycled water use.

Disinfection by-products are primarily dissolved organohalogens from the breakdown of organic substances during treatment with a chemical disinfectant. Disinfection by-products are generally harmful at low concentrations and therefore are included in this monitoring. They include parameters such as trihalomethanes, haloacetic acids, and NDMA.

The third category of parameters monitored includes those introduced as part of the influent to the wastewater treatment plant (WWTP) that may not be fully removed during treatment. These include parameters like cleaning agents, herbicides, and constituents of emerging concern. In addition, despite meeting California Title 22 reuse requirements, there are also low levels of bacteria present in recycled water.

Table 7-7. District Recycled Water Site Monitoring Parameters and Analytical Methods

Parameter	Parameter Type	Analytical Method
Boron	Basic Water Quality Parameters	EPA 6010
Calcium		EPA 6010
Magnesium		EPA 6010
Sodium		EPA 6010
Sulfate		EPA 300
Chloride		EPA 300
TDS		SM2540C
Bromide		EPA 300
Alkalinity (total)		SM2320B
Bicarbonate Alkalinity		SM2320B
Trihalomethanes (THMs)	Disinfection By-Products	EPA 8260
Halo-Acetic Acids (HAA5)		EPA 552.2
N-Nitroso Dimethylamine (NDMA)		EPA 521
Heterotrophic Plate Count	Other Parameters	SM 9215
Coliforms, Total		SM 9221
Fecal Coliforms		SM 9221
E. Coli		SM 9221
Perfluorochemicals (PFCs)		EPA 537
Ethylenediaminetetraacetic acid (EDTA)		EPA 300 (MOD)
Surfactants (MBAS)		SM 5540C
Nitrilotriacetic acid (NTA)		EPA 300 (MOD)
Perchlorate		EPA 314
Cyanide		4500CN E
Terbuthylazine		EPA 525 plus
pH	Field Parameters	Field
Temperature		Field
Oxidation Reduction Potential (ORP)		Field
Specific Conductance (EC)		Field
Total Chlorine		Field
Dissolved Oxygen (DO)		Field

MRL=Method Report Limit; ug/L= Micrograms per liter; mg/L= milligrams per liter; ng/L = nanograms per liter; CFU= Colony-Forming Units; MPN= Most Probable Number; us/cm = microsiemens per centimeter

THMs include: chloroform, bromodichloromethane, dibromochloromethane, and bromoform.

HAA5 include: Monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid.

PFCs include: Perfluorooctanesulfonate (PFOS), perfluorooctanoate (PFOA) and perfluoro butanoic acid (PFBA).

7.3.4.3 Other Monitoring Near Recycled Water Irrigation Sites

The City of San Jose's SBWR Program conveys recycled water from the San Jose/Santa Clara Water Pollution Control Plant to numerous sites within the Santa Clara Subbasin. As a Water Board condition to implement this program, SBWR implemented the Groundwater Mitigation and Monitoring Plan (GMMP). As part of the GMMP, SBWR monitors groundwater quality in both the confined and recharge areas. The City of San Jose began groundwater quality monitoring in 1997 and recycled water deliveries in the area began in 1998. SBWR currently monitors six deep water supply wells in the confined area and six shallow monitoring wells in the confined and unconfined areas (Figure 7-11).

SBWR analyzes inorganic parameters such as nitrate and TDS. Initially, sampling was conducted on a monthly, then quarterly basis. As of 2006, sampling was reduced to an annual event which occurs during the first quarter of the year. SBWR provides the annual data to the District to assist in water quality analysis.

7.3.5 Groundwater Quality Monitoring Programs by Other Agencies

The sections below discuss groundwater monitoring performed by agencies other than the District, water retailers, or SBWR within the Santa Clara and Llagas subbasins. The District does not typically use this data for annual basin evaluation and reporting, but considers related findings as they become available.

7.3.5.1 GAMA

The Groundwater Ambient Monitoring and Assessment (GAMA) program was created by the Groundwater Quality Monitoring Act of 2001, with the goals of improving statewide groundwater monitoring and increasing the availability of groundwater data to the public. The State Water Resources Control Board's program was carried out by the USGS and Lawrence Livermore National Laboratory (LLNL).

The statewide program uses a consistent study design in all study areas, with spatially distributed networks producing data sets that address basin scale objectives and allow incorporation into regional and statewide assessments. GAMA networks rely primarily on existing public supply wells, with other types of wells (irrigation, domestic supply, or monitoring wells) sampled as necessary to achieve the required spatial distribution. There are four projects under GAMA that have been completed:

- Priority Basin Project: This project initially focused on assessing the deep groundwater resource that accounts for over 95 percent of all groundwater used for public drinking. In 2012, the assessment of shallow aquifer water quality was initiated to provide information on aquifers used for domestic and small community water supplies. Areas of the state with the greatest densities of households that rely on domestic wells are prioritized into study units for this phase of the project.
- Geo Tracker GAMA: Geo Tracker GAMA is an on-line database providing water quality data from various sources on an interactive Google-based map. The goal of this system is to provide a centralized system that is available to the public and decision makers.
- Domestic Well Project: The Domestic Well Project collects samples from private wells on a county level. This program is offered free to well owners who volunteer. The water quality data is placed on GeoTracker GAMA without well owner identification.
- Special Studies Project: The Special Studies Project focuses on specific issues of concern to groundwater quality. These studies provide better understanding of groundwater contaminant occurrence, fate and transport.

As a special studies project, LLNL conducted a vulnerability assessment that included Santa Clara County.[97] The Santa Clara Subbasin is included in the San Francisco Bay Study Unit and was last studied in 2007.[98] The Llagas Subbasin is part of the South Coast Interior Groundwater Basins Study Unit and was last studied in 2008.[99] Reports for the State Water Resources Control Board's GAMA investigations including the Santa Clara and Llagas subbasins are available online.

7.3.5.2 Irrigated Lands Program

The State Water Board created the Irrigated Lands Regulatory Program (ILRP) in 2003 to protect state waters from impairment by waste discharge from commercially irrigated lands, which may contain wastes, such as pesticides, nitrates, and pathogens. The ILRP requires all growers to provide a farm evaluation and a nitrogen management plan to identify improvements that can be implemented to protect water quality. Growers will be required to have a certified nitrogen management plan if their groundwater is impacted by or susceptible to impacts from nitrate, pesticides or other agricultural constituents.[100]

The ILRP for the Llagas Subbasin is overseen by the Central Coast Water Board. In 2012, the Central Coast Water Board issued a Conditional Waiver of Waste Discharge Requirements that applies to owners and operators of irrigated land used for commercial crop production. The Central Coast Water Board is focusing on priority water quality issues, such as pesticides and toxicity, nutrients, and sediments, with heavy emphasis on nitrate impacts to drinking water sources. Growers are required to take several actions to comply with the permit, including groundwater monitoring. In the Llagas Subbasin, the Central Coast Groundwater Coalition is implementing a cooperative monitoring program.[101] Growers not participating in the cooperative are responsible for monitoring their own operations to meet Water Board requirements. Participants in cooperative monitoring programs or growers conducting individual monitoring must sample groundwater for analysis of the parameters. Sample data must be entered into the State Water Board's GeoTracker database.

7.3.6 District Groundwater Quality Monitoring Protocols

This section presents the District sampling protocols for groundwater quality monitoring. These protocols are intended to ensure consistency and produce reliable, quality assured, and representative water quality data. The District' sampling protocol is consistent with best industry practice, which includes following, where applicable, the USGS National Field Manual.

7.3.6.1 District Groundwater Quality Sampling Methodology

Well purging removes stagnant water from the well prior to sample collection to allow collection of water quality samples that are representative of the aquifer. When sampling a dedicated monitoring well, the District purges a volume of water equivalent to at least three casing volumes with a portable electric submersible pump. During purging, field measurements of pH, electrical conductivity, temperature, and turbidity are measured and recorded

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[97] Lawrence Livermore National Laboratory, California Aquifer Susceptibility, A Contamination Vulnerability Assessment for the Santa Clara and San Mateo County Groundwater Basins, 2004. http://www.waterboards.ca.gov/gama/docs/cas_llnl_santaclara_sanmateo.pdf

[98] USGS, Ground-water quality data in the San Francisco Bay study unit, 2007: Results from the California GAMA program: U.S. Geological Survey Data Series 396, 2009.

[99] USGS, Groundwater-quality data in the South Coast Interior Basins study unit, 2008: Results from the California GAMA program: U.S. Geological Survey Data Series 463, 2009.

[100] http://www.swrcb.ca.gov/water_issues/programs/agriculture/docs/about_agwaivers.pdf

[101] Northern Counties Groundwater Characterization: Salinas Valley, Pajaro Valley and Gilroy-Hollister Valley, 2015.

on field data sheets. Monitoring wells generally have turbidity levels of 10 NTU or lower. When higher turbidity is encountered, the well is pumped longer to determine if lower turbidity can be obtained, and if not, samples for inorganic analytes are filtered in the lab prior to analysis.

The District samples domestic wells by letting well water run through a designated sampling port for at least 5 minutes of continuous pump operation. Since domestic wells are operated frequently, the water in the well is not stagnant, so there is no need to remove a specific volume of water during purging. If a domestic well has sat idle for a month or more, the District performs standard purging procedures.

After the required purging has been performed and field parameters have stabilized, the District collects samples in pre-cleaned and prepared sample bottles, which contain preservatives when required by the analytical method. When sampling for bacteria, the outside portion of the sampling port is first cleaned with alcohol and then samples are placed in a secondary container and stored in wet ice. All non-bacteria samples are transported in coolers with enough ice to chill samples to 4 degrees C prior to arrival at the laboratory. All samples collected by the District are recorded on standard chain-of-custody documents.

Decontamination of portable pumps used for sampling is performed under certain circumstances, which trigger action as shown in Table 7-8. In general, full decontamination with strong detergent is only performed under rare circumstances since the District primarily monitors the potable water supply aquifer as opposed to wells located at or near contaminated sites. This provides a more streamlined and efficient decontamination procedure and protects equipment from corrosive conditions while still minimizing the likelihood of contaminant transfer between well sites.

Table 7-8. Equipment Decontamination Levels

Decontamination Level	Description	Triggers
Level 1	Complete scrubbing of portable pump apparatus with 2% Alconox solution Circulation of detergent solution through internal pump assembly Complete rinsing with de-ionized (DI) water	After a long period of storage (> 6 months) After encountering unusual water quality condition such as colored water, greasy or oily substances visible, known contamination After sampling sites with a high likelihood of contamination (e.g. fueling island, near chemical storage facilities, etc)
Level 2	Clean and rinse outside portable pump apparatus with DI water or municipal tap water Rinse internal pump assembly with DI water or municipal tap water Clean and rinse first 5 feet of pump discharge line	After sampling water with high TDS (EC > 5,000 uS/cm) After high nitrate encountered (> 250 mg/L as nitrate)
Level 3	Clean and rinse outside of portable pump assembly with DI water or municipal tap water Clean and rinse first 5 feet of pump discharge tubing.	If dirt, mud, dried mineral salts, scum or film are visible on outside of pump assembly

7.3.6.2 Laboratory Analysis and Data Validation

Nearly all samples collected by the District are analyzed by the District's water quality laboratory, which is certified under the State of California Environmental Laboratory Accreditation Program. Samples are delivered to the laboratory in the appropriate condition and are accompanied by standard chain-of-custody forms. Samples for metal analyses are filtered and preserved after they are delivered to the laboratory when turbidity is over 1 NTU.

The laboratory commonly performs three types of Quality Control (QC) checks consisting of blank spike, matrix spike, and matrix spike duplicates to determine laboratory precision and accuracy. Precision refers to the closeness of agreement of multiple measurements of the same quantity and accuracy refers to the closeness of a measurement with a known or true quantity. Blank spikes are samples created by adding a known amount of "spike" chemical to a known quantity of laboratory grade de-ionized water. The concentration of the spike sample is therefore known and results of measurements can be compared against the true amount present in the sample. Matrix spikes are created like blank spikes, but a sample of groundwater from the study area is used instead of de-ionized water. Any interferences resulting from other constituents present in the groundwater "matrix" can be detected. Matrix spike duplicates are run by the laboratory to determine and report analytical precision of measurements conducted on samples with a close resemblance to actual field samples.

In addition to reviewing the laboratory QC results, sampling results are compared to the range of past results. If there are QC issues or the result appears to be an outlier when compared to historic results, the following actions may be taken:

- If sufficient sample volume is available, the laboratory may re-analyze the sample.
- The well may be re-sampled.
- If the result is determined to be invalid, it may be discarded and not used in data analysis.
- The results may be retained and used for data analysis.

The specific action taken is dependent upon the specific results and is considered on a case-by-case basis.

7.3.6.3 Data Management

Data generated by the various District monitoring programs are quality assured prior to being stored in the database. The quality assurance (QA) procedure includes verifying that the lab QA/QC meets established standards, that the data is consistent with prior samples from the same well, and where deviations occur, that the data was collected and handled properly. Validated, approved data is transferred to a multi-user District database that allows for secure storage and 'read-only' privileges for data users. Data that does not meet standard laboratory QA/QC criteria is retained in the database with a flag to indicate data quality issues. Actual hard copy laboratory reports are scanned into electronic format and placed into an electronic document archival system with key identifiers that allow easy retrieval. Data are made available upon request in standard spreadsheet format. Because the District's access agreements with some private well owners do not provide for public release, some information has to be summarized or obscured prior to release.

7.4 SURFACE WATER MONITORING

This section describes District recharge water quality monitoring and stream-gauging, as well as surface water monitoring efforts by other agencies.

7.4.1 District Recharge Water Quality Monitoring

The purpose of the District's recharge water quality monitoring is to assess the quality of water used for managed recharge at District facilities and whether changes to existing monitoring programs or recharge operations are necessary to protect groundwater. Recharge facilities receive local runoff and/or imported water, and may be susceptible to contamination from nearby land uses. The District monitors the water quality at its recharge facilities (percolation ponds and managed reaches of creeks) on a rotating schedule.

7.4.1.1 Monitoring Locations and Frequency

Monitoring is performed during both the wet and dry season, with a rotating schedule designed to sample each major recharge system at least once every three years. Monitoring locations are depicted below on Figure 7-13 and 7-14, with the recommended frequency for sampling each recharge system in Table 7-9.

7.4.1.2 Monitoring Parameters

Monitoring parameters were selected based on the program's objective to characterize water quality in the groundwater recharge facilities and to identify parameters that may impact groundwater quality. Parameters monitored include basic water quality parameters and organic compounds.

Basic water quality parameters, including inorganic water quality parameters, allow for determination of recharge water quality at each selected site. Ongoing monitoring helps identify any changes in water quality or potential adverse impacts to groundwater quality. Measured field parameters also help to identify potential changes to groundwater quality from recharge activities.

Some of the more commonly detected organic compounds in surface waters include herbicides and pesticides, while VOCs are less commonly detected. Some creeks in the Santa Clara County have been identified by the State Water Resources Control Board as impaired water bodies due to the presence of certain pesticides.[102] Herbicides, pesticides, and VOCs present a greater risk to groundwater contamination at recharge facilities due to high soil permeability.[103] The sites with the greatest potential for highway, industrial and commercial facility runoff will be monitored for VOCs since these are the likely source for introducing these constituents.

7.4.1.3 Monitoring Protocols

Prior to collecting samples, the District measures 3 to 4 sets of field parameters including temperature, dissolved oxygen, pH, and electrical conductivity at the water's edge and records related data. Stream width and depth are also measured and recorded, if safely possible, or otherwise are estimated. Afterwards, samples are collected from the 1-foot depth horizon by inverting the sample bottle and submersing it below the surface approximately 1 foot and then returning the bottle to the upright position allowing it to fill while minimizing entry of floating debris into the sample container. Prior to filling sample containers, each is tripled rinsed with the water intending to be sampled.

If access to the water's edge is difficult, a telescopic pole with a 500 milliliter cup attached to the end is used to

[102] State Water Resources Control Board, Total Maximum Daily Load Program: California's 2006 Clean Water Act Section 303(d) List of Water Quality Limited Segments, www.waterboards.ca.gov.

[103] USEPA, Potential Groundwater Contamination from Intentional and Unintentional Stormwater Infiltration, 1994; and Burton, G. and Pitt, R., Stormwater Effects Handbook, 2002.

collect samples, which are then quickly decanted into the proper sample containers. The cup is inverted as with a regular sample container prior to submersion to obtain a sample from the approximate 1-foot depth interval.

7.4.1.4 Recharge Water Quality Data Management

Data generated by this program are first quality assured then transferred electronically to a multi-user database that allows for secure storage and 'read-only' privileges for users. Actual hard copy laboratory reports are scanned into electronic format and placed into a document archival system with key identifiers to allow easy retrieval.

7.4.1.5 Recharge Reporting and Communication

Data from this program reflects the quality of water contained in the raw surface water used for recharge, which is not subject to drinking water standards and may differ considerably from drinking water obtained from wells. Data collected is evaluated and reported in the District's Annual Groundwater Report.

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Figure 7-13. Location of District Recharge Water Quality Sampling Locations in Santa Clara Subbasin

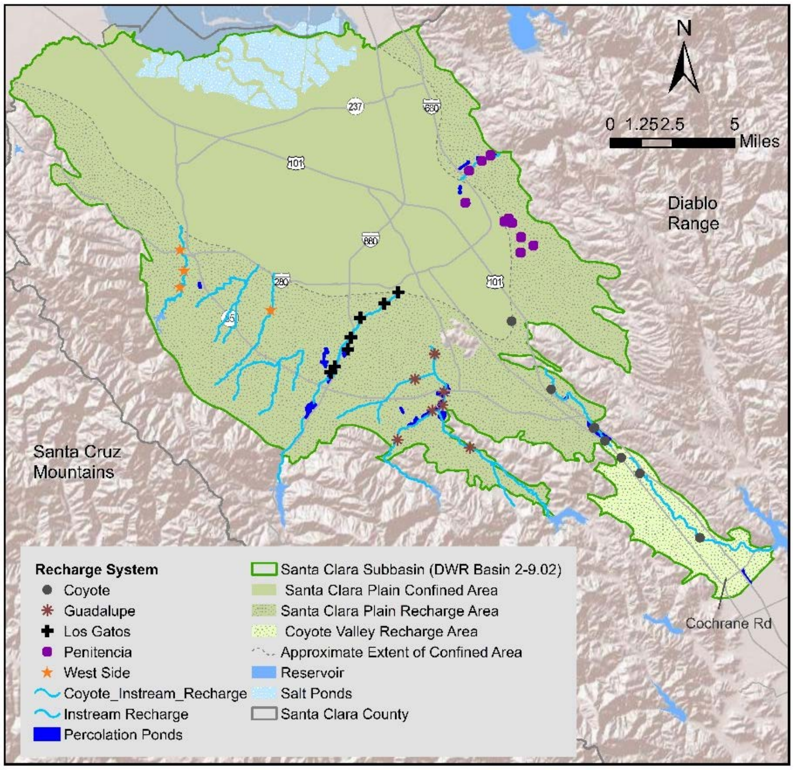

Figure 7-14. Location of District Recharge Water Quality Sampling Locations in Llagas Subbasin

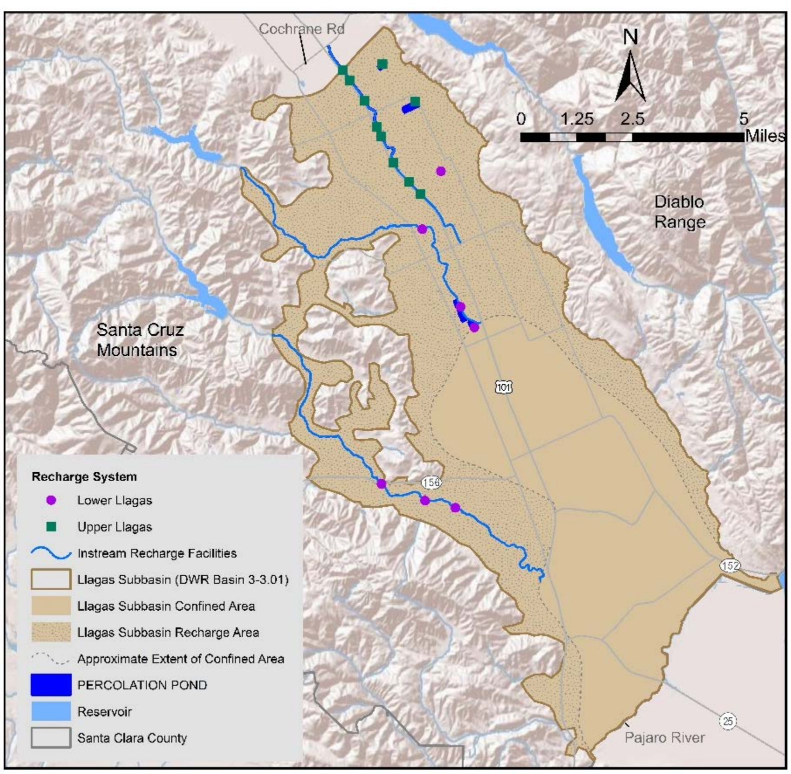

Table 7-9. Recharge Water Quality Monitoring Schedule

Recharge System	Number of Samples per System	No. of seasonal events		Total	Year 1	Year 2	Year 3
		Dry event	Wet event				
Coyote Recharge System	8	1	2	**24**		24	
Guadalupe Recharge System	4	1	2	**12**			12
Los Gatos Recharge System	6	1	2	**18**	18		
Upper Llagas Recharge System	3	1	2	**9**	9		
West Side Recharge System	3	1	2	**9**		9	
Penitencia Recharge System	3	1	2	**9**			9
Lower Llagas Recharge System	3	1	2	**9**			9
				Total	**27**	**33**	**30**

7.4.2 Surface Water Flow Monitoring

The District measures surface water stage and flow rates in streams and channels to ensure that recharge facilities are receiving appropriate flows, to comply with water rights reporting and reservoir restrictions, and to meet environmental requirements. Surface water flow data also helps the District evaluate groundwater interaction with surface water as described in Section 6.3. Real-time and archived stream gauging data is available on the District's website.[104] Stream gauging locations are presented in Figures 7-15 and 7-16.

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[104] Santa Clara Valley Water District, ALERT System Real-Time Data: http://alert.valleywater.org/

Figure 7-15. Santa Clara Subbasin Stream Gauging Locations

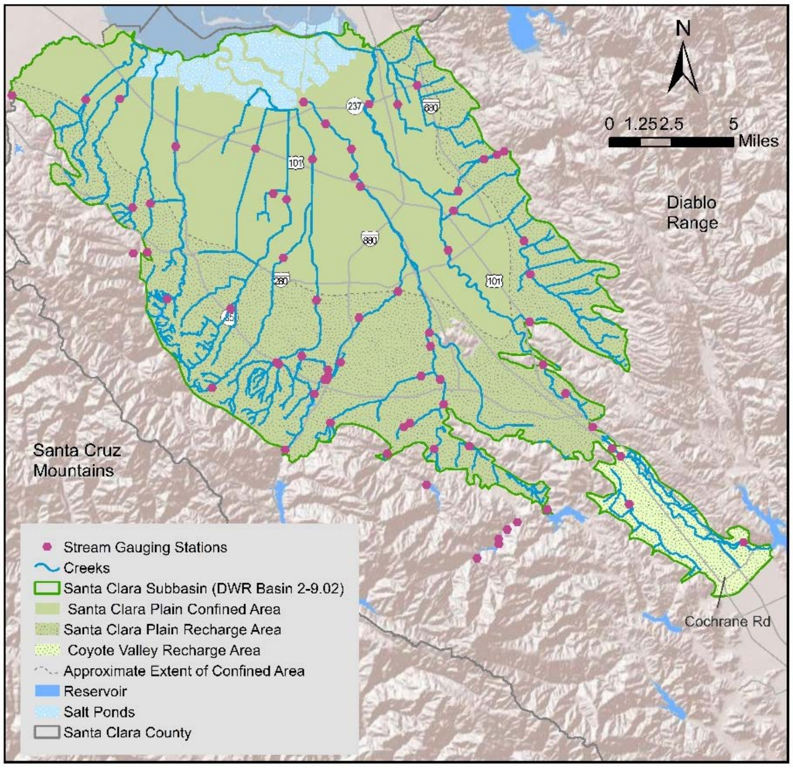
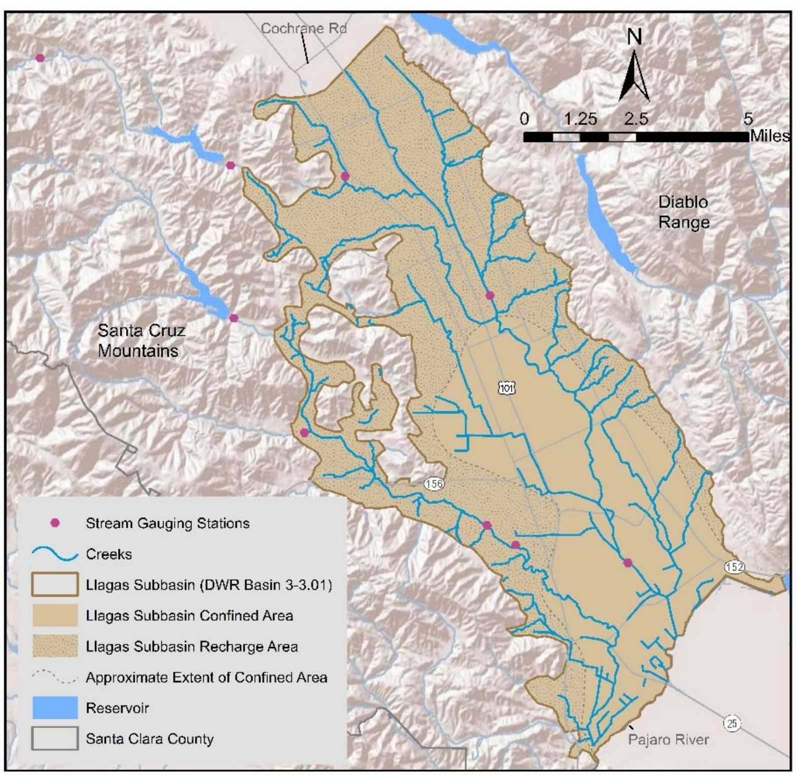


Figure 7-16. Llagas Subbasin Stream Gauging Locations



7.4.3 Surface Water Quality Monitoring by Other Agencies

Other agencies conducting surface water quality monitoring in Santa Clara County include the Central Coast Water Board and the Silicon Valley Urban Runoff Pollution Prevention Program (SCVURPPP) as described below.

7.4.3.1 Central Coast Ambient Monitoring Program

The Central Coast Ambient Monitoring Program (CCAMP) is the Central Coast Water Board's regional water quality monitoring program. The CCAMP program aims to collect, assess, and disseminate water quality information to aid decision makers and the public in maintaining and promoting good water quality within the Central Coast region.

CCAMP maintains permanent monitoring sites that provide a framework for trend analysis and detection of emerging water quality problems. CCAMP monitors a suite of 33 sites on an ongoing basis, and rotates through an additional 30 sites annually in five watershed areas. The program design includes monthly monitoring for standard water quality parameters and flow (where accessible). Other approaches may be used at some sites based on funding and hydrogeomorphological considerations or special interest (such as known discharges or existing TMDLs).[105]

7.4.3.2 Santa Clara Valley Urban Runoff Pollution Prevention Program

The Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) is an association of fifteen agencies that share a common permit to discharge stormwater to South San Francisco Bay. Member agencies include the District, Santa Clara County, and the 13 individual cities in northern Santa Clara County. The permit is granted under the National Pollutant Discharge Elimination System (NPDES) Municipal Regional Permit (MRP).

The SCVURPPP goal is to maintain and improve, wherever possible, the quality of stormwater discharged to natural waterways throughout the county. SCVURPPP includes construction site control, illicit discharge control, municipal operations, and water quality monitoring.

Between 2002 and 2008, the SCVURPPP Water Quality Monitoring and Watershed Assessment Program collected and analyzed screening-level water quality monitoring data from 73 creek sites located within 11 of the 13 watersheds found in the Santa Clara Basin. Water samples were analyzed for conventional water quality parameters, chemical pollutants (metals and organic contaminants), aquatic toxicity, and pathogen indicators. The SCVURPPP Water Quality Program is conducted to achieve specific objectives and is not carried out continuously. Additional creek monitoring efforts are planned, with updates available on the SCVURPPP website.[106]

7.5 REPORTING AND DATA AVAILABILITY

Monitoring data provides the basis for numerous District programs, projects, and management decisions, including annual water supply operations and long-term water utility planning. Data collected by the District is made publicly available on the District website[107] through several regular publications as shown in Table 7-10 below. Water level data is also available on-line at https://gis.valleywater.org/GroundwaterElevations/

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[105] Central Coast Ambient Monitoring Program: http://www.ccamp.org/ccamp/ccampa3.htm
[106] Santa Clara Valley Urban Runoff Pollution Prevention Program: http://www.scvurppp-w2k.com
[107] Santa Clara Valley Water District: http://www.valleywater.org

Table 7-10. Groundwater Reports

Report	Frequency of Publication	Contents
Water Tracker	Monthly	Overview of current water supply conditions, including high-level summary of groundwater levels, estimated pumping and managed recharge.
Monthly Groundwater Condition Report	Monthly	More detailed information on current groundwater levels, estimated pumping, and managed recharge to supplement the monthly Water Tracker.
PAWS Report	Annual (February)	Information on water supply and use; groundwater recharge, pumping, levels, and storage; in-lieu recharge, projected water supply availability and demand, and activities to protect and augment water supplies as required by the District Act
Annual Groundwater Report	Annual (June)	Detailed information on conditions in the Santa Clara and Llagas subbasins for the preceding calendar year, including groundwater levels, pumping, and recharge, subsidence, and groundwater monitoring results. The 2015 Annual Groundwater Report is included in Appendix C

In addition to the regular reports noted above, the District will prepare a summary annual report for submittal to DWR by April 1 as required by Water Code Section 10728. This report will contain the following information:

- Groundwater elevation data.
- Annual aggregated data identifying groundwater extraction for the preceding water year.
- Surface water supply used for or available for use for groundwater recharge or in-lieu use.
- Total water use.
- Change in groundwater storage.

7.6 GROUNDWATER MODELS

The District has developed numerical models to support operational decisions and long-term water supply planning. These include operational and water supply system models as well as groundwater flow models, which are described in this section. Currently the District maintains three numerical groundwater models. The District has developed models for the Santa Clara Plain and Coyote Valley to simulate groundwater conditions in the Santa Clara Subbasin and uses a separate model for the Llagas Subbasin (Figure 7-17). These models are used to evaluate and forecast groundwater storage and water levels under various operational and hydrologic conditions.

Groundwater flow models are simplified mathematical representations of complex nature systems. Models are useful tools to evaluate and forecast future groundwater conditions, but there are related limitations due to available data, simplifying assumptions, and model calibration. As articulated by George E.P. Box:[108]

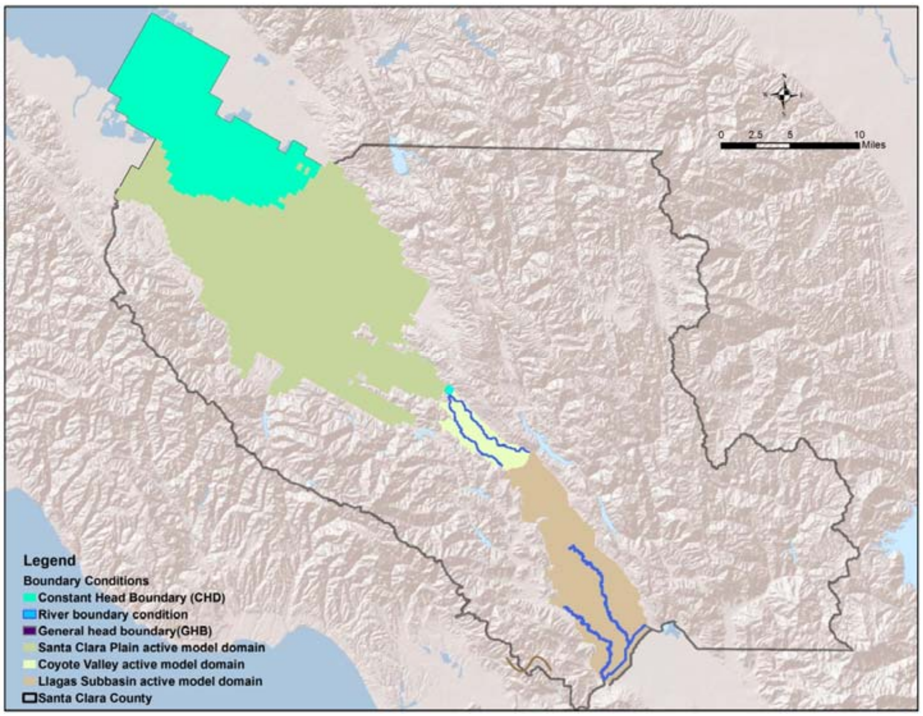
[108] Box and Draper, Empirical Model-Building and Response Surfaces, 1987.

Chapter 7 – Groundwater Monitoring and Modeling

"Remember that all models are wrong; the practical question is how wrong do they have to be to not be useful." And, *"Essentially, all models are wrong, but some are useful."*

Maintaining calibrated models that can reasonably forecast groundwater conditions is an important part of the District's comprehensive groundwater management strategy.

Figure 7-17. Groundwater Flow Model Domain and Boundary Conditions



7.6.1 Santa Clara Subbasin Models

The District uses and maintains two numerical groundwater models for the Santa Clara Subbasin: one for Santa Clara Plain and the other for Coyote Valley as described below.

7.6.1.1 Santa Clara Plain Model

The Santa Clara Plain Model is a numerical model of groundwater flow in the groundwater basin of northern Santa Clara Valley.[109] The numerical model is based on the hydrogeologic conceptual model presented in the Hydrogeologic Interpretation Draft Technical Memorandum.[110] The Santa Clara Plain model uses the MODFLOW model[111] to simulate groundwater flow in the Santa Clara Plain, with the model domain extending from the Coyote Narrows (Metcalf Road) in the south to the Santa Clara-Alameda and Santa Clara-San Mateo county lines in the north. The model area encompasses most of the alluvial fill in the northern Santa Clara Valley.

The Santa Clara Plain model comprises six layers. Layers 1 and 2 represent shallow aquifers above the regional confining layer, and extend only to the confined area boundary. Layer 3 extends over the entire model domain, representing the confining layer in the center of the basin and unconfined conditions for the remainder of the domain. Layers 4, 5, and 6 represent the deeper zones of the principal aquifer, which vary in extent based on the

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[109] CH2M HILL, Santa Clara Valley Groundwater Model Project, Basinwide Groundwater Flow Model, 1992a.

[110] CH2M HILL, Santa Clara Valley Groundwater Model Project, Hydrogeologic Interpretation, 1992b.

[111] McDonald and Harbaugh, A modular three-dimensional finite-difference ground-water flow model ,1988.

shape of the basin and bedrock encountered at depth. Each layer contains 57 rows and 92 columns. Active grid cells encompass an area of approximately 315 square miles. The smallest cells have a grid spacing of 1,000 feet by 1,000 feet, and the largest cells have a grid spacing of 6,000 feet by 6,000 feet. Horizontal flow boundaries include constant head and no-flow boundaries. Constant head cells are assigned to model cells that simulate San Francisco Bay and the Coyote Narrows. All other horizontal model boundaries are represented by no-flow cells.

The model uses data from 1970 to present, with a monthly stress period. The model has two major inflow components: managed recharge and natural recharge. The managed recharge occurs through nineteen percolation facilities. Natural recharge includes deep percolation of rainfall, minor un-gauged percolation from streams, mountain front recharge, water loss from transmission and distribution lines, sewer line exfiltration, and return water from agricultural and all other pumping. A constant head boundary condition at the Coyote Narrows simulates the subsurface groundwater exchange between the Coyote Valley and the Santa Clara Plain. The major outflow component is groundwater pumping. Minor outflow components accounted for in the model include evapotranspiration, sewer infiltration, and subsurface flow to San Francisco Bay (shallow layers) and aquifers beneath San Francisco Bay (deeper layers) through a constant head boundary. The initial head distribution is generated based on water level data measured during late 1969 and early 1970. The model is updated or improved when additional data becomes available.

7.6.1.2 Coyote Valley Model

In 2000, CH2M Hill developed a finite element Coyote valley groundwater model using Microfem for the Metcalf Energy Center.[112] CH2M Hill transformed the Microfem finite element model into a finite difference grid using data from mid-1987 through 1998 in 6 month increments and provided the finite difference grid model to the District. District staff made significant modifications to the CH2M Hill finite difference grid model and uses the refined model to assess groundwater conditions in the Coyote Valley.

The Coyote Valley model boundary extends from Metcalf Road at the Coyote Narrows in the north to the groundwater divide near Cochrane Road (Morgan Hill) in the south. The eastern and western boundaries are the contact between the valley fill alluvial sediments and the bedrock exposed along the edge of the valley. The finite difference model grid contains 140 rows and 150 columns, with a uniform grid spacing of 250 feet by 250 feet. The model runs on both MODFLOW 88/96 and MODFLOW 2000 using data from mid-1987 to present and a monthly time step. The model consists of four layers: three top layers representing alluvial sediments and the bottom layer representing the Santa Clara formation. The top alluvium is divided into three model layers of equal thickness to enable greater flexibility in assigning pumping and water level changes to discrete intervals or different depths within the model.

The inflow water budget components are managed recharge through Coyote Creek, areal recharge from the deep percolation of rainfall and agricultural irrigation/septic system return flows and stream seepage from upper Fisher Creek. Areal recharge at the top surface of the model is simulated using the MODFLOW Recharge package. Groundwater-surface water interactions along Coyote and Fisher creeks are simulated with stage data by the MODFLOW River package. A time-variant constant head boundary condition using the MODFLOW Constant Head package is defined at the Coyote Narrows in the north to simulate the subsurface groundwater exchange between the Coyote Valley and the Santa Clara Plain. The model has no-flow boundary conditions on the east, west, south and bottom of the model. The outflow water budget components are groundwater pumping, subsurface outflows at the Coyote Narrows, evapotranspiration from shallow groundwater areas, and gaining reaches of Fisher and Coyote creeks. Groundwater extraction from model layers 2 and 3 is simulated using the MODFLOW well package.

[112] CH2M Hill, Coyote Valley Groundwater Report, 2000.

Evapotranspiration from shallow groundwater areas are simulated using the MODFLOW Evapotranspiration package.

7.6.2 Llagas Subbasin Model

The Llagas Subbasin groundwater flow model was developed in 2005 to provide the District with a tool to support management of the subbasin.[113] The model is used to evaluate groundwater supplies using current and future demands under different hydrologic conditions.

The Llagas model was developed with a finite difference gridding method using MODFLOW 2000 to assess the subbasin response to hydrologic conditions using data from the water year 1988 to water year 2002 in 6 month increments. The model currently used by the District is a revised version of the original model that runs from October 1987 to the present in one month increments. The model grid covers the main alluvial areas of the Llagas Subbasin, which extends from Cochrane Road in the north to the subbasin's southern boundary near the Pajaro River. The finite difference grid contains four active layers of 200 rows and 140 columns, with a uniform grid spacing of 500 feet by 500 feet. The model has four parallel layers that roughly coincide with the distribution of production well perforations. The bottom of Layer 1 is below the lowest water levels anticipated during simulations, and the bottom of Layer 4 is the top of the bedrock interpreted from cross-sections. The elevation and thickness of the layers are based on borehole lithology and drillers logs.

The Llagas model inflow water budget components are managed recharge to creeks and percolation ponds, natural recharge (estimated as the deep percolation of rainfall, septic return flow, and stream seepage), and subsurface inflow (from bedrock uplands, alluvial tributary canyons, and the adjacent Bolsa Subbasin). The outflow components are mainly groundwater pumping, with smaller fractions of evapotranspiration, gaining creeks, and subsurface outflows to the Bolsa subbasin. The inflow and outflow water budget components are simulated in the model using different MODFLOW 2000 packages. The Llagas model has no-flow boundaries on the east and west sides of the model, at Cochrane Road in the north, and at the bottom of layer 4. A general head boundary is set at the southern boundary to simulate the head-dependent subbasin exchange between the Llagas and Bolsa Subbasins. The top surface of the model is simulated using MODFLOW recharge, well (injection), evapotranspiration, and river packages. Extraction wells are simulated using the well package from layer 1 through 4 depending on well perforation.

7.6.3 Groundwater Storage Analysis

Groundwater provides nearly all water used in the Coyote Valley and Llagas Subbasin and is an important supply in the Santa Clara Plain. The District regularly analyzes groundwater storage to support operational decisions, contingency planning, and planning to meet future needs. To support near-term operations, the District uses groundwater models to estimate storage for the current year and simulate conditions for the following calendar year under a range of projected water supply and hydrologic scenarios. As the water year progresses and more water supply and demand information becomes available, operations plans are updated accordingly. The goal of operations planning is to ensure adequate supplies are available and groundwater resources are protected. Projected end of year groundwater storage is the key trigger for the District's Water Shortage Contingency Plan, which recommends increased short-term water use reduction measures as groundwater storage declines.

Groundwater models are also used to support long-term water planning efforts such as the Urban Water Management Plan and Water Supply Master Plan and individual projects. Understanding groundwater conditions under various pumping and hydrologic scenarios supports the analysis of the potential impacts of various projects, or when and where additional investments (such as additional recharge) may be needed.

[113] CH2MHill, Llagas Basin Numerical Groundwater Model Report, 2005

Chapter 8 – Next Steps

CHAPTER 8 – NEXT STEPS

Previous chapters of this 2016 Groundwater Management Plan outlined the District's basin sustainability goals, strategies to meet those goals, related programs and activities, and key outcome measures to gauge performance. This chapter describes outcome measure evaluation, potential tools to address outcome measure performance, and recommendations to ensure continued sustainability.

8.1 EVALUATION AND REPORTING OF OUTCOME MEASURES

The 2016 GWMP is based on a "Plan, Do, Check, Act" framework or model of continuous improvement:

- Identify sustainability goals and strategies in accordance with the District Act and Board policy ("Plan")
- Implement basin management programs and activities in accordance with strategies to achieve sustainability goals ("Do")
- Conduct monitoring, analyze results, and compare to outcome measures ("Check")
- Modify existing programs or evaluate and develop new strategies and tools if outcome measures indicate improvement is needed ("Act")

The outcome measures presented in the 2016 GWMP will be evaluated on an annual basis and presented in the District's Annual Groundwater Report, which will also include recommendations for action as needed. The District will review and update the GWMP as needed, but at least every five years. This will ensure compliance with SGMA requirements for Alternatives, and provide current groundwater management information to support five-year updates of the Urban Water Management Plan as required by State law.

8.2 ADDRESSING OUTCOME MEASURE PERFORMANCE

Significant investments in conjunctive water management, close coordination with water retailers, and careful planning have allowed Santa Clara County to overcome historical undesirable results and achieve sustainable groundwater conditions. The District's approach to groundwater management has evolved over many decades in response to numerous challenges, and this adaptive approach will help meet future water supply challenges to ensure continued groundwater sustainability.

If evaluation of the outcome measures indicates a need for improvement, the District will first assess potential changes to existing programs and activities prior to considering significant groundwater management changes. Any significant policy or investment decisions would be developed and evaluated in coordination with other District planning efforts and in consultation with water retailers and local stakeholders, as the District does in current planning and budgeting processes.

8.2.1 Groundwater Supply Reliability

Maintaining reliable groundwater supplies helps meet community water needs and avoid undesirable results such as long-term overdraft, land subsidence, and salt water intrusion. Countywide water supplies are generally sufficient to meet demands in normal years through 2040, but significant shortages may occur during multiple dry years without additional investments.[114] In addition, there are certain risks that could change the water supply outlook, and further impact the District's ability to maintain sustainable groundwater supplies. These challenges include increased demands beyond what is projected, constraints on Delta exports, and climate change.

[114] Santa Clara Valley Water District, Urban Water Management Plan, 2015.

The District plans to update its Water Supply Master Plan in 2017. As part of the planning process, the District will evaluate supply projects and programs to minimize projected future shortages and ensure continued water supply reliability and groundwater sustainability. These projects and programs may include additional long-term water conservation, water recycling, recharge capacity, stormwater capture and reuse, banking, and storage. Water Supply Master Plan implementation will be staged to minimize the risk of stranded investments or under-investment should demands not increase as projected.

Existing groundwater management tools for ensuring groundwater reliability include:

- Implementation of managed recharge and groundwater pumping offsets through in-lieu recharge programs;
- Cooperation with water retailers on source shifts and shortage response;
- Coordination with water retailers and land use agencies on General Plans, Urban Water Management Plans, and water supply assessments.

Potential groundwater management tools that could also be considered to ensure sustainable groundwater supplies include:

- Creation or modification of groundwater charge zones;
- Changes to the groundwater charge rate structure;
- Changes in the District's well permitting process;
- Institutional agreements with water retailers related to groundwater management;
- Regulation of groundwater pumping if groundwater is endangered and regulation is necessary to avoid permanent damage in the form of diminution, contamination, pollution, or land subsidence.

While the regulation of pumping may be needed to address undesirable results like chronic overdraft, land subsidence, or groundwater quality impacts, related SGMA authorities have certain constraints, and significant issues regarding the potential interference with water rights and liability associated with District regulation of pumping at individual wells must be carefully considered. As described in Chapter 1 and the recommendations below, the District plans to work with water retailers and other interested stakeholders to evaluate these potential authorities.

8.2.2 Groundwater Quality Protection

Challenges to protecting groundwater quality include intensified land use, emerging contaminants, and more stringent regulatory standards. The District does not control land use or deliver groundwater directly to customers, so protecting groundwater quality requires coordination with water retailers, land use agencies, regulatory agencies, and the public.

Existing groundwater management tools to protect groundwater quality include:

- Coordination with regulatory agencies overseeing high-threat contaminant release sites to ensure adequate cleanup;
- Coordination with local land use agencies on water supply assessments, land use proposals, stormwater infiltration devices, septic systems, and small water systems served by wells;
- Outreach to domestic well owners on well maintenance, and water quality issues like nitrate;
- Rebates for point-of-use treatment to reduce private well owner exposure to elevated nitrate.

Activities that can be considered to improve groundwater protection include:

- Increased coordination with regulatory agencies to ensure high-threat contamination is promptly and adequately addressed;
- Expanded outreach efforts to raise awareness of groundwater protection, including outreach to agricultural users in coordination with local partners and the Central Coast Water Board;
- Coordination with local land use agencies and others to develop guidelines or best management practices related to specific threats;
- Expanded efforts with legislators and others to target significant threats and fund regulatory efforts;
- Enhanced managed recharge programs to further dilute contaminants;
- Re-initiation of the District's abandoned well destruction assistance program to address vertical conduit threats;
- New groundwater protection ordinance or regulatory solutions, if needed to protect groundwater quality.

8.3 GROUNDWATER MANAGEMENT PLAN RECOMMENDATIONS

The District's proactive groundwater management programs and activities have maintained sustainable groundwater levels and storage, minimized land subsidence, and improved groundwater protection. To maintain the long-term viability of groundwater resources, the following actions are recommended:

1. **Maintain existing conjunctive water management programs and evaluate opportunities for enhancement or increased efficiency.**

   Programs to recharge groundwater through direct replenishment and in-lieu recharge maintain groundwater levels and flow gradients and are essential to prevent groundwater overdraft, land subsidence, and salt water intrusion. Priorities include efforts to:

   a. Ensure the reliability of the District's water utility infrastructure, including local dams and reservoirs, diversion structures, pipelines, pumping stations, treatment plants and managed recharge facilities through appropriate maintenance or replacement.

   b. Implement high-priority capital projects that support conjunctive water management, including indirect potable reuse and dam seismic stability projects.

   c. Secure local and imported sources of supply, including a long-term solution for reliable Delta conveyance.

   d. Maintain and expand in-lieu recharge programs to offset pumping, including treated water sales, water recycling and water conservation, to reduce demands on the groundwater subbasins.

   e. Encourage water retailers to maintain other water supply sources, including San Francisco Public Utilities Commission contract deliveries to Santa Clara County.

   f. Maintain and optimize operations activities that support conjunctive water management, including modeling, forecasting, systems control, and water accounting.

2. **Continue to aggressively protect groundwater quality through District programs and collaboration with land use agencies, regulatory agencies, and basin stakeholders.**

   A reliable water supply depends not only on quantity, but on quality. Unlike surface water, most groundwater pumped in the county does not require treatment beyond disinfection, making protection of this local resource all the more important. Priorities include efforts to:

   a. Continue to implement comprehensive programs to evaluate groundwater quality conditions so potentially adverse trends can be quickly identified and appropriate action can be taken before conditions become severe.

   b. Collaborate with local partners and regulatory agencies on efforts including salt and nutrient management, stormwater management, land use and policy review, and recycled water expansion.

   c. Evaluate opportunities for expanded partnerships to maximize groundwater protection.

3. **Continue to incorporate groundwater sustainability in District planning efforts.**

   Future sustainability depends on continued, thoughtful water supply planning and investments. Priorities include efforts to:

   a. Complete the Water Supply Master Plan in 2017 to address future challenges to maintaining reliable groundwater supplies and implement related projects as appropriate.

   b. Continue to include groundwater sustainability as an important component under the District's Urban Water Management Plan and related water shortage contingency plan.

   c. Account for groundwater sustainability during the planning and implementation of multi-benefit projects under the District's One Water Plan.

4. **Maintain adequate monitoring programs and modeling tools.**

   The assessment of groundwater conditions and performance of outcome measures relies on timely, accurate, and representative data. The District has comprehensive groundwater monitoring programs and calibrated groundwater flow models, but they need to be maintained and improved. Priorities include efforts to:

   a. Identify gaps and redundancies in existing monitoring networks.

   b. Secure long-term access for sustainable monitoring networks.

   c. Identify additional monitoring needed to improve assessment of basin conditions.

   d. Identify and implement modeling improvements to enhance simulation capabilities, including groundwater storage estimates.

   e. Improve understanding of surface water/groundwater interaction.

5. **Continue and enhance groundwater management partnerships with water retailers and land use agencies.**

   Continued collaboration and strong partnerships with water retailers and land use are needed to ensure future sustainability, with priorities including efforts to:

   a. Continue regular interaction with water retailers through Water Retailer meetings, including the Groundwater Subcommittee.

b. Meet regularly with South County water retailers to discuss groundwater management issues in areas dependent on groundwater.

c. Explore options for improved management of local water and San Francisco Public Utilities Commission supplies in Santa Clara County.

d. Maintain contingency plans and further develop management options for water shortages, as well as for local or Delta-related interruptions in supply.

e. Coordinate with water retailers and local land use agencies on General Plans, water supply assessments, and Urban Water Management Plans.

6. Evaluate the potential new authorities provided by SGMA.

These include the ability to regulate groundwater pumping and assess different types of groundwater charges. The District plans to evaluate these new authorities in cooperation with water retailers and other interested stakeholders and consider what conditions might necessitate their implementation to sustainably manage groundwater into the future.

a. Work with major pumpers to develop basin conditions that might trigger the need to regulate pumping, as well as implementation mechanisms to ensure related authorities can be effectively implemented should they become necessary.

b. Evaluate the various fees that can be collected pursuant to SGMA, including fixed fees, to determine if they further sustainable groundwater management.

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Glossary

A

Acre-Foot
The volume of water necessary to cover one acre to a depth of one foot; equal to 43,560 cubic feet or 325,851 gallons.

Alluvium
A general term for clay, silt, sand, gravel, or similar unconsolidated detrital material, deposited during comparatively recent geologic time by a stream or other body of running water, as a sorted or semi-sorted sediment in the bed of the stream or on its floodplain or delta, as a cone or fan at the base of a mountain slope.

Aquifer
A body of rock or sediment that is sufficiently porous and permeable to store, transmit, and yield significant or economic quantities of groundwater to wells and springs.

Aquitard
A confining bed and/or formation composed of rock or sediment that retards but does not prevent the flow of water to or from an adjacent aquifer. It does not readily yield water to wells or springs, but stores groundwater.

Artesian Aquifer
A body of rock or sediment containing groundwater that is under greater than hydrostatic pressure; that is, a confined aquifer. When an artesian aquifer is penetrated by a well, the water level will rise above the top of the aquifer.

B

Basin
A groundwater basin or subbasin identified and defined in the California Department of Water Resources Bulletin 118.

Basin Plan
The Regional Water Quality Control Board's master water quality control planning document that designates beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater and includes implementation programs to achieve water quality objectives.

Beneficial Use
One of many ways that water can be used either directly by people or for their overall benefit. The State Water Resources Control Board recognizes 23 types of beneficial use with water quality criteria for those uses established by the Regional Water Quality Control Boards.

Bulletin 118
The Department of Water Resources report, entitled "California's Groundwater: Bulletin 118", updated in 2003, or as it may be subsequently updated or revised.

C

CASGEM
The California Statewide Groundwater Elevation Monitoring Program developed by the Department of Water Resources pursuant to Water Code Section 10920 et seq.

Cone of Depression
In an unconfined aquifer, this is an actual depression of the water levels. In confined aquifers (artesian), the cone of depression is a reduction in the pressure head surrounding the pumped well.

Glossary

Confined Aquifer
An aquifer that is bounded above and below by formations of distinctly lower permeability than that of the aquifer itself. An aquifer containing confined groundwater. See artesian aquifer.

Conjunctive Management/Use
The coordinated and planned management of both surface and groundwater resources to maximize the efficient use of the resource; that is, the planned and managed operation of a groundwater basin and a surface water storage system combined through a coordinated conveyance infrastructure. Water is stored in the groundwater basin for later and planned use by intentionally recharging the basin with available surface water supplies.

G

Groundwater
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.

Groundwater Basin
An alluvial aquifer or a stacked series of alluvial aquifers with reasonably well-defined boundaries in a lateral direction and having a definable bottom.

Groundwater Budget
A numerical accounting of the recharge, discharge and changes in storage of an aquifer, part of an aquifer, or a system of aquifers. The groundwater equation for mass conservation or balance for an aquifer, part of an aquifer, or a system of aquifers.

Groundwater Charge Zone
A zone in which groundwater production charges are levied to fund District activities that protect and augment groundwater supplies.

Groundwater Demand
The quantity of groundwater within the subbasin needed for beneficial use.

Groundwater Gradient
A measure of the change in groundwater head over a given distance. Groundwater flows from areas of high hydraulic head (high water level elevation) to areas of low head (low water level elevation).

Groundwater Recharge
The natural or intentional infiltration of surface water into the zone of saturation.

Groundwater Subbasin
A subdivision of a groundwater basin created by dividing the basin using geologic and hydrologic conditions or institutional boundaries.

Groundwater Sustainability Agency
One or more local agencies that implement the provisions of the Sustainable Groundwater Management Act. The Santa Clara Valley Water District is the groundwater sustainability agency for Santa Clara Subbasin and Llagas Subbasin.

Groundwater Sustainability Plan (GSP)
A plan of a groundwater sustainability agency proposed or adopted pursuant to the Sustainable Groundwater Management Act.

Glossary

I

Imported Water

Non-local source of water. Water is purchased from the State and Federal Water Projects and others outside the groundwater basin's geographical boundaries and transported into the basin for use as surface water or for recharge into the basin.

In-Lieu Recharge

The practice of providing surplus surface water or recycled water to historic groundwater users, thereby leaving groundwater in storage for later use. Water conservation programs also serve as in-lieu recharge by reducing demands, thereby increasing storage.

L

Land Subsidence

The lowering of the natural land surface due to groundwater extraction.

Long-Term Overdraft

The condition of a groundwater basin where the average annual amount of water extracted for a long-term period, generally 10 years or more, exceeds the long-term average annual supply of water to the basin, plus any temporary surplus. Overdraft during a period of drought is not sufficient to establish a condition of long-term overdraft if extractions and 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.

M

Managed Recharge

The addition of water to a groundwater reservoir by human activity, such as putting surface water into dug or constructed spreading basins or injecting water through wells.

Maximum Contaminant Level (MCL)

The highest drinking water contaminant concentration allowed under federal and State Safe Drinking Water Act regulations. Health based MCLs are referred to as Primary MCLS. Secondary MCLs are established for contaminants that may affect aesthetic properties of drinking water such as taste, color, and odor.

N

Natural Recharge

Natural replenishment of an aquifer, generally from runoff, through seepage from the surface.

O

Operational Storage

The usable storage within an aquifer system or groundwater basin that accounts for the avoidance of adverse impacts. It is a dynamic quantity that must be determined from a set of alternative groundwater management decisions subject to goals, objectives, and constraints of the groundwater management plan.

Outcome Measures

Specific, quantifiable goals for the maintenance or improvement of the specified groundwater conditions included in the Plan to achieve the sustainability goal for the basin.

P

Potable Reuse

The use of recycled water as part of the potable water supply. Indirect potable reuse is the use of highly treated recycled water for managed recharge, which provides natural filtration and blending with groundwater prior to its reuse as a potable supply. Direct potable reuse is the direct delivery of highly purified recycled water to the potable water supply.

Public Water System

As defined in Section 116275 of the Health and Safety Code, a public water system is a system for the provision of water for human consumption through pipes or other constructed conveyances that has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out of the year. A public water system includes the following:

(1) Any collection, treatment, storage, and distribution facilities under control of the operator of the system that are used primarily in connection with the system.

(2) Any collection or pretreatment storage facilities not under the control of the operator that are used primarily in connection with the system.

(3) Any water system that treats water on behalf of one or more public water systems for rendering it safe for human consumption.

R

Recharge Area

The area that supplies water to an aquifer in a groundwater basin.

S

Salt Water Intrusion

The movement of salt water into a body of fresh water. It can occur in either surface water or groundwater bodies.

Semitropic Groundwater Bank

Long-term water storage project designed to optimize the distribution and use of water resources between the Semitropic Groundwater Bank and its banking partners, like the District. Semitropic receives SWP or CVP surface water from its banking partners in years of ample supplies and delivers it to landowners in Kern County for irrigation use in lieu of groundwater pumping. Groundwater which otherwise would have been pumped remains in storage, credited to the account of the banking partner. In times of surface water shortages, the water may be withdrawn and used by Semitropic or other downstream users in exchange for an equal amount of water conveyed to the District from the Sacramento-San Joaquin Delta.

Sustainable Groundwater Management Act (SGMA)

Legislation signed into state law in 2014 with the intent for groundwater to be managed sustainably in California's groundwater basins by local public agencies and newly-formed groundwater sustainability agencies.

Sustainable Yield

As defined in SGMA (Water Code Section 10721), 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.

U

Unconfined Aquifer

An aquifer which is not bounded on top by an aquitard. The upper surface of an unconfined aquifer is the water table.

Undesirable Result
As defined in SGMA (Water Code Section 10721), an undesirable result is 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 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.

Urban Water Management Plan (UWMP)
An UWMP is required for all urban water suppliers having more than 3,000 connections or supplying more than 3,000 acre-feet of water. The plans include discussions on water supply, supply reliability, water use, water conservation, and water shortage contingency and serve to assist urban water suppliers with their long-term water resources planning to ensure adequate water supplies for existing and future demands.

W

Water Budget
An accounting of the total groundwater and surface water entering and leaving a basin including the changes in the amount of water stored. See groundwater budget.

Water Year
The period from October 1 through the following September 30, inclusive.

Wellhead Protection Area
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.

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Appendix A – Board Action and GWMP Outreach

A1. Board Agenda Item and Resolution to Become the Groundwater Sustainability Agency for the Santa Clara and Llagas Subbasins

A2. Board Resolution to Adopt the 2016 Groundwater Management Plan and Related Agenda Item (Includes Public Comment Letters Received)

A3. District Response to Public Comment Letters on the Draft GWMP

A4. GWMP Outreach – Public Notices

A5. GWMP Outreach – Letter to Interested Stakeholders

A6. GWMP Outreach – List of Meetings Where the GWMP was Discussed

A7. GWMP Outreach – District Website Information

A8. Environmental Documentation

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Appendix A – Board Action and GWMP Outreach

A1. Board Agenda Item and Resolution to Become the Groundwater Sustainability Agency for the Santa Clara and Llagas Subbasins

Santa Clara Valley Water District

CONFORMED COPY

File No.: 16-0304

Agenda Date: 5/24/2016
Item No.: 2.7.

BOARD AGENDA MEMORANDUM

SUBJECT:
Public Hearing and Resolution on the Decision to Become the Groundwater Sustainability Agency for the Santa Clara and Llagas Subbasins.

RECOMMENDATION:

A. Conduct the public hearing on the Decision to Become the Groundwater Sustainability Agency for the Santa Clara and Llagas Subbasins;
B. Adopt the Resolution DECISION TO BECOME THE GROUNDWATER SUSTAINABILITY AGENCY FOR THE SANTA CLARA AND LLAGAS SUBBASINS; and
C. Authorize the Interim Chief Executive Officer or designee to submit the resolution and a Notice of Intent to the California Department of Water Resources (DWR).

SUMMARY:
The Sustainable Groundwater Management Act (SGMA) was enacted by the state legislature in 2014 to ensure sustainable management of groundwater in California. For basins designated as high or medium priority by the state, SGMA requires the identification of a local agency that will manage the basin by June 30, 2017. This could be a local agency with statutory authority to manage groundwater or a Groundwater Sustainability Agency (GSA). SGMA designates the Santa Clara Valley Water District (District) as the exclusive local groundwater management agency within its statutory boundary, which coincides with Santa Clara County. SGMA provides GSAs with access to various powers and authorities to ensure sustainable management.

The Santa Clara and Llagas Subbasins in Santa Clara County are medium and high priority basins, respectively (Attachment 1), and are subject to SGMA requirements. For many decades, the District has sustainably managed these subbasins through authorities provided by the District Act. The District's comprehensive groundwater management strategy and programs are described in the 2012 Groundwater Management Plan, which was adopted by the District Board of Directors.

This public hearing is being held pursuant to Water Code Section 10723, and provides an opportunity for any interested person to provide comments on the District decision to become the GSA for the Santa Clara and Llagas Subbasins. Staff recommends that the Board adopt the

ADOPTED
MAY 24 2016

resolution to decide to become the GSA for the Santa Clara and Llagas Subbasins (Attachment 2). This action will confirm the District's role as the local groundwater management agency, ensure access to SGMA authorities, and preserve access to funding or other opportunities that may be limited to GSAs. Staff also recommends that the Board authorize the Chief Executive Officer or her designee to submit the resolution and required Notice of Intent to DWR.

Background

Management of Santa Clara County's groundwater resources is critical to support Silicon Valley's vibrant economy. Groundwater provides nearly half the water used in the county and is the sole drinking water source in South County. About 150,000 acre-feet of groundwater is pumped annually, far exceeding the amount naturally replenished. The Santa Clara and Llagas Subbasins transmit, filter, and store huge quantities of water and serve as the county's best protection against drought or extended system outages.

The District was formed in 1929 to address unsustainable groundwater pumping and related effects, including overdraft and land subsidence. While many areas of the State are observing chronic overdraft and subsidence, Santa Clara County is recognized as an area where these issues have been, and continue to be, successfully addressed through sustainable groundwater management.

Groundwater Management Authorities

The District manages the Santa Clara and Llagas Subbasins through broad statutory authority granted by the District Act to recharge groundwater basins; conserve, manage and store water for beneficial and useful purposes; increase water supply; protect surface water and groundwater from contamination; prevent waste and diminution of the District's water supply; and do any and every lawful act necessary to ensure sufficient water is available for present and future beneficial uses within the Santa Clara County. The District Act also allows for the creation of zones and the levy of groundwater charges to fund water supply activities within those zones.

SGMA does not affect any existing District authorities, but provides access to new tools that may be needed to ensure sustainability. Potential new authorities include the ability to restrict or allocate pumping and control well spacing or operation. Additional methods for collecting fees, including fixed or tiered fees, are also available through SGMA. The District will work closely with stakeholders prior to implementing any new authority.

Decision to Become the GSA for the Santa Clara and Llagas Subbasins

SGMA lists the District as the exclusive groundwater management agency within its statutory

boundary and no other agency can become a GSA in Santa Clara County unless the District decides to opt out of that distinction. SGMA is vague on the advantages, if any, between being an *exclusive* groundwater management agency or a GSA, including whether SGMA authorities identified for a GSA are also available to exclusive groundwater management agencies.

The staff proposal to become the GSA for the Santa Clara and Llagas Subbasins has been discussed with the Water Retailers Committee and Water Retailers Groundwater Subcommittee. The primary interest of the retailers is to be involved as the District updates its Groundwater Management Plan and considers implementation of any new authorities. The District will continue to work closely with water retailers and receive input from other interested stakeholders to ensure continued, sustainable management of local groundwater.

Staff recommends that the District decide to become the GSA for the Santa Clara and Llagas Subbasins. Although no other agency could be the GSA unless the District opts out, this action will confirm the District's role with regard to local SGMA compliance and ensure that related authorities are available if needed. This will also ensure District access to funding or other opportunities that may be limited to GSAs. Pursuant to Water Code Sections 10723 and 10723.8, the decision to become the GSA requires a public hearing, Board Resolution (Attachment 2), and submittal of a Notice of Intent to DWR.

Other Subbasins in Santa Clara County

In addition to the Santa Clara and Llagas Subbasins, Santa Clara County includes small portions of five subbasins in San Mateo, Alameda, and San Benito Counties as shown in Attachment 1. The portions of the subbasins overlapping with San Benito County are required to be managed per SGMA.

The San Mateo Plain is ranked as a very low priority basin and does not require further action under SGMA at this time. However, the District is coordinating with San Mateo County staff on their subbasin characterization efforts. Areas of overlap with Alameda County and San Benito County relating to county boundaries are being resolved through DWR adjustments.

A GSA for the medium priority Hollister and San Juan Bautista Subbasins (including the small portions in Santa Clara County) must be identified by June 30, 2017. These subbasins are primarily located within San Benito County, and the San Benito County Water District manages groundwater in their jurisdiction. The District does not conduct groundwater management activities in the Hollister or San Juan Bautista Subbasins. Staff will continue to discuss areas of overlap with the San Benito County Water District and will bring related information back to the Board by December 2016.

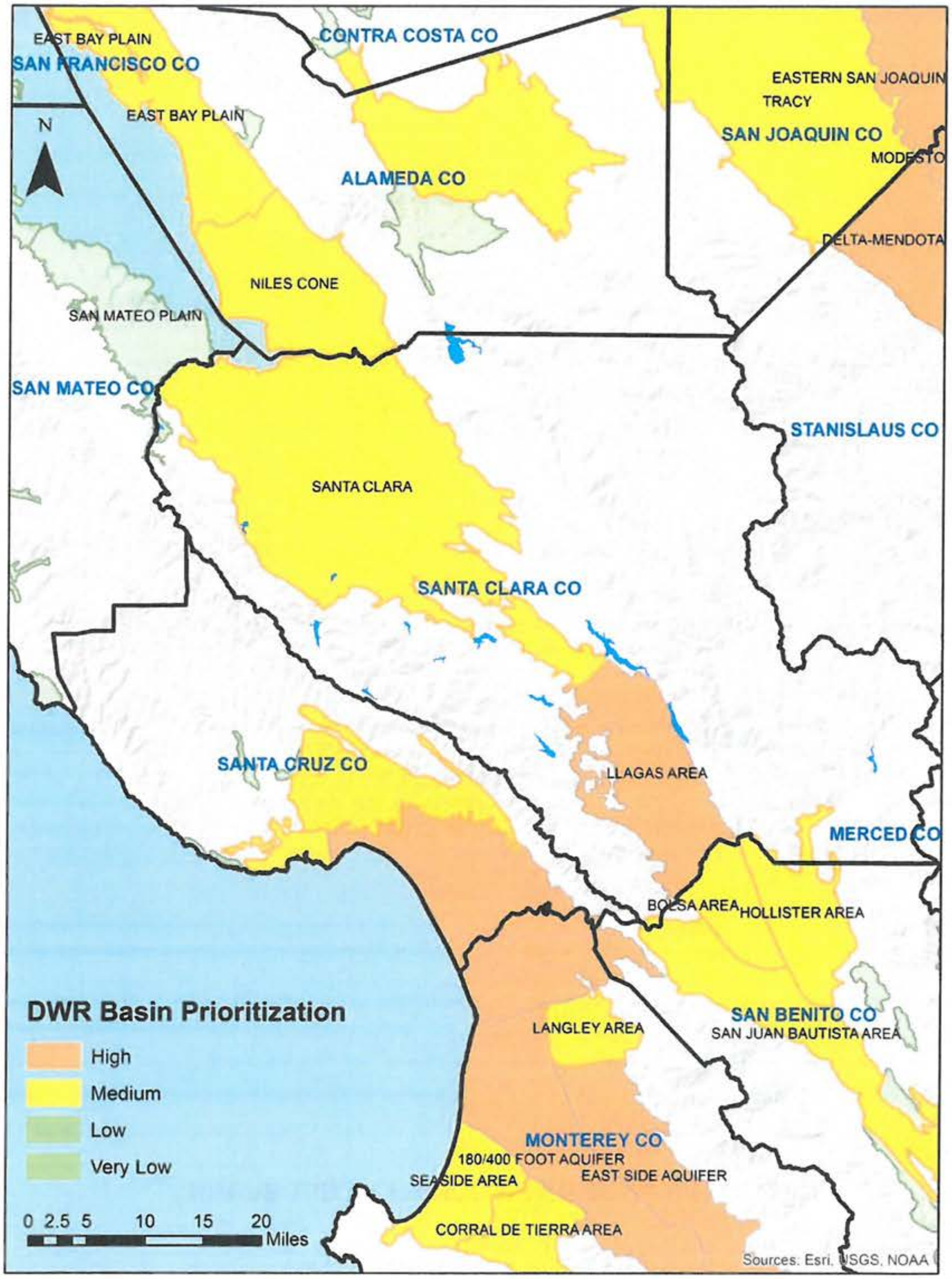
FINANCIAL IMPACT:
There is no financial impact associated with this item.

CEQA:
The recommended action does not constitute a project under CEQA because it does not have a potential for resulting in direct or reasonably foreseeable indirect physical change in the environment.

ATTACHMENTS:
Attachment 1: SC County Groundwater Subbasins Map w/DWR Basin Prioritization
Attachment 2: Resolution
Attachment 3: PowerPoint

UNCLASSIFIED MANAGER:
Garth Hall, 408-630-2750

Attachment 1 – Santa Clara County Groundwater Subbasins with DWR Basin Priority Ranking



Attachment 1
Page 1 of 1

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BOARD OF DIRECTORS
SANTA CLARA VALLEY WATER DISTRICT

RESOLUTION NO. 16– 51

DECISION TO BECOME THE GROUNDWATER SUSTAINABILITY AGENCY FOR THE SANTA CLARA AND LLAGAS SUBBASINS

WHEREAS, on September 16, 2014, the Sustainable Groundwater Management Act (SGMA) was signed into law and adopted into the California Water Code, commencing with Section 10720; and

WHEREAS, the legislative intent of SGMA is to provide for the sustainable management of groundwater basins, to enhance local management of groundwater, to establish minimum standards for sustainable groundwater management, and to provide local groundwater agencies with the authority and the technical and financial assistance necessary to sustainably manage groundwater; and

WHEREAS, Water Code Sections 10725 et al. and 10726 et al. detail additional new powers and authorities granted to Groundwater Sustainability Agencies to implement sustainable groundwater management in the basins under their jurisdictions; and

WHEREAS, Water Code Section 10723(c)1(M) specifically identifies the Santa Clara Valley Water District (District) as one of fifteen (15) agencies created by statute to manage groundwater that shall be deemed the exclusive local agencies within their respective statutory boundaries; and

WHEREAS, the Santa Clara Valley Water District Act (California Water Code Appendix, Chapter 60) provides the District with broad groundwater management authority, including the authority to protect, spread, store, retain, and cause water to percolate in the soil within Santa Clara County; and

WHEREAS, the District's statutory boundary wholly overlies the Santa Clara Subbasin and Llagas Subbasin; and

WHEREAS, the Santa Clara and Llagas Subbasins are deemed to be medium-priority and high-priority basins by the California Department of Water Resources (DWR) and therefore requiring the development of a Groundwater Sustainability Plan or an Alternative Plan; and

WHEREAS, establishing the District as the Groundwater Sustainability Agency will enable the District to prepare and implement an Alternative Plan for the Santa Clara and Llagas Subbasins, and to best work with DWR and the State Water Resources Control Board to resolve groundwater and surface water issues related to the Santa Clara and Llagas Subbasins; and

WHEREAS, the District is committed to its legislatively created mandate to manage the surface water and groundwater resources within its jurisdiction; and

WHEREAS, prior to adopting a resolution of intent to establish the District as a Groundwater Sustainability Agency, Water Code Section 10723 requires the local agency to hold a public hearing, after publication of notice pursuant to California Government Code Section 6066, on whether or not to adopt a resolution to establish a Groundwater Sustainability Agency; and

WHEREAS, pursuant to Government Code 6066, notices of a public hearing on whether or not to adopt a resolution to establish a Groundwater Sustainability Agency were published on May 4, 2016 and May 12, 2016; and

WHEREAS, on May 24, 2016, this District held a public hearing regarding the adoption of a resolution to establish the District as the Groundwater Sustainability Agency for the Santa Clara and Llagas Subbasins;

NOW, THEREFORE BE IT RESOLVED that the Board of Directors of the Santa Clara Valley Water District:

1. Hereby establishes the District as the Groundwater Sustainability Agency for the Santa Clara and Llagas Subbasins; and

2. Hereby authorizes the Chief Executive Officer or her designee to provide a copy of this resolution and a Notice of Intent to the California Department of Water Resources within 30 days and to otherwise comply with the requirements of Water Code Section 10723.8(a); and

3. All the recitals in this Resolution are true and correct and the District so finds, determines, and represents.

PASSED AND ADOPTED by the Board of Directors of Santa Clara Valley Water District by the following vote on May 24, 2016:

AYES:	Directors	T. Estremera, R. Santos, G. Kremen, L. LeZotte, J. Varela, B. Keegan
NOES:	Directors	None
ABSENT:	Directors	N. Hsueh
ABSTAIN:	Directors	None

SANTA CLARA VALLEY WATER DISTRICT

By: ______________________
BA[illegible]
Chair/Board of Directors

ATTEST: MICHELE L. KING, CMC

____
Clerk/Board of Directors

Public Hearing to become the Groundwater Sustainability Agency for the Santa Clara and Llagas Subbasins

May 24, 2016

Santa Clara Valley Water District

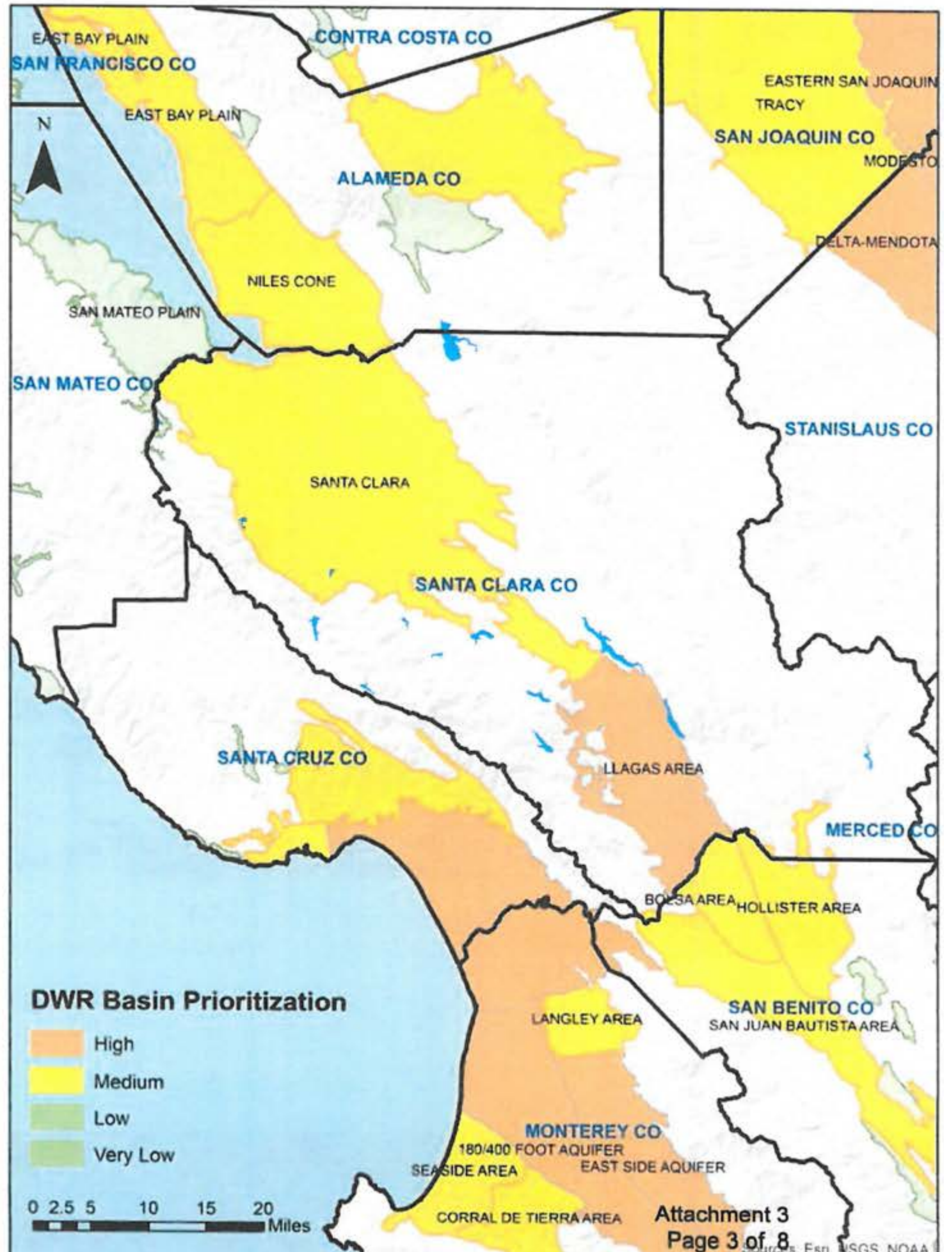
Sustainable Groundwater Management Act (SGMA)

- Framework for sustainable management in CA
  - Applies to basins designated as medium or high priority by the state
  - Provides for formation of local Groundwater Sustainability Agencies (GSAs)
  - Requires local sustainability plans
  - Provides tools to GSAs

Santa Clara Valley Water District

Santa Clara County Subbasins

- SGMA applies to the Santa Clara and Llagas Subbasins
- Strong groundwater management framework ensures continued sustainability



Attachment 3
Page 3 of 8

Historical Undesirable Results

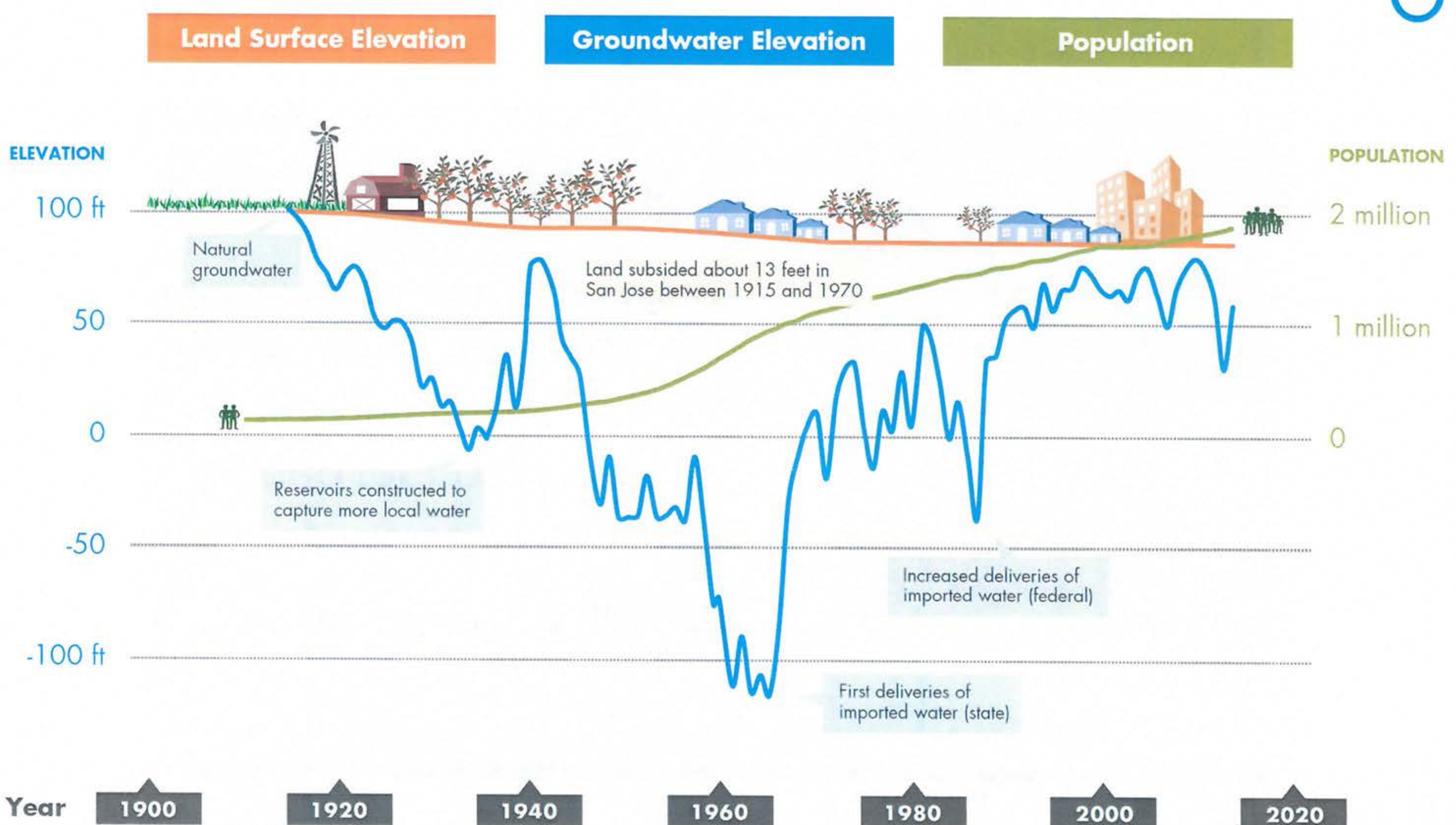
- Groundwater overdraft
  - Lower water levels
  - Reduced reliability
- Land subsidence
- Salt water intrusion

Sustainable groundwater management

SANTA CLARA COUNTY GROUNDWATER AT-A-GLANCE

a graphic representation not intended as a technical exhibit

Santa Clara Valley Water District



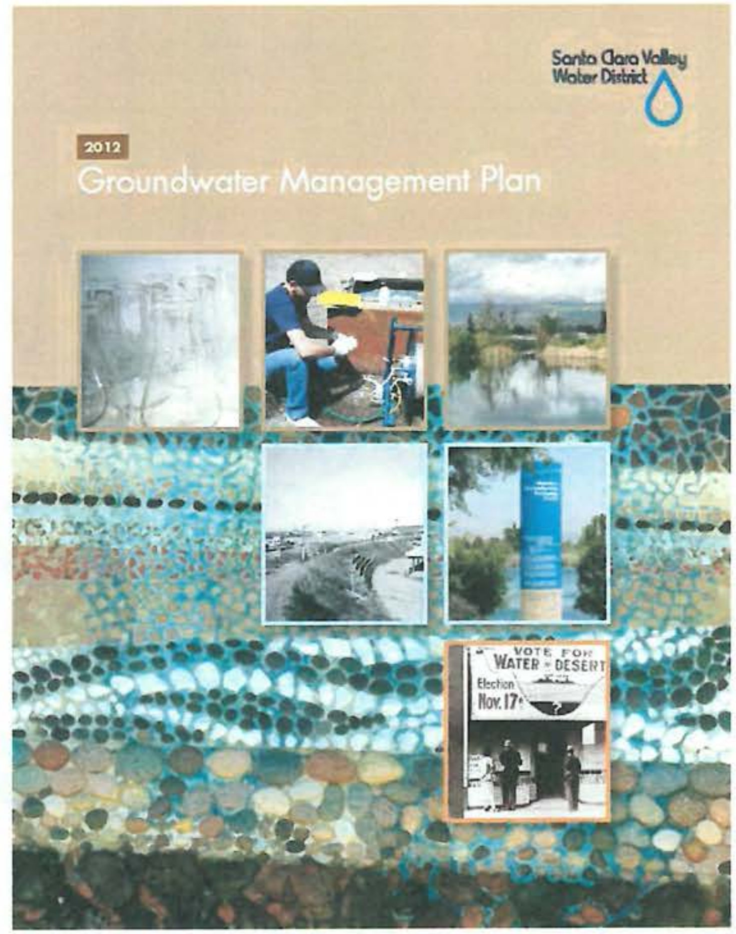
Attachment 3

Attachment 3
Page 5 of 8

Last updated November 13, 2015

Comprehensive groundwater management

- Basins in long-term balance due to
  - Managed recharge of local and imported water
  - Treated water deliveries, conservation, and recycling
- Groundwater protection programs
- Coordination with retailers and others



Santa Clara Valley Water District

Attachment 3
Page 6 of 8

Groundwater Sustainability Agencies (GSAs)

- Any local agency or combination of agencies overlying a basin can decide to be a GSA
- Agencies with statutory authority are the exclusive local agencies to comply with the Act

Agencies with Statutory Authority to Manage Groundwater (Water Code Section 10723)

Alameda County Water District
Desert Water Agency
Fox Canyon GWMA
Honey Lake Valley GWMD
Long Valley GWMD
Mendocino City CSD
Mono County Tri-Valley GWMD
Monterey Peninsula WMD
Ojai GWMA
Orange County Water District
Pajaro Valley WMA
Santa Clara Valley Water District
Sierra Valley Water District
Willow Creek GMA
Zone 7

Recommendations

- Adopt the resolution to decide to be the Groundwater Sustainability Agency for the Santa Clara and Llagas Subbasins

  To confirm the District's role as local groundwater manager, ensure access to SGMA authorities and opportunities that may only be available to GSAs

- Authorize the CEO or her designee to submit the resolution and Notice of Intent to DWR

Santa Clara Valley Water District

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A2. Board Resolution to Adopt the 2016 Groundwater Management Plan and Related Agenda Item (Includes Public Comment Letters Received)

Santa Clara Valley Water District

Santa Clara Valley Water District

The Board adopted and approved recommendations B and C; and referred to the Water Conservation and Demand Management Committee to engage stakeholders in the evaluation of new authorities under the Sustainable Groundwater Management Act.

File No.: 16-0768 **CONFORMED COPY** **Agenda Date:** 11/22/2016
Item No.: 2.7.

BOARD AGENDA MEMORANDUM

SUBJECT:
Public Hearing on the 2016 Groundwater Management Plan for the Santa Clara and Llagas Subbasins.

RECOMMENDATION:

A. Conduct the public hearing to consider comments on the 2016 Groundwater Management Plan for the Santa Clara and Llagas Subbasins (GWMP);
B. Adopt the Resolution ADOPTING THE 2016 GROUNDWATER MANAGEMENT PLAN FOR THE SANTA CLARA AND LLAGAS SUBBASINS;
C. Authorize the Interim Chief Executive Officer or designee to submit the resolution and 2016 GWMP to the California Department of Water Resources; and
D. Receive information on and discuss various options with regard to future stakeholder engagement in evaluating new authorities under the Sustainable Groundwater Management Act.

SUMMARY:
To meet the planning requirements prescribed by the Sustainable Groundwater Management Act (SGMA), as well as the Emergency Groundwater Sustainability Plan (GSP) Regulations adopted by the Department of Water Resources (DWR), District staff has prepared the 2016 Groundwater Management Plan (GWMP) as an alternative to a GSP (Alternative Plan). This approach builds upon the District's previous GWMP, which was adopted by the Board in 2012. SGMA's schedule requires Alternative Plans to be submitted to DWR by January 1, 2017.

This public hearing provides an opportunity for the public to provide input to the Board on the District's draft 2016 GWMP (Alternative Plan) prior to adoption. The resolution setting the time and place of the public hearing was adopted by the Board on November 8, 2016. The draft 2016 GWMP was posted on the District website at <http://www.valleywater.org/groundwatermanagement> on or before November 4, 2016 for public review.

Staff recommends that the public hearing be conducted, and that the draft 2016 GWMP be adopted as the final 2016 GWMP by the Board as is or as modified per Board direction. Following Board adoption, the 2016 GWMP will be submitted to DWR as an Alternative Plan under SGMA by the

ADOPTED
NOV 22 2016

statutory deadline of January 1, 2017. Staff also requests Board direction on various stakeholder engagement options related to the evaluation of new authorities under SGMA following adoption of the 2016 GWMP.

Background

The District was formed in 1929 for the purposes of managing groundwater. Historically, unsustainable pumping in Santa Clara County resulted in chronic overdraft, land subsidence, and salt water intrusion. While similar problems persist in groundwater basins throughout California, Santa Clara County is recognized as an area where these issues have been, and continue to be, successfully addressed through sustainable groundwater management.

The District's purposes and authorities related to groundwater management are derived from the Santa Clara Valley Water District Act. In 2014, SGMA was signed into state law by Governor Brown, establishing new state-wide requirements and authorities for groundwater management.

For each basin subject to SGMA (including the Santa Clara and Llagas Subbasins), Groundwater Sustainability Agencies (GSAs), such as the District, must develop and implement a GSP or a prescribed Alternative. (Recall that on May 24, 2016 the Board adopted a resolution whereby the District became the GSA for the Santa Clara and Llagas Subbasins.) A GSP must be submitted to DWR by January 2022 for basins not in critical overdraft. A GSA may prepare an Alternative Plan that meets SGMA objectives; however, it must be submitted to DWR by January 1, 2017. While a GSP would not be due until 2022 for the Santa Clara and Llagas Subbasins, preparing an Alternative Plan leverages the District's comprehensive 2012 GWMP, provides maximum local control and flexibility in terms of plan content, and affirms the District as a leader in groundwater management.

2016 GWMP (Alternative Plan) Overview

The 2016 GWMP describes the District's comprehensive groundwater management framework, which has maintained sustainable conditions in the Santa Clara and Llagas Subbasins over many decades. It describes basin conditions for the Santa Clara and Llagas Subbasins and provides information on the District's history, groundwater management authority, and water supply system. The 2016 GWMP also documents the District's groundwater sustainability goals, related strategies, groundwater management programs and activities, outcome measures, and recommendations. The GWMP is consistent with the intent of SGMA and addresses state requirements for Alternatives.

The 2016 GWMP includes the following sustainability goals, based on Board Water Supply Objective 2.1.1:

- Groundwater supplies are managed to optimize water supply reliability and minimize land subsidence.
- Groundwater is protected from existing and potential contamination, including salt water

intrusion.

The following strategies are identified to achieve the sustainability goals:

1. Manage groundwater in conjunction with surface water.
2. Implement programs to protect and promote groundwater quality.
3. Maintain and develop adequate groundwater models and monitoring networks.
4. Work with regulatory and land use agencies to protect recharge areas, promote natural recharge, and prevent groundwater contamination.

The 2016 GWMP also includes the following outcome measures to gauge performance in meeting groundwater sustainability goals:

1. Projected end of year groundwater storage is greater than 278,000 AF in the Santa Clara Plain, 5,000 in the Coyote Valley, and 17,000 AF in the Llagas Subbasin.
2. Groundwater levels are above subsidence thresholds in the Santa Clara Plain subsidence index wells.
3. At least 95% of countywide water supply wells meet primary drinking water standards and at least 90% of Coyote Valley and Llagas Subbasin wells meet Basin Plan agricultural objectives.
4. At least 90% of wells in both the shallow and principal aquifer zones have stable or decreasing concentrations of nitrate, chloride, and total dissolved solids (TDS).

The sustainability goals, strategies, and outcome measures are largely unchanged from the 2012 GWMP since they have been effective in maintaining sustainable groundwater conditions and prompting action when needed. Minor changes have been made for clarity and consistency. The 2016 GWMP includes potential actions that may be taken if outcome measure performance indicates improvement is needed.

The 2016 GWMP updates and supersedes all previous District groundwater management plans. Per SGMA, an Alternative Plan must be submitted to DWR by January 1, 2017 and every five years thereafter.

<u>Outreach on the 2016 GWMP</u>

As the primary groundwater pumpers within Santa Clara County, the District's water retailers are key stakeholders in the development and implementation of the 2016 GWMP. Coordination with water retailers has been through meetings of the Water Retailer Committee, Groundwater Subcommittee, and Water Supply Subcommittee. In addition, District staff has met with several of the retailers on an individual basis. The primary interest of the retailers is to be involved as the District considers implementation of any new authorities under SGMA.

Staff has notified water retailers, local land use agencies, and interested stakeholders of the intent to update the District's 2012 GWMP as an Alternative Plan for submittal to DWR by the January 1, 2017 statutory deadline. The District has also notified interested stakeholders about related information on the District website at <http://www.valleywater.org/groundwatermanagement> and informational

public meetings. Public meetings were held at the District's headquarters on July 21, 2016, and in Morgan Hill on August 2, 2016. Input received at those meetings was considered in preparing the draft 2016 GWMP.

Although public hearings are not required for Alternative Plans, this hearing provides an opportunity for the public to provide formal input to the Board prior to adoption of the 2016 GWMP. Notice for this public hearing was published in a newspaper of general circulation.

New SGMA Authorities and Options for Future Stakeholder Engagement

The 2016 GWMP acknowledges potential new authorities under SGMA, including the ability to: manage pumping, control well spacing or operation, and collect different types of fees. These authorities would be available upon adoption of the GWMP. However, authorities related to controlling pumping have certain constraints, and significant issues regarding the potential interference with water rights and liability associated with District regulation of pumping at individual wells must be carefully considered. District staff plans to begin evaluating these new authorities in 2017, in cooperation with water retailers and other interested stakeholders, and consider what conditions might necessitate implementation of these authorities in the future.

Potential stakeholder engagement options for evaluating the new SGMA authorities include a stakeholder committee or a formal Board advisory structure as described below. In either case, it is expected that this committee would serve on a short-term, ad-hoc basis. If the District identifies a need to implement new SGMA authorities in the future, the committee could be reinstated.

1) Stakeholder Committee Option
   To ensure broad stakeholder involvement, potential members for this staff-level committee could include representatives from the Board Advisory Committees (Agricultural Water Advisory Committee, Environmental and Water Resources Committee, and Water Commission), water retailers not represented by the Water Commission, and individual well owners.

2) Board Advisory Committee Option
   This could take the form of a new, ad-hoc committee focused on evaluating SGMA authorities, with composition similar to the stakeholder committee option above. Another option, proposed by several water retailers, is to create a subcommittee of the Water Commission to include representatives from the investor-owned utilities.

Staff is seeking Board input on potential stakeholder engagement options related to the evaluation of new SGMA authorities. Prior to formally establishing a stakeholder committee, staff proposes to come back to the Board to discuss Board principles and guidance on the evaluation of new SGMA authorities. These principles will guide development of the purpose, structure, and objectives for the stakeholder committee. Once these steps are completed, the stakeholder committee will be initiated and related evaluation will begin.

FINANCIAL IMPACT:
There is no financial impact associated with this item. Programs described in the 2016 GWMP are addressed as part of the annual District budget approved by the Board. Water utility projects

supporting the protection and augmentation of water supplies are funded through the Water Utility Enterprise fund, which includes revenue from groundwater production charges, treated water charges, and other sources.

CEQA:
This project is exempt from CEQA under CEQA Guidelines Section 15262, which exempts planning studies.

ATTACHMENTS:
Attachment 1: Resolution
Attachment 2: PowerPoint

UNCLASSIFIED MANAGER:
Garth Hall, 408-630-2750

BOARD OF DIRECTORS
SANTA CLARA VALLEY WATER DISTRICT

RESOLUTION NO. 16– 78

ADOPTING THE 2016 GROUNDWATER MANAGEMENT PLAN FOR THE SANTA CLARA AND LLAGAS SUBBASINS

WHEREAS, the Santa Clara Valley Water District Act (California Water Code Appendix, Chapter 60) provides the District with broad groundwater management authority, including the authority to protect, spread, store, retain, and cause water to percolate in the soil within Santa Clara County; and

WHEREAS, the District's statutory boundary wholly overlies the Santa Clara Subbasin and Llagas Subbasin, identified by the California Department of Water Resources as Basins 2-9.02 and 3-3.01, respectively; and

WHEREAS, on September 16, 2014, the Sustainable Groundwater Management Act (SGMA) was signed into law and adopted into the California Water Code, commencing with Section 10720; and

WHEREAS, the legislative intent of SGMA is to provide for the sustainable management of groundwater basins, to enhance local management of groundwater, to establish minimum standards for sustainable groundwater management, and to provide local groundwater agencies with the authority and the technical and financial assistance necessary to sustainably manage groundwater; and

WHEREAS, Water Code Section 10723(c)1(M) identifies the Santa Clara Valley Water District (District) as one of fifteen (15) agencies created by statute to manage groundwater that shall be deemed the exclusive local agencies within their respective statutory boundaries; and

WHEREAS, on May 24, 2016, the District Board of Directors adopted Resolution 16-51 on the Decision to Become the Groundwater Sustainability Agency for the Santa Clara and Llagas Subbasins; and

WHEREAS, the Santa Clara and Llagas Subbasins are deemed to be medium-priority and high-priority basins by the California Department of Water Resources (DWR) and therefore require the development of a Groundwater Sustainability Plan or prescribed alternative; and

WHEREAS, Water Code Section 10733.6(b)(1) identifies a plan developed pursuant to Part 2.75 (commencing with Section 10750) or other law authorizing groundwater management as an acceptable alternative; and

WHEREAS, the District is committed to its legislatively-created mandate to manage the surface water and groundwater resources within its jurisdiction; and

WHEREAS, the 2016 Groundwater Management Plan describes the District's comprehensive framework to ensure continued, sustainable groundwater conditions in the Santa Clara and Llagas Subbasins; and

WHEREAS, the District prepared and made available a draft of its 2016 Groundwater Management Plan, and noticed a public hearing regarding said plan, which was held on November 22, 2016; and

WHEREAS, the District Board of Directors considered the 2016 Groundwater Management Plan during a public hearing held on November 22, 2016, and has existing statutory authority to adopt the 2016 Groundwater Management Plan under the Santa Clara Valley Water District Act.

NOW, THEREFORE BE IT RESOLVED that the Board of Directors of the Santa Clara Valley Water District does hereby:

1. Adopt the 2016 Groundwater Management Plan for the Santa Clara and Llagas Subbasins; and

2. Authorize the Chief Executive Officer (CEO) or designee to submit the 2016 Groundwater Management Plan as an Alternative to a Groundwater Sustainability Plan to the California Department of Water Resources by January 1, 2017, as required by Section 10733.6 of the Water Code.

PASSED AND ADOPTED by the Board of Directors of Santa Clara Valley Water District by the following vote on November 22, 2016:

AYES: Directors J. Varela, T. Estremera, N. Hsueh, G. Kremen, L. LeZotte, R. Santos, B. Keegan

NOES: Directors None

ABSENT: Directors None

ABSTAIN: Directors None

SANTA CLARA VALLEY WATER DISTRICT

By: [signature]
BARE
Chair/Board of Directors

ATTEST: M CHELE L KING, CMC

[signature]
Clerk/Board of Directors

Public Hearing on the 2016 Groundwater Management Plan for the Santa Clara and Llagas Subbasins

November 22, 2016

Santa Clara Valley Water District

Attachment 2
Page 1 of 12

Recommendations

- Consider public hearing input and provide direction to staff in finalizing the 2016 GWMP
- Adopt the 2016 Groundwater Management Plan
- Authorize the CEO to submit the final GWMP to DWR
- Discuss stakeholder engagement options for evaluating new SGMA authorities in 2017

Santa Clara Valley Water District

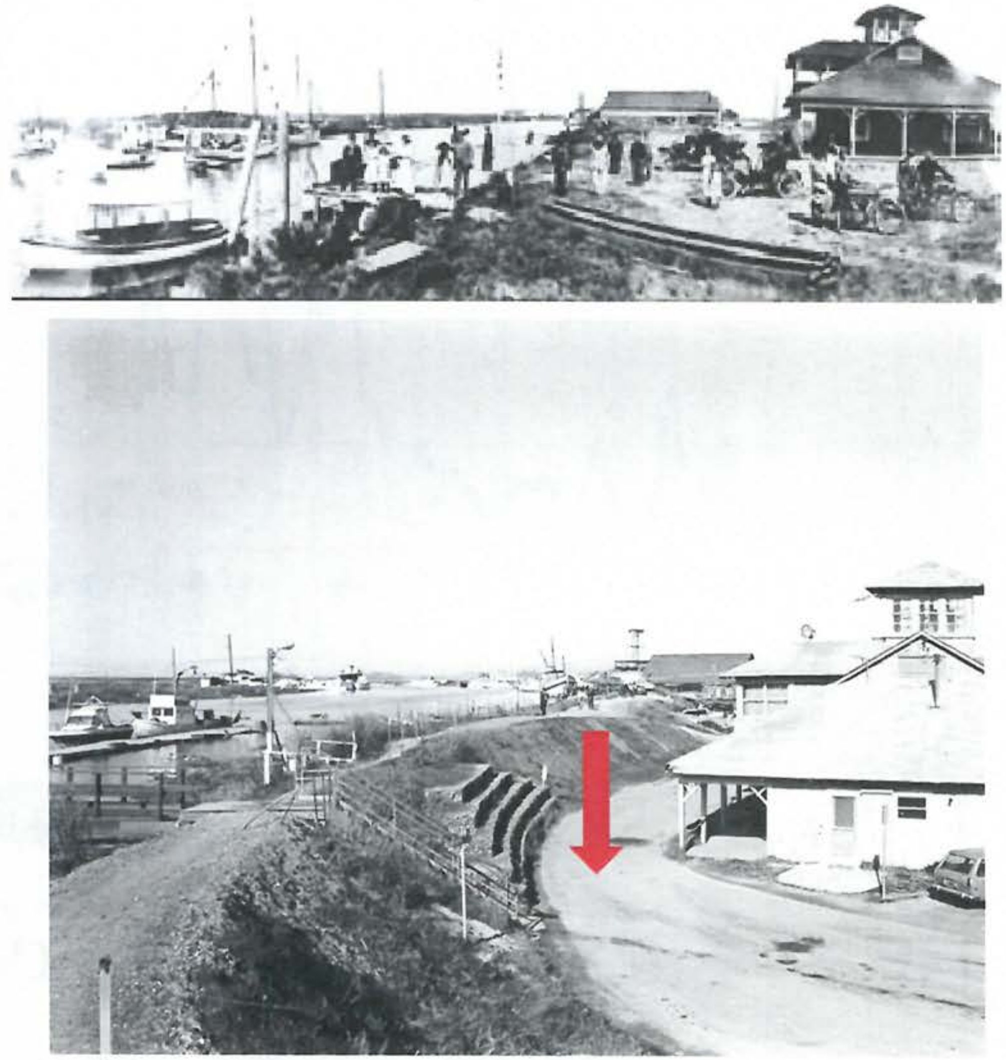
Groundwater Management Plan overview

- Long-term plan required by State law
- Updates District's 2012 plan
- Documents basin conditions, goals, and actions to ensure continued sustainability

District roots in groundwater management

Historical undesirable results:

- Long-term overdraft
  - Lower water levels
  - Reduced reliability
- Land subsidence
- Salt water intrusion



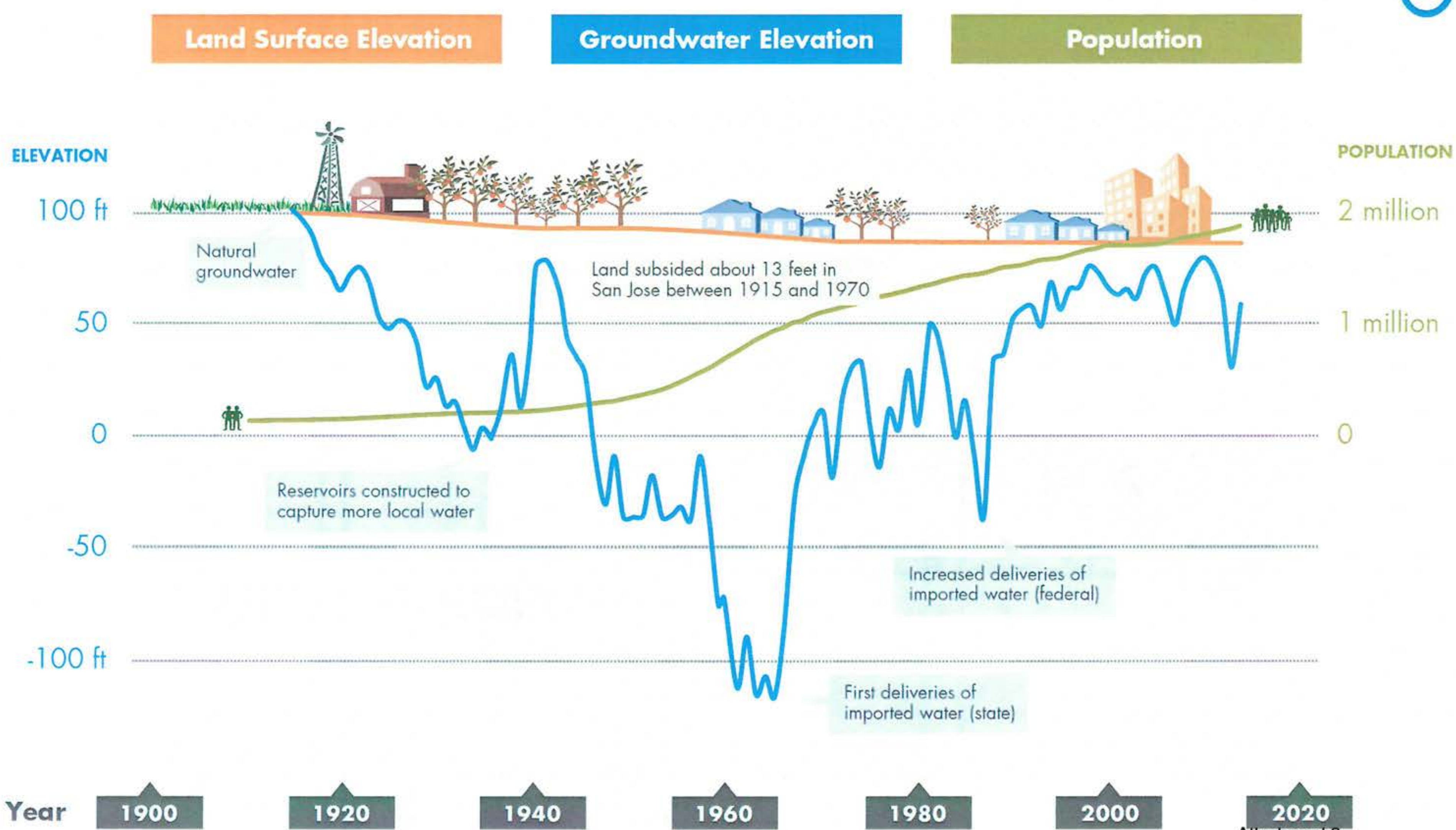
Alviso, before and after more than 6 feet of permanent subsidence

Investing in sustainability

SANTA CLARA COUNTY GROUNDWATER AT-A-GLANCE

a graphic representation not intended as a technical exhibit

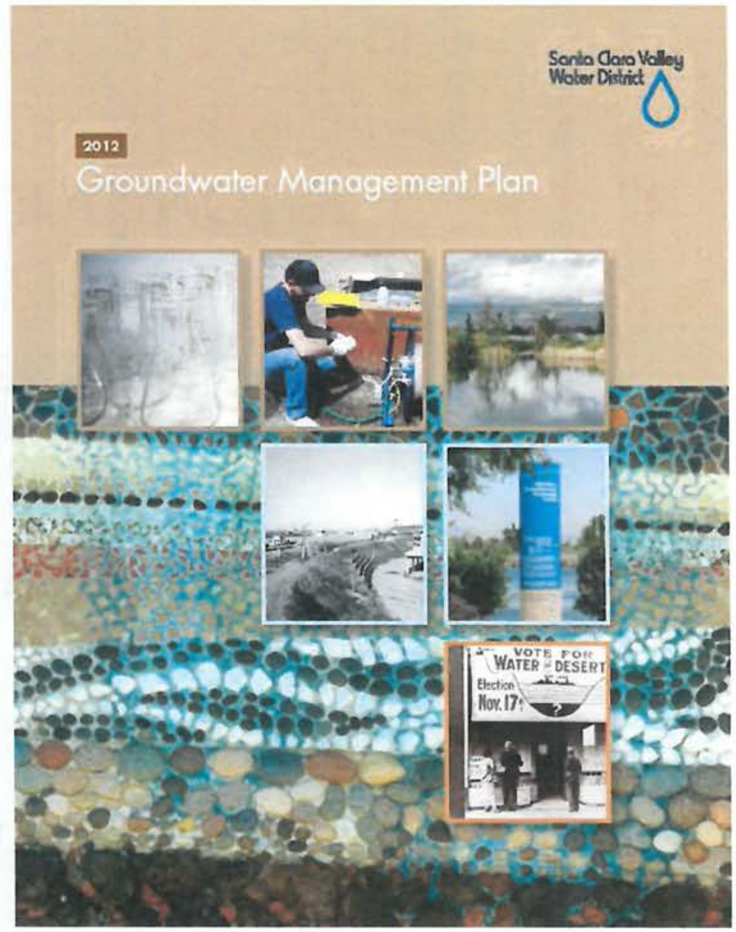
Santa Clara Valley Water District



Attachment 2
Page 5 of 12
Last updated November 13, 2015

Comprehensive groundwater management

- Basins in long-term balance due to
  - Managed recharge of local and imported water
  - In-lieu recharge (treated water deliveries, conservation, and recycling)
- Groundwater protection programs
- Coordination with other agencies and stakeholders



Santa Clara Valley Water District

Attachment 2
Page 6 of 12

2016 Groundwater Management Plan

- Goals, strategies, outcome measures prompt effective action
- Updated technical information
  - Basin setting and conditions
  - Groundwater/surface water interaction
- Information on future groundwater demands
- New SGMA authorities acknowledged

Santa Clara Valley Water District

Authorities available after GWMP adoption

- Regulation of pumping
  - Well spacing/operational requirements, pumping limitations or allocations
  - Existing water rights and potential liability must be carefully considered
- Collection of various fees
  - Fixed or tiered volumetric
  - Must comply with applicable Prop 218 provisions

Santa Clara Valley Water District

Next steps

- Finalize Groundwater Management Plan
  - Incorporate Board direction based on public hearing
  - Include resolution adopting plan
- Submit plan to DWR by January 1, 2017
- Begin evaluating new SGMA authorities in 2017

Santa Clara Valley Water District

Next steps: evaluation of SGMA authorities

1) Board input on options for stakeholder engagement (11/22/16)
2) Board input on principles related to new SGMA authorities (early 2017)
3) Establish stakeholder committee (mid 2017)

Santa Clara Valley Water District

Stakeholder engagement options

- Option 1. Stakeholder committee
  - Potential representatives from Board advisory committees, water retailers, and individual well owners
- Option 2. Board advisory committee
  - New SGMA ad-hoc committee, or
  - New subcommittee of the Water Commission

Santa Clara Valley Water District

Recommendations (recap)

- Consider public hearing input and provide direction to staff in finalizing the 2016 GWMP
- Adopt the 2016 Groundwater Management Plan
- Authorize the CEO to submit the final GWMP to DWR
- Discuss stakeholder engagement options for evaluating new SGMA authorities in 2017

Santa Clara Valley Water District

San Jose Water Company

110 W. Taylor Street
San Jose, CA 95110-2131

November 18, 2016

Santa Clara Valley Water District
Attention: Barbara Keegan, Board Chair
5750 Almaden Expressway
San Jose, CA 95118-3686

Re: Submittal of an Alternative Plan Pursuant to the Sustainable Groundwater Management Act

Dear Ms. Keegan:

After more than a century without comprehensive groundwater regulation in California, the Legislature adopted the Sustainable Groundwater Management Act (SGMA), effective January 1, 2015, and established criteria for the adoption of Groundwater Sustainability Plans (GSPs). As the designated Groundwater Sustainability Agency (GSA) under SGMA, the Santa Clara Valley Water District (District) was empowered to either prepare a GSP in compliance with SGMA[1] or submit an existing Alternative Plan that meets all the requirements of SGMA as the functional equivalent required by Articles 5 and 7 of the Department of Water Resources' (DWR) SGMA Regulations.[2] The Alternative Plan must fully "demonstrate the ability of the Alternative to achieve the objectives of the Act."[3]

San Jose Water Company (SJWC) writes to express our support for sustainable groundwater management and the District moving forward with an Alternative Groundwater Sustainability Plan (Alternative Plan). However, we must also make you aware of our opposition to the District's submitting its 2012 Ground Water Management Plan (GWMP), with amendments,[4] as an Alternative Plan without your having first concurrently embraced the important role of the region's Public Water Systems (Water Systems)[5] in the shared oversight of

---

[1] SGMA and related regulations (jointly referred to as "SGMA Requirements").
[2] Cal. Code Regs. (CCR) Tit. 23, Div. 2, Ch. 1.5, Sub Ch. 2, approved by the California Water Commission on May 18, 2016.
[3] 23 CCR 358.2(d).
[4] According to SGMA, however, "[b]eginning January 1, 2015, a new [GWMP] shall not be adopted and an existing [GWMP] shall not be renewed pursuant to [the Water Code]." (Wat. Code § 10750.1.)
[5] "Public water system" has the same meaning as defined in Section 116275 of the Health and Safety Code (Wat. Code § 10721(s)), which defines "Public water system" as "a system for the provision of water for human consumption through pipes or other constructed conveyances that has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out of the year." Health & Safety Code, § 116275.

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150 Years of Service to the Community

certain provisions that ensure sustainability.[6] We believe this shared responsibility among the Water Systems will enable the District to adopt effective sustainability goals, while also allowing those assuming the greatest burden and interest in a successful outcome the opportunity to develop the strategy for achieving compliance.

Incorporated in 1866, SJWC is a public water system, regulated by the California Public Utilities Commission (CPUC), and has an approved Urban Water Management Plan. It has faithfully discharged its duty to provide a high quality and reliable water supply to more than 1 million people. In furtherance of this duty, it has developed a portfolio of water supplies and efficiently managed the distribution of its water for over 150 years. No water supply is more important to SJWC and the broader community it serves than its groundwater.

Toward that end, SJWC has developed appropriative and prescriptive rights to groundwater that it conjunctively uses in coordination with the District's programs as a private steward of an important public resource. In reliance on these vested proprietary water rights, SJWC has made substantial investments and developed groundwater infrastructure and well capacity sufficient to withdraw approximately 290,000 acre-feet in a single year.

Since July 2016, we have repeatedly corresponded and met with District management and staff[7] in a good faith effort to share our concerns over the adequacy of the GWMP and to suggest a shared governance model among Water Systems that may facilitate the approval of the GWMP by DWR and will improve its efficacy. Specifically, the GWMP fails to acknowledge the proprietary groundwater rights held by the Water Systems within the management area (including SJWC) and the need to directly involve such systems in defining responsive actions consistent with their vested rights.[8] SGMA requires GSAs to consider the interests of beneficial uses and users of groundwater. Those interests specifically include Water Systems.[9] Consequently, the GWMP is not yet a functional equivalent of a GSP as required under applicable law. Even if it were, it holds open the question of future enforcement and will serve to undermine future planning and water supply development.

The Legislature has clearly declared that sustainable groundwater management must respect proprietary rights to groundwater.[10] In fact, it was the expressed intent of the Legislature to "preserve the security of water rights in the state to the greatest extent possible consistent with the sustainable management of groundwater."[11]

SGMA requires management of groundwater within the sustainable yield of the basin.[12] GSPs and functionally equivalent Alternative Plans must have mechanisms to ensure

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[6] Wat. Code § 10735.2(a)(3)-(5)
[7] July 7, 2016 correspondence; 2016 Meetings: September 9, October 7, 12 and 20.
[8] While the Amended Plan acknowledges that pursuant to SGMA, local agencies may not determine water rights in regulating pumping, it does not define the proprietary water rights in the Basin, explain how these rights will be protected, or what the process will be to respect those rights.
[9] Water Code§ 10723.2.
[10] Wat. Code § 113(b)(4); Wat. Code § 10720(b)(4).
[11] Wat. Code § 10720.1(b).
[12] Wat. Code § 10721(v).

sustainability,[13] and the District's GWMP is lacking. If the District adopts a sustainable yield and ultimately corresponding methods to limit groundwater production within the plan area, then the burden of implementing strategies will be borne almost entirely by the sovereign Water Systems. These Water Systems have already dedicated this groundwater to a public use and have accrued proprietary groundwater rights.[14] Either a future amendment to the GWMP will address the subject of plan enforcement and its consistency with these vested rights, or a court is likely to do so. We believe the Water Systems, pursuant to a memorandum of agreement with the District, can collaboratively develop water budgets and curtailment strategies that will provide certainty and enhance efficient use.

Under the District's GWMP, Water Systems within the planning area are forced to guess as to how and when the District will move to adopt provisions to ensure sustainability that may dramatically impact their ability to plan and provide water service to their customers in the future. This uncertainty adds to the lack of regional water supply reliability, and will result in increased costs and waste, and is otherwise contrary to the public interest.

Despite requests from SJWC and other Water Systems, the District has not stated what actions it will take to ensure that sustainability objectives are achieved, or provided assurance that its actions will be consistent with vested water rights and, thus far it has been unwilling to acknowledge that measures that curtail the quantity of available groundwater are best left to the entities with the primary responsibility for distribution of groundwater. **We ask that the District agree now to a shared governance among Water Systems on the question of how any allocation of groundwater or curtailing use be borne and implemented.[15] Only this way can the District ensure that its achievement of a sustainability goal will be consistent with the vested rights cumulatively held by these entities and not resisted by them at a later date.**

Specifically, in reviewing the District's GWMP and comparing it to the standards of a GSP,[16] we wish to point out the following deficiencies:

- **Failure to Describe Basin Conditions in Required Detail.** The District's GWMP fails to describe the current status and conditions of the Santa Clara Sub-basin (Basin) with the level of detail mandated by the SGMA Requirements. The GWMP's multiple maps and other graphics depicting the Basin also fall short of providing the required information and details. These basic deficiencies suggest that the GWMP lacks sufficient baseline data to successfully, and sustainably, manage the Basin pursuant to the SGMA Requirements.

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[13] 23 CCR 354.24 requires that "[t]he [GSP] shall include a description of the sustainability goal, including information from the basin setting used to establish the sustainability goal, [and] a discussion of the measures that will be implemented to ensure that the basin will be operated within its sustainable yield."

[14] These rights are statutorily protected against loss or diminishment by third-party conduct. Civ. Code § 1007; *see Wright v. Goleta Water District* (1985) 174 Cal.App.3d 71.

[15] A proposal for shared public water system governance by a Memorandum of Agreement is attached hereto.

[16] 23 CCR 358.2(d).

- **No Express Identification of Basin's Beneficial Users.** The District's GWMP fails to specifically identify individual beneficial users of the Basin's groundwater resources, which is required under the SGMA Requirements. Failure to identify specific Basin users also indicates that the District's GWMP lacks important, and required, data about the status of the Basin's groundwater supplies. It also may result in incomplete and an unfair distribution of enforcement burdens and one that fails to honor and protect vested rights.

- **Failure to Include Basin's Projected Water Budget.** To be functionally equivalent, a GWMP must include a basin's water budget under historical, current and future conditions. Although the District's GWMP includes a graphic illustrating the Basin's historical average annual water budget, this graphic does not include the information nor level of detail required under the SGMA Requirements. The GWMP does not include any discussion regarding the quantification of the Basin's current or future groundwater budget nor provide whether there are limitations on expanded or even existing production.

- **GWMP Fails to Identify All Required Undesirable Results or Establish Sufficient Minimum Thresholds.** Although the District's GWMP briefly identifies multiple undesirable results present in the Basin, discussion of these conditions is insufficient to meet the SGMA Requirements. In addition to this deficiency, the District's GWMP also fails to quantify current groundwater conditions and establish adequate minimum thresholds to determine when conditions in the Basin necessitate action. The four "Outcome Measures" in the Amended Plan do not meet the extensive requirements for minimum thresholds and measurable objectives for each applicable sustainability indicator. Failure to satisfy this cornerstone requirement of SGMA means that the District's GWMP is not functionally equivalent.

- **No Identification of GWMP's Data Gaps.** To be deemed functionally equivalent, a GWMP is required to identify both uncertainty and existing gaps in the data that informs the hydrogeological model within the SGMA Requirements. The District's GWMP fails to expressly identify any data gaps within either its monitoring network or the data provided about the Basin, which is a key requirement under the SGMA Requirements.

Although the District's recent draft amendment to its GWMP attempts to address these deficiencies in its 2012 GWMP, it does not fully satisfy SGMA's requirements. Moreover, SGMA prohibits local agencies in medium- and high-priority basins from adopting a new GWMP or

amending an existing GWMP as of January 1, 2015.[17] A fair reading of the plain meaning of Water Code § 10750.1(a) suggests that an amended GWMP is not eligible for consideration as an Alternative Plan.

As stated above and in all of our prior communications, SJWC supports sustainable groundwater management. We agree the District is best situated to develop sustainability goals. However, allocating groundwater among interests and requiring curtailment to achieve sustainability goals is a matter that is best left to the vested right holders in the planning area.

Based upon our review of the District's GWMP—and as described above—we do not believe the GWMP qualifies as an Alternative Plan. It does not provide sufficient clarity as to how the GWMP will result in sustainable management or how water budget/allocations will be addressed and any curtailment enforced.

Should the District move forward with submitting its GWMP as an Alternative Plan without first acknowledging the need for shared governance on the key areas of water budget/allocations and curtailment, we are prepared to submit a comprehensive comment letter to DWR detailing the GWMP's lack of functional equivalency as summarized above and stating our opposition to its adoption at this time.

SJWC urges the District Board of Directors to defer adoption of an amended GWMP until its deficiencies are corrected and the shared governance issues identified in this letter are appropriately addressed and incorporated into the plan. SJWC looks forward to the cooperation of the District to resolve these concerns and stands ready to help develop workable solutions that balance the needs and rights of Water Systems with achieving the important basin sustainability goals required by SGMA.

Respectfully,

Andrew R. Gere, P.E.
President and Chief Operating Officer

Cc: Gary Kremen, District Board Member
John Varela, District Board Member
Linda LeZotte, District Board Member
Nai Hsueh, District Board Member
Richard Santos, District Board Member
Tony Estremera, District Board Member
Norma Camacho, District CEO
Jim Fiedler, District COO

[17] Wat. Code § 10750.1(a).

MEMORANDUM OF AGREEMENT ("MOA") BETWEEN PUBLIC WATER RETAILERS AND THE SANTA CLARA VALLEY WATER DISTRICT ("DISTRICT") REGARDING THE IMPLEMENTATION OF THE 2012 GROUNDWATER MANAGEMENT PLAN, ALTERNATIVE PLAN OR SUSTAINABLE GROUNDWATER MANAGEMENT PLAN

WHEREAS, Public Water Retailers are "public water systems" that produce groundwater within Santa Clara County and are required to prepare and file Urban Water Management Plans ("UWMP") with the California Department of Water Resources;

WHEREAS, the District is a multi-purpose water management district with the powers set forth in its authorizing act and is the agency designated as the Groundwater Sustainability Agency ("GSA") for purposes of preparing a Groundwater Sustainability Plan ("GSP") and implementing the California Sustainable Groundwater Management Act ("SGMA") within Santa Clara County for the Santa Clara and Llagas subbasins ("subbasins");

WHEREAS, since the 1930's, the District's water supply strategy has been to maximize conjunctive use, the coordinated management of surface and groundwater; [1]

WHEREAS, Tables ES-1 and ES-2 of the District 2012 Groundwater Management Plan ("2012 GMP") acknowledge the shared responsibility and cooperation with others that is required to effectively manage groundwater within these areas;[3]

WHEREAS, Section 2.2 of the 2012 GMP states that "[n]early half of the water used in Santa Clara County is pumped from groundwater, one of the county's greatest natural resources," and that UWMP of the public water systems demonstrate that these water retailers show a continued reliance upon groundwater to meet the needs of their customers;[4]

WHEREAS, Section 1.3 of the 2012 GMP reflects the District's intention to be a regional partner in groundwater management;

WHEREAS, Section 4.1.4 of the 2012 GMP acknowledges that the subbasins in Santa Clara County are not adjudicated and the District does not legally control the operation of groundwater wells or the amount of groundwater that wells can produce;

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[1] 2012 Groundwater Management Plan, ES-1.

[3] 2012 Groundwater Management Plan, Tables ES-1 and ES-2.

[4] 2012 Groundwater Management Plan, Section 4.1.5 and 1.3.

WHEREAS, a key component of the water supply reliability performance under the 2012 GMP and approved UWMP depends on the cooperation between the District and its water retailers, which is "critical during times of shortage;"[5]

WHEREAS, the District resolved to continue and enhance further groundwater management partnerships;[6]

WHEREAS, the District has announced its intention to submit its 2012 GMP as an Alternative Plan in lieu of a GSP in compliance with SGMA, and to qualify Alternative Plans must fulfill the objectives of a GSP;

WHEREAS, groundwater management pursuant to SGMA must be consistent with Section 2 of Article X of the California Constitution and nothing within SGMA may modify the priorities of common law water rights[7] and the statutory protection of those rights;[8]

WHEREAS, SGMA requires GSAs to consider the interests of beneficial uses and users of groundwater within the plan area and those "interests" specifically include public water systems[9]; and

WHEREAS, SGMA provides that a GSA may implement a plan pursuant to legal agreement in a manner consistent with Recommendation 7-5 of the District 2012 GMP, pursuant to an MOA.

NOW THEREFORE, the Parties hereby agree that a Water Rights Committee with the foregoing powers and authority shall be formed to guide implementation of the 2012 GMP as an Alternative Plan or a GSP as either the 2012 GMP or GSP may be amended and approved by DWR from time to time.

1. Water Rights Committee.

A "Water Rights Committee" ("WRC") is hereby established by written agreement among the signatory Water Retailers and the District. This WRC will wield the responsibility for coordinating and facilitating implementation of the 2012 GMP or a GSP (collectively hereinafter the "SGMA Plan") with regard to the following subjects in the manner described:

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[5] 2012 Groundwater Management Plan, Section 4-1-4 at p. 4-5.
[6] 2012 Groundwater Management Plan, Recommendation: 7-3(5) at pp. 7.4-7.5 .
[7] Water Code § 10720.5.
[8] See. e.g. Civil Code § 1007, Water Code §§ 106, 106.5; Public Utilities Code § 851.
[9] Water Code § 10723.2; Section 354.10 of the GSP Regulations ("Notice and Communication").

(a) Curtailment/Apportionment. In the event that either the District determines that curtailment of groundwater production or an apportionment of groundwater (allocation) within the subbasins is required to avoid causing undesirable results under a SGMA Plan, then:

(i) The District will notify the WRC in writing of the need for a curtailment/apportionment plan to avoid causing undesirable results;
(ii) At any time on its own initiative, the WRC may, or within twelve (12) months of its receipt of written notice from the District, the WRC will prepare a curtailment/apportionment plan;
(iii) The methodology to curtail existing extractions or apportionment of groundwater shall be developed by the WRC in its complete discretion;
(iv) Any WRC curtailment/apportionment plan shall be presented to the District for its consideration and inclusion in any SGMA Plan;
(v) The District will accept and include the WRC curtailment/apportionment plan developed by the WRC in the SGMA Plan unless, after a good faith evaluation, the District finds that the WRC allocation/curtailment plan, including proposed mitigation measures, do not provide reasonable assurance that "undesirable results" will be avoided;
(vi) In the event the District disagrees with the WRC curtailment/apportionment plan pursuant to (v) above, the District may seek to set aside the adoption of the WRC plan pursuant to Code of Civil Procedure (CCP) § 1085;
(vii) The Parties will exercise good faith and reasonable efforts to coordinate the implementation of any interim measures required to protect against "undesirable results" during the WRC's development of a curtailment/apportionment plan;
(viii) If after twelve (12) months from the date of the District's notice required in paragraph (a)(i) above, the WRC fails to complete a curtailment/apportionment plan and present the plan to the District for approval, then the District may prepare its own curtailment/apportionment plan. If the WRC disagrees with the District's plan, then the WRC may seek to set aside the adoption of the District's curtailment/apportionment plan pursuant to CCP § 1085.

(b) Transfer and Carry-Over. If water allocations are created pursuant to section 1(a) of this MOA, the WRC may, in its complete discretion, develop a transfer and carry-over plan further implementing a SGMA Plan that will establish rules and conditions for the transfer, conservation, and carry-over of any unused allocation between and among the public water systems.

(i) The WRC will notify the District in writing of its intent to prepare a transfer and carry-over plan, and thereafter the WRC will exercise good faith and reasonable diligence in preparing a transfer and carry-over plan;

(ii) The methodology for transfer and carry-over of any allocations shall be developed by the WRC in its complete discretion, subject to the express requirement that the transfer and carry-over plan will not cause or threaten to cause unmitigated "undesirable results;"

(iii) The District will accept and include a WRC transfer and carry-over plan in the SGMA Plan unless, after a good faith evaluation, the District finds that the WRC transfer and carry-over plan, including proposed mitigation measures, do not provide reasonable assurances against causing or threatening to cause "undesirable results;"

(iv) In the event the District disagrees with the WRC transfer and carry-over plan pursuant to (b)(iii) above, the District may seek to set aside the adoption of the WRC plan pursuant to CCP § 1085.

(c) Storage and recovery of imported water. The District will submit any plan that will limit or condition the ability of public water systems to import foreign (out of County, out of watershed) supplemental water into the subbasins for storage and recovery by the public water systems to the WRC for its review and consideration.

(i) The District will provide written notice to the WRC of its intent to prepare a storage and recovery plan;

(ii) The storage and recovery plan shall not impair the operating ability of a public water system or cause or threaten to cause "undesirable results;"

(iii) The District will seek the WRC's approval of any storage and recovery plan prior to inclusion in any SGMA Plan;

(iv) If the WRC disagrees with the District's plan, then the WRC may seek to set aside the District's adoption of its storage and recovery plan pursuant to CCP § 1085;

(v) Alternatively, if the District has not issued a notice of its intention to prepare a storage plan pursuant to (c)(i) above, the WRC may independently develop a plan for the storage and recovery of imported water to enhance local water supply reliability. The WRC will present any WRC plan for the storage and recovery of water to the District for inclusion in a SGMA Plan. The District will accept and include the WRC storage and recovery plan unless, after a good faith

evaluation, it finds that storage and recovery of imported water will cause or threatens to cause "undesirable results" or will directly interfere with existing District operations or replenishment programs;

(vi) The WRC may challenge the District's decision not to include the storage and recovery plan in a SGMA Plan pursuant to CCP § 1085.

(d) Well Permits / Well Location. The District will not restrict or seek to regulate a public water system's ability to produce groundwater for public consumption by an existing, replacement or new well unless there is a direct and immediate threat to the health, safety and welfare that is separate, discrete and distinguishable from groundwater production in the subbasin as a whole. If the District determines in its discretion that such an immediate and direct threat to the health, safety, and welfare of the community exists, it may act by an urgency ordinance to reasonably condition the new wells but only for so long as the actual emergency condition exists. The District will exercise good faith and reasonable efforts to coordinate with the WRC to develop a consensus on reasonable conditions to protect public health and safety and to avoid undesirable results. The WRC may challenge the District's plan to limit or condition well permits and well location pursuant to CCP §1085.

2. Water Rights Committee Representation.

The WRC shall be comprised of representatives appointed by each of the Public Water Retailers and drawn from its membership.

Voting: Except as specifically otherwise provided herein, the vote of a majority of the members of the WRC present at any regular, adjourned or special meeting shall be sufficient to pass or act upon any matter properly before the WRC, and each member of the WRC shall have one vote.

Groundwater Weighted Voting: Upon the call and request of any WRC member, present and able to vote, and a quorum being present, a weighted voting formula shall apply for any vote to be taken by the WRC, with each member having one or more votes based upon the groundwater pumping set forth in Exhibit A. In order for the WRC to take action under the provisions of this section two requirements must be fulfilled:

a) A majority of the votes weighted by groundwater pumping must be cast in favor of the action, provided that not less than two member agencies vote in favor of the action; and

b) A majority of the members vote in favor of the action. In the event a simple majority vote on a question has previously been taken, and a weighted vote is subsequently called; a roll call vote will be taken that tabulates both the weighted vote and the members voting. The vote weighted by a majority of

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those voting representing a majority of the groundwater pumping shall supersede the previous simple majority vote, provided that the vote of a single member may not defeat an action.

Groundwater Pumping: For the purposes of determining the weighted vote of water retailers or the At-Large representative, the weighted vote by groundwater use shall be based on the historical groundwater pumping range set forth in Exhibit A, which may be updated annually by the WRC to reflect the actual increase in a WRC member's groundwater use.

3. WRC Formation and Organization.

The Public Water Retailers agree to form the WRC by January 15, 2017.

(a) Quorum. A majority of the voting power of the WRC shall constitute a quorum for the transaction of affairs and the approval or disapproval of plans and actions set forth in paragraph 1(a)-1(d) above. Any action or recommendation of the WRC shall be transmitted to the District in writing.

(b) Organizational Meeting. At its first meeting each year, the WRC shall elect a chairperson and vice-chairperson from its membership. It shall also elect a secretary and treasurer as may be appropriate, and the positions need not be from its membership.

(c) The WRC shall conduct its business in accordance with Robert's Rules of Order and the California Open Meetings Law, and shall establish further governing rules and procedures as may be necessary and convenient for the WRC.

4. Binding on All Plans.

The commitments set forth in this MOA shall apply to any SGMA Plan.

5. Effective Date.

The MOA is effective upon execution of the Parties.

EXHIBIT A

Method: All Retailers Represented with Weighting except that use <400 AFY[1].
One At-Large representative to be appointed from among parties that use <400 AFY.

Retailer	# of Votes	Range in AF		# of Votes
San Jose Water Company	10	55,800	62,000	10
Santa Clara	3	49,600	55,800	9
Great Oaks[2]	3	43,400	49,600	8
Gilroy	2	37,200	43,400	7
Morgan Hill	2	31,000	37,200	6
Cal Water	1	24,800	31,000	5
Sunnyvale	1	18,600	24,000	4
San Jose	1	12,400	18,600	3
Mountain View	1	6,200	12,400	2
At-Large	1	0	6,200	1
Total	25			

Range = Total GW/#votes
Total GW = 155,000
votes = 25

GROUNDWATER USE IN AF

	2010 UWMP	% Total
San Jose Water Company	60,500	39.0%
Santa Clara	14,800	9.5%
Great Oaks	12,300	7.9%
Gilroy	8,500	5.5%
Morgan Hill	7,800	5.0%
Cal Water	5,200	3.4%
Sunnyvale	1,200	0.8%
San Jose	400	0.3%
Mountain View	400	0.3%
Stanford	200	0.1%
Independent Santa Clara	9,800	6.3%
Independent Coyote Valley	5,000	3.2%
Independent Llagas	28,900	18.6%
Total	155,000	100.0%

[1] SCVWD 2010 UWMP
[2] Great Oaks rounded up to 12,400

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Michele King

From:	D. Muirhead [doug.muirhead@stanfordalumni.org]
Sent:	Tuesday, November 22, 2016 11:47 AM
To:	Clerk of the Board
Cc:	Vanessa De La Piedra
Subject:	Comments on 2016 Groundwater Management Plan SCVWD Board meeting November 22 2016 # 2.7. Public Hearing

Comments on 2016 Groundwater Management Plan of November 2016
for the Santa Clara and Llagas Subbasins
Board meeting November 22 2016
2.7. Public Hearing on 2016 Groundwater Management Plan

My compliments to the Groundwater Monitoring and Analysis Unit for a much improved 2016 plan compared to the 2012 plan. It helps greatly to have the material on each subbasin gathered into its own chapter. This makes it easier to understand where we can have common management approaches across subbasins, and where more targeted concerns must be addressed: land subsidence and salt water intrusion in North County, groundwater quality and groundwater recharge in South County.

The classification of the subbasins as medium and high priority appears in the Executive Summary but is not defined until the Introduction.
The definition does not appear in the Glossary. I had incorrectly assumed that higher priority meant a problem such as overdraft.

> DWR has identified the Santa Clara Subbasin as a medium-priority subbasin and the Llagas Subbasin as a high-priority subbasin based on criteria that include overlying population, projected growth, number of wells, irrigation acreage, groundwater reliance, and groundwater impacts. Neither subbasin has been identified as being in overdraft. [pg 1-1]

Since the authorities available under SGMA would be available upon Board adoption of the 2016 GWMP [pg ES-5] (or when DWR accepts it?), it is unclear to me what the timeline will be or what sort of checkpoints will exist in defining what to do with new abilities such as regulating groundwater pumping and assessing different types of groundwater charges. In Regulation of Groundwater Pumping [pg 1-12], you may be able to "impose spacing requirements on new well construction to minimize interference". This is challenged by "Property owners and municipalities have rights to the reasonable, beneficial use of groundwater". Sustainable Management Criteria Strategy 4 says that you will "work with regulatory and land use agencies to protect recharge areas, promote natural recharge, and prevent groundwater contamination" [pg 5-5].
Since my number one priority is finding ways to increase groundwater recharge in South County, I am very interested in how you determine how and when to use your new abilities.

It would help me if you would explain what "managing your water rights" ("The District currently has 20 appropriative water rights licenses and 1 filed water right permit with the SWRCB" [pg 4-1]) means. I understand that water rights are complicated and contentious, but what does it mean in terms of day-to-day operations of the District?

In Basin Management, you mention an Injection Well Pilot. "The injection well is not currently in operation" [pg 6-3]. Was it ever used? Under what conditions would it be used in the future?

In Basin Management, under Water Banking, you say that we "withdraw" our water from the Semitropic Groundwater Bank by being "delivered imported water from the Delta that would have otherwise been delivered to the banking partner or to other SWP contractors" [pg 6-4]. You should mention that the assumption that we could get deliveries from the Delta failed us in recent years, and the District thus considered the Reverse Flow project.

I want to encourage more measurements and fewer estimates. In Basin Management, under Groundwater Production Measurement, you say

"meters are only installed at those sites determined to be economically feasible or as required to facilitate the complete and accurate collection of groundwater production revenue". "Metered wells extract the vast majority of the groundwater used. Where meters are not used, crop factors are used to determine agricultural water use and average values are used to estimate domestic use". [pg 6-6]

Under Groundwater Monitoring and Modeling Data Management, are we limited in our collection and analysis by

"Because the District's access agreements with some private well owners do not provide for public release, some information has to be summarized or obscured prior to release" [pg 7-22].

Having read the Watershed Emergency Report Team report on the Loma Fire, heard after-action reports by CalFire at HLUET and SCC OAC, and toured the area with OSA, I think post-fire issues should be addressed in Watershed Management [pg 6-20]. For example, should obstructions be removed from creeks (decrease flood risk) or remain to slow debris flows which degrade water quality downstream to local users and our reservoirs?

I will withhold judgment on whether projected future shortfalls are only of concern during multi-year droughts.

I know you all try very hard to engage with the public. And I know you mean it when you say that the public are important partners [pg 6-17]. But neither Groundwater Awareness Week nor the public input meetings for the Groundwater Management Plan received any notice in Morgan Hill. Unfortunately, I do not have any suggestions.

Thank you for your consideration,
Doug Muirhead, Morgan Hill

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GREAT OAKS WATER COMPANY

P. O. Box 23490
San Jose, California 95153
(408) 227-9540

November 22, 2016

Hand-Delivered

Board of Directors
Santa Clara Valley Water District
5750 Almaden Expressway
San José, CA 95118

RE: Public Hearing to Consider Comments on the 2016 Groundwater Management Plan for the Santa Clara and Llagas Subbasins

Sustainable Groundwater Management Act
Submission of Alternative Plan

Dear Chair Keegan, Vice Chair Varela, and Board Members

On November 8, 2016, the Board of Directors (Board) of the Santa Clara Valley Water District (District) adopted a Resolution authorizing publication of a notice calling for a public hearing to consider comments on the 2016 Groundwater Management Plan for the Santa Clara and Llagas Subbasins Prior to its Adoption. The November 8, 2016 Resolution provides, in pertinent part:

> WHEREAS, the District "intends to adopt the 2016 Groundwater Management Plan as an Alternative Plan to be submitted to the California Department of Water Resources for compliance with the Sustainable Groundwater Management Act;

Great Oaks Water Company (Great Oaks) will be directly affected by the proposed Alternative Plan and submits this letter to the Board in response to the Board's solicitation of comments on the proposed Alternative Plan. Great Oaks respectfully requests that this letter, in its entirety, be entered into the record at the November 22, 2016 public hearing.

I apologize for not being able to present these matters in person at the November 22, 2016 hearing, but my travel plans for the Thanksgiving holiday were made prior to the District's very recent scheduling of the hearing on this matter, and I will be in transit to be with family at the time of the hearing. For future reference, please be mindful that when scheduling hearings

on important matters such as this, full public participation is best served when the hearings are not held just before major holidays when families often travel to be together

Submission of Alternative Plan

The Alternative Plan is ostensibly being submitted under California Water Code (Water Code) Section 10733.6(b)(1).[1] As such, it is essential that the Alternative Plan satisfies the objectives of SGMA[2] and each of its elements is functionally equivalent to a Groundwater Sustainability Plan (GSP) submitted required by Sections 5 and 7 of Title 23, Division 2, Chapter 1.5, Subchapter 2 of the California Code of Regulations.[3]

Background

One of the critical legislative declarations providing rationale for the Sustainable Groundwater Management Act (SGMA) is that, "[w]hen properly managed, groundwater resources will help protect communities, farms, and the environment against prolonged dry periods and climate change, preserving water supplies for existing and potential beneficial use."[4] Likewise, an essential element of the legislative intent behind SGMA requires the Legislature, as well as local and regional agencies acting under the authority of SGMA, "[t]o respect overlying and other proprietary rights to groundwater."[5]

All of Great Oaks' water supplies are sourced from the Santa Clara Subbasin. Aware of the significance of SGMA, at Great Oaks' request, a meeting was held at the District on November 4, 2014 to generally discuss the ramifications of SGMA and, specifically, the portion of SGMA that provides that nothing in the new law determines or alters groundwater rights.[6]

District staff attended the meeting together with several "water retailers" and the discussion was both constructive and robust. The parties agreed that any action taken or otherwise contemplated by the District that would have the potential to affect groundwater rights would be the subject of further discussion and, ideally, agreement. None of the attendees expressed the desire to engage in a lengthy and expensive legal action to adjudicate respective groundwater rights, but all recognized that a basin adjudication could be triggered by District action taken without proper regard for historic groundwater production and rights.

In June of 2016, District staff advised the retailers of the District's intention to update its 2012 Groundwater Management Plan (GMP) and submit the updated GMP[7] as an Alternative Plan under SGMA. This raised immediate concerns among the retailers for several reasons.

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[1] Alternative Plan, page ES-1.
[2] Water Code §10733.6(a).
[3] Groundwater Sustainability Plan Regulations, hereinafter referred to as GSP Regulations.
[4] Uncodified findings, Sustainable Groundwater Management Act, SB 1168 (Pavley), AB 1739 (Dickinson), and SB 1319 (Pavley).
[5] *Id.*
[6] Water Code §10720.5(b).
[7] The District refers to the updated 2012 GMP as the 2016 Groundwater Management Plan.

First, the submission deadline for an Alternative Plan is January 1, 2017.[8] At the time of the announcement of the intention to submit an updated GMP as its SGMA Alternative Plan, District staff had barely begun the process and had mere months to review and update the 2012 GMP. Nothing has changed this time consideration, which has now manifested itself in a process by which the District has released its proposed Alternative Plan and scheduled a hearing on it to receive comments, all in the span of less than three weeks. As noted above, the scheduling of the public hearing on this matter just prior to the Thanksgiving holiday, after many, including the undersigned, had already made travel plans, will not result in the type of open and collaborative public process an important matter like this requires and deserves.

Next, the District and the water retailers are well aware that the 2012 GMP does not contain any formalized decision-making process to resolve or even address issues pertaining to groundwater rights in the event of District action that actually or potentially affects groundwater rights. At present, without any formally-established methodology, any such issues may or may not be addressed with retailers.

The same is true with respect to water retailer operations affected or potentially affected by District actions pertaining to the groundwater Subbasins. The District has a significant and very meaningful deficit in experience in operating a retail water business (*i.e.*, a classic water utility), as compared to the water retailers. District groundwater actions should not be taken without a full understanding of the effects of those actions on the retailers and their customers – the residents and businesses of Santa Clara County. The 2012 GMP and its update do not provide for or establish a procedure to address these issues.

And, just as importantly, the largest water-producing retailers have no established authority to provide meaningful input, response, or advice on such District actions, except through retailer committees or subcommittees that have no Board advisory role. San Jose Water Company (SJWC), California Water Service Company (Cal Water), and Great Oaks are three of the largest water producers in the County, with SJWC being the largest by far. Yet, SJWC, Cal Water, and Great Oaks have no status on any Board advisory committee. At best, these three water retailers, serving a population larger than all other Santa Clara County water retailers combined, are relegated to voicing their concerns through District staff or through non-advisory committees and subcommittees, and hoping those concerns are heard by the Board.

<u>Recent Actions</u>

This last point is one of the reasons that on July 20, 2016, SJWC sent a letter to District's Interim Chief Executive Officer Norma Camacho requesting a role for SJWC as "a constructive partner in the decision-making pertaining to [the District]'s implementation and compliance with SGMA, and the control of groundwater extractions." SJWC invited Cal Water, Great Oaks, and the City of Santa Clara to participate in a meeting on the subject with Ms. Camacho and members of the District staff on September 14, 2016.

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[8] Water Code §10733.6(c).

During the course of that meeting, every effort by the retailers to forge a formalized procedure for decision-making under SGMA was met with resistance. District representatives at the meeting pointed to past voluntary cooperation and coordination among the District and the retailers as examples of how decisions *might* be made under SGMA. Decisions *might* also be made in an entirely different, without even soliciting cooperation or engaging in coordination. Simply put, the District's process for making SGMA-related decisions is neither defined nor established.

In Ms. Camacho's October 7, 2016 letter to SJWC following the meeting, the same examples were provided and, again, no written assurances of an established decision-making procedure were offered or provided. In short, the efforts of the retailers to establish a formalized process for SGMA decision making were rejected in favor of hoped for voluntary collaboration on groundwater management issues.

In the end, the proposed Alternative Plan fails to include any formalized procedure to address the legitimate SGMA-related concerns of water retailers, especially the non-public agency retailers. The staff presentation accompanying the proposed Alternative Plan only speaks to "stakeholder engagement options" that include potential representation on a new ad hoc Board advisory committee or through a new subcommittee of the Water Commission (which would still not include SJWC, Cal Water, and Great Oaks).

The Alternative Plan Does Not Satisfy SGMA Objectives

In a letter dated November 18, 2016, SJWC provided a comprehensive analysis of the proposed Alternative Plan (SJWC Letter).[9] The SJWC details the many deficiencies of the proposed Alternative Plan, and Great Oaks joins with SJWC in opposition to the proposed Alternative Plan for the reasons stated in the SJWC Letter.

In addition to the deficiencies noted by SJWC, the proposed Alternative Plan also fails to include the required "Notice and Communication" section, with the necessary elements of (1) an explanation of the District's decision-making process; and (2) identification of opportunities for public engagement and a discussion of how public input and response will be used.[10]

There is, of course, no "Notice and Communication" section in the Alternative Plan at all. Section 1.5 of the Alternative Plan is entitled "Groundwater Management Partners and Stakeholders," but this section does not include an explanation of how the District will make decisions pertaining to groundwater management that affect water retailers, especially the largest water-producing retailers.

At best, the Alternative Plan references "the shared goal of protecting groundwater resources" and notes: "Ongoing strong partnership and collaboration will be essential to meet

[9] The SJWC letter is attached hereto and incorporated herein by reference.
[10] California Code of Regulations, Title 23, Division 2, Chapter 1.5, Subchapter 2. Groundwater Sustainability Plans, §§354.10(d)(1) and (2).

future water supply challenges."[11] This hoped-for collaboration between the District and water retailers appears to be the District's "decision-making process." But this is contradicted by the description of the role of water retailers in groundwater management, which makes no reference to *any* decision-making responsibility on the part of water retailers.[12] There is no explanation of how input and response from water retailers will be used, if at all, when decisions are made that affect or potentially affect groundwater rights and water retailer operations.

Despite the claim that the information and elements of the Alternative Plan are "functionally equivalent to the elements of a [Groundwater Sustainability Plan] required by Articles 5 and 7 of the [GSP Regulations]"[13], that is clearly not the case. The Alternative Plan is deficient under both SGMA and the GSP Regulations because, among other reasons, it does not satisfy the objectives of SGMA and it does not contain the required explanation of the decision-making process, including how public input and response (including that from water retailers) will be used.

As detailed above, Great Oaks has been involved in specific efforts to establish a formal procedure for making decisions that affect or potentially affect water-producing retailers. Since this is a requirement of an Alternative Plan, now is the time to include that procedure in the Alternative Plan.

Other Issues

SGMA generally requires all groundwater basins in the State to be managed under a Groundwater Sustainability Plan (GSP), with high and medium-high priority basins to be managed under a GSP by January 31, 2020, and all other groundwater basins to be managed under a GSP by January 31, 2022. The Santa Clara Subbasin has been determined by the State to be of medium priority, while the Llagas Subbasin has been determined to be of high priority.[14] Neither the Santa Clara Subbasin nor the Llagas Subbasin is of low or very-low priority.

The proposed Alternative Plan is framed as a Groundwater Management Plan, not as a GSP under SGMA. The conclusory statements in the proposed Alternative Plan to the effect that it meets GSP objectives are unsupported, as detailed in the SJWC Letter and above. Because the Department of Water Resources will be unable to issue a determination that the Alternative Plan satisfies SGMA objectives for GSPs, the Alternative Plan will violate Water Code §10750.1(a).

Since, through its own decisions, the District has left itself very little time to cure the deficiencies in its proposed Alternative Plan, an alternative course of action would be to take the time necessary to properly prepare a GSP for submittal to the Department of Water Resources so that it will be in effect by January 31, 2020.

[11] Alternative Plan, pages 1-14 and 1-15.
[12] *Id.*, at page 1-16. Only within the District's groundwater management role is there a reference to coordination with water retailers and others.
[13] *Id.*, at page ES-1.
[14] See District Board Resolution 16-51, adopted May 24, 2016.

Great Oaks reserves the right to object to the Alternative Plan and/or submit materials in opposition to the Alternative Plan to appropriate State authorities. Should there be any questions, please contact the undersigned directly.

Great Oaks Water Company

Timothy S Guster

Timothy S Guster
Vice President and General Counsel
Legal and Regulatory Affairs

Attachment: SJWC Letter

San Jose Water Company

110 W. Taylor Street
San Jose, CA 95110-2131

November 18, 2016

Santa Clara Vallry Water District
Attention: Barbara Keegan, Board Chair
5750 Almaden Expressway
San Jose, CA 95118-3686

Re: Submittal of an Alternative Plan Pursuant to the Sustainable Groundwater Management Act

Dear Ms. Keegan:

After more than a century without comprehensive groundwater regulation in California, the Legislature adopted the Sustainable Groundwater Management Act (SGMA), effective January 1, 2015, and established criteria for the adoption of Groundwater Sustainability Plans (GSPs). As the designated Groundwater Sustainability Agency (GSA) under SGMA, the Santa Clara Valley Water District (District) was empowered to either prepare a GSP in compliance with SGMA[1] or submit an existing Alternative Plan that meets all the requirements of SGMA as the functional equivalent required by Articles 5 and 7 of the Department of Water Resources' (DWR) SGMA Regulations.[2] The Alternative Plan must fully "demonstrate the ability of the Alternative to achieve the objectives of the Act."[3]

San Jose Water Company (SJWC) writes to express our support for sustainable groundwater management and the District moving forward with an Alternative Groundwater Sustainability Plan (Alternative Plan). However, we must also make you aware of our opposition to the District's submitting its 2012 Ground Water Management Plan (GWMP), with amendments,[4] as an Alternative Plan without your having first concurrently embraced the important role of the region's Public Water Systems (Water Systems)[5] in the shared oversight of

[1] SGMA and related regulations (jointly referred to as "SGMA Requirements").
[2] Cal. Code Regs. (CCR) Tit. 23, Div. 2, Ch. 1.5, Sub Ch. 2, approved by the California Water Commission on May 18, 2016.
[3] 23 CCR 358.2(d).
[4] According to SGMA, however, "[b]eginning January 1, 2015, a new [GWMP] shall not be adopted and an existing [GWMP] shall not be renewed pursuant to [the Water Code]." (Wat. Code § 10750.1.)
[5] "Public water system" has the same meaning as defined in Section 116275 of the Health and Safety Code (Wat. Code § 10721(s)), which defines "Public water system" as "a system for the provision of water for human consumption through pipes or other constructed conveyances that has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out of the year." Health & Safety Code, § 116275.

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certain provisions that ensure sustainability.[6] We believe this shared responsibility among the Water Systems will enable the District to adopt effective sustainability goals, while also allowing those assuming the greatest burden and interest in a successful outcome the opportunity to develop the strategy for achieving compliance.

Incorporated in 1866, SJWC is a public water system, regulated by the California Public Utilities Commission (CPUC), and has an approved Urban Water Management Plan. It has faithfully discharged its duty to provide a high quality and reliable water supply to more than 1 million people. In furtherance of this duty, it has developed a portfolio of water supplies and efficiently managed the distribution of its water for over 150 years. No water supply is more important to SJWC and the broader community it serves than its groundwater.

Toward that end, SJWC has developed appropriative and prescriptive rights to groundwater that it conjunctively uses in coordination with the District's programs as a private steward of an important public resource. In reliance on these vested proprietary water rights, SJWC has made substantial investments and developed groundwater infrastructure and well capacity sufficient to withdraw approximately 290,000 acre-feet in a single year.

Since July 2016, we have repeatedly corresponded and met with District management and staff[7] in a good faith effort to share our concerns over the adequacy of the GWMP and to suggest a shared governance model among Water Systems that may facilitate the approval of the GWMP by DWR and will improve its efficacy. Specifically, the GWMP fails to acknowledge the proprietary groundwater rights held by the Water Systems within the management area (including SJWC) and the need to directly involve such systems in defining responsive actions consistent with their vested rights.[8] SGMA requires GSAs to consider the interests of beneficial uses and users of groundwater. Those interests specifically include Water Systems.[9] Consequently, the GWMP is not yet a functional equivalent of a GSP as required under applicable law. Even if it were, it holds open the question of future enforcement and will serve to undermine future planning and water supply development.

The Legislature has clearly declared that sustainable groundwater management must respect proprietary rights to groundwater.[10] In fact, it was the expressed intent of the Legislature to "preserve the security of water rights in the state to the greatest extent possible consistent with the sustainable management of groundwater."[11]

SGMA requires management of groundwater within the sustainable yield of the basin.[12] GSPs and functionally equivalent Alternative Plans must have mechanisms to ensure

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[6] Wat. Code § 10735.2(a)(3)-(5)

[7] July 7, 2016 correspondence; 2016 Meetings: September 9, October 7, 12 and 20.

[8] While the Amended Plan acknowledges that pursuant to SGMA, local agencies may not determine water rights in regulating pumping, it does not define the proprietary water rights in the Basin, explain how these rights will be protected, or what the process will be to respect those rights.

[9] Water Code§ 10723.2.

[10] Wat. Code § 113(b)(4); Wat. Code § 10720(b)(4).

[11] Wat. Code § 10720.1(b).

[12] Wat. Code § 10721(v).

sustainability,[13] and the District's GWMP is lacking. If the District adopts a sustainable yield and ultimately corresponding methods to limit groundwater production within the plan area, then the burden of implementing strategies will be borne almost entirely by the sovereign Water Systems. These Water Systems have already dedicated this groundwater to a public use and have accrued proprietary groundwater rights.[14] Either a future amendment to the GWMP will address the subject of plan enforcement and its consistency with these vested rights, or a court is likely to do so. We believe the Water Systems, pursuant to a memorandum of agreement with the District, can collaboratively develop water budgets and curtailment strategies that will provide certainty and enhance efficient use.

Under the District's GWMP, Water Systems within the planning area are forced to guess as to how and when the District will move to adopt provisions to ensure sustainability that may dramatically impact their ability to plan and provide water service to their customers in the future. This uncertainty adds to the lack of regional water supply reliability, and will result in increased costs and waste, and is otherwise contrary to the public interest.

Despite requests from SJWC and other Water Systems, the District has not stated what actions it will take to ensure that sustainability objectives are achieved, or provided assurance that its actions will be consistent with vested water rights and, thus far it has been unwilling to acknowledge that measures that curtail the quantity of available groundwater are best left to the entities with the primary responsibility for distribution of groundwater. **We ask that the District agree now to a shared governance among Water Systems on the question of how any allocation of groundwater or curtailing use be borne and implemented.[15] Only this way can the District ensure that its achievement of a sustainability goal will be consistent with the vested rights cumulatively held by these entities and not resisted by them at a later date.**

Specifically, in reviewing the District's GWMP and comparing it to the standards of a GSP,[16] we wish to point out the following deficiencies:

- **Failure to Describe Basin Conditions in Required Detail.** The District's GWMP fails to describe the current status and conditions of the Santa Clara Sub-basin (Basin) with the level of detail mandated by the SGMA Requirements. The GWMP's multiple maps and other graphics depicting the Basin also fall short of providing the required information and details. These basic deficiencies suggest that the GWMP lacks sufficient baseline data to successfully, and sustainably, manage the Basin pursuant to the SGMA Requirements.

[13] 23 CCR 354.24 requires that "[t]he [GSP] shall include a description of the sustainability goal, including information from the basin setting used to establish the sustainability goal, [and] a discussion of the measures that will be implemented to ensure that the basin will be operated within its sustainable yield."

[14] These rights are statutorily protected against loss or diminishment by third-party conduct. Civ. Code § 1007; *see Wright v. Goleta Water District* (1985) 174 Cal.App.3d 71.

[15] A proposal for shared public water system governance by a Memorandum of Agreement is attached hereto.

[16] 23 CCR 358.2(d).

- **No Express Identification of Basin's Beneficial Users.** The District's GWMP fails to specifically identify individual beneficial users of the Basin's groundwater resources, which is required under the SGMA Requirements. Failure to identify specific Basin users also indicates that the District's GWMP lacks important, and required, data about the status of the Basin's groundwater supplies. It also may result in incomplete and an unfair distribution of enforcement burdens and one that fails to honor and protect vested rights.

- **Failure to Include Basin's Projected Water Budget.** To be functionally equivalent, a GWMP must include a basin's water budget under historical, current and future conditions. Although the District's GWMP includes a graphic illustrating the Basin's historical average annual water budget, this graphic does not include the information nor level of detail required under the SGMA Requirements. The GWMP does not include any discussion regarding the quantification of the Basin's current or future groundwater budget nor provide whether there are limitations on expanded or even existing production.

- **GWMP Fails to Identify All Required Undesirable Results or Establish Sufficient Minimum Thresholds.** Although the District's GWMP briefly identifies multiple undesirable results present in the Basin, discussion of these conditions is insufficient to meet the SGMA Requirements. In addition to this deficiency, the District's GWMP also fails to quantify current groundwater conditions and establish adequate minimum thresholds to determine when conditions in the Basin necessitate action. The four "Outcome Measures" in the Amended Plan do not meet the extensive requirements for minimum thresholds and measurable objectives for each applicable sustainability indicator. Failure to satisfy this cornerstone requirement of SGMA means that the District's GWMP is not functionally equivalent.

- **No Identification of GWMP's Data Gaps.** To be deemed functionally equivalent, a GWMP is required to identify both uncertainty and existing gaps in the data that informs the hydrogeological model within the SGMA Requirements. The District's GWMP fails to expressly identify any data gaps within either its monitoring network or the data provided about the Basin, which is a key requirement under the SGMA Requirements.

Although the District's recent draft amendment to its GWMP attempts to address these deficiencies in its 2012 GWMP, it does not fully satisfy SGMA's requirements. Moreover, SGMA prohibits local agencies in medium- and high-priority basins from adopting a new GWMP or

amending an existing GWMP as of January 1, 2015.[17] A fair reading of the plain meaning of Water Code § 10750.1(a) suggests that an amended GWMP is not eligible for consideration as an Alternative Plan.

As stated above and in all of our prior communications, SJWC supports sustainable groundwater management. We agree the District is best situated to develop sustainability goals. However, allocating groundwater among interests and requiring curtailment to achieve sustainability goals is a matter that is best left to the vested right holders in the planning area.

Based upon our review of the District's GWMP—and as described above—we do not believe the GWMP qualifies as an Alternative Plan. It does not provide sufficient clarity as to how the GWMP will result in sustainable management or how water budget/allocations will be addressed and any curtailment enforced.

Should the District move forward with submitting its GWMP as an Alternative Plan without first acknowledging the need for shared governance on the key areas of water budget/allocations and curtailment, we are prepared to submit a comprehensive comment letter to DWR detailing the GWMP's lack of functional equivalency as summarized above and stating our opposition to its adoption at this time.

SJWC urges the District Board of Directors to defer adoption of an amended GWMP until its deficiencies are corrected and the shared governance issues identified in this letter are appropriately addressed and incorporated into the plan. SJWC looks forward to the cooperation of the District to resolve these concerns and stands ready to help develop workable solutions that balance the needs and rights of Water Systems with achieving the important basin sustainability goals required by SGMA.

Respectfully,

Andrew R. Gere, P.E.
President and Chief Operating Officer

Cc: Gary Kremen, District Board Member
John Varela, District Board Member
Linda LeZotte, District Board Member
Nai Hsueh, District Board Member
Richard Santos, District Board Member
Tony Estremera, District Board Member
Norma Camacho, District CEO
Jim Fiedler, District COO

[17] Wat. Code § 10750.1(a)

**MEMORANDUM OF AGREEMENT ("MOA")
BETWEEN PUBLIC WATER RETAILERS AND THE SANTA CLARA VALLEY WATER DISTRICT ("DISTRICT") REGARDING THE IMPLEMENTATION OF THE 2012**

Public Water Retailers are "public water systems" that produce groundwater within Santa Clara County and are required to prepare and file Urban Water Management Plans ("UWMP") with the California Department of Water Resources;

WHEREAS, the District is a multi-purpose water management district with the powers set forth in its authorizing act and is the agency designated as the Groundwater Sustainability Agency ("GSA") for purposes of preparing a Groundwater Sustainability Plan ("GSP") and implementing the California Sustainable Groundwater Management Act ("SGMA") within Santa Clara County for the Santa Clara and Llagas subbasins ("subbasins");

WHEREAS, since the 1930's, the District's water supply strategy has been to maximize conjunctive use, the coordinated management of surface and groundwater; [1]

WHEREAS, Tables ES-1 and ES-2 of the District 2012 Groundwater Management Plan ("2012 GMP") acknowledge the shared responsibility and cooperation with others that is required to effectively manage groundwater within these areas;[3]

WHEREAS, Section 2.2 of the 2012 GMP states that "[n]early half of the water used in Santa Clara County is pumped from groundwater, one of the county's greatest natural resources," and that UWMP of the public water systems demonstrate that these water retailers show a continued reliance upon groundwater to meet the needs of their customers;[4]

WHEREAS, Section 1.3 of the 2012 GMP reflects the District's intention to be a regional partner in groundwater management;

WHEREAS, Section 4.1.4 of the 2012 GMP acknowledges that the subbasins in Santa Clara County are not adjudicated and the District does not legally control the operation of groundwater wells or the amount of groundwater that wells can produce;

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[1] 2012 Groundwater Management Plan, ES-1.

[3] 2012 Groundwater Management Plan, Tables ES-1 and ES-2.

[4] 2012 Groundwater Management Plan, Section 4.1.5 and 1.3.

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WHEREAS, a key component of the water supply reliability performance under the 2012 GMP and approved UWMP depends on the cooperation between the District and its water retailers, which is "critical during times of shortage;"[5]

WHEREAS, the District resolved to continue and enhance further groundwater management partnerships;[6]

WHEREAS, the District has announced its intention to submit its 2012 GMP as an Alternative Plan in lieu of a GSP in compliance with SGMA, and to qualify Alternative Plans must fulfill the objectives of a GSP;

WHEREAS, groundwater management pursuant to SGMA must be consistent with Section 2 of Article X of the California Constitution and nothing within SGMA may modify the priorities of common law water rights[7] and the statutory protection of those rights;[8]

WHEREAS, SGMA requires GSAs to consider the interests of beneficial uses and users of groundwater within the plan area and those "interests" specifically include public water systems[9]; and

WHEREAS, SGMA provides that a GSA may implement a plan pursuant to legal agreement in a manner consistent with Recommendation 7-5 of the District 2012 GMP, pursuant to an MOA.

NOW THEREFORE, the Parties hereby agree that a Water Rights Committee with the foregoing powers and authority shall be formed to guide implementation of the 2012 GMP as an Alternative Plan or a GSP as either the 2012 GMP or GSP may be amended and approved by DWR from time to time.

1. Water Rights Committee.

A "Water Rights Committee" ("WRC") is hereby established by written agreement among the signatory Water Retailers and the District. This WRC will wield the responsibility for coordinating and facilitating implementation of the 2012 GMP or a GSP (collectively hereinafter the "SGMA Plan") with regard to the following subjects in the manner described:

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[5] 2012 Groundwater Management Plan, Section 4-1-4 at p. 4-5.
[6] 2012 Groundwater Management Plan, Recommendation: 7-3(5) at pp. 7.4-7.5
[7] Water Code § 10720.5.
[8] See. e.g. Civil Code § 1007, Water Code §§ 106, 106.5; Public Utilities Code § 851.
[9] Water Code § 10723.2; Section 354.10 of the GSP Regulations ("Notice and Communication").

(a) Curtailment/Apportionment. In the event that either the District determines that curtailment of groundwater production or an apportionment of groundwater (allocation) within the subbasins is required to avoid causing undesirable results under a SGMA Plan, then:

(i) The District will notify the WRC in writing of the need for a curtailment/apportionment plan to avoid causing undesirable results;
(ii) At any time on its own initiative, the WRC may, or within twelve (12) months of its receipt of written notice from the District, the WRC will prepare a curtailment/apportionment plan;
(iii) The methodology to curtail existing extractions or apportionment of groundwater shall be developed by the WRC in its complete discretion;
(iv) Any WRC curtailment/apportionment plan shall be presented to the District for its consideration and inclusion in any SGMA Plan;
(v) The District will accept and include the WRC curtailment/apportionment plan developed by the WRC in the SGMA Plan unless, after a good faith evaluation, the District finds that the WRC allocation/curtailment plan, including proposed mitigation measures, do not provide reasonable assurance that "undesirable results" will be avoided;
(vi) In the event the District disagrees with the WRC curtailment/apportionment plan pursuant to (v) above, the District may seek to set aside the adoption of the WRC plan pursuant to Code of Civil Procedure (CCP) § 1085;
(vii) The Parties will exercise good faith and reasonable efforts to coordinate the implementation of any interim measures required to protect against "undesirable results" during the WRC's development of a curtailment/apportionment plan;
(viii) If after twelve (12) months from the date of the District's notice required in paragraph (a)(i) above, the WRC fails to complete a curtailment/apportionment plan and present the plan to the District for approval, then the District may prepare its own curtailment/apportionment plan. If the WRC disagrees with the District's plan, then the WRC may seek to set aside the adoption of the District's curtailment/apportionment plan pursuant to CCP § 1085.

(b) Transfer and Carry-Over. If water allocations are created pursuant to section 1(a) of this MOA, the WRC may, in its complete discretion, develop a transfer and carry-over plan further implementing a SGMA Plan that will establish rules and conditions for the transfer, conservation, and carry-over of any unused allocation between and among the public water systems.

(i) The WRC will notify the District in writing of its intent to prepare a transfer and carry-over plan, and thereafter the WRC will exercise good faith and reasonable diligence in preparing a transfer and carry-over plan;

(ii) The methodology for transfer and carry-over of any allocations shall be developed by the WRC in its complete discretion, subject to the express requirement that the transfer and carry-over plan will not cause or threaten to cause unmitigated "undesirable results;"

(iii) The District will accept and include a WRC transfer and carry-over plan in the SGMA Plan unless, after a good faith evaluation, the District finds that the WRC transfer and carry-over plan, including proposed mitigation measures, do not provide reasonable assurances against causing or threatening to cause "undesirable results;"

(iv) In the event the District disagrees with the WRC transfer and carry-over plan pursuant to (b)(iii) above, the District may seek to set aside the adoption of the WRC plan pursuant to CCP § 1085.

(c) Storage and recovery of imported water. The District will submit any plan that will limit or condition the ability of public water systems to import foreign (out of County, out of watershed) supplemental water into the subbasins for storage and recovery by the public water systems to the WRC for its review and consideration.

(i) The District will provide written notice to the WRC of its intent to prepare a storage and recovery plan;

(ii) The storage and recovery plan shall not impair the operating ability of a public water system or cause or threaten to cause "undesirable results;"

(iii) The District will seek the WRC's approval of any storage and recovery plan prior to inclusion in any SGMA Plan;

(iv) If the WRC disagrees with the District's plan, then the WRC may seek to set aside the District's adoption of its storage and recovery plan pursuant to CCP § 1085;

(v) Alternatively, if the District has not issued a notice of its intention to prepare a storage plan pursuant to (c)(i) above, the WRC may independently develop a plan for the storage and recovery of imported water to enhance local water supply reliability. The WRC will present any WRC plan for the storage and recovery of water to the District for inclusion in a SGMA Plan. The District will accept and include the WRC storage and recovery plan unless, after a good faith

evaluation, it finds that storage and recovery of imported water will cause or threatens to cause "undesirable results" or will directly interfere with existing District operations or replenishment programs;

(vi) The WRC may challenge the District's decision not to include the storage and recovery plan in a SGMA Plan pursuant to CCP § 1085.

(d) Well Permits / Well Location. The District will not restrict or seek to regulate a public water system's ability to produce groundwater for public consumption by an existing, replacement or new well unless there is a direct and immediate threat to the health, safety and welfare that is separate, discrete and distinguishable from groundwater production in the subbasin as a whole. If the District determines in its discretion that such an immediate and direct threat to the health, safety, and welfare of the community exists, it may act by an urgency ordinance to reasonably condition the new wells but only for so long as the actual emergency condition exists. The District will exercise good faith and reasonable efforts to coordinate with the WRC to develop a consensus on reasonable conditions to protect public health and safety and to avoid undesirable results. The WRC may challenge the District's plan to limit or condition well permits and well location pursuant to CCP §1085.

2. Water Rights Committee Representation.

The WRC shall be comprised of representatives appointed by each of the Public Water Retailers and drawn from its membership.

Voting: Except as specifically otherwise provided herein, the vote of a majority of the members of the WRC present at any regular, adjourned or special meeting shall be sufficient to pass or act upon any matter properly before the WRC, and each member of the WRC shall have one vote.

Groundwater Weighted Voting: Upon the call and request of any WRC member, present and able to vote, and a quorum being present, a weighted voting formula shall apply for any vote to be taken by the WRC, with each member having one or more votes based upon the groundwater pumping set forth in Exhibit A. In order for the WRC to take action under the provisions of this section two requirements must be fulfilled:

a) A majority of the votes weighted by groundwater pumping must be cast in favor of the action, provided that not less than two member agencies vote in favor of the action; and

b) A majority of the members vote in favor of the action. In the event a simple majority vote on a question has previously been taken, and a weighted vote is subsequently called; a roll call vote will be taken that tabulates both the weighted vote and the members voting. The vote weighted by a majority of

those voting representing a majority of the groundwater pumping shall supersede the previous simple majority vote, provided that the vote of a single member may not defeat an action.

Groundwater Pumping: For the purposes of determining the weighted vote of water retailers or the At-Large representative, the weighted vote by groundwater use shall be based on the historical groundwater pumping range set forth in Exhibit A, which may be updated annually by the WRC to reflect the actual increase in a WRC member's groundwater use.

The Public Water Retailers agree to form the WRC by January 15, 2017.

(a) Quorum. A majority of the voting power of the WRC shall constitute a quorum for the transaction of affairs and the approval or disapproval of plans and actions set forth in paragraph 1(a)-1(d) above. Any action or recommendation of the WRC shall be transmitted to the District in writing.

(b) Organizational Meeting. At its first meeting each year, the WRC shall elect a chairperson and vice-chairperson from its membership. It shall also elect a secretary and treasurer as may be appropriate, and the positions need not be from its membership.

(c) The WRC shall conduct its business in accordance with Robert's Rules of Order and the California Open Meetings Law, and shall establish further governing rules and procedures as may be necessary and convenient for the WRC.

4. Binding on All Plans.

The commitments set forth in this MOA shall apply to any SGMA Plan.

5. Effective Date.

The MOA is effective upon execution of the Parties.

EXHIBIT A

Method: All Retailers Represented with Weighting except that use <400 AFY[1].
One At-Large representative to be appointed from among parties that use <400 AFY.

Retailer	# of Votes	Range in AF		# of Votes
San Jose Water Company	10	55,800	62,000	10
Santa Clara	3	49,600	55,800	9
Great Oaks[2]	3	43,400	49,600	8
Gilroy	2	37,200	43,400	7
Morgan Hill	2	31,000	37,200	6
Cal Water	1	24,800	31,000	5
Sunnyvale	1	18,600	24,000	4
San Jose	1	12,400	18,600	3
Mountain View	1	6,200	12,400	2
		0	6,200	1
Total				

: = Total GW/#votes
Total GW = 155,000
otes = 25

GROUNDWATER USE IN AF		
	2010 UWMP	% Total
San Jose Water Company	60,500	39.0%
Santa Clara	14,800	9.5%
Great Oaks	12,300	7.9%
Gilroy	8,500	5.5%
Morgan Hill	7,800	5.0%
Cal Water	5,200	3.4%
Sunnyvale	1,200	0.8%
San Jose	400	0.3%
Mountain View	400	0.3%
Stanford	200	0.1%
Independent Santa Clara	9,800	6.3%
Independent Coyote Valley	5,000	3.2%
Independent Llagas	28,900	18.6%
Total	155,000	100.0%

[1] SCVWD 2010 UWMP
[2] Great Oaks rounded up to 12,400

017729\0003\15111891.

Michele King

From:	Katja Irvin [katja.irvin@sbcglobal.net]
Sent:	Tuesday, November 22, 2016 12:13 PM
To:	Clerk of the Board; Barbara Keegan; Vanessa De La Piedra
Cc:	'Banerjee Kakoli'; 'Mike Ferreira'
Subject:	November 22, 2016 SCVWD Board Agenda Item 2.7
Attachments:	Sierra Club Comments on 2016 GWMP 112216.pdf

Dear Melissa, Barbara and Vanessa,

The Sierra Club requests the subject agenda item be continued to December 5, 2016 to allow stakeholders more time to make complete comments. Unless a two-week delay will result in an important missed deadline for the District, we feel this is a reasonable request that should be granted for stakeholders and the public to adequately review the Groundwater Management Plan (GWMP). Ten days is not adequate time to review this 238-page plan.

On top of that, my Mom was admitted to the hospital last Friday so I did not have time to complete my comments this weekend. This morning the doctor called to tell me she has stomach cancer so I'm on my way back to the hospital now. I'm sorry I won't be able to attend the meeting tonight.

I'm attaching some initial comments from the Sierra Club. I hope to have time to submit some complete comments if the item is continued.

Thank you for your consideration.

Katja Irvin
Water Committee Chair
Sierra Club Loma Prieta Chapter

Sierra Club Loma Prieta Chapter
Celebrating 80 years of protecting the planet

SIERRA CLUB
3921 East Bayshore Road, Suite 204, Palo Alto, CA 94303
loma.prieta.chapter@sierraclub.org | TEL - (650) 390-8411 | FAX - (650) 390-8497

November 22, 2016

RE: Sierra Club Comments on SCVWD 2016 Groundwater Management Plan

The GWMP does not adequately include the District's mission to provide water for the environment. With "One Water" the District is moving in the direction of integrated planning, and hopefully away from isolated plans that ignore important aspects of watershed-based planning. Specifically:

1. The Basin Sustainability Goals and Strategies (pg. ES-5) need to be updated to include the relationship between ground water and stream flows. **For example,** "Groundwater supplies are managed to optimize water supply reliability, minimize land subsidence, **and provide adequate flow to support aquatic species in local streams**."
2. To support the environment, strategy #4 (pg. ES-5) should acknowledge the updated goal. For example, **"Work with regulatory and land use agencies to protect recharge areas,** promote natural recharge, prevent groundwater contamination, **and protect surface stream flows from over-pumping."**
3. Outcome Measures (pg. ES-6) should include monitoring and stream flow goals that are adequate to restore populations of species listed under the Endangered Species Act. Section 2.2.3 on pg. 2-14 says "Surface water flow data can be used to evaluate which reaches of streams are gaining or losing streams with regard to groundwater. However, the District has not performed a comprehensive evaluation of the data for this purpose." The District should plan to do this comprehensive evaluation for a near-term GWMP update.
4. Under Next Steps (pg. ES-6) a new action should be added to develop modeling and monitoring methods to protect and restore aquatic species.

The 2016 GWMP should be updated in the near term (sooner than five years) to include environmental goals, environmental analysis, and environmental indicators.

Specific Comments

5. **This sentence, "Any significant policy or investment decisions would be developed and** evaluated in consultation with local stakeholders, as the District does in current planning **and budgeting processes." on page ES-6 should be updated. "Stakeholders" should be replaced with "water retailers" since these are the only stakeholders involved in significant** policy or investment decisions.
6. The maps in Chapter 2 could be improved the utility of the GWMP.

- Provide more contrast between the Confined Area and the Recharge Area in Figure 2.1 (pg. 2-1). Also, use a darker, stronger line style to show the Approximate Extent of Confined Area. This also applies to and subsequent similar figures.
- If possible, remove legend items for confined areas and recharge areas from other figures because they are not visible (for example, Figure 2.15 on pg. 2-16). The legend is confusing.

Stanford University

SUSTAINABILITY AND ENERGY MANAGEMENT

November 22, 2016

Via Email Only (board@valleywater.org)

Board of Directors
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118-3686

Subject: **Draft 2016 Groundwater Management Plan**

Dear Members of the Board,

Stanford University ("University") appreciates the opportunity to provide comments on Santa Clara Valley Water District's ("District") Draft 2016 Groundwater Management Plan ("GWMP"). As a stakeholder that has for many years been an active participant in the District's groundwater management efforts, the University has a few concerns regarding the GWMP and the District's related efforts to comply with and implement the Sustainable Groundwater Management Act ("SGMA).

1. **The GWMP needs to be more specific with respect to the process the District will use to evaluate new SGMA authorities and develop criteria for the exercise of those authorities.**

The GWMP vaguely states that the District plans to engage and collaborate with stakeholders in a process to evaluate new SGMA authorities and develop criteria for the exercise of those authorities. The GWMP does not provide any details on the process envisioned by the District or the level of stakeholder involvement in that process. The GWMP should include more detail about the collaborative process and a timeline that the District will follow in evaluating new SGMA authorities and developing criteria and processes for the exercise of those authorities. The details should include, among other things: (a) the type of processes to be used by the District (e.g., public hearings, workshops, etc.); (b) the type of involvement that stakeholders will have in the process; and (c) dates for events to occur as part of the process. The processes should include meetings and workshops with stakeholders regarding the implementation of SGMA-related authorities and any proposed measures that are authorized by SGMA rather than the District's enabling statute. These additional details are appropriate so that all stakeholders can fully and properly participate in the process.

2. **The District's exercise of authority, including under SGMA as a groundwater sustainability agency, must comply with all applicable laws and cannot alter water rights.**

As acknowledged in the GWMP, SGMA does not (and cannot) determine or alter water rights, including groundwater rights. (See, Wat. Code § 10720.5(b).) Thus, the District's exercise of any SGMA authorities must be done in a manner that does not alter water rights. This requirement should be a primary focus and concern of the District as it considers, develops and implements any new SGMA authorities under the GWMP. In addition, the District must comply with Proposition 218 and Proposition 26 in the implementation of its GWMP.

WATER RESOURCES & CIVIL INFRASTRUCTURE GROUP
327 Bonair Siding, Stanford, CA 94305-7272 T 650-725-8081 F 650-723-3191

Thank you for your attention to this matter. Please contact me at (650) 725-3400, if you have any questions or comments.

Sincerely,

FOR

Tom W. Zigterman, P.E., D.WRE
Director - Water Resources & Civil Infrastructure
Stanford University, Department of Sustainability and Energy Management

Cc: Ms. Vanessa De La Piedra, P.E., Groundwater Monitoring and Analysis Unit (gwmp@valleywater.org)

WATER RESOURCES & CIVIL INFRASTRUCTURE GROUP
327 Bonair Siding, Stanford, CA 94305-7272 T 650-725-8081 F 650-723-3191

OPEN SPACE AUTHORITY
SANTA CLARA VALLEY

November 22, 2016

Vanessa De La Pierda
Santa Clara Valley Water District
5700 Almaden Expressway
San Jose, CA 95120

Dear Ms. De La Piedra,

The Santa Clara Valley Open Space Authority (Authority) is a California special district whose jurisdiction includes over 1,000 square miles of Santa Clara County, including the cities of Milpitas, Santa Clara, San Jose, Campbell and Morgan Hill. The Authority permanently protects open space, natural areas and agricultural lands through land acquisition, conservation easements and partnerships. To date, the Authority has partnered with the County, cities, other public conservation agencies and non-profit conservation organizations to protect over 20,000 acres of open space and agricultural land and operates a system of open space preserves for multi-use recreation. In 2014, the Authority completed the Santa Clara Valley Greenprint[1] as a strategic plan to guide its work for the next 30 years. The Greenprint analyzed biodiversity, water resources, working farms and ranches, recreation, and viewshed criteria throughout the Authority's jurisdiction. In 2015, our two agencies entered a formal Partnership Agreement to work on projects and initiatives that increase the pace and scale of watershed conservation in the Santa Clara Valley, advancing the goals of both agencies. We look forward to continued collaboration with the District and partnering on specific projects that support the *Basin Sustainability Goals* as articulated in the Draft Plan.

The goals include:

- Groundwater supplies are managed to optimize water supply reliability and minimize land subsidence.
- Groundwater is protected from contamination, including salt water intrusion.

The Authority respectfully provides the following comments on the District's 2016 Draft Groundwater Management Plan (Draft Plan).

Comment #1.

1.4.5 Relation to Other District Programs and Plans

The Authority recommends including reference to the District's One Water Plan effort. This effort is discussed elsewhere in the Draft Plan, but not highlighted here. Since this effort represents the

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[1] Santa Clara Valley Open Space Authority. 2014. *The Santa Clara Valley Greenprint: A guide for protecting open space and livable communities.* San Jose, CA
http://www.openspaceauthority.org/about/pdf/SCVOSA.Greenprint.FINAL.March2014_RevisedWithCovers28May2014.pdf

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District's vision of integrated resource management, we think it will be a key guiding document for integrating innovative strategies to help the District meet its sustainability goals.

Comment #2.

1.5.2 Land Use Agencies, 1.5.3 Local State and Federal Agencies and 1.5.4 Stakeholders

The Draft Plan focusses solely on agencies with permit authority, land-use planning authority, well owners, and land owners. The Draft Plan should also reference proactive resource conservation partners like the Authority, County Parks, and Resource Conservation Districts who can and will play a critical role in implementing Strategy 4 (e.g. protect recharge areas, promote natural recharge, and prevent groundwater contamination). We suggest adding text to this section that specifically calls out local conservation partners (public and private) and the key role they can play in proactive and voluntary collaboration with the District to implement the Draft Plan.

Comment #3.

4.1.2 Groundwater

"The groundwater subbasins provide multiple benefits to residents and businesses in Santa Clara County. Although most of the groundwater pumped is a result of District managed recharge programs, ***the subbasins provide some groundwater supply resulting from the percolation of rainfall in the recharge areas and natural seepage through local creeks and streams (natural groundwater recharge).*** *In addition, the groundwater subbasins serve as an* ***extensive conveyance network, allowing water to move from the recharge areas to individual groundwater wells.*** *The groundwater subbasins* ***also provide some natural filtration of surface water as it percolates through the soil and rock.*** *Unlike surface water, most groundwater in the county can be used for drinking water without additional treatment. Lastly, the* ***groundwater subbasins provide water storage****, allowing water to be carried over from the wet season to the dry season and even from wet years to dry years."*

This general introduction to the role groundwater plays in the overall water supply paradigm directly supports the underlying assumptions behind the current effort that the District and Authority are collaborating on in the Coyote Valley. This work is founded on the four key principals articulated in this paragraph: (a) that natural recharge is a small, but cost-effective and critical component of the overall recharge/supply equation; (b) that increasing recharge through the natural landscape in the Coyote Valley is a cost-effective tool that would benefit local wells and provide outflows into both the Santa Clara and Llagas basins; (c) that restoration of meadows, wetlands, and riparian floodplains that enable stormwater to slow, spread, and sink could result in improvements to both surface and groundwater quality; and (d) that our existing basins are the most cost-effective storage options we have and enable our community to "bank" water locally to mitigate inter and intra annual supply fluctuations.

While the current work the Authority and the District are collaborating on directly address opportunities related to a, b and c above, current provisions in three of the District's Coyote Creek water right licenses have the potential to impact the amount of storage available in the Coyote subbasin. License #7211, #7212, and #10607 all contain the following language, "The storage and diversion facilities shall be so operated under this license as to cause as nearly as practicable the same annual percolation between Madrone and Coyote as would have occurred in a state of nature without the existence of said facilities." This language has been interpreted by District staff as a constraint on restoring natural

recharge and groundwater storage in the Coyote Valley and potentially leading to a conflict between opportunities to maximize existing storage and meet key provisions in existing water right licenses. It is our understanding that the District is currently in the process of modifying these licenses, and we suggest that requesting modifications to this language could increase the District's operational flexibility in meeting their sustainable groundwater goals and implementing the related strategies.

Comment #4.

4.3 Conjunctive Water Management

*"**Local groundwater resources make up the foundation of the county's water supply,** but they need to be augmented by the District's comprehensive water management activities in order to reliably meet the needs of county residents, businesses, agriculture, and the environment. **These activities include managed recharge of imported and local supplies** and in-lieu groundwater recharge through the provision of treated surface water and raw water, acquisition of supplemental water supplies, and water conservation and recycling."*

As "local groundwater resources make up the foundation of the county's water supply," the Authority recommends that the Plan includes language about the potential for increased natural recharge through ecological system restoration or enhancement as an integral component of developing a sustainable groundwater management plan.

Comment #5.

Figure 4.5 Groundwater Budget for the Santa Clara and Llagas Subbasins (2003-2012) & Figure 4.7 Projected Future Groundwater Demands (AF).

Figure 4.5 and the associated text on water budgets illustrates the unique opportunities related to the Coyote Valley subbasin. According to these figures, nearly 20% (2500-AF/yr) of the recharge in the Coyote Valley subbasin is a result of "natural recharge". This average fluctuates based on climatic conditions as well as land-use conditions; recent estimates of natural recharge in the Coyote Valley subbasin range 500-AF in 2013 to a near average 2,400-AF in 2014 (Santa Clara Valley Water District, 2015). Of the total water recharged in this subbasin approximately 4,500-AF/yr leaves as subsurface flow into the Santa Clara and Llagas basins, supplementing managed recharge in these larger basins. Moreover, this section indicates that unlike the Santa Clara[2] and Llagas basins that appear in balance, the Coyote Valley basin shows a 500AF/yr deficit in storage. This deficit is particularly important due to the scale (e.g. hundreds of AF/yr) and Table 4.7 shows future demand curves increasing from the current level of 10,500AF/yr to 12,000AF/yr by 2020, 14,000AF/yr by 2030, and 16,000AF/yr by 2040. **To put these numbers in perspective, recent analysis of gauge data on Fisher Creek at Laguna Avenue and at Monterey Avenue suggest that significant opportunities for stormwater capture and recharge exist and that the potential quantity of water is meaningful at the scale of the current deficit (500AF) and future increased demand.** For example, the Fisher Creek gauge at Laguna Avenue shows nearly

[2] The Draft Plan shows that the Santa Clara basin storage is increasing by approximately 2000AF/yr. It is important to note that flow from the Coyote Valley subbasin into the Santa Clara subbasin is estimated at 4,500AF/yr, over 2X the annual increase. This suggests the importance of flow from the Coyote Valley subbasin into the Santa Clara subbasin for maintaining the balance now and into the future.

1,500AF of water flowing past this location during an 11-day period in March of 2016 – on both ends of the March 7 and 14 storms. The gauge at Monterey shows nearly the same amount of water moving through the system during that period. If even 50% of that water could have been captured and recharged through a series of appropriately sited floodplains, depression, and swales, that would have resulted in upwards of 750AF of recharge. This stormwater runoff represents a major lost opportunity, and the Authority recommends that opportunities like this be identified in the Draft Plan.

Comment #6.

4.5 Future Demands

"The UWMP recognizes that the near-term and potentially long-term water demand may be considerably affected by the recent and unprecedented statewide drought conditions of 2012 to 2016. This event has already affected demand as the public has changed attitudes and as water use restrictions have been put in place. Some of the water use efficiency successes and changed behavior will last into the future. But if the past is a guide, some rebound of water use will likely occur within a few years of removing water use restrictions. This drought and the local and statewide efforts to date may likely lead to new policy or technological enhancements that may reduce future demands in ways that cannot be currently predicted."

The Authority supports the need to plan proactively for drought. While this statement addresses the demand side of the equation, we suggest additional text be added to explicitly focus on the supply side of this equation. Prolonged drought has already significantly affected water imports into the District's service area and they are expected to become less reliable as the climate continues to change. The Draft Plan (Chapter 4) details current and future supply and demand, but does not appear to adequately address the uncertainty related to climate change forecasts and potential for long-term interruptions in water imports. The Draft Plan would benefit from greater emphasis and analysis of climate change (e.g. in terms of sea level rise and salt water intrusion and reductions in natural and managed recharge). **The Draft Plan should clearly acknowledge the role that natural landscapes and natural recharge can play in providing a buffer against reduced imports and drought.** The Authority recommends that the Draft Plan include strategies for increasing the operational storage capacity of each basin, specifically the Coyote Valley subbasin (see Comment #5 above) as insurance in the face of climate change and anticipated future prolonged droughts.

Comment # 7

5.1 Sustainable Management Criteria

Board Water Supply Objective 2.1.1: Aggressively protect groundwater from the threat of contamination and maintain and develop groundwater to optimize reliability and to minimize land subsidence and salt water intrusion.

Objective 2.1.1 is described in the Draft Plan as one of two key criteria for sustainable management. **The Authority recommends that the District consider enhancing recharge of local stormwater in the Coyote Valley subbasin as a key strategy for meeting multiple criteria including both optimizing reliability and minimizing land subsidence and salt water intrusion.** Existing modeling illustrates the

value of subsurface outflow from Coyote Valley into the Santa Clara Plain. In addition, modeling by Russo et al (2014)[3] further highlights the value of maximizing recharge in the Coyote Valley subbasin and its potential effect on land subsidence and salt water intrusion. This research showed that while simulated recharge projects sited near the coast or lower in the watershed helped to reduce sea water intrusion more rapidly, they also resulted in increased losses to the ocean. In contrast, projects placed farther inland resulted in more long-term reductions in sea water intrusion, less recharged groundwater flowing to the ocean, and more groundwater available for potential extraction.

Comment #8

The Authority commends the District for including Strategy 4 in the Draft Plan which calls for working with local government to protect groundwater recharge areas and support low impact development - "Since the 1950s, land use in the Santa Clara Plain has changed from largely rural and agricultural to a highly developed urban area. The increased amount of land covered by impervious materials has increased surface water runoff and reduced natural recharge. Although not as urbanized as the Santa Clara Plain, the Llagas Subbasin serves the growing cities of Morgan Hill and Gilroy, and significant development has been considered in the Coyote Valley. This strategy calls for working with land use agencies to maximize natural recharge by protecting groundwater recharge areas and supporting the use of low-impact development. This includes the development of technical studies, participation in policy development, and coordination on proposed development."

The Authority also recommends that Strategy 4 include reference to working closely with open space and resource conservation agencies to identify opportunities to maximize recharge through habitat restoration or other ecological enhancement projects that could also restore/increase local water capture.

Comment #9

5.4 Outcome measures- *"This section describes key performance measures in meeting the following sustainability goals: (1) Groundwater supplies are managed to optimize water supply reliability and minimize land subsidence; and (2) Groundwater is protected from contamination, including salt water intrusion."*

Given the GWMP recognizes that increased urbanization reduces natural recharge and increases risk of contamination, the Authority recommends the Draft Plan set goals and key performance measures that address basin urbanization which could reduce natural groundwater recharge or result in future groundwater contamination.

[3] Russo, T.A., Fisher, A.T., Lockwood, B.S. (2014) Assessment of Managed Aquifer Recharge Potential and Impacts using GIS and Numeric Modeling. Groundwater. 12213.

Comment #10

<u>*6.1.3 Protection of Natural Recharge*</u>

"The District's managed recharge program augments natural recharge since natural replenishment is insufficient to meet groundwater demands. However, protecting natural recharge capacity is also important. Natural recharge is defined here as any type of recharge not controlled by the District, including: rainfall, subsurface seepage from surrounding hills, net irrigation return flows, net leakage from water distribution systems, storm drains, sewer lines, and septic systems, and net seepage into the groundwater basin. Natural recharge to deep drinking water aquifers is about 55,000 AF per year on average based on estimates from 2003 to 2012. In 2015, a drought year, natural recharge was estimated to be 39,000 AF...The preservation of open space supports agriculture and natural recharge capacity...."

The Authority strongly supports strategy 6.1.3 and requests the District elevate and implement this strategy through its partnerships with other public and private partners. Preservation of open space and enhancing or restoring conditions for natural recharge provide multiple benefits well beyond sustainable groundwater management and are generally cost-effective. These activities generally do not require "gray" infrastructure such as pipes, pumps, and other facilities that have a capital cost, depreciate over time, and have significant maintenance costs. Green infrastructure such as natural drainage channels/streams, floodplains, meadows, etc. can be used to spread and sink stormwater into the landscape. Green infrastructure has minimal/no operational costs and the resource appreciates over time and provides a host of other benefits to the community (e.g. flood risk reduction, improved water quality, ecosystem uplift, carbon sequestration, etc.)[4]. These co-benefits further increase the economic value of investments in land conservation for water resource protection.

Comment #11

<u>*#8. 6.1.4.4 Pricing Policies*</u>

The Authority recommends the District evaluate the appropriateness of a net-metering system for incentivizing landowners to develop facilities (natural depression, ponds, basins, etc.) that can increase natural recharge of local stormwater. Dr. Andy Fisher at U.C. Santa Cruz is currently piloting a net-metering system in the Pajaro Valley with the Pajaro Valley Water Management Agency, the Resource Conservation District of Santa Cruz County and agricultural landowners. The program is focused on participants that can recharge over 100 AF/yr and provides a pricing structure for rebates that accounts for water that is actively recharged and provides discounts on pumping fees. This type of incentive based approach could be a valuable component of any new groundwater pumping fees levied through SGMA. The Authority would like to partner with the District to pursue Conservation Innovation Grant

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[4]Batker, D., Schwartz, A., Schmidt, R., Mackenzie, A., Smith, J., Robins, J. 2014. Nature's Value in Santa Clara County. Earth Economics, Tacoma, WA & the Santa Clara Valley Open Space Authority, San Jose, CA.
http://www.openspaceauthority.org/about/healthylandshealthyeconomies.html

funding from the NRCS to explore this and other opportunities to incentivize multi-benefit water resources projects.

Comment #12

6.1.6.3 Planning to Meet Future Needs

The Authority recommends that under this section the Draft Plan discuss climate change in more detail, including projected impacts to Santa Clara County. See comment #6 above.

Comment #13

6.1.7 Asset Management

"Maintaining the integrity of the District's existing infrastructure is essential for water supply reliability. This includes maintaining recharge facilities and all District facilities, such as reservoirs, treatment plants, and conveyance and distribution infrastructure. The District maintains a rigorous asset management program to optimize asset renewal strategies and minimize the total cost of owning assets while providing expected service levels and operating at an acceptable level of risk. The program seeks to reduce unplanned infrastructure failure and service disruptions and improve reliability of water supply infrastructure. The program helps to optimize asset lifecycle costs, enable accurate financial planning to sustainably deliver services, and capture and transfer asset-specific knowledge."

The Authority strongly recommends that the District include natural capital (e.g. watersheds, stream corridors, unconfined recharge areas, wetlands, undeveloped floodplains etc.) as essential infrastructure assets for water supply reliability. These natural capital assets provide considerable services that are typically provided more efficiently and at a lower cost than engineered alternatives. The Authority requests that the District consider investments in the protection, management, and restoration of natural capital as a part of its water supply asset management strategy. The District should also consider partnering with public and private landowners on programs or projects that conserve or restore these assets.

Comment #14

6.3.4 Watershed Management

"Drawing from detailed existing programs and plans, One Water seeks to find the nexus between these three mission components for new opportunities in integrated water resources management. One Water does not replace the substantial existing planning in place by the District's Water Utility Enterprise and the Watersheds Division but instead looks for opportunities to further protect and enhance water resources. The ***One Water Plan is a long-term endeavor that seeks to build up to long-term improvements in water resources management and watershed conditions.*** *One Water will operate under the current commitments, regulations, and existing restrictions and challenges that drive District operations and day-to-day work. This means that not all strategies will be practicable and not all goals and objectives can be carried out simultaneously. In the end, however,* ***the established framework called***

out in the One Water Plan identifies a roadmap for integrated water resources management for the future. *Not all District activities can be integrated, nor all activities managed under One Water, but all types of water will be considered in building upon past successes to manage these valuable resources as One Water."*

The Authority commends the District for its development of One Water as a roadmap for integrated water resource management. Understanding that not all of One Water's goals, objectives, or strategies may be currently practicable- the Authority recommends that that groundwater management plan addresses how it can implement One Water components that *are* currently feasible, and how it plans to address commitments, regulations, and existing restrictions and challenges that are currently preventing the District from fully implementing One Water's approach to integrated water resource management.

In closing, the Partnership between the Authority and District is based on the understanding that protection and restoration of watershed lands not only ensures safe and reliable water resources, but also bolsters the resiliency of the ecosystems and human communities they support. The Authority is currently working with the District to assess the contribution of natural landscapes to water resource reliability, and opportunities to increase these services through ecological restoration and enhancement in the Coyote Valley. This work recognizes watershed lands as natural assets that can be managed to achieve water resource protection and reliability goals. The above comments are offered in this spirit of partnership. The Authority commends the District in its effort to achieve sustainable groundwater management and will continue to work closely with the District to implement integrated water resource management approaches and strategies.

Sincerely,

Andrea Mackenzie

Andrea Mackenzie
General Manager

Cc: Norma Camacho, Chief Executive Officer (Interim)
Jim Fiedler, Chief Operating Officer: Water Utility Enterprise
Santa Clara Valley Water District Board of Directors
Santa Clara Valley Open Space Authority Board of Directors

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A3. District Response to Public Comment Letters on the Draft GWMP

5750 Almaden Expressway, San Jose, CA 95118-3614 | (408) 265-2600 | www.valleywater.org

Santa Clara Valley Water District

December 14, 2016

Mr. Andrew Gere
President and Chief Operating Officer
San Jose Water Company
110 W. Taylor Street
San Jose, CA 95110-2131

Subject: Response to San Jose Water Company Comments on the Draft 2016 Groundwater Management Plan

Dear Mr. Gere:

Thank you for the San Jose Water Company (SJWC) comment letter dated November 18, 2016 on the Santa Clara Valley Water District's Draft 2016 Groundwater Management Plan for the Santa Clara and Llagas Subbasins (GWMP). After considering oral and written stakeholder comments during the November 22, 2016 public hearing, the Board of Directors (Board) adopted the GWMP.

On or before January 1, 2017, the GWMP will be submitted to the Department of Water Resources (DWR) as an Alternative Plan in accordance with the Sustainable Groundwater Management Act (SGMA). Your comment letter, and this District response, will be included in an appendix to the GWMP. Major topics outlined in the SJWC comment letter are summarized below, along with the District response.

Water Rights and Potential Pumping Regulation

The SJWC comment letter states that "the GWMP fails to acknowledge proprietary groundwater rights held by the Water Systems within the management area (including SJWC) and the need to directly involve such systems in defining responsive actions consistent with their vested rights." The letter goes on to request that the District agree to share governance with public water systems with regard to how any groundwater allocation or curtailment is implemented.

The GWMP does not propose implementing new SGMA authorities to allocate, curtail, or otherwise regulate pumping. Rather, it acknowledges these authorities as potential tools that may be needed in the future to avoid undesirable results while recognizing related limitations. The GWMP clearly acknowledges that property owners and pumpers have rights to use groundwater, and that local agencies are not authorized to make a binding determination of water rights. As stated on page 1-12 (Section 1.4.2.2):

> "While these authorities are listed in SGMA, the Act also acknowledges limitations related to controlling pumping. Several related SGMA sections state that local agencies are not authorized to make a binding determination of the water rights of any person or entity.[1] Property owners and municipalities have rights to the reasonable, beneficial use of

[1] California Water Code §§10720.5(b) and 10726.8(b)

groundwater. Other pumpers have established appropriative rights, and may also claim prescriptive rights to local groundwater."

Chapter 8 of the GWMP (Next Steps) includes Recommendation 6a to "Work with major pumpers to develop basin conditions that might trigger the need to regulate pumping, as well as implementation mechanisms to ensure related authorities can be effectively implemented should they become necessary." This analysis will consider related limitations with regard to existing water rights and land use authority.

The District was formed in 1929 to manage groundwater for the benefit of the community and those pumping groundwater for beneficial use. This includes municipal, domestic, industrial, and agricultural pumpers, as well as private water companies like SJWC. The District's existing, comprehensive groundwater management framework has been successful in adapting to changing needs, and has maintained sustainable conditions over many decades. This framework includes well-established and clearly defined governance structure and authorities under the Santa Clara Valley Water District Act (District Act), effective conjunctive water management programs, and partnerships with water retailers and others.

The GWMP documents this framework, including the many ways we collaborate with retailers, such as through Urban Water Management Plan development and shortage response. The existing groundwater management framework, including collaboration with water retailers and others, has led to sustainable groundwater conditions. This proven groundwater management strategy, including excellent collaboration, is the preferred approach to address future challenges.

Stakeholder engagement beginning in 2017 will ensure that specific pumping regulation approaches are carefully considered and discussed at a time when basin conditions are sustainable. This will avoid rushed development during a crisis should pumping regulation ever be needed. At the November 22nd public hearing, the Board emphasized an ongoing commitment to working closely with water retailers and other stakeholders on SGMA policy issues, and referred consideration of continued stakeholder engagement on related issues to the Board's Water Conservation and Demand Management Committee. Staff will keep water retailers and interested stakeholders apprised of related committee and stakeholder meetings.

Deficiencies Identified by SJWC

The comment letter claims the GWMP is deficient in five areas in comparison to the standards of a Groundwater Sustainability Plan (GSP). The District does not agree with this representation, for the reasons explained below. Importantly, a direct comparison to specific elements of the GSP standards is inappropriate. By definition, an Alternative to a GSP is not a GSP, nor is it required to contain all GSP components. Instead, it must demonstrate functional equivalence to Articles 5 and 7 of the Emergency GSP Regulations[2] and that the Alternative achieves SGMA objectives. Appendix B of the GWMP contains detailed information to document this functional equivalence.

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[2] California Code of Regulations, Title 23, Division 2, Chapter 1.5, Subchapter 2

1) Failure to Describe Basin Conditions in Required Detail

There is no definitive level of detail required for Alternatives. As noted above, agencies submitting an Alternative must demonstrate functional equivalence to certain articles of the GSP Regulations. Functional equivalence is required to assure DWR, basin stakeholders, and the public that basin conditions are understood to the degree necessary to make informed decisions and take action to ensure sustainability. GWMP Chapters 2, 3, and 4 and Appendix C contain detailed information on the status and conditions of the Santa Clara and Llagas Subbasins. The GWMP demonstrates that the District has developed a thorough understanding of groundwater conditions which, in turn, supports continued sustainable management.

2) No Express Identification of Basin's Beneficial Users

SGMA requires Groundwater Sustainability Agencies like the District to consider the interests of all beneficial uses and users of groundwater. It does not require that a GSP or Alternative identify individual beneficial users or related water rights.

The GWMP contains detailed information on pumping by municipal and industrial (M&I), domestic, and agricultural users in Chapter 4. The information presented in Chapter 4 provides significant information on the county's groundwater supplies and presents a detailed water budget based on historical demand and use. Listing the nearly 5,000 individual pumping wells in Santa Clara County would not change the information on the overall demand and use in the county and, thus, is not a necessary level of detail.

Chapter 6 describes numerous programs and actions to maintain sustainable groundwater supplies for current and future beneficial uses. As stated above, the GWMP does not propose implementing new SGMA authorities to allocate, curtail, or otherwise regulate pumping. Instead, the District's proven groundwater management strategy, as outlined in Chapter 6, including excellent collaboration, is the preferred approach to address future challenges. Identifying specific groundwater users would do nothing to increase the effectiveness of the programs and actions described in Chapter 6, or increase an understanding of how they are implemented.

3) Failure to Include Basin's Projected Water Budget

The District ensures future water supply reliability through regular, forward-looking planning and appropriate investments. Chapter 4 and Appendix C of the GWMP present detailed water budget information for the countywide water budget, the long-term average groundwater budget, the 2015 groundwater budget, and annual change in groundwater storage. Chapter 4 includes future groundwater demand projections through 2040 from the District's Urban Water Management Plan.

The Urban Water Management Plan includes detailed information on water supply and demand projections, water supply challenges and constraints, and water supply reliability. The GWMP also discusses District planning efforts to evaluate and recommend actions for future water supply reliability through the Water Supply Master Plan. Projected groundwater demands are within historic use patterns for the Santa

Clara Subbasin and the Water Supply Master Plan will be addressing projected increases in the Llagas Subbasin.

4) GWMP Fails to Identify All Required Undesirable Results or Establish Sufficient Minimum Thresholds

Alternatives do not need to conform to GSP requirements but must demonstrate functional equivalence to certain GSP Regulation articles and that they meet the intent of SGMA. The GWMP describes historical undesirable results that have been successfully addressed through District planning and investments, including long-term declines in groundwater levels and storage, land subsidence, and salt water intrusion. The GWMP also states that the groundwater subbasins are sustainable, indicating no undesirable results are occurring, and presents supporting data and information in Chapters 2, 3, and 4.

The intent of minimum thresholds is to identify when problems may be occurring so appropriate action can be taken. The outcome measures in the GWMP have been in place since 2012, and have proven to be effective in prompting action when needed to maintain sustainable conditions. In 2014, increased pumping and decreased recharge due to drought conditions caused groundwater levels in the Santa Clara Subbasin to approach the subsidence thresholds in the GWMP outcome measure. The District and SJWC took swift and collaborative action to understand the issue and reduce pumping in key areas, resulting in a direct, positive effect on groundwater levels and minimizing the risk of resumed subsidence.

The groundwater storage outcome measure, derived from the Water Shortage Contingency Plan, has also proven effective. Based on projected end of year groundwater, the Board set water use reduction targets each calendar year between 2014 and 2016. The water retailers' response was impressive, reducing overall water use by 27% in 2015 compared to 2013 and using more treated water in lieu of groundwater pumping. Coupled with District efforts to secure supplemental surface water, this response caused groundwater levels to improve even with continued drought conditions. Countywide groundwater storage is projected to be near the Normal Stage (Stage 1) of the Water Shortage Contingency Plan at the end of 2016 despite five years of drought. This is a significant accomplishment and a testament to effective metrics and collaborative response.

The SJWC comment letter also asserts that the GWMP does not meet GSP requirements for measurable objectives. Measurable objectives serve as targets to achieve the basin sustainability goal within 20 years of implementation. Since groundwater conditions are sustainable in Santa Clara County, this concept is not applicable.

5) No Identification of GWMP's Data Gaps

Unlike many basins that have little or no groundwater data, the District has conducted extensive groundwater monitoring and analysis for decades, and the Santa Clara and Llagas subbasins have been extensively studied. Groundwater monitoring and modeling efforts are described in detail in Chapter 7 of the GWMP. As noted on GWMP page 7-1:

> "For all monitoring, the District works to ensure the monitoring locations and data collected provide adequate information to facilitate a comprehensive understanding of groundwater conditions and support informed decision-making. This includes ongoing assessment of data gaps or redundancy, monitoring protocols, and data management, evaluation, and reporting. Specific wells or locations monitored may vary and evolve over time due to issues with well construction or access, but the overall programs provide strong and comprehensive data to assess conditions and trends within the Santa Clara and Llagas subbasins."

The District's monitoring network is extensive, and there are no significant data gaps in the monitoring programs or hydrogeologic conceptual model. Ongoing assessment and adaptation of the program to meet changing needs ensures the District will continue to collect data that supports thorough assessment of groundwater conditions and related decision making.

Ability to Amend a GWMP

The SJWC comment letter states that "SGMA prohibits local agencies in medium- and high-priority basins from adopting a new GWMP or amending an existing GWMP as of January 1, 2015" and references Water Code Section 10750.1(a). However, for the reasons set forth below, the District is confident that the 2016 GWMP can be submitted as an alternative to a GSP under Water Code Section 10733.6(b)(1) and Section 358.2(c)(1) of the GSP Emergency Regulations.

Section 10750.1(a) does not apply to the 2016 GWMP as the Plan was adopted pursuant to the authorities provided in the District Act. Water Code Section 10733.6(b)(1) allows local agencies to submit alternative plans that are developed pursuant to not only Part 2.75, but also some other law authorizing groundwater management. Here, the District Act is the authorizing law and, as such, any prescription against adopting or amending plans prepared pursuant to Part 2.75 does not apply to the 2016 GWMP.

Even if the 2016 GWMP was developed pursuant to Part 2.75, however, the prescription against adopting or amending a groundwater management plan still does not apply to a plan submitted as an alternative to a GSP. Section 10750.1(c) states:

> "This section does not apply to a plan submitted as an alternative pursuant to Section 10733.6, unless the department has not determined that the alternative satisfies the objectives of Part 2.74 (commencing with Section 10720) on or before January 31, 2020, or the department later determines that the plan does not satisfy the objectives of that part."

A fair reading of Section 10750.1(c) suggests that a groundwater management plan can be amended or adopted after January 1, 2015, as long as it is submitted as an alternative to a GSP pursuant to Section 10733.6, and DWR determines that the plan satisfies SGMA's objectives.

For the reasons outlined above, we respectfully disagree with the SJWC assertion that the GWMP is deficient and is ineligible to be submitted as an Alternative under SGMA.

The District and local water retailers have always had a collaborative relationship, and a continued, strong partnership will be needed as we implement the GWMP under the new framework of SGMA.

We look forward to our continued partnership in ensuring local water supply reliability and maintaining sustainable groundwater supplies.

Sincerely,

Norma J. Camacho
Interim Chief Executive Officer

5750 Almaden Expressway, San Jose, CA 95118-3614 | (408) 265-2600 | www.valleywater.org

Santa Clara Valley Water District

December 14, 2016

via e-mail

Mr. Doug Muirhead
doug.muirhead@stanfordalumni.org

Subject: Response to Comments on the Santa Clara Valley Water District Draft 2016 Groundwater Management Plan

Dear Mr. Muirhead:

Thank you for your comment letter received November 22, 2016 on the Santa Clara Valley Water District's Draft 2016 Groundwater Management Plan for the Santa Clara and Llagas Subbasins (GWMP). After considering oral and written stakeholder comments during the November 22, 2016 public hearing, the Board of Directors (Board) adopted the GWMP.

On or before January 1, 2017, the GWMP will be submitted to the Department of Water Resources (DWR) as an Alternative Plan in accordance with the Sustainable Groundwater Management Act (SGMA). Your comment letter, and this District response, will be included in an appendix to the GWMP. Your comments are summarized below, along with the District response.

Medium- and High- Priority Basin Ranking

Your comment letter notes that the DWR subbasin classification as medium or high priority is not defined until the Introduction of the GWMP, although referenced in the Executive Summary. You correctly note that a higher priority does not indicate a problem such as overdraft.

The statewide DWR basin prioritization is based on criteria including population and groundwater reliance, and focuses on basins producing greater than 90% of California's groundwater. It should not be inferred that a higher ranking indicates the basin is not well managed or is experiencing overdraft or other undesirable results.

New SGMA Authorities

The GWMP acknowledges the new authorities in SGMA as potential tools that may be needed in the future to avoid undesirable results, but does not propose implementing new SGMA authorities to allocate, curtail, or otherwise regulate pumping. The existing groundwater management framework, including collaboration with water retailers and others, has led to sustainable groundwater conditions, and is the preferred approach to address future challenges. Stakeholder engagement beginning in 2017 will ensure that specific pumping regulation approaches are carefully considered and discussed at a time when basin conditions are sustainable. This will avoid rushed development during a crisis should pumping regulation ever be needed.

At the November 22nd public hearing, the Board emphasized an ongoing commitment to working closely with water retailers and other stakeholders on SGMA policy issues, and referred consideration of continued stakeholder engagement on related issues to the Board's Water Conservation and Demand Management Committee. Staff will keep interested stakeholders apprised of related committee and stakeholder meetings.

Water Rights

You requested information on what is required to maintain District water rights. The District's ongoing water supply operations account for annual water rights. The District develops detailed operations plans to maximize the use of water rights for beneficial use and avoid exceeding allocations. These plans are updated at least monthly, but may be updated several times per week during the rainy season to determine daily releases from reservoirs or other facilities.

Careful planning helps the District to maximize the beneficial use of the water to meet the District's objectives under multiple regulations and requirements, such as Division of Safety of Dams reservoir operating restrictions and California Department of Fish and Wildlife Lake and Streambed Alteration Agreements. Local creek systems are complex and the water rights accounting process includes analyzing large amounts of data to support accurate and timely reporting for each of the District's water rights, as required by the State Water Resources Control Board.

Injection Well Pilot

With regard to the San Tomas Injection Well, you asked if it was ever used and under what conditions it may be used in the future. The injection well was operated as a pilot facility from 2003 to 2005, and is not currently in operation. Operations and maintenance are more complex for the injection well compared to managed recharge through percolation ponds and creeks, and regular use of the well would likely require new permits.

Water Banking

Your comment notes that "the assumption that we could get deliveries from the Delta failed us in recent years, and the District thus considered the Reverse Flow Project."

You correctly note that during the recent, severe drought, the District considered a proposed project to convey water banked in the Semitropic Groundwater Bank back to the San Luis Reservoir, essentially reversing the flow of the California Aqueduct. This was considered as a drought response measure due to uncertainty in Delta deliveries, but was ultimately not needed. However, the work done on this project could support a similar future project if needed.

Measurements and Data

Your comment encourages the use of more measurements and fewer estimates and gives well metering as a specific example. When practicable, the District uses measured values over estimates. However, this must consider related costs and the value of additional measurements. As shown in GWMP Table 6-1 (District Well Metering Summary), while there are several thousand unmetered wells, the related volume pumped is quite small. Over 95% of the volume of groundwater pumped in the Santa Clara and Llagas subbasins is metered, providing the

District with a good understanding of groundwater pumping while balancing costs related to installing, calibrating, and reading meters.

In your comment letter, you also ask if data collection and analysis is limited by the use of data from privately-owned wells. While some of this data cannot be shared directly with the public, the raw data is analyzed by the District and supplements data collected from District wells. The use of data from privately-owned wells helps the District to understand basin conditions while minimizing monitoring costs.

Loma Fire

Your comment letter recommends addressing post-fire issues related to the Loma Fire in the GWMP section on Watershed Management. As noted on GWMP page 6-20, "the District works to protect the water quality and water supply reliability of the District's reservoirs through regular monitoring, coordination with other agencies on water quality issues, and through activities to protect local reservoirs from potentially contaminating activities." While the District concurs that it is important to ensure local watersheds are protected from the effects of major fires, related project-specific work is more appropriately addressed outside long-term planning documents such as the GWMP.

Thank you for your continued interest in groundwater management and in the District's 2016 GWMP. We look forward to working with you moving forward as the GWMP is implemented.

Sincerely,

Norma J. Camacho
Interim Chief Executive Officer

5750 Almaden Expressway, San Jose, CA 95118-3614 | (408) 265-2600 | www.valleywater.org

Santa Clara Valley Water District

December 14, 2016

Mr. Tim Guster
Vice President and General Counsel
Great Oaks Water Company
P.O. Box 23490
San Jose, CA 95153

Subject: Response to Great Oaks Water Company Comments on the Draft 2016 Groundwater Management Plan

Dear Mr. Guster:

Thank you for the Great Oaks Water Company (Great Oaks) comment letter dated November 18, 2016 on the Santa Clara Valley Water District's Draft 2016 Groundwater Management Plan for the Santa Clara and Llagas Subbasins (GWMP). After considering oral and written stakeholder comments during the November 22, 2016 public hearing, the Board of Directors (Board) adopted the GWMP.

On or before January 1, 2017, the GWMP will be submitted to the Department of Water Resources (DWR) as an Alternative Plan in accordance with the Sustainable Groundwater Management Act (SGMA). The Great Oaks comment letter, and this District response, will be included in an appendix to the GWMP. Major topics outlined in the Great Oaks comment letter are summarized below, along with the District response.

Preparation and Timing of the Alternative Plan

The Great Oaks comment letter notes the Alternative submittal deadline of January 1, 2017, and implies inadequate review time. As District staff noted in multiple meetings of the Groundwater Subcommittee dating back to April 7, 2016, planned SGMA compliance focused on updating the District's comprehensive 2012 GWMP for submittal as an Alternative. This was also discussed at Groundwater Subcommittee meetings dated June 8th, June 24th, and October 12th and at Water Retailer Committee meetings dated March 16th and July 20th.

In meetings with water retailers, District staff was clear that the 2016 GWMP would not include any fundamental change in groundwater management goals, strategies, programs, or outcome measures, which have proven effective in maintaining sustainable groundwater conditions. Rather, the focus would be on including updated and expanded technical information on the subbasins, restructuring the document to facilitate review, and acknowledging new SGMA authorities.

Because the state's Emergency GSP Regulations (which also address Alternatives) were not finalized until June 2016, this left relatively little time to understand related requirements and complete preparation of the Alternative. However, District staff worked to keep water retailers up to date on related progress, and to clearly map out planned differences between the 2016 GWMP as compared to the 2012 GWMP as explained above. While staff would have also

preferred to avoid holding the GWMP public hearing during a holiday week, the statutory deadline and Board meeting schedule left staff with few options.

Water Rights and Potential Pumping Regulation

The Great Oaks letter discusses concerns identified by several water retailers regarding water rights and potential District actions to regulate pumping. The letter notes that "District groundwater actions should not be taken without a full understanding of the effects of those actions on the retailers and their customers…" and that water retailers have no established authority to provide meaningful input on related District action.

The GWMP does not propose implementing new SGMA authorities to allocate, curtail, or otherwise regulate pumping. Rather, it acknowledges these authorities as potential tools that may be needed in the future to avoid undesirable results. The GWMP acknowledges there are related limitations and that a Groundwater Sustainability Agency cannot make a binding determination on water rights.

The District's statutory authority to manage groundwater for the benefit of the community and those pumping groundwater for beneficial use dates back to 1929. The existing groundwater management framework, including well-established governance and decision-making authorities, has led to sustainable groundwater conditions. This proven framework, including excellent collaboration, is the preferred approach to address future challenges. The District concurs that related, potential actions must consider effects on water retailers and the community. Stakeholder engagement beginning in 2017 will ensure that specific pumping regulation approaches are carefully considered and discussed at a time when basin conditions are sustainable. This will avoid rushed development during a crisis should pumping regulation ever be needed.

At the November 22nd public hearing, the Board emphasized an ongoing commitment to working closely with water retailers and other stakeholders on SGMA policy issues, and referred consideration of continued stakeholder engagement on related issues to the Board's Water Conservation and Demand Management Committee. Staff will keep water retailers and interested stakeholders apprised of related committee and stakeholder meetings.

Compliance with SGMA Objectives

The Great Oaks comment letter supports and references the SJWC letter dated November 18, 2016, which asserts the GWMP is deficient in five areas in comparison to the standards of a Groundwater Sustainability Plan (GSP). As explained in the attached response to SJWC, the District respectfully disagrees with the assertion that the GWMP does not satisfy SGMA objectives. The GWMP demonstrates functional equivalence to Articles 5 and 7 of the Emergency GSP Regulations[1] and that it achieves SGMA objectives. Appendix B of the GWMP contains detailed information to document this functional equivalence.

The comment letter notes that the GWMP fails to include the required "Notice and Communication" section. As noted in the response to SJWC, the direct comparison to specific

[1] California Code of Regulations, Title 23, Division 2, Chapter 1.5, Subchapter 2

elements of the GSP standards is inappropriate. By definition, an Alternative to a GSP is not a GSP, nor is it required to contain all GSP components.

Ongoing public engagement during implementation of the GWMP will include Board meetings, other meeting forums, such as the water retailer committee and subcommittees, and other means of coordination as described in the GWMP. Programs identified in the GWMP are existing programs, many of which have been in place for decades. Major policy or investment decisions fall under the purview of the District Board of Directors and are discussed during publicly-noticed Board meetings. These meetings provide an opportunity for all stakeholders to provide input for Board consideration prior to Board action. The District will keep interested groundwater management stakeholders apprised of meetings or significant activities related to SGMA policy or implementation.

The District and local water retailers have always had a collaborative relationship, and a continued, strong partnership will be needed as we implement the GWMP under the new framework of SGMA. The District's commitment to engage water retailers and stakeholders in the evaluation of new SGMA authorities is documented in the GWMP and was clearly affirmed by the District Board when discussing the Draft GWMP in its November 22, 2016 meeting.

We look forward to our continued partnership in ensuring local water supply reliability and maintaining sustainable groundwater supplies.

Sincerely,

Norma J. Camacho
Interim Chief Executive Officer

Attachment: District Response to SJWC Letter

5750 Almaden Expressway, San Jose, CA 95118-3614 | (408) 265-2600 | www.valleywater.org

Santa Clara Valley Water District

December 14, 2016

Mr. Andrew Gere
President and Chief Operating Officer
San Jose Water Company
110 W. Taylor Street
San Jose, CA 95110-2131

Subject: Response to San Jose Water Company Comments on the Draft 2016 Groundwater Management Plan

Dear Mr. Gere:

Thank you for the San Jose Water Company (SJWC) comment letter dated November 18, 2016 on the Santa Clara Valley Water District's Draft 2016 Groundwater Management Plan for the Santa Clara and Llagas Subbasins (GWMP). After considering oral and written stakeholder comments during the November 22, 2016 public hearing, the Board of Directors (Board) adopted the GWMP.

On or before January 1, 2017, the GWMP will be submitted to the Department of Water Resources (DWR) as an Alternative Plan in accordance with the Sustainable Groundwater Management Act (SGMA). Your comment letter, and this District response, will be included in an appendix to the GWMP. Major topics outlined in the SJWC comment letter are summarized below, along with the District response.

Water Rights and Potential Pumping Regulation

The SJWC comment letter states that "the GWMP fails to acknowledge proprietary groundwater rights held by the Water Systems within the management area (including SJWC) and the need to directly involve such systems in defining responsive actions consistent with their vested rights." The letter goes on to request that the District agree to share governance with public water systems with regard to how any groundwater allocation or curtailment is implemented.

The GWMP does not propose implementing new SGMA authorities to allocate, curtail, or otherwise regulate pumping. Rather, it acknowledges these authorities as potential tools that may be needed in the future to avoid undesirable results while recognizing related limitations. The GWMP clearly acknowledges that property owners and pumpers have rights to use groundwater, and that local agencies are not authorized to make a binding determination of water rights. As stated on page 1-12 (Section 1.4.2.2):

> "While these authorities are listed in SGMA, the Act also acknowledges limitations related to controlling pumping. Several related SGMA sections state that local agencies are not authorized to make a binding determination of the water rights of any person or entity.[1] Property owners and municipalities have rights to the reasonable, beneficial use of

[1] California Water Code §§10720.5(b) and 10726.8(b)

groundwater. Other pumpers have established appropriative rights, and may also claim prescriptive rights to local groundwater."

Chapter 8 of the GWMP (Next Steps) includes Recommendation 6a to "Work with major pumpers to develop basin conditions that might trigger the need to regulate pumping, as well as implementation mechanisms to ensure related authorities can be effectively implemented should they become necessary." This analysis will consider related limitations with regard to existing water rights and land use authority.

The District was formed in 1929 to manage groundwater for the benefit of the community and those pumping groundwater for beneficial use. This includes municipal, domestic, industrial, and agricultural pumpers, as well as private water companies like SJWC. The District's existing, comprehensive groundwater management framework has been successful in adapting to changing needs, and has maintained sustainable conditions over many decades. This framework includes well-established and clearly defined governance structure and authorities under the Santa Clara Valley Water District Act (District Act), effective conjunctive water management programs, and partnerships with water retailers and others.

The GWMP documents this framework, including the many ways we collaborate with retailers, such as through Urban Water Management Plan development and shortage response. The existing groundwater management framework, including collaboration with water retailers and others, has led to sustainable groundwater conditions. This proven groundwater management strategy, including excellent collaboration, is the preferred approach to address future challenges.

Stakeholder engagement beginning in 2017 will ensure that specific pumping regulation approaches are carefully considered and discussed at a time when basin conditions are sustainable. This will avoid rushed development during a crisis should pumping regulation ever be needed. At the November 22nd public hearing, the Board emphasized an ongoing commitment to working closely with water retailers and other stakeholders on SGMA policy issues, and referred consideration of continued stakeholder engagement on related issues to the Board's Water Conservation and Demand Management Committee. Staff will keep water retailers and interested stakeholders apprised of related committee and stakeholder meetings.

Deficiencies Identified by SJWC

The comment letter claims the GWMP is deficient in five areas in comparison to the standards of a Groundwater Sustainability Plan (GSP). The District does not agree with this representation, for the reasons explained below. Importantly, a direct comparison to specific elements of the GSP standards is inappropriate. By definition, an Alternative to a GSP is not a GSP, nor is it required to contain all GSP components. Instead, it must demonstrate functional equivalence to Articles 5 and 7 of the Emergency GSP Regulations[2] and that the Alternative achieves SGMA objectives. Appendix B of the GWMP contains detailed information to document this functional equivalence.

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1) Failure to Describe Basin Conditions in Required Detail

   There is no definitive level of detail required for Alternatives. As noted above, agencies submitting an Alternative must demonstrate functional equivalence to certain articles of the GSP Regulations. Functional equivalence is required to assure DWR, basin stakeholders, and the public that basin conditions are understood to the degree necessary to make informed decisions and take action to ensure sustainability. GWMP Chapters 2, 3, and 4 and Appendix C contain detailed information on the status and conditions of the Santa Clara and Llagas Subbasins. The GWMP demonstrates that the District has developed a thorough understanding of groundwater conditions which, in turn, supports continued sustainable management.

2) No Express Identification of Basin's Beneficial Users

   SGMA requires Groundwater Sustainability Agencies like the District to consider the interests of all beneficial uses and users of groundwater. It does not require that a GSP or Alternative identify individual beneficial users or related water rights.

   The GWMP contains detailed information on pumping by municipal and industrial (M&I), domestic, and agricultural users in Chapter 4. The information presented in Chapter 4 provides significant information on the county's groundwater supplies and presents a detailed water budget based on historical demand and use. Listing the nearly 5,000 individual pumping wells in Santa Clara County would not change the information on the overall demand and use in the county and, thus, is not a necessary level of detail.

   Chapter 6 describes numerous programs and actions to maintain sustainable groundwater supplies for current and future beneficial uses. As stated above, the GWMP does not propose implementing new SGMA authorities to allocate, curtail, or otherwise regulate pumping. Instead, the District's proven groundwater management strategy, as outlined in Chapter 6, including excellent collaboration, is the preferred approach to address future challenges. Identifying specific groundwater users would do nothing to increase the effectiveness of the programs and actions described in Chapter 6, or increase an understanding of how they are implemented.

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   The Urban Water Management Plan includes detailed information on water supply and demand projections, water supply challenges and constraints, and water supply reliability. The GWMP also discusses District planning efforts to evaluate and recommend actions for future water supply reliability through the Water Supply Master Plan. Projected groundwater demands are within historic use patterns for the Santa

Clara Subbasin and the Water Supply Master Plan will be addressing projected increases in the Llagas Subbasin.

4) GWMP Fails to Identify All Required Undesirable Results or Establish Sufficient Minimum Thresholds

Alternatives do not need to conform to GSP requirements but must demonstrate functional equivalence to certain GSP Regulation articles and that they meet the intent of SGMA. The GWMP describes historical undesirable results that have been successfully addressed through District planning and investments, including long-term declines in groundwater levels and storage, land subsidence, and salt water intrusion. The GWMP also states that the groundwater subbasins are sustainable, indicating no undesirable results are occurring, and presents supporting data and information in Chapters 2, 3, and 4.

The intent of minimum thresholds is to identify when problems may be occurring so appropriate action can be taken. The outcome measures in the GWMP have been in place since 2012, and have proven to be effective in prompting action when needed to maintain sustainable conditions. In 2014, increased pumping and decreased recharge due to drought conditions caused groundwater levels in the Santa Clara Subbasin to approach the subsidence thresholds in the GWMP outcome measure. The District and SJWC took swift and collaborative action to understand the issue and reduce pumping in key areas, resulting in a direct, positive effect on groundwater levels and minimizing the risk of resumed subsidence.

The groundwater storage outcome measure, derived from the Water Shortage Contingency Plan, has also proven effective. Based on projected end of year groundwater, the Board set water use reduction targets each calendar year between 2014 and 2016. The water retailers' response was impressive, reducing overall water use by 27% in 2015 compared to 2013 and using more treated water in lieu of groundwater pumping. Coupled with District efforts to secure supplemental surface water, this response caused groundwater levels to improve even with continued drought conditions. Countywide groundwater storage is projected to be near the Normal Stage (Stage 1) of the Water Shortage Contingency Plan at the end of 2016 despite five years of drought. This is a significant accomplishment and a testament to effective metrics and collaborative response.

The SJWC comment letter also asserts that the GWMP does not meet GSP requirements for measurable objectives. Measurable objectives serve as targets to achieve the basin sustainability goal within 20 years of implementation. Since groundwater conditions are sustainable in Santa Clara County, this concept is not applicable.

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> "For all monitoring, the District works to ensure the monitoring locations and data collected provide adequate information to facilitate a comprehensive understanding of groundwater conditions and support informed decision-making. This includes ongoing assessment of data gaps or redundancy, monitoring protocols, and data management, evaluation, and reporting. Specific wells or locations monitored may vary and evolve over time due to issues with well construction or access, but the overall programs provide strong and comprehensive data to assess conditions and trends within the Santa Clara and Llagas subbasins."

The District's monitoring network is extensive, and there are no significant data gaps in the monitoring programs or hydrogeologic conceptual model. Ongoing assessment and adaptation of the program to meet changing needs ensures the District will continue to collect data that supports thorough assessment of groundwater conditions and related decision making.

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The SJWC comment letter states that "SGMA prohibits local agencies in medium- and high-priority basins from adopting a new GWMP or amending an existing GWMP as of January 1, 2015" and references Water Code Section 10750.1(a). However, for the reasons set forth below, the District is confident that the 2016 GWMP can be submitted as an alternative to a GSP under Water Code Section 10733.6(b)(1) and Section 358.2(c)(1) of the GSP Emergency Regulations.

Section 10750.1(a) does not apply to the 2016 GWMP as the Plan was adopted pursuant to the authorities provided in the District Act. Water Code Section 10733.6(b)(1) allows local agencies to submit alternative plans that are developed pursuant to not only Part 2.75, but also some other law authorizing groundwater management. Here, the District Act is the authorizing law and, as such, any prescription against adopting or amending plans prepared pursuant to Part 2.75 does not apply to the 2016 GWMP.

Even if the 2016 GWMP was developed pursuant to Part 2.75, however, the prescription against adopting or amending a groundwater management plan still does not apply to a plan submitted as an alternative to a GSP. Section 10750.1(c) states:

> "This section does not apply to a plan submitted as an alternative pursuant to Section 10733.6, unless the department has not determined that the alternative satisfies the objectives of Part 2.74 (commencing with Section 10720) on or before January 31, 2020, or the department later determines that the plan does not satisfy the objectives of that part."

A fair reading of Section 10750.1(c) suggests that a groundwater management plan can be amended or adopted after January 1, 2015, as long as it is submitted as an alternative to a GSP pursuant to Section 10733.6, and DWR determines that the plan satisfies SGMA's objectives.

For the reasons outlined above, we respectfully disagree with the SJWC assertion that the GWMP is deficient and is ineligible to be submitted as an Alternative under SGMA.

The District and local water retailers have always had a collaborative relationship, and a continued, strong partnership will be needed as we implement the GWMP under the new framework of SGMA.

We look forward to our continued partnership in ensuring local water supply reliability and maintaining sustainable groundwater supplies.

Sincerely,

Norma J. Camacho
Interim Chief Executive Officer

5750 Almaden Expressway, San Jose, CA 95118-3614 | (408) 265-2600 | www.valleywater.org

Santa Clara Valley Water District

December 14, 2016

Ms. Katja Irvin
Sierra Club Loma Prieta Chapter
3921 East Bayshore Road, Suite 204
Palo Alto, CA 94303

Subject: Response to Sierra Club Comments on the Santa Clara Valley Water District 2016 Groundwater Management Plan

Dear Ms. Irvin:

Thank you for the Sierra Club comment letter received November 22, 2016 on the Santa Clara Valley Water District's Draft 2016 Groundwater Management Plan for the Santa Clara and Llagas Subbasins (GWMP). After considering oral and written stakeholder comments during the November 22, 2016 public hearing, the Board of Directors (Board) adopted the GWMP.

On or before January 1, 2017, the GWMP will be submitted to the Department of Water Resources (DWR) as an Alternative Plan in accordance with the Sustainable Groundwater Management Act (SGMA). Your comment letter, and this District response, will be included in an appendix to the GWMP. The Sierra Club comments are summarized below, along with the District response.

Comment: The GWMP does not adequately include the District's mission to provide water for the environment. With "One Water" the District is moving in the direction of integrated planning, and hopefully away from isolated plans that ignore important aspects of watershed-based planning.

The Sierra Club comment letter also provides several recommendations to modify GWMP basin sustainability goals, strategies, and outcome measures to address the protection and restoration of aquatic species in local streams. As described below, the GWMP provides information to support the District's One Water Plan, which is the primary forum to address related issues.

As the watershed steward for Santa Clara County, the District shares the Sierra Club's goal of protecting surface water flows and aquatic species within the authorities provided by the Santa Clara Valley Water District Act. The focus of the District's One Water Plan is to identify opportunities for improving water resource conditions that integrate the District's three mission components of water supply, flood protection, and stream stewardship. However, the One Water Plan does not replace the need for detailed plans related to individual mission components, such as the GWMP.

The District's One Water Plan, discussed in GWMP Section 6.3.4, addresses stream flow and habitat goals in Objectives F (Supportive Stream Flows: Stream Flows Support Natural Processes) and G (Resilient Habitats: Resilient Habitats and Resources for Native Species). In addition to the other programs and plans listed in GWMP Section 1.4.5 (Relation to Other

Our mission is to provide Silicon Valley safe, clean water for a healthy life, environment, and economy.

District Programs and Plans), the GWMP provides information that supports the District's One Water Plan.

An important goal of SGMA is to prevent the significant and unreasonable depletion of interconnected surface water due to groundwater pumping. As documented in GWMP Sections 2.2.3 and 3.2.3 related to groundwater/surface water interaction, the District is not aware of any areas where this undesirable result is occurring due to groundwater pumping. The GWMP also discusses District efforts to modify in-stream recharge operations to improve aquatic habitat protection through the Fisheries and Aquatic Habitat Collaborative Effort in Section 6.1.1.2.

Included in the GWMP is extensive discussion of District programs to augment the groundwater subbasins through managed and in-lieu recharge. As noted in the GWMP, District surface water releases for managed recharge (typically over 60,000 acre-feet per year) help maintain flows in local creeks, most of which would flow only intermittently otherwise. Existing groundwater management programs are effective in preventing the depletion of interconnected surface water due to overpumping.

The Sierra Club comment letter suggests that the District acknowledge environmental goals by modifying Strategy 4, which relates to coordinating with regulatory and land use agencies. However, the primary programs that ensure interconnected streams are not depleted due to overpumping are the managed and in-lieu recharge programs, which serve to maintain basin water levels and storage. District implementation of Strategy 1 (Manage groundwater in conjunction with surface water) includes working with environmental regulatory agencies to meet environmental needs.

Groundwater/surface water interaction is highly complex. District staff concurs with the Sierra Club's recommendation for further evaluation of groundwater/surface water interaction in the Santa Clara and Llagas subbasins, as noted in GWMP recommendation 4 (Maintain adequate monitoring programs and modeling tools), part (e) on page 8-4: "Improve understanding of surface water/groundwater interaction." This will include a more comprehensive evaluation of which stream reaches are gaining or losing, as recommended by the Sierra Club.

Specific Comments

The Sierra Club suggests that the word "stakeholders" be replaced with "water retailers" in the following statement on page ES-6: "Any significant policy or investment decisions would be developed and evaluated in consultation with local stakeholders, as the District does in current planning and budgeting processes." The District respectfully disagrees with the Sierra Club comment that only water retailers are involved in significant policy or investment decisions. All stakeholders have opportunities to provide input on policy or financial issues through publicly noticed meeting of the Board of Directors, Board Advisory Committees, and Board ad-hoc committees. Stakeholder engagement is also welcomed through various planning efforts, including the One Water Plan and upcoming Water Supply Master Plan.

At the November 22nd public hearing, the Board emphasized an ongoing commitment to working closely with water retailers and other stakeholders on SGMA policy issues, and referred consideration of continued stakeholder engagement on related issues to the Board's Water Conservation and Demand Management Committee. Staff will keep interested stakeholders apprised of related committee and stakeholder meetings.

The District appreciates your suggestions to improve the maps in Chapter 2.

Thank you for your interest in the District's 2016 GWMP. We look forward to working with you as the GWMP is implemented.

Sincerely,

Norma J. Camacho
Interim Chief Executive Officer

5750 Almaden Expressway, San Jose, CA 95118-3614 | (408) 265-2600 | www.valleywater.org

Santa Clara Valley Water District

December 14, 2016

Mr. Tom Zigterman
Director – Water Resources & Civil Infrastructure
Stanford University
327 Bonair Siding
Stanford, CA 94305-7272

Subject: Response to Stanford University Comments on the Draft 2016 Groundwater Management Plan

Dear Mr. Zigterman:

Thank you for the Stanford University (Stanford) comment letter received November 22, 2016 on the Santa Clara Valley Water District's Draft 2016 Groundwater Management Plan for the Santa Clara and Llagas Subbasins (GWMP). After considering oral and written stakeholder comments during the November 22, 2016 public hearing, the Board of Directors (Board) adopted the GWMP.

On or before January 1, 2017, the GWMP will be submitted to the Department of Water Resources (DWR) as an Alternative Plan in accordance with the Sustainable Groundwater Management Act (SGMA). Your comment letter, and this District response, will be included in an appendix to the GWMP. The Stanford comments are summarized below, along with the District response.

Comment #1: The GWMP needs to be more specific with respect to the process the District will use to evaluate new authorities and develop criteria for the exercise of those authorities.

The GWMP does not propose that new SGMA authorities related to pumping regulation or fee collection be implemented, as the existing groundwater management framework has led to sustainable groundwater conditions. This proven groundwater management strategy, including excellent collaboration, is the preferred approach to address future challenges. Stakeholder engagement beginning in 2017 will ensure that specific pumping regulation approaches are carefully considered and discussed at a time when basin conditions are sustainable. This will avoid rushed development during a crisis should pumping regulation ever be needed. The District intends to engage stakeholders in this evaluation as noted in the following statements on GWMP page 1-11:

> "The District plans to evaluate these new authorities in cooperation with water retailers and other stakeholders and consider what conditions might necessitate their implementation to sustainably manage groundwater into the future."

> "The District plans to work with water retailers and other interested stakeholders to identify the specific basin conditions that might trigger the need to control groundwater extraction and the most effective implementation mechanisms."

At the November 22nd public hearing, the Board emphasized an ongoing commitment to working closely with water retailers and other stakeholders on SGMA policy issues, and referred consideration of continued stakeholder engagement on related issues to the Board's Water Conservation and Demand Management Committee. Staff will keep water retailers and interested stakeholders apprised of related committee and stakeholder meetings.

Comment #2: The District's exercise of authority, including under SGMA as a groundwater sustainability agency, must comply with all applicable laws and cannot alter water rights.

For many decades, the District has managed groundwater sustainably under authorities provided by the Santa Clara Valley Water District Act (District Act) while complying with applicable laws and without altering water rights of pumpers. The GWMP does not propose implementing new SGMA authorities to allocate, curtail, or otherwise regulate pumping. Rather, it acknowledges these authorities as potential tools that may be needed in the future to avoid undesirable results, but highlights related limitations. As stated on page 1-12 (Section 1.4.2.2):

> "While these authorities are listed in SGMA, the Act also acknowledges limitations related to controlling pumping. Several related SGMA sections state that local agencies are not authorized to make a binding determination of the water rights of any person or entity.[1] Property owners and municipalities have rights to the reasonable, beneficial use of groundwater. Other pumpers have established appropriative rights, and may also claim prescriptive rights to local groundwater."

As acknowledged in the GWMP and noted by Stanford, careful consideration of water rights and land use authority will be a key focus and concern during the evaluation of SGMA authorities related to regulating pumping. Limitations on fees imposed pursuant to SGMA are also acknowledged on page 1-12 of the GWMP, and will be considered during evaluation.

The District and local water retailers have always had a collaborative relationship, and a continued strong partnership will be needed as we implement the GWMP under the new framework of SGMA. The District's commitment to engage water retailers and stakeholders in the evaluation of new SGMA authorities is documented in the GWMP and was clearly affirmed by the District Board.

We look forward to our continued partnership in ensuring local water supply reliability and maintaining sustainable groundwater supplies.

Sincerely,

Norma J. Camacho
Interim Chief Executive Officer

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[1] California Water Code §§10720.5(b) and 10726.8(b)

5750 Almaden Expressway, San Jose, CA 95118-3614 | (408) 265-2600 | www.valleywater.org

Santa Clara Valley Water District

December 14, 2016

Ms. Andrea Mackenzie
General Manager
Santa Clara Valley Open Space Authority
6980 Santa Teresa Blvd., Suite 100
San Jose, CA 95119

Subject: Response to the Santa Clara Valley Open Space Authority Comments on the Draft 2016 Groundwater Management Plan

Dear Ms. Mackenzie:

Thank you for the Santa Clara Valley Open Space Authority (Authority) comment letter dated November 22, 2016 on the Santa Clara Valley Water District's Draft 2016 Groundwater Management Plan for the Santa Clara and Llagas Subbasins (GWMP). After considering oral and written stakeholder comments during the November 22, 2016 public hearing, the Board of Directors (Board) adopted the GWMP.

On or before January 1, 2017, the GWMP will be submitted to the Department of Water Resources (DWR) as an Alternative Plan in accordance with the Sustainable Groundwater Management Act (SGMA). The Authority's comment letter, and this District response, will be included in an appendix to the GWMP. The Authority's comments are summarized below, along with the District response.

Comment #1: GWMP Section 1.4.5 (Relation to Other District Programs and Plans)

The Authority commented that the connection between the GWMP and the One Water Plan should be highlighted. In addition to the other programs and plans listed in Section 1.4.5 (Relation to Other District Programs and Plans), the GWMP provides information that supports the District's One Water Plan, which identifies opportunities for improving water resources conditions that integrate the District's three mission components of water supply, flood protection, and stream stewardship.

Comment #2: GWMP Sections 1.5.2 (Land Use Agencies), 1.5.3 (Local, State, and Federal Agencies), and 1.5.4 (Stakeholders)

The District agrees with the Authority's comment that partnerships with open space and resource conservation agencies are important in implementing the GWMP. In addition to the agencies shown on Figure 1-7, District collaboration with local open space and resource conservation agencies helps protect natural recharge and groundwater quality.

Comment #3: GWMP Section 4.1.2 (Groundwater)

The comment suggesting modification to Coyote Creek water right license language is noted and will be shared with District staff currently working with the State Water Resources Control Board to update the District's water rights licenses.

Comment #4: GWMP Section 4.3 (Conjunctive Water Management)

The Authority's comment recommends that the GWMP include language about the potential for increased natural recharge through ecological system restoration or enhancement. Through the One Water Plan, the District is evaluating potential water resource projects that integrate the District's water supply, watershed, and flood protection missions. This is also a goal of the formal Partnership Agreement between the District and the Authority. Through these efforts, the District looks forward to collaborating with the Authority on potential multi-objective projects in the Coyote Valley and elsewhere.

Comment #5: GWMP Figure 4.5 (Groundwater Budget for the Santa Clara and Llagas Subbasins, 2003-2012) and Figure 4-7 (Projected Future Groundwater Demands)

The Authority's comment letter references the 500 acre-foot per year deficit in the Coyote Valley water budget in the GWMP and notes opportunities to capture and recharge additional stormwater. The need for additional recharge in the Coyote Valley, or elsewhere in the Santa Clara and Llagas subbasins, is being evaluated as part of the District's Water Supply Master Plan. This plan will recommend investments needed to ensure continued water supply reliability and groundwater sustainability.

The District is currently partnering with the Authority on potential ecological restoration or enhancement projects in the Coyote Valley that may also have water supply benefits. In considering potential projects, water supply constraints and localized groundwater conditions must be carefully considered and analyzed, which may result in certain potential projects being infeasible. The District looks forward to our continued partnership to evaluate potential stormwater capture and reuse opportunities in the Coyote Valley. Stormwater reuse is also being evaluated on a broader scale as part of the District's Water Supply Master Plan, which is currently being developed.

Comment # 6: GWMP Section 4.5 (Future Demands)

The Authority's comment recommends that additional text be added to address uncertainty related to imported water supply and climate change and that the GWMP include strategies for increasing the operational storage capacity of the subbasins.

The District prepares regular, comprehensive plans to assess future water supplies/demands and recommend investments to ensure future water supply reliability through the Urban Water Management Plan and the Water Supply Master Plan, respectively. The Urban Water Management Plan evaluates future water supplies under normal, dry, and multiple dry years and discusses risks to water supplies, such as imported water availability and climate change. These plans lay the foundation for the District to address future water supply needs and risks to ensure continued water supply reliability. The District also actively assesses the risks of climate change through its Climate Change Framework Team.

The operational storage capacity for the Coyote Valley is estimated based on physical features of the groundwater subbasin, including area, specific yield (volume of water that can be released from an aquifer), and operational considerations that avoid adverse impacts. The District must consider both physical and operational conditions in assessing updated estimates of operational storage.

Comment #7: GWMP Section 5.1 (Sustainable Management Criteria)

The Authority recommends that the District consider enhanced stormwater recharge in the Coyote Valley as meeting multiple criteria, including optimizing reliability and minimizing land subsidence and salt water intrusion. As noted previously, the District looks forward to evaluating opportunities to implement projects that provide multiple benefits, including groundwater sustainability. However, water supply constraints and localized groundwater conditions must be carefully considered and analyzed, which may result in certain potential projects being infeasible.

Comment #8: GWMP Section 5.3 (Basin Management Strategies)

The District agrees with the Authority comment that there are other partnerships not listed that help protect natural recharge. In implementing Strategy 4, the District collaborates with resource conservation and open space agencies, such as the Santa Clara Valley Open Space Authority, to protect and enhance natural recharge.

Comment #9: GWMP Section 5.4 (Outcome Measures)

The Authority's comment recommends that the District set goals and performance measures to address basin urbanization. The District does not have land use authority and therefore cannot directly affect or limit urbanization. However, the District works with local land use agencies to support water supply reliability and water quality protection by reviewing general plans and certain land use proposals. The District is also a member of the Santa Clara Valley Urban Runoff Pollution Prevention Program, which encourages green infrastructure and low-impact development.

Comment #10: GWMP Section 6.1.3 (Protection of Natural Recharge)

The District appreciates the Authority's support on strategies and projects to protect natural recharge.

Comment #11: GWMP Section 6.1.4.4 (Pricing Policies)

The Authority recommends the District evaluate the appropriateness of a net-metering system for incentivizing landowners to develop facilities that increase stormwater recharge, similar to the pilot project being implemented by the Pajaro Valley Water Management Authority (PVWMA). The Authority also notes it would like to partner with the District to pursue grants to explore this and other projects with multiple benefits.

Unlike many basins experiencing chronic overdraft, the District's direct and in-lieu recharge programs have been successful in achieving long-term balance. With very highly constrained

supplies, the PVWMA is working to reduce long-term groundwater overdraft through conservation, recycling, and managed recharge, the latter of which focuses on PVWMA owned and operated recharge basins. As a potential supplement, the PVWMA is initiating a pilot program to offer incentives for landowners to develop managed recharge projects. District staff have discussed this program will PVWMA staff, and will continue to stay updated on the five-year pilot project participation, challenges, and successes as it progresses.

The need for additional recharge to meet projected future water supply shortfalls in Santa Clara County will be evaluated in the Water Supply Master Plan, which will be completed in 2017. If additional recharge is needed, this plan will identify where it is needed and which related projects are most feasible and cost-effective. The District will consider recharge by private landowners as a potential project during this process and will continue to track related efforts elsewhere. The District appreciates the Authority's offer to partner on grants as opportunities arise.

Comment #12: GWMP Section 6.1.6.3 (Planning to Meet Future Needs)

Please see response under Comment #6 above.

Comment #13: GWMP Section 6.1.7 (Asset Management)

The Authority's comment recommends including natural capital as essential infrastructure assets for water supply reliability. While the District agrees that natural capital such as local watersheds and groundwater subbasins are essential and priceless assets, the GWMP Section 6.1.7 addresses physical infrastructure assets owned, managed, and/or maintained by the District.

Comment #14: GWMP Section 6.3.4 (Watershed Management)

The District appreciates the Authority's support and continued engagement in the One Water Plan. Because the One Water Plan is still being developed, it is premature to include specific One Water components in the GWMP. Because the GWMP will be updated every five years, this will be addressed in future updates as appropriate.

Thank you again for providing comments on the Draft 2016 GWMP. We look forward to our continued partnership in ensuring local water supply reliability, maintaining sustainable groundwater supplies, and being good environmental stewards.

Sincerely,

Norma J. Camacho
Interim Chief Executive Officer

A4. GWMP Outreach – Public Notices

State school bond will bring windfall to area

← GUSD, A1

public education facilities. At last count, it had about 54 percent of the vote.

Enough money might flow from Prop. 51 to build not only a planned new grade school but also a new South Valley Middle School at a new location, instead of renovating the aging facility on the city's east side, according to one school official.

"We are talking, give or take, $100 million. It's not guaranteed, but I think it's looking pretty good," said GUSD trustee Mark Good.

"We have been in line and we have approvals for a number of projects already," he said.

Good was elected to a fourth term on Nov. 8 and was the runaway favorite. It's not likely outstanding ballots will change that outcome. He garnered 1,175 more votes than incumbent James Pace, the next-highest vote getter, according to an as-yet incomplete vote count.

Good raised the idea of new middle school not only because of possible state matching funds, but also because the proposed high speed rail project as currently planned might cut right through South Valley's campus on IOOF Avenue.

The distribution formula for state bond money is dollar-for-dollar reimbursement for new construction and 40 percent for renovation projects.

Pace agreed that state funds have the potential to accelerate and expand plans for improving school facilities.

"It makes it a lot easier for us not having to worry as much about where the funding is coming from," he said Monday.

The state bond money will be added to $170 million from Measure E, the local facilities bond sale approved in June by GUSD voters.

In the meantime, if vote counts do not change or change by only a few voters, it means Paul Nadeau will have finished second, third or tied in 19 of 35 precincts in the Gilroy school district's race for three seats, even though he dropped out of the race.

As of Monday, Nadeau was 117 votes behind the third place candidate, BC Doyle, a former Navy SEAL, retired GUSD union leader and maintenance worker.

Good, an attorney and former Gilroy police sergeant, garnered 10,312 votes, or 29.40 percent, 1,175 more votes than Pace, his nearest opponent, according to county vote counts as of Nov. 14.

Pace's finish also appears unlikely to change. He pulled in 9,137 votes, or 26.05 percent of the 35,078 votes cast for individual candidates and counted as of Monday evening.

The latest counts show Doyle received 7,873 votes or 22.44 percent. Nadeau had 7,756 votes, or 22.11 percent—just 0.33 percent behind Doyle, according to the count on Monday.

The count will be updated twice daily, at 9 a.m. and 5 p.m., until all ballots are counted.

Nadeau is director of operations at the nonprofit Navigator Schools, which runs public charter schools in Gilroy and Hollister.

After entering the race, he announced he was dropping out and would resign if elected because of a conflict of interest he said he found out about only after filing.

That is because the school board oversees and makes some decisions related to Navigator's local charter, Gilroy Prep.

This year, for example, the board is expected to consider a request to renew the school's charter to operate under the district's auspices.

But Nadeau pulled out of the race after the deadline for his name to come off the ballot. When that happens, the county is not required to put a note on ballot materials or to in any way notify voters.

That meant voters could still pick him, which they did by the thousands despite news reports he was no longer an active candidate and would resign if elected.

A resignation would throw the seat on the seven-member board open to an appointment by the board for a two-year term.

Brad Kava

St. Joseph's needs turkeys

St. Joseph's Family Center's Vicky Martin is hunting for turkeys. The organization feeds 1,000 people for Thanksgiving, but right now has only 90 turkeys. Martin says that when people don't hear that the organization is behind and in dire straits, they assume the coffers are full. They aren't. They need another 900 donations by Tuesday. You can drop turkeys off at St. Joseph's at 7950 Church St #A.

Public hearing notice

2016 Groundwater Management Plan

Santa Clara Valley Water District

Topic: 2016 Groundwater Management Plan

Who: Santa Clara Valley Water District (District)

What: Public Hearing to Consider Comments on the 2016 Groundwater Management Plan

When: Tuesday, November 22, 2016, 6:00 p.m.

Where: Santa Clara Valley Water District Board Room
5700 Almaden Expressway, San Jose, CA 95118

The District has sustainably managed groundwater in Santa Clara County for many decades through programs to protect and augment water supplies. In accordance with the Sustainable Groundwater Management Act (SGMA), Groundwater Sustainability Agencies (GSAs) such as the District must manage groundwater to avoid certain undesirable results, and must adopt a Groundwater Sustainability Plan or prescribed Alternative.

The District intends to update its comprehensive Groundwater Management Plan and submit it as an Alternative to the California Department of Water Resources by the statutory deadline of January 1, 2017. The District wishes to encourage active public involvement by holding a public hearing prior to adoption of this plan.

The District's 2016 Groundwater Management Plan (GWMP) documents important information on the Santa Clara and Llagas subbasins, District groundwater management objectives and strategies, programs and activities to sustain groundwater, and outcome measures to gauge performance. The 2016 GWMP updates and supersedes all previous District Groundwater Management Plans.

For more information about this hearing or this topic, please visit our website at **http://www.valleywater.org/groundwatermanagement** or contact **Vanessa De La Piedra** at **(408) 630-2788**.

Reasonable efforts will be made to accommodate persons with disabilities wishing to attend this public hearing. For additional information on attending this hearing, including requesting accommodations for disabilities or interpreter assistance, please contact the **Office of the Clerk of the Board** at **(408) 630-2277** at least three business days prior to the hearing.

10/2016_ET

LETTER OF INTENT

Hatch's storied run moves on to Cal

Cheeto Barrera
Sports Editor

Cheeto Barrera

SIGN ME UP *Joining Kiara Lyle, Jarod Hatch signs his Letter of Intent to swim for Cal next year.*

Sobrato's Jared Hatch had several options when he was looking at which school to commit to swim at starting next year.

Although he comes from a Cal family, Hatch kept an open mind as he travels to places like Michigan and Arizona among other places as he narrowed his options.

But on his way back from a visit at Arizona, the decision became clear. There was only one option for him and he didn't need to give it much more thought: He was going to become a Golden Bear.

"It was nice at other schools but when I went to Cal, I automatically knew I wanted to go there," Hatch said. "I grew up wanting to go up there. ... I just felt at home. The team was very welcoming. I didn't have to change my personality at all or check myself. I just went with the flow and everything was great."

Hatch made his decision official last week during a signing ceremony in the Sobrato quad during lunch as his family came out in large numbers to celebrate his accomplishment.

Hatch thanked his friends and family for their support during the years where he's committed so much of his life to getting better in the pool. He thanked his friends for being there even though he "can't hang out 102 percent of the time."

"I was very nervous. I was like oh my God, am I going to mess this up even though I'm just signing a piece of paper," Hatch said. "It's a big step and you always second guess yourself and I'm happy it's over."

Hatch owns every swimming record at Sobrato.

He has qualified for CCS in every event (even though he can only swim in four total). And that was just this last year.

"Definitely a lot of ups and downs," Hatch said of his journey. "It's just something you have to push through and you can't let anything keep you down for long. Working hard for my coach. He's been there for me since day one."

Hatch was even invited to swim for Team Philippines in the 2016 Rio Olympics.

An honor he politely turned down to keep his status with Team USA in tact.

Despite declining this year, Philippines has extended an offer for 2020. He said depending on how things break, he might go that route or he may swim for the US.

Hatch is a dual citizen because his mother is a Filipino citizen, which is how he ended up with the offer.

He said there will be a lot going into the decision, but will is keeping his options open.

Cheeto Barrera

A LOT OF THANK YOUS *Sobrato's Kiara Lyle thanks a crowd of family and friends during a signing day ceremony as she committed to dive for Cal Poly next year.*

LETTER OF INTENT

Lyle found a good fit with Cal Poly diving

Cheeto Barrera
Sports Editor

Kiara Lyle has not been diving that long.

She started her freshman year thanks in part to a friend who encouraged her to go out.

And as she signed her letter of intent to keep diving on the collegiate level for Cal Poly, the moment was not lost on her in the least.

"It's wild considering I just started diving four years ago," Lyle said. "I didn't think I was this good or good enough to dive at college at least. My hard work paid off."

Lyle signed her letter of intent during a lunchtime ceremony in the Sobrato quad with her family and friends looking on—and cheering on—in support.

Lyle was a gymnast for 10 years before she got into high school, which she said helped because many of the skills overlap.

"One of my best friends from gym left to go to diving and she really enjoyed it and she persuaded me to join," Lyle said. "At first I was really scared because water, that's not me."

As a result, Lyle has dove in three-straight CCS championship events and will be going for her fourth this spring.

Lyle said the choice to go to Cal Poly was easy thanks in large part to just how comfortable she felt at the campus and with the swimming and diving team.

"I went on a trip there and I really liked it. I fit in with the environment, I fit in with the team and really liked the coach," Lyle said. "I knew I belonged there."

Looking back, Lyle said she has some great memories of diving, especially some of the unique chances she's received over the years.

"I really liked going to travel meets and seeing all the high divers try to dive when they smack because it's not like club where everyone knows what they're doing," Lyle said.

Lyle has been active not just with diving, but also in school.

She was elected junior class and senior class president.

"It's been an awesome experience getting involved."

Public hearing notice

2016 Groundwater Management Plan

Santa Clara Valley Water District

Topic: 2016 Groundwater Management Plan

Who: Santa Clara Valley Water District (District)

What: Public Hearing to Consider Comments on the 2016 Groundwater Management Plan

When: Tuesday, November 22, 2016, 6:00 p.m.

Where: Santa Clara Valley Water District Board Room
5700 Almaden Expressway, San Jose, CA 95118

The District has sustainably managed groundwater in Santa Clara County for many decades through programs to protect and augment water supplies. In accordance with the Sustainable Groundwater Management Act (SGMA), Groundwater Sustainability Agencies (GSAs) such as the District must manage groundwater to avoid certain undesirable results, and must adopt a Groundwater Sustainability Plan or prescribed Alternative.

The District intends to update its comprehensive Groundwater Management Plan and submit it as an Alternative to the California Department of Water Resources by the statutory deadline of January 1, 2017. The District wishes to encourage active public involvement by holding a public hearing prior to adoption of this plan.

The District's 2016 Groundwater Management Plan (GWMP) documents important information on the Santa Clara and Llagas subbasins, District groundwater management objectives and strategies, programs and activities to sustain groundwater, and outcome measures to gauge performance. The 2016 GWMP updates and supersedes all previous District Groundwater Management Plans.

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Reasonable efforts will be made to accommodate persons with disabilities wishing to attend this public hearing. For additional information on attending this hearing, including requesting accommodations for disabilities or interpreter assistance, please contact the **Office of the Clerk of the Board** at **(408) 630-2277** at least three business days prior to the hearing.

10/2016_ET

Ad Number: 0005851957-02
Insertion Number: N/A
Size: 3 Col x 7.5 in
Color Type:

Advertiser: Santa Clara Valley Water Dist...
Agency: N/A
Section-Page-Zone(s): A-16-All
Description:

Public hearing notice

2016 Groundwater Management Plan

Santa Clara Valley Water District

Topic: 2016 Groundwater Management Plan

Who: Santa Clara Valley Water District (District)

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10/2016_BA

Ad Number: 0005851957-02
Insertion Number: N/A
Size: 3 Col x 7.5 in
Color Type:

Advertiser: Santa Clara Valley Water Dist...
Agency: N/A
Section-Page-Zone(s): A-11-All
Description:

Cambrian Resident
Friday, November 18, 2016

Public hearing notice

2016 Groundwater Management Plan

Santa Clara Valley Water District

Topic: 2016 Groundwater Management Plan

Who: Santa Clara Valley Water District (District)

What: Public Hearing to Consider Comments on the 2016 Groundwater Management Plan

When: Tuesday, November 22, 2016, 6:00 p.m.

Where: Santa Clara Valley Water District Board Room
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10/2016_BA

Ad Number: 0005851957-02
Insertion Number: N/A
Size: 3 Col x 7.5 in
Color Type:
Advertiser: Santa Clara Valley Water Dist...
Agency: N/A
Section-Page-Zone(s): A-10-All
Description:

LETTERS

Public hearing notice

2016 Groundwater Management Plan

Santa Clara Valley Water District

Topic: 2016 Groundwater Management Plan

Who: Santa Clara Valley Water District (District)

What: Public Hearing to Consider Comments on the 2016 Groundwater Management Plan

When: Tuesday, November 22, 2016, 6:00 p.m.

Where: Santa Clara Valley Water District Board Room
5700 Almaden Expressway, San Jose, CA 95118

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10/2016_BA

LETTERS

Thank you to County Fire for rescue

Kudos to County Fire Capt. Dave Mayfield and his crew. Early Sunday morning on Nov. 6 my daughter, husband and I stepped into an elevator at Kirk's Mini Storage in Campbell. We pressed the button for the second floor. Just then, the lights went out and the elevator quit.

We pressed the alarm, but no one was in the building to hear it. Fortunately, our cell phones had service in the elevator. Our 911 call was transferred to County Fire, and within a few minutes Mayfield was outside the elevator door talking to us. He took charge of the situation and determined the problem was a preplanned electricity shutoff on Dillon Avenue for construction.

He got the electricity turned back on within the hour. Another pleasant surprise was that the elevator company phone number was answered instantly and a repair person dispatched.

We would like to thank County Fire, and let Campbell residents know they have a professional crew on duty for their protection. We really appreciated their help.

Finally, one of the services County Fire provides is an annual inspection of businesses. That hour in the dark elevator with nothing but our cell phones for communication taught us many things about elevator safety. We hope some improvements can be made for the benefit of the next folks stranded somewhere as we were.

CYNTHIA BARRY
Saratoga resident

Speak Out Policy

Lately the Speak Out section of the opinion page has been a little quiet in Campbell. But when you, the reader, voice your opinion, the page turns into a lively dialog that is specific to Campbell.

We welcome your letters and believe this is one of the most important pages in the newspaper, because this is where you can let the community know how you feel about a particular issue or topic. So don't hesitate to email or write. We look forward to hearing from many of you in the future. Email us at mwilson@bayareanewsgroup.com.

— Editor

Letters to the Editor

The Campbell Reporter welcomes letters commenting on its coverage and on topics of local interest. Please sign your letter and provide your address and daytime phone number so we can reach you in case of questions. We encourage letters to be a maximum of 250-300 words. Letters can be sent via e-mail to mwilson@bayareanewsgroup.com. Deadline is Wednesday.

The Campbell Reporter

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Silicon Valley Community Newspapers

Published every Friday by Silicon Valley Community Newspapers. Declared a newspaper of General Circulation by Santa Clara County Superior Court on Dec. 22, 1922. (Decree No. 725878)

Offices located at:
1095 The Alameda
San Jose, CA 95126
Telephone: 408.200.1000
Web: www.community-newspapers.com
Office hours: Mon.-Thurs. 8:30 a.m. to 4 p.m., Fri. 8 a.m. to 3 p.m.

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BayArea NewsGroup

The Campbell Reporter
Friday, November 18, 2016

Ad Number:	0005851957-02
Advertiser:	Santa Clara Valley Water Dist...
Insertion Number:	N/A
Agency:	N/A
Size:	3 Col x 7.5 in
Section-Page-Zone(s):	A-29-All
Color Type:	
Description:	

Cupertino Courier

Friday, November 18, 2016

Public hearing notice

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Santa Clara Valley Water District

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10/2016_BA

Jose City Council Approves Raising Minimum Wage to $15 by 2019

if. – The San José City Council
lay November 15, 2016 to raise its
e to $15 per hour by January 1, 2019
gional effort to ensure more Silicon
s benefit from the region's growing
perity.

minimum wage will provide a
t for the thousands of hard-working
r community who are struggling
th the extraordinarily high cost of
n Valley," said Mayor Sam Liccardo.
rward together with many of our
ies, even more residents will benefit
wage and we will create a more level
r businesses throughout the region."

minated an effort launched by
lo in September 2015 to forge a
ach to raising the minimum wage
licon Valley. Since then, Mayor
onvened a coalition of mayors from
con Valley, as well as representatives
ciation of Santa Clara County, to
n economic analysis studying the
tential wage increase and to develop
posal that each elected leader could
eir city councils.

minimum wage increase matches
ons from the Cities Association and

coalition of mayors to reach a $15 minimum wage by January 1, 2019 in three steps ($12 in 2017, $13.50 in 2018, and $15 in 2019), with automatic annual cost of living increases (based on the CPI, up to 5%) every year thereafter.

The City Council adopted a July 1 implementation date for the initial 2017 wage increase so that the tens-of-thousands of San Jose businesses and non-profits have time to plan for the wage hike. The council also approved a narrow exemption for seasonal job training/educational programs that target disadvantaged youth.

San José joins a number of other Santa Clara County cities who have taken steps towards a $15 minimum wage. Cupertino, Los Altos, Mountain View, Palo Alto and Sunnyvale have adopted ordinances to raise the minimum wage to $15 per hour by 2019 (Mountain View and Sunnyvale are on track to reach $15 by 2018). In addition, City Councils in Campbell, Milpitas, Santa Clara and Saratoga are expected to take up $15 minimum wage proposals in the next few months.

According to the economic analysis commissioned by the City of San José, raising the minimum wage to $15 by 2019 will generate an average pay increase of $3,000 for 115,000 San José workers (31 percent of workforce), including a ripple effect for those who earn $15-$17.50 per hour.

Notificación de Audiencia Pública

Plan Administrativo de Aguas Subterráneas del 2016

Santa Clara V
Water District

Topic: Plan Administrativo de Aguas Subterráneas del 2016

Who: Distrito de Aguas del Valle de Santa Clara (Distrito)

What: Audiencia Pública para Considerar Comentarios sol
el Plan Administrativo de Aguas Subterráneas del 2

When: Martes, 22 de Noviembre, 2016, 6:00 p.m.

Where: Salón de la Directiva del Distrito
de Aguas del Valle de Santa Clara
5700 Almaden Expressway, San José, CA 95118

El Distrito ha sostenido la administración de aguas subterráne
en el Condado de Santa Clara por muchas décadas a través
de programas para proteger y aumentar el suministro de agu
De acuerdo al Acta de Administración Sostenible de Aguas
Subterráneas (SGMA), Agencias de Sostenimiento de Aguas
Subterráneas (GSAs) como la del Distrito, deben administrar
agua subterránea para evitar ciertos resultados indeseables, y
deben adoptar un Plan de Sostenimiento de Aguas Subterráne
o una Alternativa prescrita.

El Distrito intenta actualizar su Plan Comprensivo de
Administración de Aguas Subterráneas y someterlo como una
Alternativa al Departamento de Recursos de Aguas de Califor
para la fecha límite del 1 de enero, 2017. El Distrito desea
incentivar la participación activa del público llevando a cabo
una audiencia pública antes de adoptar este plan.

El Plan Administrativo de Aguas Subterráneas del 2016 del
Distrito (GWMP) documenta información importante sobre las
sub-cuencas Santa Clara y Llagas, los objetivos y estrategias
de la administración de Aguas Subterráneas, programas y
actividades para sostener el agua subterránea, y medidas de
los resultados para calibrar el desempeño. El GWMP del 201
actualiza y sobrepasa todos los previos Planes de Administra
de Aguas Subterráneas del Distrito.

Para más información sobre esta audiencia y este tópico, por
favor visite nuestra página web al **http://www.valleywater.or
groundwatermanagement** o contacte a **Vanessa De La Piedra
(408) 630-2788**.

Se harán esfuerzos razonables para acomodar a personas
discapacitadas que deseen atender esta audiencia pública.
Para información adicional sobre cómo atender esta audienci
incluyendo los pedidos de acomodación por discapacidad o
asistencia de interprete, por favor contacte la **Office of the Cle
of the Board** al **(408) 630-2277** por lo menos tres días hábile
antes de la audiencia.

BRIEFS

From Page 29

members will be invited to join students on the field for a firsthand marching band and color guard experience.

Their show, titled "Déjà Vu," is an original work by composers and drill designers John Mapes and Ian Grom. Recurring musical themes and visual presentations are woven and morphed throughout the three-movement show, giving audiences a déjà vu experience. The music features trumpet solos by Michael Vronsky and baritone solos by Timothy McAfee.

The 80-member Marching Band and Color Guard has been working on its show since the second week of August. Students have spent more than 20 hours per week together rehearsing and performing. Last year, the band finished its season as one of the top eight bands in its class among Western Band Association (WBA) ensembles, which comprises bands from five western states. So far this year, the band has earned the Best Visuals caption award and placed second and third overall at regional WBA competions.

The Fall Finale is scheduled Saturday at the Los Altos High School football stadium, 201 Almond Ave. Fundraising events will begin at 10:15 a.m., followed by the show at 11 a.m. Proceeds will support all music programs at Los Altos High.

Admission is free and open to the public.

For more information, visit mvla.net/LAHS/Department/121-Performing-Arts/Portal/Instrumental-Music-Booster.

Woodside Priory play features local students

Woodside Priory School is scheduled to perform "Much Ado About Nothing" Thursday through Sunday, with a number of Los Altos students in the cast.

Set in modern-day Italy, the play follows two of playwright William Shakespeare's most beloved characters, Beatrice and Benedick, witty people who hate each other with an intense – and much expressed – loathing. Friends of the two sworn enemies conspire to make them fall head-over-heels in love. At the same time, young Claudio and Hero have fallen in love, but because of the evil Don John, all may be lost and one of them may die. Throw in a police force that couldn't find itself on a clear, sunny day with a flashlight, and the production offers a mix of slapstick, verbal wit and action.

Los Altos residents in the cast include Rachel Goines, Hannah Sheridan, Arjun Kumar and Mark Theis. Stagehands from Los Altos include Makae Wilcox, Asa Gutow, Matt Gutow and Gavin Thompson.

Performances are scheduled 7 p.m. Thursday, Friday and Saturday, and 2 p.m. Sunday in Woodside Priory's Rothrock Performance Hall, 302 Portola Road, Portola Valley.

The show is appropriate for all ages.

Tickets are $15 adults, $5 students.

Tickets may be purchased at the door or online at priory.ticketleap.com/much-ado.

Woodside Priory students are slated to perform a modern-day version of William Shakespeare's "Much Ado About Nothing." Several Los Altos students are featured in the cast.

KELLY SARGENT/SPECIAL TO THE TOWN CRIER

Ad Number: 0005851957-02
Advertiser: Santa Clara Valley Water Dist...
Insertion Number: N/A
Agency: N/A
Size: 3 Col x 7.5 in
Section-Page-Zone(s): A-30-All
Color Type:
Description:

Public hearing notice

Santa Clara Valley Water District

2016 Groundwater Management Plan

Topic: 2016 Groundwater Management Plan

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Color Type:
Advertiser: Santa Clara Valley Water District
Agency: N/A
Section-Page-Zone(s): B-2-All
Description:

The Mercury News
Tuesday, November 15, 2016

Park

Continued from Page 1

four competing design groups and make a decision, and two proposals — CMG's and that of !melk Fr-ee — came out as the top picks. The jury reconvened this month to hash it out and the competitors were notified of the recommendation Nov. 4.

However, a protest was received from one of the teams on Sunday, the final day it could be filed, and that may take weeks to resolve. The city isn't saying yet which group filed the protest, but you can bet it wasn't CMG.

It's another drama in the quest to reinvent one of San Jose's oldest public spaces. Once considered a downtown jewel, St. James Park has gained a reputation over the past few decades for a growing homeless population despite efforts to make it more family-friendly.

CMG's concept, titled "Remember/Imagine," includes the Park Paseo, a path through the park that connects its existing monuments such as the McKinley statue and the Robert F. Kennedy memorial forum with new spaces and amenities including a dog park, a picnic grove and a playground. A fountain in the park's center reimagines the fish sculptures that once occupied the current, dilapidated fountain — elevating them and using them to spout water onto playing kids below. It's a nifty update that takes a good cue from the popular geyser fountain at Plaza de Cesar Chavez.

A key feature in all the designs was the inclusion of an outdoor performance pavilion in the northeast corner of the park — along St. James Street — that will be jointly developed by CMG, the city, Friends of Levitt Pavilion San Jose and the Mortimer & Mimi Levitt Foundation. The Levitt Pavilion venue will host at least 50 free concerts in the park every year and will feature a huge lawn for seating — and be available for other uses like yoga or games when there's not a concert.

CMG's initial design also closes North Second Street to car traffic and proposes moving the southbound St. James VTA light-rail station south of St. John Street. Those changes and the estimated price tag on the initial design — $41 million — were probably the two biggest challenges on the plan's horizon, at least until the protest was filed.

Contact Sal Pizarro at spizarro@bayareanewsgroup.com.

COURTESY CITY OF SAN JOSE

Above is an artist's rendering of an overhead view of San Jose's St. James Park as reimagined by CMG Landscape Architecture and the firm's design partners. CMG and its partners submitted one of four proposals under consideration for the redesign.

Lawsuit

Continued from Page 1

ney Rick Doyle is recommending a settlement, which the City Council is expected to approve Tuesday.

The settlement includes a $4 million payment from Trammell Crow to the city. San Jose would use that money to acquire certain properties to the north of the SAP Center for public parking. It's unclear how many new spaces would be provided.

"The city will make good faith efforts to purchase these properties with the provided funds," Doyle wrote in a memo. "If the city is able to acquire all the properties, the city will also lease certain adjoining (Sharks Sports & Entertainment) properties for $1 /month and construct a surface parking lot that will be operated by SSE for the purposes of public parking."

Doyle confirmed Monday that the planned acquisition of nearby properties will not replace all 835 of the parking spots that would be lost.

"There will be further discussions down the road on other needs, but this is a good start," he said. "This will allow us to address the parking issue and it's something we've contemplated for a while. BART is coming down there and there's a lot of future development happening."

As part of the settlement, Sharks Sports & Entertainment will give San Jose an option to purchase the properties if the city constructs a parking garage or upon termination of its Arena Management Agreement. "The city will also make efforts to secure additional parking for SSE employee parking," Doyle wrote.

Cynthia Langhorst, a Trammell Crow spokeswoman, said final details are still being worked out, but "there is substantial agreement amongst the parties."

Bernard Vogel, III, CEO of the Silicon Valley Law Group, which represents Sharks Sports & Entertainment, declined to comment Monday.

But Sean Morley, who represents the Sharks' parent company, said the group is happy the suit is being resolved so quickly and the organization "can now return its focus to operating one of the best sports and entertainment venues in the country, which remains the single biggest economic engine in downtown."

"SSE is pleased Trammell Crow and the City are committing to improve parking opportunities close to SAP Center," Morley said in an email. He added that the settlement also ensures that the city continues to meet its obligation to provide parking within 1/3 mile of the arena.

One longtime land use consultant said the lawsuit may have strained the relationship between San Jose and the Sharks, but the proposed settlement appears to be a good deal for the parties.

"The economic benefit to Trammell Crow is probably a tenth of what it would cost them to replace those spots," said Bob Staedler, a principal at Silicon Valley Synergy, who estimates replacing 835 parking spots would cost nearly $40 million.

But, Staedler added, the Sharks for years have unsuccessfully tried to buy four private parcels near the SAP Center for parking and it's possible the city might help with that effort as part of the settlement.

"It's going to be interesting to see how involved the city will be as far as acquisition," Staedler said. "That's what it will come down to."

Contact Ramona Giwargis at 408-920-5705.

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10/2016_ET

MV voters display liberal streak

By Kevin Forestieri

A s the final votes from the presidential election con-tinue to trickle in, there clear signs that Mountain w voters are generally more ral and more supportive of taxes when compared to the of Santa Clara County, and state as a whole.

resident-elect Donald Trump have scored an upset victory he electoral college, but Dem-atic candidate Hillary Clinton unced Trump locally, accord- to election results from the ta Clara County Registrar of ers. As of Monday, Clinton won support from 61 percent Californians, 73.3 percent of ta Clara County residents 80.4 percent of Mountain w residents, making it a larger nocratic blowout than in both 2012 and 2008 elections.

n education, more than -thirds of Mountain View dents supported extending mporary sales and income to fund public schools — her than the rest of the nty and the state — and a jority of city voters favored position 51, which would erate $9 billion in state ds for new school construc-. Conversely, a majority of ta Clara County residents opposed the state bonds.

Efforts to repeal the death penalty in California fell short for the second time in four years, after Proposition 62 failed to reach a majority, but Mountain View residents overwhelming favored ending capital punishment. About 67.3 percent of city voters voted "Yes" on Proposition 62. In the same vein, Proposition 66 — which would speed up the lengthy decades-long death row process — was largely rejected by Mountain View voters despite winning over a slim majority of state voters.

Mountain View voters also rejected changes to the plastic bag ban under Proposition 65, which was put forward by the plastic bag industry, with only 46.1 percent of city voters supporting the measure, and instead strongly favored Proposition 67 — which upholds existing plastic bag bans — with a solid 72 percent of voters.

City residents supported the cigarette tax proposed under Proposition 56, regulations on ammunition sales under Proposition 63 and marijuana legalization under Proposition 64. A very slim majority of Mountain View voters turned down Proposition 61, which would limit prescription drug prices purchased by state agencies by tying it to the amount paid by the U.S. Department of Veterans Affairs. ■

How Mountain View voted

		California	Santa Clara County	Mountain View
President	Hillary Clinton Donald Trump	61% 33.1%	73.3% 21.3%	80.4% 13.7%
Proposition 51	$9B in school bonds	53.9%	46.3%	53.8%
Proposition 52	Medi-Cal hospital fees	69.6%	71.7%	74.5%
Proposition 53	Vote for projects over $2 billion	48.5%	46.3%	36.1%
Proposition 54	72-hour public display of bills	64.4%	66.7%	65.5%
Proposition 55	Education tax extension	62.1%	66.25%	67.9%
Proposition 56	Cigarette tax	63.1%	73%	77.7%
Proposition 58	Multilingual education	72.5%	74.8%	77.9%
Proposition 59	Oppose Citizens United	52.5%	61.4%	67.8%
Proposition 60	Condoms in adult films	46%	44.3%	35.2%
Proposition 61	State-bought prescription drug prices	46.2%	50.1%	49.6%
Proposition 62	Repeal death penalty	46.1%	54.1%	67.3%
Proposition 63	Ammunition regulations	62.7%	74.3%	78.8%
Proposition 64	Marijuana legalization	56.1%	57.8%	67.7%
Proposition 65	Changes to plastic bag ban	44.7%	51.1%	46.1%
Proposition 66	Streamline death penalty process	50.9%	47.6%	36.5%
Proposition 67	Uphold plastic bag ban	52.1%	65.4%	72%

Source: Santa Clara County Elections Office and California Secretary of State

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10/2016_EF

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Topic: 2016 Groundwater Management Plan

Who: Santa Clara Valley Water District (District)

What: Public Hearing to Consider Comments on the 2016 Groundwater Management Plan

When: Tuesday, November 22, 2016, 6:00 p.m.

Where: Santa Clara Valley Water District Board Room
5700 Almaden Expressway, San Jose, CA 95118

The District has sustainably managed groundwater in Santa Clara County for many decades through programs to protect and augment water supplies. In accordance with the Sustainable Groundwater Management Act (SGMA), Groundwater Sustainability Agencies (GSAs) such as the District must manage groundwater to avoid certain undesirable results, and must adopt a Groundwater Sustainability Plan or prescribed Alternative.

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For more information about this hearing or this topic, please visit our website at **http://www.valleywater.org/groundwatermanagement** or contact **Vanessa De La Piedra** at **(408) 630-2788**.

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10/2016_EI

BUTTERNUT HUMMUS DEVILED EGGS

The deviled eggs from Erin Gleeson's latest cookbook "The Forest Feast Gatherings: Simple Vegetarian Menus for Hosting Friends & Family."

This recipe was adapted by Gleeson from the butternut hummus and hummus-tomato deviled eggs recipes.

- Peel and halve 12 hard-boiled eggs, then remove and set aside yolks.
- Mash yolks in a bowl with 2 tablespoons of the butternut hummus (or substitute regular hummus), 2 tablespoons mayonnaise and 2 tablespoons mustard (can be prepared one day ahead).
- Spoon mixture into egg white halves.
- Garnish each with a grape-tomato half, plus a sprinkle of paprika and salt. (Gleeson replaced the grape tomato with a few pomegranate seeds for her twist on this recipe).

Erin Gleeson

(continued from previous page)

Gleeson, who for the first time will be hosting her family's Thanksgiving meal this year, said that it is a tradition for her family to cook together all day. One of her cousins often makes deviled eggs and Manhattan cocktails for the cooks.

In that spirit, she walked the Weekly through a combination of two of her recipes in her latest cookbook: deviled eggs with butternut hummus, topped with pomegranate seeds. The appetizer is ideal for snacking during upcoming holiday gatherings and — importantly — requires a minimum of that precious oven time. The butternut gives the hummus an even creamier texture and a nutty flavor while the pomegranate seeds complement the egg and hummus with a bit of crunch and tart sweetness — and a festive flair.

Gleeson has thought through every aspect of gatherings, from prep time to the way that dishes work together to create a warm and inviting tablescape, and includes stress-free ideas for how to put together last-minute decorations for the table by using colorful produce and foraged items.

The idea stems from a Gleeson family Thanksgiving tradition. Right before the evening meal at sunset, everyone ventures outside, aprons on, a glass of wine and a paper bag in hand, and picks flowers or gathers bits of nature that have fallen on the ground — bark, pinecones, acorns, different types of leaves. They decorate the table, along with candles and other edibles sprinkled throughout.

"We (also) usually buy a bunch of pomegranates and persimmons — something kind of colorful — some fresh produce to mix in there and little votive candles, and that's the centerpiece every year," she said.

Gleeson has plans to explore other creative ventures for The Forest Feast, including launching an online stationery shop this month. In an interview, she reflected on what has led to The Forest Feast's success.

"I had so many other little projects that didn't take off, and I was sort of like 'what was it about this one that people were drawn to somehow?' I think it was that I was drawn to it more ... I was just doing what was fun, and that idea of remembering what's fun — I think if you can hold on to that, it can take you in a good direction," she said.

Gleeson will be signing copies of her new book on Monday, Nov. 20, at 5 p.m. at Books Inc. in Mountain View. ■

Editorial Assistant & Intern Coordinator Anna Medina can be reached at amedina@paweekly.com. She once worked as an unpaid studio assistant to Erin Gleeson.

WATCH ONLINE PaloAltoOnline.com

To watch a video of Gleeson assembling the recipe, go to paloaltoonline.com/arts.

Ad Number: 0005851957-02
Insertion Number: N/A
Size: 3 Col x 7.5 in
Color Type:
Advertiser: Santa Clara Valley Water Dist...
Agency: N/A
Section-Page-Zone(s): A-17-All
Description:

Public hearing notice

2016 Groundwater Management Plan

Santa Clara Valley Water District

Topic: 2016 Groundwater Management Plan

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10/2016_BA

Rose Garden Resident
Friday, November 18, 2016

SARATOGA NEWS
Friday, November 18, 2016

STYLE

Delmar, Ellen Wrensch celebrate 50th anniversary with reception

By Dick Sparrer

PHOTOGRAPH COURTESY OF MARDELL GULLY

Ellen and Delmar Wrensch will celebrate their 50th wedding anniversary with a reception on Nov. 19. They were married on Nov. 25, 1966.

Joann's loss was certainly Ellen's gain. At least, that's the way Ellen and Delmar Wrensch see things.

Turns out that Del wasn't about to miss out on a date night, so when Joann stood him up, he decided to ask her roommate out for a date. Joann's roommate? Ellen Drake.

A few days later they went out to a movie, and that was the start of a beautiful relationship that has lasted more than half a century.

Ellen and Delmar will celebrate their 50th wedding anniversary on Nov. 19 at an evening reception hosted by their children, Mardell Gully and Tyson Wrensch. It's an event to commemorate a bond forged on Nov. 25, 1966, in their home state of Wisconsin.

Ellen was an only child, born on Oct. 10, 1944, in Milton, Wis., and just two months later Del was born on Dec. 21 in Waterton, Wis., the oldest of four children. Ellen grew up in Milton and Del in Waterton. Del graduated from the Wisconsin School of Electronics in Madison in September of 1966. Two months later, the couple married, and a day after the ceremony flew to California where Del was already working for Lockheed.

He took a detour from his career path when he was drafted in 1969 and sent to Vietnam in 1970 where he served as a communications combat engineer. He returned to Lockheed in 1971, where he worked until his retirement in 1999.

Ellen worked part-time in school food services for 24 years, but her priority was as a stay-at-home mother.

The Wrensches have lived in Cupertino for 33 years, and their two children are both graduates of Monta Vista High School. Tyson, 44, a senior account executive for Gartner Company in Las Vegas, graduated from Santa Clara University. Mardell, 42, a broker associate Realtor at Bennion Deville Homes in Orange County, is a graduate of Loyola Marymount University, where she played volleyball and is a member of the school's Athletic Hall of Fame. Mardell and her husband Sean have two children, Avery, 5, and Olivia, 3.

"They are simple, salt of the earth, true at heart Midwesterners; good, nice, neighborly people who are responsible, dependable, happy and loving," said their daughter Mardell.

Not so simple, though, that they don't enjoy traveling. In fact, over the years they have been to all seven continents, visiting an amazing 43 countries.

"Experiences are more important than things, and I love that about them," said Mardell. "They live life to the fullest."

Creative ways to substitute old foliage and stalks for cut flowers

Much of the color in the garden through autumn and winter is provided by foliage. Some foliage turns color as the weather gets cooler. Some had been blue, gray, gold, red, bronze or variegated all year, and just happen to get noticed more now that there is not much other color provided by flowers. There are a few flowers that bloom now or even later in winter, but not nearly as many as there were in spring and summer.

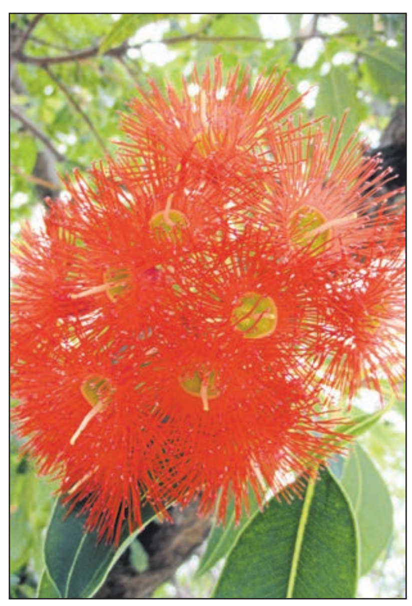
Coral bark Japanese maple and red twig dogwood display colorful defoliated stems as the weather gets cooler. The colorful berries of firethorn (pyracantha), cotoneaster and toyon will ripen about the same time, providing bright red color until the birds get them. Otherwise, there might not seem to be much more to cut and bring into the home to substitute for cut flowers and add to all the colorful foliage, twigs and berries.

TONY TOMEO

Well, this is where things get less horticultural and more creative. All those old flowers and flower stalks that should get pruned off, and maybe a few old leaves, might be good for more than compost. Blooms of hydrangea, Queen Anne's lace and lavender can be cut just as they begin to deteriorate, and hung upside-down to dry. They lose much of their color, and shrivel somewhat, but are nice options to fresh flowers.

Old flower stalks of New Zealand flax and lily-of-the-Nile have striking form once plucked of tattered flower parts and seed capsules. New Zealand flax stalks are tall and straight. Lily-of-the-Nile stalks are like starbursts on sticks. If the natural color lacks appeal, they can be spray-painted. Seed capsules of red flowering gum (eucalyptus) dry in loose clusters with stems that are long enough to arrange like cut flowers.

Pine cones, magnolia grenades (seedpods) and sweetgum maces (seedpods) that fall from their stems can be drilled and attached to sticks. There are no substitutes for real flowers, but there are no limits to creative and even weird alternatives.



Because of its resiliency, drought tolerance and adaptability to the local environment, the red flowering gum makes for a good street tree. It rarely gets more than 30 feet tall and has a stout branch structure.

Tree of the Week: Red flowering gum

We all know about the bad reputation of eucalypti, especially the notorious blue gum. They are too big, too aggressive, too messy, too structurally deficient, and in groups, they are too combustible. However, there are several eucalypti that are not only appropriate for local home gardens but because of their resiliency, drought tolerance and adaptability to the local environment, should be more popular than they are.

Red flowering gum, Eucalyptus ficifolia (which is now known as Corymbia ficifolia), rarely gets more than 30 feet tall and broad, with a stout branch structure. It is a good street tree because the roots are usually deep and complaisant. Constantly falling leaves and seed capsules are somewhat messy, but the mess is proportionate to the compact canopy, and is probably worth the spectacular summer and autumn bloom.

Fuzzy trusses of staminate flowers are usually some shade of red, but might be pink, salmon, reddish orange or pale white. Trees must be a few years old to bloom, so color might be a surprise when young trees bloom for the first time. Profusion of bloom can be variable from year to year, or from one portion of the canopy to another. Tree size and form are also variable. Some are vigorous while others are more compact.

Horticulturist Tony Tomeo can be contacted at 408.551.9931 or lghorticulture@aol.com.

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Public hearing notice

2016 Groundwater Management Plan

Santa Clara Valley Water District

Topic: 2016 Groundwater Management Plan

Who: Santa Clara Valley Water District (District)

What: Public Hearing to Consider Comments on the 2016 Groundwater Management Plan

When: Tuesday, November 22, 2016, 6:00 p.m.

Where: Santa Clara Valley Water District Board Room
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10/2016_BA

Thông Báo Điều Trần Công Khai

Santa Clara Valley Water District

Kế hoạch Quản Trị Nguồn Nước Ngầm 2016

Đề tài: Kế hoạch Quản Trị Nguồn Nước Ngầm 2016

Ai mời: Khu Thủy Cục Santa Clara

Việc gì: Thảo luận và đón nhận ý kiến về Kế hoạch Quản Trị Nguồn Nước Ngầm 2016

Khi nào: Thứ Ba, ngày 22/11/2016 vào lúc 6:00 giờ tối

Tại đâu: Santa Clara Valley Water District Board Room
5700 Almaden Expressway, San Jose, CA 95118

Khu Thủy Cục đã liên tục quản trị nguồn nước ngầm trong phạm vi quận hạt Santa Clara từ nhiều thập niên qua để Bảo Vệ và Gia Tăng Lượng Nước Cung Ứng. Theo luật Sustainable Groundwater Management Act (SGMA), các cơ quan quản trị bền vững nguồn nước ngầm như Khu Thủy Cục phải quản lý nguồn nước ngầm để tránh những hậu quả không mong muốn, và phải chấp nhận một kế hoạch nguồn nước ngầm bền vững hoặc một kế hoạch thay thế.

Khu Thuỷ Cục dự định cập nhật Kế hoạch toàn diện quản lý nguồn nước ngầm và đệ nạp như là một kế hoạch thay thế lên Nha Thủy Cục California theo thời hạn luật định hạn chót là ngày 1 tháng 1, năm 2017. Khu Thủy Cục mong muốn khuyến khích công chúng tham gia tích cực qua một buổi điều trần công khai trước khi thông qua kế hoạch này.

Kế hoạch quản lý nguồn nước ngầm năm 2016 (GWMP) của Khu Thủy Cục ghi nhận các dữ kiện quan trọng về các lưu vực thứ cấp Santa Clara và Llagas, mục tiêu và chiến lược quản lý nguồn nước ngầm của Khu Thủy Cục, chương trình và các hoạt động để duy trì nguồn nước ngầm, và các biện pháp đo lường và lượng định kết quả. Kế hoạch GWMP năm 2016 cập nhật và thay thế tất cả các kế hoạch quản lý nguồn nước ngầm từ trước đến nay.

Để biết thêm tin tức về buổi điều trần này hoặc đề tài này, xin vào trang mạng của chúng tôi tại **http://www.valleywater.org/groundwatermanagement** hoặc liên lạc với **Vanessa De La Piedra** tại số **(408) 630-2788.**

Mọi nỗ lực sẽ được thực hiện hầu giúp những người bị khuyết tật có thể tham dự. Để biết thêm chi tiết hầu tham dự buổi điều trần, kể cả yêu cầu giúp đỡ người khuyết tật hay giúp thông dịch, xin liên lạc **Văn Phòng Thư Ký Ban Quản Trị** ở số **(408) 630-2277** ít nhất 3 ngày làm việc trước ngày điều trần.

10/2016_ET

Ad Number: 0005851957-02
Insertion Number: N/A
Size: 3 Col x 7.5 in
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Advertiser: Santa Clara Valley Water Dist...
Agency: N/A
Section-Page-Zone(s): A-27-All
Description:

Willow Glen Resident
Friday, November 18, 2016

Public hearing notice

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10/2016_BA

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A5. GWMP Outreach – Letter to Interested Stakeholders

5750 Almaden Expressway, San Jose, CA 95118-3614 | (408) 265-2600 | www.valleywater.org

Santa Clara Valley Water District

July 8, 2016

Subject: Notice of Groundwater Management Plan Update

The Santa Clara Valley Water District (District) has been sustainably managing groundwater in Santa Clara County for many decades. Related groundwater management goals, programs, and desired outcomes are described in the District's comprehensive 2012 Groundwater Management Plan (GWMP).

The Sustainable Groundwater Management Act (SGMA), enacted by the State legislature in 2014, requires the District to submit a Groundwater Sustainability Plan by 2022 or an alternative plan by January 1, 2017. The District plans to update its 2012 GWMP and submit it as an alternative plan under SGMA. The District is currently reviewing and considering changes to the plan to comply with SGMA requirements and meet the January 1, 2017 deadline.

The District will hold two informational public meetings on the GWMP update:

- Thursday July 21, 2016 at 6:30 p.m.
  District Headquarters Building
  5700 Almaden Expressway, San Jose, CA 95118

- Tuesday August 2, 2016 at 6:30 p.m.
  Morgan Hill Community and Cultural Center (El Toro Room)
  17000 Monterey Road, Morgan Hill, CA 95037

The District will also make proposed revisions to the GWMP available for public review, and the District Board of Directors will hold a public hearing in November or December of 2016 to receive and consider comments on the proposed revisions.

For more information regarding SGMA, the GWMP update, meeting announcements, and availability of the draft plan, please visit www.valleywater.org/GroundwaterManagement or contact Vanessa De La Piedra, Groundwater Management Unit Manager, at (408) 630-2788 or vdelapiedra@valleywater.org.

Sincerely,

Garth Hall
Deputy Operating Officer
Water Supply Division

cc: V. De La Piedra, B. Kassab, G. Cook, File

A6. GWMP Outreach – List of Meetings Where the GWMP was Discussed

Board of Directors Meetings

- October 13, 2015
- April 26, 2016
- November 8, 2016
- November 22, 2016

Stakeholder Meetings

- Meetings with Water Retailers Committee
    - March 16, 2016
    - July 20, 2016

- Meetings with Water Retailers Groundwater Subcommittee
    - October 22, 2015
    - April 7, 2016
    - June 8, 2016
    - June 24, 2016
    - October 12, 2016

- Informational Public Meetings
    - July 21, 2016
    - August 2, 2016

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A7. GWMP Outreach – District Website Information

Home | Services | Newsroom | Business | Jobs | About | Search | GO

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CLEAN RELIABLE WATER
- Where Does Your Water Come From?
  - Groundwater
    - Groundwater Management
      - Groundwater Supply
      - Groundwater Quality
    - Groundwater Monitoring
    - Groundwater Studies
    - Free Testing For Well Owners
    - Nitrate Treatment System Rebate Program
  - Imported Water
  - Reservoirs
  - Recycled Water
  - Water Retailers
- Water Conservation
- Water Charges
- Drinking Water Quality
- Water Supply Planning
- Projects

FLOOD PROTECTION

HEALTHY CREEKS AND ECOSYSTEMS

PROGRAMS

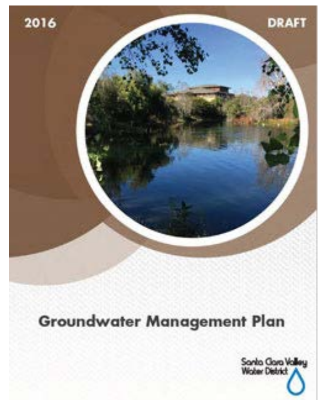
TECHNICAL INFORMATION

Home > Services > Clean Reliable Water > Where does your water come from > Groundwater Management

Groundwater Management

Sustainable Groundwater Management

The Santa Clara Valley Water District has managed groundwater resources in Santa Clara County since 1929. District programs and activities protect and augment groundwater supplies to ensure long-term sustainability. The 2012 Groundwater Management Plan, adopted by the District Board of Directors in July 2012, describes the District's groundwater basin management objectives, and the strategies, programs, and activities that support those objectives.



DRAFT 2016 Groundwater Management Plan

In 2014, Governor Brown signed the Sustainable Groundwater Management Act (SGMA) to promote the local, sustainable management of groundwater supplies. For basins designated as medium and high priority by the State, SGMA requires the identification of local groundwater agencies and the development and implementation of plans to achieve sustainability. For many decades, the District has sustainably managed the Santa Clara and Llagas Subbasins, which the California Department of Water Resources (DWR) designates as medium and high priority basins, respectively.

2016 Groundwater Management Plan (GWMP)

SGMA requires preparation of a Groundwater Sustainability Plan (GSP) or Alternative for all high and medium priority basins. GSPs must be submitted by 2020 for critically overdrafted basins, and by 2022 for all others. Recognizing that groundwater is well-managed in many areas, SGMA also provides for the submittal of specified Alternatives to a GSP. Alternatives must be submitted to DWR by January 1, 2017. Emergency regulations for GSPs and Alternative Plans were adopted by the California Water Commission on May 18, 2016. Some of the requirements for GSPs are more applicable to basins working to achieve sustainability rather than those with comprehensive and sustainable programs already in place, like those in Santa Clara County.

The District's 2012 GWMP is very comprehensive, including basin management objectives, strategies, numeric outcome measures, and a description of the subbasins and groundwater management programs. The 2016 GWMP updates technical information and acknowledges additional authorities provided by SGMA, such as the ability to regulate pumping or control well spacing, which are additional tools that may be needed in the future to ensure continued sustainability. Following a public hearing on November 22, 2016, the Board of Directors will consider adoption of the 2016 GWMP Update. Upon adoption, the 2016 GWMP will be submitted to DWR as an Alternative to a GSP.

The District held two informational public meetings on the 2016 GWMP.

- Thursday July 21, 2016 at 6:30 p.m. at the District's Headquarters Building, located at 5700 Almaden Expressway, San Jose; and
- Tuesday August 2, 2016 at 6:30 p.m. at Morgan Hill Community and Cultural Center (El Toro Room), located at 17000 Monterey Road, Morgan Hill.

Comments on the draft 2016 GWMP can be submitted through e-mail at gwmp@valleywater.org or be presented at the public hearing to be held on November 22, 2016 at the District's Headquarters Building, located at 5700 Almaden Expressway, San Jose.

Decision to Become the Groundwater Sustainability Agency (GSA)

SGMA lists the District as the exclusive groundwater management agency within its statutory boundary, which includes all of Santa Clara County. Following public notice and a public hearing on May 24, 2016, the District Board of Directors adopted a resolution to become the

Related Information

- 2012 Groundwater Management Plan
- Draft 2016 Groundwater Management Plan

GSA for the Santa Clara and Llagas Subbasins, confirming the District's role as the local groundwater management agency.

This webpage was last updated on November 9, 2016. For questions, please contact us at GWMP@valleywater.org.

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A8. Environmental Documentation

Santa Clara Valley Water District

MEMORANDUM

FC 14 (01-02-07)

TO: Tiffany Hernandez, Acting Water Resources Planning Unit Manager for Debra Caldon

FROM: Ryan Heacock, Senior Environmental Planner

SUBJECT: 2016 Groundwater Management Plan for the Santa Clara and Llagas Subbasins

DATE: December 20, 2016

ISSUE

Whether the district's Groundwater Management Plan meets the standard for the statutory exemption as defined under CEQA section15262.

ANALYSIS

The District Act (California Water Code Appendix, Chapter 60) provides the District with broad groundwater management authority, including the authority to protect, spread, store, retain, and cause water to percolate in the soil within Santa Clara County. On September 16, 2014, the Sustainable Groundwater Management Act (SGMA) was signed into law and adopted into the California Water Code, commencing with Section 10720. The legislative intent of SGMA is to provide for the sustainable management of groundwater basins, to enhance local management of groundwater, to establish minimum standards for sustainable groundwater management, and to provide local groundwater agencies with the authority and the technical and financial assistance necessary to sustainably manage groundwater.

On May 24, 2016, the District Board of Directors adopted Resolution 16-51 on the Decision to Become the Groundwater Sustainability Agency for the Santa Clara and Llagas Subbasins. The Santa Clara and Llagas Subbasins are deemed to be medium-priority and high-priority basins by the California Department of Water Resources (DWR) and therefore require the development of a Groundwater Sustainability Plan or prescribed alternative. Water Code Section 10733.6(b)(1) identifies a plan developed pursuant to Part 2.75 (commencing with Section 10750) or other law authorizing groundwater management as an acceptable alternative. The District is committed to its legislatively-created mandate to manage the surface water and groundwater resources within its jurisdiction. The 2016 Groundwater Management Plan (Plan) describes the District's comprehensive framework to ensure continued, sustainable groundwater conditions in the Santa Clara and Llagas Subbasins

The District's Plan is a planning study that sets for goals and objectives as well as possible future actions for management of the Santa Clara and Llagas Subbasins. No specific actions have been approved, adopted, or funded by the Board by adopting the Plan. Any future actions taken by the District to meet the goals and objectives of the Plan will be considered at that time and environmental review of those actions will be considered per CEQA. Planning studies such as the District's Plan are statutorily exempt per CEQA section 15262.

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CONCLUSION

Adoption of the District's Plan does not approve, adopt, or fund any specific future actions. Therefore the Plan meets the definition of a planning study under CEQA section 15262 is therefore statutorily exempt from CEQA.

Ryan Heacock, Senior Environmental Planner

Concur:

Tiffany Hernandez, Acting Water Resources Planning Unit Manager for Debra Caldon

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Appendix B – Demonstration of Functional Equivalency

The District has prepared the 2016 Groundwater Management Plan under authority granted by the District Act. The GWMP demonstrates how the District will continue to sustainably manage the Santa Clara and Llagas subbasins. The comprehensive framework documented in this plan includes authorities, sustainability goals and strategies, conjunctive management and monitoring programs, long-term planning, and numeric outcome measures that effectively prompt action when needed.

The GWMP meets the requirements of an alternative to a GSP in accordance with Water Code Section 10733.6 (b)(1) and Article 9 of the Emergency GSP Regulations.[1] Alternatives must be functionally equivalent to requirements in Articles 5 and 7 of the Emergency GSP Regulations. This plan meets the intent of SGMA and is functionally equivalent to Articles 5 and 7 of the Emergency GSP Regulations, as described in this Appendix.

General Requirements of Article 5

The functional equivalence of this GWMP to the five subarticles of Article 5 is described below.

1) Administrative Information

   The GWMP provides detailed information on the plan area as well as the District's legal authorities, governance, management structure, and funding sources. As a special act district created in 1929 to manage groundwater, the District has a well-established framework to fund and implement successful conjunctive management programs through the Water Utility Enterprise, which has a $359 million operations and capital budget for fiscal year 2016-2017.

   The GWMP also describes how the District accounts for future land use and water demand changes through the Urban Water Management Plan and Water Supply Master Plan, which have a 25-year planning horizon and are updated every five years. Beneficial uses, users, and outreach related to the 2016 GWMP are also described in various sections of the GWMP.

2) Basin Setting

   The GWMP contains detailed information on the Santa Clara and Llagas subbasins with regard to basin structure, boundaries, stratigraphy, and recharge areas. Basin conditions related to water levels, water quality, land subsidence, salt water intrusion, and interconnected surface waters are also described in detail. The GWMP also presents balanced water budgets and future groundwater demands.

3) Sustainable Management Criteria

   The District's 2012 GWMP documented numeric outcome measures to assess performance in meeting basin sustainability goals. These outcome measures, which relate to groundwater storage, land subsidence, and water quality, are largely unchanged in the 2016 GWMP as they have been effective in avoiding undesirable results and prompting action when needed. For example, the District's outcome measures for groundwater storage are related to the District's Water Shortage Contingency Plan. The recent, prolonged drought resulted in lower storage, prompting the Board to request short-term water use reduction. An impressive response by the community, coupled with water retailers' efforts to use more treated surface water in lieu of groundwater, have resulted in rebound close to the normal stage of the Water Shortage Contingency Plan. The outcome measures are evaluated annually and related reporting occurs through the District's Annual Groundwater Report.

[1] California Code of Regulations, Title 23, Division 2, Chapter 1.5, Subchapter 2.

4) Monitoring Networks

The District has established extensive networks to monitor groundwater levels, groundwater quality, land subsidence, and surface water. The District evaluates data from hundreds of wells measured directly, and also leverages groundwater level and quality data collected by water retailers. Detailed information on monitoring results is available through the District's Annual Groundwater Report. The District also prepares a monthly Water Tracker, which summarizes water supply conditions, and the companion monthly Groundwater Condition Report. These reports are available on the District website, as is groundwater level data and real-time stream, reservoir, and precipitation data.

5) Projects and Management Actions

For more than 80 years, the District has implemented conjunctive water management programs to maximize water supply reliability. These programs include the direct managed recharge of about 100,000 AF of local and imported surface water each year. The District's in-lieu recharge programs, including treated surface water deliveries, water conservation, and water recycling, account for over 200,000 AF in most years. These programs require extensive infrastructure and rely on substantial local water rights and imported water agreements. The District also implements programs to ensure groundwater quality is protected, such as the well ordinance program. The GWMP contains detailed information on programs implemented by the District and other agencies to protect local groundwater.

General Requirements of Article 7

The functional equivalence of this GWMP to the Article 7 requirements is described below.

1) Annual Reports

Agencies are required to submit an annual report to DWR with information on groundwater elevations, pumping, recharge, total water use, and change in storage for the preceding water year. Each year, the District prepares a comprehensive Annual Groundwater Report with detailed information on groundwater conditions for the preceding calendar year, including all the information listed above. This report is posted to the District website and will be submitted to DWR.

2) Periodic Evaluations by the Agency

Article 7 also requires agencies to review their plans at least every five years and provide a written assessment to DWR. Article 9 (Alternatives) requires Alternatives to be submitted by January 1, 2017 and every five years thereafter. Both these requirements are aligned with the District's goal of updating the GWMP every five years. This approach supports updates to the District's Urban Water Management Plan and Water Supply Master Plan, which are also on five-year update cycles.

The table below is provided to further demonstrate functional equivalency and facilitate review of this GWMP as an Alternative.

Appendix B – Demonstration of Functional Equivalency

DWR Emergency Regulations Section	Requirement	GWMP Location
Article 5. Subarticle 1: Administrative Information		
Introduction to Administrative Information (§ 354.2)		
§ 354.2	This Subarticle describes information in the Plan relating to administrative and other general information about the Agency that has adopted the Plan and the area covered by the Plan.	§§ 1.2, 1.3
General Information (§ 354.4)		
§ 354.4(a)	Each Plan shall include the following general information: (a) An executive summary written in plain language that provides an overview of the Plan and description of groundwater conditions in the basin.	Executive Summary
§ 354.4(b)	(b) A list of references and technical studies relied upon by the Agency in developing the Plan. Each Agency shall provide to the Department electronic copies of reports and other documents and materials cited as references that are not generally available to the public.	References
Agency Information (§ 354.6)		
§ 354.6(a)	When submitting an adopted Plan to the Department, the Agency shall include a copy of the information provided pursuant to Water Code Section 10723.8, with any updates, if necessary, along with the following information: The name and mailing address of the Agency.	§ 1.1
§ 354.6(b)	The organization and management structure of the Agency, identifying persons with management authority for implementation of the Plan.	§§ 1.1, 1.3
§ 354.6(c)	The name and contact information, including the phone number, mailing address and electronic mail address, of the plan manager.	§ 1.1
§ 354.6(d)	The legal authority of the Agency, with specific reference to citations setting forth the duties, powers, and responsibilities of the Agency, demonstrating that the Agency has the legal authority to implement the Plan.	§ 1.3
§ 354.6(e)	An estimate of the cost of implementing the Plan and a general description of how the Agency plans to meet those costs.	§ 1.3

Appendix B – Demonstration of Functional Equivalency

DWR Emergency Regulations Section	Requirement	GWMP Location
Description of Plan Area (§ 354.8)		
§ 354.8(a)	Each Plan shall include a description of the geographic areas covered, including the following information: (a) One or more maps of the basin that depict the following, as applicable: (1) The area covered by the Plan, delineating areas managed by the Agency as an exclusive Agency and any areas for which the Agency is not an exclusive Agency, and the name and location of any adjacent basins. (2) Adjudicated areas, other Agencies within the basin, and areas covered by an Alternative. (3) Jurisdictional boundaries of federal or state land (including the identity of the agency with jurisdiction over that land), tribal land, cities, counties, agencies with water management responsibilities, and areas covered by relevant general plans. (4) Existing land use designations and the identification of water use sector and water source type. (5) The density of wells per square mile, by dasymetric or similar mapping techniques, showing the general distribution of agricultural, industrial, and domestic water supply wells in the basin, including de minimis extractors, and the location and extent of communities dependent upon groundwater, utilizing data provided by the Department, as specified in Section 353.2, or the best available information.	Figures 1-1, 2-1, 3-1, 4-8, 4-10
§ 354.8(b)	(b) A written description of the Plan area, including a summary of the jurisdictional areas and other features depicted on the map.	§§ 1.2, 2.1, 3.1
§ 354.8(c)	(c) Identification of existing water resource monitoring and management programs, and description of any such programs the Agency plans to incorporate in its monitoring network or in development of its Plan.	Chapters 6, 7
§ 354.8(d)	(d) A description of how existing water resource monitoring or management programs may limit operational flexibility in the basin, and how the Plan has been developed to adapt to those limits.	Chapter 6
§ 354.8(e)	(e) A description of conjunctive use programs in the basin.	§§ 4.3, 6.1

Appendix B – Demonstration of Functional Equivalency

DWR Emergency Regulations Section	Requirement	GWMP Location
§ 354.8(f)	(f) A plain language description of the land use elements or topic categories of applicable general plans that includes the following: (1) A summary of general plans and other land use plans governing the basin. (2) A general description of how implementation of existing land use plans may change water demands within the basin or affect the ability of the Agency to achieve sustainable groundwater management over the planning and implementation horizon, and how the Plan addresses those potential effects. (3) A general description of how implementation of the Plan may affect the water supply assumptions of relevant land use plans over the planning and implementation horizon. (4) A summary of the process for permitting new or replacement wells in the basin, including adopted standards in local well ordinances, zoning codes, and policies contained in adopted land use plans. (5) To the extent known, the Agency may include information regarding the implementation of land use plans outside the basin that could affect the ability of the Agency to achieve sustainable groundwater management.	§§ 1.4, 5.3, 6.1, 6.2
§ 354.8(g)	(g) A description of any of the additional Plan elements included in Water Code Section 10727.4 that the Agency determines to be appropriate.	§§ 1.4, 5.3, Chapter 6
Notice and Communication (§ 354.10)		
§ 354.10(a)	Each Plan shall include a summary of information relating to notification and communication by the Agency with other agencies and interested parties including the following: (a) A description of the beneficial uses and users of groundwater in the basin, including the land uses and property interests potentially affected by the use of groundwater in the basin, the types of parties representing those interests, and the nature of consultation with those parties.	Appendix A
§ 354.10(b)	(b) A list of public meetings at which the Plan was discussed or considered by the Agency.	Appendix A
§ 354.10(c)	(c) Comments regarding the Plan received by the Agency and a summary of any responses by the Agency.	Appendix A
§ 354.10(d)	(d) A communication section of the Plan that includes the following: (1) An explanation of the Agency's decision-making process. (2) Identification of opportunities for public engagement and a discussion of how public input and response will be used. (3) A description of how the Agency encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin. (4) The method the Agency shall follow to inform the public about progress implementing the Plan, including the status of projects and actions.	§§ 1.4, 1.5, Appendix A

Appendix B – Demonstration of Functional Equivalency

DWR Emergency Regulations Section	Requirement	GWMP Location
Article 5. Subarticle 2: Basin Setting		
Introduction to Basin Setting (§ 354.12)		
§ 354.12	This Subarticle describes the information about the physical setting and characteristics of the basin and current conditions of the basin that shall be part of each Plan, including the identification of data gaps and levels of uncertainty, which comprise the basin setting that serves as the basis for defining and assessing reasonable sustainable management criteria and projects and management actions. Information provided pursuant to this Subarticle shall be prepared by or under the direction of a professional geologist or professional engineer.	Chapters 2, 3
Hydrogeologic Conceptual Model (§ 354.14)		
§ 354.14(a)	(a) Each Plan shall include a descriptive hydrogeologic conceptual model of the basin based on technical studies and qualified maps that characterizes the physical components and interaction of the surface water and groundwater systems in the basin.	Chapters 2, 3
§ 354.14(b)	(b) The hydrogeologic conceptual model shall be summarized in a written description that includes the following: (1) The regional geologic and structural setting of the basin including the immediate surrounding area, as necessary for geologic consistency. (2) Lateral basin boundaries, including major geologic features that significantly affect groundwater flow. (3) The definable bottom of the basin. (4) Principal aquifers and aquitards, including the following information: (A) Formation names, if defined. (B) Physical properties of aquifers and aquitards, including the vertical and lateral extent, hydraulic conductivity, and storativity, which may be based on existing technical studies or other best available information. (C) Structural properties of the basin that restrict groundwater flow within the principal aquifers, including information regarding stratigraphic changes, truncation of units, or other features. (D) General water quality of the principal aquifers, which may be based on information derived from existing technical studies or regulatory programs. (E) Identification of the primary use or uses of each aquifer, such as domestic, irrigation, or municipal water supply. (5) Identification of data gaps and uncertainty within the hydrogeologic conceptual Model.	Chapters 2, 3

Appendix B – Demonstration of Functional Equivalency

DWR Emergency Regulations Section	Requirement	GWMP Location
§ 354.14(c)	(c) The hydrogeologic conceptual model shall be represented graphically by at least two scaled cross-sections that display the information required by this section and are sufficient to depict major stratigraphic and structural features in the basin.	Figures 2-4, 2-5, 3-4, 3-5, 3-6
§ 354.14(d)	(d) Physical characteristics of the basin shall be represented on one or more maps that depict the following: (1) Topographic information derived from the U.S. Geological Survey or another reliable source. (2) Surficial geology derived from a qualified map including the locations of cross sections required by this Section. (3) Soil characteristics as described by the appropriate Natural Resources Conservation Service soil survey or other applicable studies. (4) Delineation of existing recharge areas that substantially contribute to the replenishment of the basin, potential recharge areas, and discharge areas, including significant active springs, seeps, and wetlands within or adjacent to the basin. (5) Surface water bodies that are significant to the management of the basin. (6) The source and point of delivery for imported water supplies.	Figures 1-3, 2-1, 2-2, 2-4, 2-5, 2-6, 2-14, 3-1, 3-2, 3-4, 3-5, 3-6
Groundwater Conditions (§ 354.16)		
§ 354.16(a)	Each Plan shall provide a description of current and historical groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes the following: (a) Groundwater elevation data demonstrating flow directions, lateral and vertical gradients, and regional pumping patterns, including: (1) Groundwater elevation contour maps depicting the groundwater table or potentiometric surface associated with the current seasonal high and seasonal low for each principal aquifer within the basin. (2) Hydrographs depicting long-term groundwater elevations, historical highs and lows, and hydraulic gradients between principal aquifers.	§§ 2.2, 3.2, Appendix C Figures 2-8, 2-9, 2-10, 2-11, 3-8, 3-9, 3-10
§ 354.16(b)	(b) A graph depicting estimates of the change in groundwater in storage, based on data, demonstrating the annual and cumulative change in the volume of groundwater in storage between seasonal high groundwater conditions, including the annual groundwater use and water year type.	§§ 4.4 Figures 4-9, 4-10, 4-13
§ 354.16(c)	(c) Seawater intrusion conditions in the basin, including maps and cross-sections of the seawater intrusion front for each principal aquifer.	§ 2.2 Figure 2-21

DWR Emergency Regulations Section	Requirement	GWMP Location
§ 354.16(d)	(d) Groundwater quality issues that may affect the supply and beneficial uses of groundwater, including a description and map of the location of known groundwater contamination sites and plumes.	§§ 2.2, 3.2, 6.2 Figures 6-1, 6-2
§ 354.16(e)	(e) The extent, cumulative total, and annual rate of land subsidence, including maps depicting total subsidence, utilizing data available from the Department, as specified in Section 353.2, or the best available information.	§ 2.2 Figure 2-13
§ 354.16(f)	(f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information.	§§ 2.2, 3.2
§ 354.16(g)	(g) Identification of groundwater dependent ecosystems within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information.	§§ 2.2, 3.2
Water Budget (§ 354.18)		
§ 354.18(a)	(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.	§§ 4.4, 4.5
§ 354.18(b)	(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.	§ 4.4

DWR Emergency Regulations Section	Requirement	GWMP Location
§ 354.18(c) (1) and (2)	(c) Each Plan shall quantify the current, historical, and projected water budget for the basin as follows: (1) Current water budget information shall quantify current inflows and outflows for the basin using the most recent hydrology, water supply, water demand, and land use information. (2) Historical water budget information shall be used to evaluate availability or reliability of past surface water supply deliveries and aquifer response to water supply and demand trends relative to water year type. The historical water budget shall include the following: (A) A quantitative evaluation of the availability or reliability of historical surface water supply deliveries as a function of the historical planned versus actual annual surface water deliveries, by surface water source and water year type, and based on the most recent ten years of surface water supply information. (B) A quantitative assessment of the historical water budget, starting with the most recently available information and extending back a minimum of 10 years, or as is sufficient to calibrate and reduce the uncertainty of the tools and methods used to estimate and project future water budget information and future aquifer response to proposed sustainable groundwater management practices over the planning and implementation horizon. (C) A description of how historical conditions concerning hydrology, water demand, and surface water supply availability or reliability have impacted the ability of the Agency to operate the basin within sustainable yield. Basin hydrology may be characterized and evaluated using water year type.	§§ 4.4, 4.5

DWR Emergency Regulations Section	Requirement	GWMP Location
§ 354.18(c)(3)	(3) Projected water budgets shall be used to estimate future baseline conditions of supply, demand, and aquifer response to Plan implementation, and to identify the uncertainties of these projected water budget components. The projected water budget shall utilize the following methodologies and assumptions to estimate future baseline conditions concerning hydrology, water demand and surface water supply availability or reliability over the planning and implementation horizon: (A) Projected hydrology shall utilize 50 years of historical precipitation, evapotranspiration, and streamflow information as the baseline condition for estimating future hydrology. The projected hydrology information shall also be applied as the baseline condition used to evaluate future scenarios of hydrologic uncertainty associated with projections of climate change and sea level rise. (B) Projected water demand shall utilize the most recent land use, evapotranspiration, and crop coefficient information as the baseline condition for estimating future water demand. The projected water demand information shall also be applied as the baseline condition used to evaluate future scenarios of water demand uncertainty associated with projected changes in local land use planning, population growth, and climate. (C) Projected surface water supply shall utilize the most recent water supply information as the baseline condition for estimating future surface water supply. The projected surface water supply shall also be applied as the baseline condition used to evaluate future scenarios of surface water supply availability and reliability as a function of the historical surface water supply identified in Section 354.18(c)(2)(A), and the projected changes in local land use planning, population growth, and climate.	§ 4.5
§ 354.18(d)	(d) The Agency shall utilize the following information provided, as available, by the Department pursuant to Section 353.2, or other data of comparable quality, to develop the water budget: (1) Historical water budget information for mean annual temperature, mean annual precipitation, water year type, and land use. (2) Current water budget information for temperature, water year type, evapotranspiration, and land use. (3) Projected water budget information for population, population growth, climate change, and sea level rise.	§§ 4.4, 4.5, 6.1

DWR Emergency Regulations Section	Requirement	GWMP Location
§ 354.18(e)	(e) Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow. If a numerical groundwater and surface water model is not used to quantify and evaluate the projected water budget conditions and the potential impacts tobeneficial uses and users of groundwater, the Plan shall identify and describe an equally effective method, tool, or analytical model to evaluate projected water budget conditions.	§§ 4.4, 4.5, 7.6
§ 354.18(f)	(f) The Department shall provide the California Central Valley Groundwater-Surface Water Simulation Model (C2VSIM) and the Integrated Water Flow Model (IWFM) for use by Agencies in developing the water budget. Each Agency may choose to use a different groundwater and surface water model, pursuant to Section 352.4.	§7.6
Management Areas (§ 354.20)		
§ 354.20(a)	(a) Each Agency may define one or more management areas within a basin if the Agency has determined that creation of management areas will facilitate implementation of the Plan. Management areas may define different minimum thresholds and be operated to different measurable objectives than the basin at large, provided that undesirable results are defined consistently throughout the basin.	Executive Summary, § 2.1
§ 354.20(b)	(b) A basin that includes one or more management areas shall describe the following in the Plan: (1) The reason for the creation of each management area. (2) The minimum thresholds and measurable objectives established for each management area, and an explanation of the rationale for selecting those values, if different from the basin at large. (3) The level of monitoring and analysis appropriate for each management area. (4) An explanation of how the management area can operate under different minimum thresholds and measurable objectives without causing undesirable results outside the management area, if applicable.	Executive Summary, § 5.4
§ 354.20(c)	(c) If a Plan includes one or more management areas, the Plan shall include descriptions, maps, and other information required by this Subarticle sufficient to describe conditions in those areas.	Chapter 2

DWR Emergency Regulations Section	Requirement	GWMP Location
Article 5. Subarticle 3: Sustainable Management Criteria		
Introduction to Sustainable Management Criteria (§ 354.22)		
§ 354.22	This Subarticle describes criteria by which an Agency defines conditions in its Plan that constitute sustainable groundwater management for the basin, including the process by which the Agency shall characterize undesirable results, and establish minimum thresholds and measurable objectives for each applicable sustainability indicator.	Chapter 5
Sustainability Goal (§ 354.24)		
§ 354.24	Each Agency shall establish in its Plan a sustainability goal for the basin that culminates in the absence of undesirable results within 20 years of the applicable statutory deadline. The Plan shall include a description of the sustainability goal, including information from the basin setting used to establish the sustainability goal, a discussion of the measures that will be implemented to ensure that the basin will be operated within its sustainable yield, and an explanation of how the sustainability goal is likely to be achieved within 20 years of Plan implementation and is likely to be maintained through the planning and implementation horizon.	Chapters 5, 6, 8
Undesirable Results (§ 354.26)		
§ 354.26(a)	(a) Each Agency shall describe in its Plan the processes and criteria relied upon to define undesirable results applicable to the basin. Undesirable results occur when significant and unreasonable effects for any of the sustainability indicators are caused by groundwater conditions occurring throughout the basin.	Chapters 2, 3, 5
§ 354.26(b)	(b) The description of undesirable results shall include the following: (1) The cause of groundwater conditions occurring throughout the basin that would lead to or has led to undesirable results based on information described in the basin setting, and other data or models as appropriate. (2) The criteria used to define when and where the effects of the groundwater conditions cause undesirable results for each applicable sustainability indicator. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin. (3) Potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.	Chapters 2, 3, 5

DWR Emergency Regulations Section	Requirement	GWMP Location
§ 354.26(c)	(c) The Agency may need to evaluate multiple minimum thresholds to determine whether an undesirable result is occurring in the basin. The determination that undesirable results are occurring may depend upon measurements from multiple monitoring sites, rather than a single monitoring site.	§ 5.4
§ 354.26(d)	(d) An Agency that is able to demonstrate that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin shall not be required to establish criteria for undesirable results related to those sustainability indicators.	Chapters 2, 3 § 5.4
Minimum Thresholds (§ 354.28)		
§ 354.28(a)	(a) Each Agency in its Plan shall establish minimum thresholds that quantify groundwater conditions for each applicable sustainability indicator at each monitoring site or representative monitoring site established pursuant to Section 354.36. The numeric value used to define minimum thresholds shall represent a point in the basin that, if exceeded, may cause undesirable results as described in Section 354.26.	§§ 2.2, 3.2, 5.4
§ 354.28(b)	(b) The description of minimum thresholds shall include the following: (1) The information and criteria relied upon to establish and justify the minimum thresholds for each sustainability indicator. The justification for the minimum threshold shall be supported by information provided in the basin setting, and other data or models as appropriate, and qualified by uncertainty in the understanding of the basin setting. (2) The relationship between the minimum thresholds for each sustainability indicator, including an explanation of how the Agency has determined that basin conditions at each minimum threshold will avoid undesirable results for each of the sustainability indicators. (3) How minimum thresholds have been selected to avoid causing undesirable results in adjacent basins or affecting the ability of adjacent basins to achieve sustainability goals. (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests. (5) How state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the Agency shall explain the nature of and basis for the difference. (6) How each minimum threshold will be quantitatively measured, consistent with the monitoring network requirements described in Subarticle 4.	§§ 2.2, 3.2, 5.4, 7.2

DWR Emergency Regulations Section	Requirement	GWMP Location
§ 354.28(c)(1)	(c) Minimum thresholds for each sustainability indicator shall be defined as follows: (1) Chronic Lowering of Groundwater Levels. 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. Minimum thresholds for chronic lowering of groundwater levels shall be supported by the following: (A) The rate of groundwater elevation decline based on historical trends, water year type, and projected water use in the basin. (B) Potential effects on other sustainability indicators.	§§ 2.2, 3.2, 5.4
§ 354.28(c)(2)	(2) Reduction of Groundwater Storage. 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.	§§ 2.2, 3.2, 5.4
§ 354.28(c)(3)	(3) Seawater Intrusion. The minimum threshold for seawater intrusion shall be defined by a chloride concentration isocontour for each principal aquifer where seawater intrusion may lead to undesirable results. Minimum thresholds for seawater intrusion shall be supported by the following: (A) Maps and cross-sections of the chloride concentration isocontour that defines the minimum threshold and measurable objective for each principal aquifer. (B) A description of how the seawater intrusion minimum threshold considers the effects of current and projected sea levels.	§ 2.2, 5.4
§ 354.28(c)(4)	(4) Degraded Water Quality. The minimum threshold for degraded water quality shall be the degradation of water quality, including the migration of contaminant plumes that impair water supplies or other indicator of water quality as determined by the Agency that may lead to undesirable results. 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. In setting minimum thresholds for degraded water quality, the Agency shall consider local, state, and federal water quality standards applicable to the basin.	§§ 2.2, 3.2, 5.4

DWR Emergency Regulations Section	Requirement	GWMP Location
§ 354.28(c)(5)	(5) Land Subsidence. 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. Minimum thresholds for land subsidence shall be supported by the following: (A) Identification of land uses and property interests that have been affected or are likely to be affected by land subsidence in the basin, including an explanation of how the Agency has determined and considered those uses and interests, and the Agency's rationale for establishing minimum thresholds in light of those effects. (B) Maps and graphs showing the extent and rate of land subsidence in the basin that defines the minimum threshold and measurable objectives.	§ 2.2, 5.4
§ 354.28(c)(6)	(6) Depletions of Interconnected Surface Water. The minimum threshold for depletions 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. The minimum threshold established for depletions of interconnected surface water shall be supported by the following: (A) The location, quantity, and timing of depletions of interconnected surface water. (B) A description of the groundwater and surface water model used to quantify surface water depletion. If a numerical groundwater and surface water model is not used to quantify surface water depletion, the Plan shall identify and describe an equally effective method, tool, or analytical model to accomplish the requirements of this Paragraph.	§§ 2.2, 2.3
§ 354.28(d)	(d) An Agency may establish a representative minimum threshold for groundwater elevation to serve as the value for multiple sustainability indicators, where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual minimum thresholds as supported by adequate evidence.	N/A
§ 354.28(e)	(e) An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish minimum thresholds related to those sustainability indicators.	Chapters 2, 3, 5
Measurable Objectives (§ 354.30)		
§ 354.30(a)	(a) Each Agency shall establish measurable objectives, including interim milestones in increments of five years, to achieve the sustainability goal for the basin within 20 years of Plan implementation and to continue to sustainably manage the groundwater basin over the planning and implementation horizon.	Executive Summary, Chapter 8

DWR Emergency Regulations Section	Requirement	GWMP Location
§ 354.30(b)	(b) Measurable objectives shall be established for each sustainability indicator, based on quantitative values using the same metrics and monitoring sites as are used to define the minimum thresholds.	N/A
§ 354.30(c)	(c) Measurable objectives shall provide a reasonable margin of operational flexibility under adverse conditions which shall take into consideration components such as historical water budgets, seasonal and long-term trends, and periods of drought, and be commensurate with levels of uncertainty.	N/A
§ 354.30(d)	(d) An Agency may establish a representative measurable objective for groundwater elevation to serve as the value for multiple sustainability indicators where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual measurable objectives as supported by adequate evidence.	N/A
§ 354.30(e)	(e) Each Plan shall describe a reasonable path to achieve the sustainability goal for the basin within 20 years of Plan implementation, including a description of interim milestones for each relevant sustainability indicator, using the same metric as the measurable objective, in increments of five years. The description shall explain how the Plan is likely to maintain sustainable groundwater management over the planning and implementation horizon.	Executive Summary, Chapter 8
§ 354.30(f)	(f) Each Plan may include measurable objectives and interim milestones for additional Plan elements described in Water Code Section 10727.4 where the Agency determines such measures are appropriate for sustainable groundwater management in the basin.	N/A
§ 354.30(g)	(g) An Agency may establish measurable objectives that exceed the reasonable margin of operational flexibility for the purpose of improving overall conditions in the basin, but failure to achieve those objectives shall not be grounds for a finding of inadequacy of the Plan.	N/A
Article 5. Subarticle 4: Monitoring Networks		
Introduction to Monitoring Networks (§ 354.32)		
§ 354.32	This Subarticle describes the monitoring network that shall be developed for each basin, including monitoring objectives, monitoring protocols, and data reporting requirements. The 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.	Chapter 7

DWR Emergency Regulations Section	Requirement	GWMP Location
Monitoring Network (§ 354.34)		
§ 354.34(a)	(a) Each Agency shall develop a monitoring network capable of collecting sufficient data to demonstrate short-term, seasonal, and long-term trends in groundwater and related surface conditions, and yield representative information about groundwater conditions as necessary to evaluate Plan implementation.	§§ 7.1, 7.2, 7.3, 7.4
§ 354.34(b)	(b) Each Plan shall include a description of the monitoring network objectives for the basin, including an explanation of how the network will be developed and implemented to monitor groundwater and related surface conditions, and the interconnection of surface water and groundwater, with sufficient temporal frequency and spatial density to evaluate the affects and effectiveness of Plan implementation. The monitoring network objectives shall be implemented to accomplish the following: (1) Demonstrate progress toward achieving measurable objectives described in the Plan. (2) Monitor impacts to the beneficial uses or users of groundwater. (3) Monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds. (4) Quantify annual changes in water budget components.	§§ 7.1, 7.2, 7.3, 7.4
§ 354.34(c)(1)	(c) Each monitoring network shall be designed to accomplish the following for each sustainability indicator: (1) Chronic Lowering of Groundwater Levels. Demonstrate groundwater occurrence, flow directions, and hydraulic gradients between principal aquifers and surface water features by the following methods: (A) A sufficient density of monitoring wells to collect representative measurements through depth-discrete perforated intervals to characterize the groundwater table or potentiometric surface for each principal aquifer. (B) Static groundwater elevation measurements shall be collected at least two times per year, to represent seasonal low and seasonal high groundwater conditions.	§ 7.1
§ 354.34(c)(2)	(2) Reduction of Groundwater Storage. Provide an estimate of the change in annual groundwater in storage.	§ 7.1
§ 354.34(c)(3)	(3) Seawater Intrusion. Monitor seawater intrusion using chloride concentrations, or other measurements convertible to chloride concentrations, so that the current and projected rate and extent of seawater intrusion for each applicable principal aquifer may be calculated.	§ 7.3

DWR Emergency Regulations Section	Requirement	GWMP Location
§ 354.34(c)(4)	(4) Degraded Water Quality. Collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues.	§ 7.3
§ 354.34(c)(5)	(5) Land Subsidence. Identify the rate and extent of land subsidence, which may be measured by extensometers, surveying, remote sensing technology, or other appropriate method.	§ 7.2
§ 354.34(c)(6)	(6) Depletions of Interconnected Surface Water. Monitor surface water and groundwater, where interconnected surface water conditions exist, to characterize the spatial and temporal exchanges between surface water and groundwater, and to calibrate and apply the tools and methods necessary to calculate depletions of surface water caused by groundwater extractions. The monitoring network shall be able to characterize the following: (A) Flow conditions including surface water discharge, surface water head, and baseflow contribution. (B) Identifying the approximate date and location where ephemeral or intermittent flowing streams and rivers cease to flow, if applicable. (C) Temporal change in conditions due to variations in stream discharge and regional groundwater extraction. (D) Other factors that may be necessary to identify adverse impacts on beneficial uses of the surface water.	§ 7.4
§ 354.34(d)	(d) The monitoring network shall be designed to ensure adequate coverage of sustainability indicators. 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 sustainable management criteria specific to that area.	Chapter 7
§ 354.34(e)	(e) A Plan may utilize site information and monitoring data from existing sources as part of the monitoring network.	Chapter 7

DWR Emergency Regulations Section	Requirement	GWMP Location
§ 354.34(f)	(f) The Agency shall determine the density of monitoring sites and frequency of measurements required to demonstrate short-term, seasonal, and long-term trends based upon the following factors: (1) Amount of current and projected groundwater use. (2) Aquifer characteristics, including confined or unconfined aquifer conditions, or other physical characteristics that affect groundwater flow. (3) Impacts to beneficial uses and users of groundwater and land uses and property interests affected by groundwater production, and adjacent basins that could affect the ability of that basin to meet the sustainability goal. (4) Whether the Agency has adequate long-term existing monitoring results or other technical information to demonstrate an understanding of aquifer response.	Chapter 7
§ 354.34(g)	(g) Each Plan shall describe the following information about the monitoring network: (1) Scientific rationale for the monitoring site selection process. (2) Consistency with data and reporting standards described in Section 352.4. If a site is not consistent with those standards, the Plan shall explain the necessity of the site to the monitoring network, and how any variation from the standards will not affect the usefulness of the results obtained. (3) For each sustainability indicator, the quantitative values for the minimum threshold, measurable objective, and interim milestones that will be measured at each monitoring site or representative monitoring sites established pursuant to Section 354.36.	Chapter 7
§ 354.34(h)	(h) The location and type of each monitoring site within the basin displayed on a map, and reported in tabular format, including information regarding the monitoring site type, frequency of measurement, and the purposes for which the monitoring site is being used.	Chapter 7, Appendix E
§ 354.34(i)	(i) The monitoring protocols developed by each Agency shall include a description of technical standards, data collection methods, and other procedures or protocols pursuant to Water Code Section 10727.2(f) for monitoring sites or other data collection facilities to ensure that the monitoring network utilizes comparable data and methodologies.	Chapter 7
§ 354.34(j)	(j) An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish a monitoring network related to those sustainability indicators.	Chapters 2, 3, 5

Appendix B – Demonstration of Functional Equivalency

DWR Emergency Regulations Section	Requirement	GWMP Location
Representative Monitoring (§ 354.36)		
§ 354.36(a)	Each Agency may designate a subset of monitoring sites as representative of conditions in the basin or an area of the basin, as follows: (a) Representative monitoring sites may be designated by the Agency as the point at which sustainability indicators are monitored, and for which quantitative values for minimum thresholds, measurable objectives, and interim milestones are defined.	Chapters 5, 7
§ 354.36(b)	(b) Groundwater elevations may be used as a proxy for monitoring other sustainability indicators if the Agency demonstrates the following: (1) Significant correlation exists between groundwater elevations and the sustainability indicators for which groundwater elevation measurements serve as a proxy. (2) Measurable objectives established for groundwater elevation shall include a reasonable margin of operational flexibility taking into consideration the basin setting to avoid undesirable results for the sustainability indicators for which groundwater elevation measurements serve as a proxy.	Chapters 5, 7
§ 354.36(c)	(c) The designation of a representative monitoring site shall be supported by adequate evidence demonstrating that the site reflects general conditions in the area.	Chapters 5, 7
Assessment and Improvement of Monitoring Network (§ 354.38)		
§ 354.38(a)	(a) Each Agency shall review the monitoring network and include an evaluation in the Plan and each five-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.	Chapter 7
§ 354.38(b)	(b) Each Agency shall identify data gaps wherever the basin does not contain a sufficient number of 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 Agency.	N/A
§ 354.38(c)	(c) If the monitoring network contains data gaps, the Plan shall include a description of the following: (1) The location and reason for data gaps in the monitoring network. (2) Local issues and circumstances that limit or prevent monitoring. (d) Each Agency shall describe steps that will be taken to fill data gaps before the next five-year assessment, including the location and purpose of newly added or installed monitoring sites.	N/A
§ 354.38(d)	(d) Each Agency shall describe steps that will be taken to fill data gaps before the next five-year assessment, including the location and purpose of newly added or installed monitoring sites.	N/A

DWR Emergency Regulations Section	Requirement	GWMP Location
Article 5. Subarticle 5: Projects and Management Actions		
Introduction to Projects and Management Actions (§ 354.42)		
§ 354.42	This Subarticle describes the criteria for projects and management actions to be included in a Plan to meet the sustainability goal for the basin in a manner that can be maintained over the planning and implementation horizon.	Chapter 6
Projects and Management Actions (§ 354.44)		
§ 354.44(a)	(a) Each Plan shall include a description of the projects and management actions the Agency has determined will achieve the sustainability goal for the basin, including projects and management actions to respond to changing conditions in the basin.	Chapters 6, 8
§ 354.44(b) (1) and (2)	(b) Each Plan shall include a description of the projects and management actions that include the following: (1) A list of projects and management actions proposed in the Plan with a description of the measurable objective that is expected to benefit from the project or management action. The list shall include projects and management actions that may be utilized to meet interim milestones, the exceedance of minimum thresholds, or where undesirable results have occurred or are imminent. The Plan shall include the following: (A) A description of the circumstances under which projects or management actions shall be implemented, the criteria that would trigger implementation and termination of projects or management actions, and the process by which the Agency shall determine that conditions requiring the implementation of particular projects or management actions have occurred. (B) The process by which the Agency shall provide notice to the public and other agencies that the implementation of projects or management actions is being considered or has been implemented, including a description of the actions to be taken. (2) If overdraft conditions are identified through the analysis required by Section 354.18, the Plan shall describe projects or management actions, including a quantification of demand reduction or other methods, for the mitigation of overdraft.	Chapters 6, 8

DWR Emergency Regulations Section	Requirement	GWMP Location
§ 354.44(b) (3) to (8)	(3) A summary of the permitting and regulatory process required for each project and management action. (4) The status of each project and management action, including a time-table for expected initiation and completion, and the accrual of expected benefits. (5) An explanation of the benefits that are expected to be realized from the project or management action, and how those benefits will be evaluated. (6) An explanation of how the project or management action will be accomplished. If the projects or management actions rely on water from outside the jurisdiction of the Agency, an explanation of the source and reliability of that water shall be included. (7) A description of the legal authority required for each project and management action, and the basis for that authority within the Agency. (8) A description of the estimated cost for each project and management action and a description of how the Agency plans to meet those costs.	Chapter 6
§ 354.44(b) (9)	(9) A description of the management of groundwater extractions and recharge to ensure that chronic lowering of groundwater levels or depletion of supply during periods of drought is offset by increases in groundwater levels or storage during other periods.	Chapters 1, 4, 6
§ 354.44(c)	(c) Projects and management actions shall be supported by best available information and best available science.	Chapters 1, 4, 6
§ 354.44(d)	(d) An Agency shall take into account the level of uncertainty associated with the basin setting when developing projects or management actions.	Chapters 1, 4, 6
Article 7 Annual Reports and Periodic Evaluations by the Agency		
§ 356.2	Each Agency shall submit an annual report to the Department by April 1 of each year following the adoption of the Plan.	Chapter 7, Appendix C
§ 356.4	Each agency shall evaluate its Plan at least every five years and whenever the Plan is amended, and provide a written assessment to the Department. The assessment shall describe whether the Plan implementation, including implementation of projects and management actions, are meeting the sustainability goal in the basin, and shall include components (a) through (k) as documented in the Emergency GSP Regulations.	Executive Summary, Chapter 8

Appendix C – 2015 Annual Groundwater Report

2015 Annual Groundwater Report

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Santa Clara Valley Water District

Annual Groundwater Report

For Calendar Year 2015

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Executive Summary

This annual Groundwater Report describes groundwater use, levels, quality, storage, and land subsidence in the Santa Clara and Llagas Subbasins for Calendar Year (CY) 2015. Groundwater monitoring data are used to evaluate outcome measures identified in the District's Groundwater Management Plan (GWMP)[1]. These measures help evaluate performance in meeting **Board Water Supply Objective 2.1.1: "Aggressively protect groundwater from the threat of contamination and maintain and develop groundwater to optimize reliability and to minimize land subsidence and salt water intrusion."**

Groundwater provided approximately 42 percent of the water used in the county in CY 2015, the fourth year of California's ongoing drought. To help sustain and protect groundwater supplies, the District:

- Replenished groundwater with 54,900 acre-feet (AF) of local and imported surface water,
- Reduced groundwater demands by approximately 180,000 AF through treated water deliveries, water conservation, and water recycling,
- Conducted extensive monitoring of water levels, groundwater quality, and land subsidence,
- Implemented the well ordinance program and other programs to minimize threats to groundwater quality,
- Worked with basin stakeholders, land use agencies, and regulatory agencies to protect local groundwater resources, and
- Requested a 30% reduction in water use compared to 2013, which was nearly met, with an impressive 27% water use reduction in CY 2015.

Table ES-1 shows data for key indicators in CY 2015 as compared to CY 2014 and the last five years. Groundwater levels and storage were affected by ongoing extreme dry conditions, with about 26,300 AF[2] withdrawn from groundwater reserves in 2015. CY 2015 water levels slightly increased as compared to CY 2014 due to reduced pumping and increased recharge, with the exception of the Llagas Subbasin where water levels decreased because pumping did not vary much between CY 2014 and 2015. Water levels were well above historical minimums in all groundwater level index wells. Estimated end of 2015 total groundwater storage was 229,100 AF, which falls in the "Severe" stage (Stage 3) of the District's Water Shortage Contingency Plan. Groundwater quality remained very good with the exception of nitrate in South County.

North County Groundwater Summary

Groundwater use in the Santa Clara Plain was 66,300 AF, a 42% decrease from CY 2014. Pumping locations and use remained relatively stable, with nearly all groundwater used for municipal and industrial (M&I) purposes. Groundwater levels recovered slightly due to increased recharge and reduced pumping, and were above historical lows. Groundwater levels in the Santa Clara Plain were also above thresholds established to minimize the risk of land subsidence in CY 2015. Estimated groundwater storage at the end of 2015 was 214,800 AF, which was 19,800 AF lower than CY 2014.

[1] Santa Clara Valley Water District, Groundwater Management Plan, July 2012

[2] Groundwater storage estimates presented in this report are as of March 2016, and are refined as additional data becomes available.

North County groundwater is generally of very high quality. In CY 2015, 99% of water supply wells tested met all health-based drinking water standards. The only exceptions were two domestic wells in which nitrate exceeded the drinking water standard. Public water systems must comply with drinking water standards, which may require treatment or blending prior to delivery.

South County Groundwater Summary

Groundwater pumping in the Coyote Valley and Llagas Subbasin was 9,900 AF and 42,200 AF, respectively. Pumping in the South County decreased by 4% in Coyote Valley and 3% in the Llagas Subbasin compared to 2014. The distribution of pumping for M&I, domestic, and agricultural uses was similar to CY 2014. 2015 Groundwater levels were lower than 2014 levels in the Llagas Subbasin, but remained well above historical lows at index wells. Estimated groundwater storage in South County at the end of 2015 was 14,300 AF, which is 6,500 AF lower than 2014.

Groundwater quality in South County is generally good with the exception of nitrate, which remains the primary groundwater protection challenge due to historic and ongoing sources. Nitrate was detected above the drinking water standard in about 23% of South County water supply wells tested (primarily domestic wells). For this reason, the outcome measure related to drinking water standards was not met. The District continues to offer basic well testing (including nitrate) to eligible domestic well owners. As part of the Safe Clean Water Program, the District also approved five nitrate treatment system rebates for domestic well users exposed to elevated nitrate.

The occurrence of perchlorate in the Llagas Subbasin from a former highway safety flare plant has been substantially reduced due to ongoing managed recharge and removal of perchlorate from the source area. The perchlorate plume, which once extended about 10 miles from Morgan Hill to Gilroy, now extends approximately 3 miles to the San Martin Airport. The District continues to closely monitor related activities and advocate for expedited and thorough cleanup.

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Table ES-1 2015 Groundwater Conditions as Compared to Other Indices

Index[1]	2015	Compared to 2014	Compared to Last 5 Years (2010 - 2014)
Managed Recharge (AF)	54,900	Up 113%	Down 35%
Groundwater Pumping (AF)	118,500	Down 30%	Down 17%
Groundwater as % of Total Water Use	42%	Down 9%	No Change
Groundwater Levels (feet)[2]			
Santa Clara Plain	49.8	Up 20%	Down 23%
Coyote Valley	259.3	Up 1%	Down 2%
Llagas Subbasin	188.9	Down 2%	Down 14%
End of Year Groundwater Storage (AF)	229,100	Down 10%	--
Land Subsidence (feet/year)[3]	0.005	Decrease	--
Groundwater Quality[4]			
Santa Clara Plain – Median TDS, mg/L	400	No Change[5]	No Change
Coyote Valley – Median TDS, mg/L	380	No Change	No Change
Llagas Subbasin – Median TDS, mg/L	371	No Change	No Change
Santa Clara Plain –Median Nitrate, mg/L	13	No Change	Decrease
Coyote Valley – Median Nitrate, mg/L	23.8	No Change	No Change
Llagas Subbasin – Median Nitrate, mg/L	28.6	No Change	No Change

1. Groundwater levels and quality are shown for three groundwater management areas: the Santa Clara Plain and Coyote Valley (which comprise the Santa Clara Subbasin) and the Llagas Subbasin.
2. Groundwater elevations represent the average of all readings at groundwater level -index wells for the time period noted.
3. The established tolerable rate of 0.01 feet per year was not exceeded. Water levels at all subsidence index wells were above these thresholds throughout 2015.
4. Values shown represent median groundwater quality for all principal aquifer zone wells tested. Nitrate is measured as NO_3. Data from shallow monitoring wells is excluded, including wells with high TDS due to saline intrusion.
5. Individual wells sampled for TDS and nitrate vary each year so a straight numeric comparison of median values is not performed. “No change” indicates no significant difference using an appropriate statistical test (Mann-Whitney Test) at 95% confidence level. An entry of either “Increase” or “Decrease” indicates a statistically significant change for the time period indicated.

Outcome measures related to groundwater storage, land subsidence, and water quality were met, with the exception of groundwater storage, nitrate, and chloride. Table ES-2 summarizes outcome measure performance and recommended actions to address measures not being met.

Groundwater Outlook

Groundwater levels and storage have begun to recover with improved rainfall and increased surface water available for managed recharge in CY 2015. Groundwater storage has been critical in helping to meet the county’s water supply needs during the ongoing drought. The estimated end of year storage for 2015 was below the 300,000 AF target but water levels did not exceed subsidence thresholds in related index wells. In accordance with the Water Shortage Contingency Plan, the District Board set a 30% water use reduction target (compared to 2013) in March 2015. The water use reduction target was adjusted to 20% in June 2016 due to improved water supply conditions.

2015 Annual Groundwater Report

The District continues to actively monitor groundwater levels, land subsidence, and water quality to support operational decisions and ensure groundwater resources are protected. To help ensure water supply reliability, the District is also working to expedite several Indirect Potable Reuse (IPR) projects to provide a drought-proof source of purified water for groundwater replenishment. The District will also continue to track proposed legislation, policies, and regulatory standards that may impact groundwater resources or the District's ability to manage them.

Compliance with the Sustainable Groundwater Management Act (SGMA) will be a major focus of District groundwater management in CY 2016. The District was deemed the exclusive Groundwater Sustainability Agency (GSA) for the Santa Clara and Llagas Subbasins on June 22, 2016 by the California Department of Water Resources (DWR). The District's scientific basin boundary modification request for the Llagas Subbasin was recently approved by DWR and will be included in a revised DWR Bulletin 118 in late 2016. The District will update the 2012 Groundwater Management Plan for submittal to DWR as an Alternative to a Groundwater Sustainability Plan under SGMA.

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Table ES-2 Summary of 2015 Outcome Measure Performance and Action Plan

Groundwater Storage	**OM 2.1.1.a.** Greater than 278,000 AF of projected end of year groundwater storage in the Santa Clara Plain. Estimated end of 2015 Storage: 214,800 AF **OM 2.1.1.b.** Greater than 5,000 AF of projected end of year groundwater storage in the Coyote Valley. Estimated end of 2015 Storage: 400 AF **OM 2.1.1.c.** Greater than 17,000 AF of projected end of year groundwater storage in the Llagas Subbasin. Estimated end of 2015 Storage: 13,900 AF **Action Plan for OM 2.1.1.a, b, and c:** In accordance with the Water Shortage Contingency Plan, the District Board of Directors called for a 30% countywide water use reduction in March 2015. In June 2016, this was adjusted to 20% in light of improved supplies.
Groundwater Levels and Subsidence	**OM 2.1.1.d.** 100% of subsidence index wells groundwater levels above subsidence thresholds. All ten subsidence index wells had groundwater levels above thresholds in 2015.
Groundwater Quality	**OM 2.1.1.e.** At least 95% of countywide water supply wells meet primary drinking water standards. Only 84% of countywide water supply wells tested in 2015 met primary drinking water standards due to elevated nitrate in South County (mainly in domestic wells). If nitrate is not included, 100% of water supply wells met primary drinking water standards. **OM 2.1.1.f.** At least 90% of South County wells meet Basin Plan agricultural objectives. Nearly all wells (98%) met Basin Plan agricultural objectives. **Action Plan for OM 2.1.1.e:** Implement Salt and Nutrient Management Plans to address salt loading, continue free testing program for domestic wells, and work to increase participation in the nitrate treatment system rebate program.
Groundwater Quality Trends	**OM 2.1.1.g.** At least 90% of wells in both the shallow and principal aquifer zones have stable or decreasing concentrations of nitrate, chloride, and total dissolved solids. This measure is nearly met for chloride, with 84% of wells showing stable or decreasing concentrations. This measure is met for nitrate and total dissolved solids as stable or decreasing concentrations were observed in 93% and 94% of wells, respectively. **Action Plan for OM 2.1.1.g:** Implement Salt and Nutrient Management Plans to address salt loading.

Outcome measure met
Outcome measure not met

1. INTRODUCTION

The Santa Clara Valley Water District (District) has the responsibility and authority to manage the Santa Clara and Llagas Subbasins in Santa Clara County per an act of the California legislature[3]. The District's objectives and authority related to groundwater management are to recharge groundwater basins, conserve, manage and store water for beneficial and useful purposes, increase water supply, protect surface water and groundwater from contamination, prevent waste or diminution of the District's water supply, and do any and every lawful act necessary to ensure sufficient water is available for present and future beneficial uses.

The District Board of Directors (Board) adopted Water Supply Objective 2.1.1, which reflects the mission to protect groundwater resources: *"Aggressively protect groundwater from the threat of contamination and maintain and develop groundwater to optimize reliability and to minimize land subsidence and salt water intrusion."* Pursuant to the District Act and Board policy, the District has identified the following basin management objectives in the Groundwater Management Plan (GWMP)[4]:

- Groundwater supplies are managed to optimize water supply reliability and minimize land subsidence.
- Groundwater is protected from existing and potential contamination, including salt water intrusion.

Purpose

This annual report describes groundwater conditions in Santa Clara County for Calendar Year (CY) 2015 including groundwater use, water levels, storage, quality, and land subsidence. The following outcome measures (OM) derived from the GWMP are also assessed to evaluate performance in meeting Water Supply Objective 2.1.1:

- OM 2.1.1.a. Greater than 278,000 AF[5] of projected end of year groundwater storage in the Santa Clara Plain.
- OM 2.1.1.b. Greater than 5,000 AF of projected end of year groundwater storage in the Coyote Valley.
- OM 2.1.1.c. Greater than 17,000 AF of projected end of year groundwater storage in the Llagas Subbasin.
- OM 2.1.1.d. 100% of subsidence index wells with groundwater levels above subsidence thresholds.
- OM 2.1.1.e. At least 95% of countywide water supply wells meet primary drinking water standards.
- OM 2.1.1.f. At least 90% of South County wells meet Basin Plan agricultural objectives.
- OM 2.1.1.g. At least 90% of wells in both the shallow and principal aquifer zones have stable or decreasing concentrations of nitrate, chloride, and total dissolved solids.

Study Area

This report presents information for the Santa Clara and Llagas Subbasins, which are managed by the District and are identified by DWR as Subbasins 2-9.02 and 3-3.01, respectively (Figure 1). The District divides the Santa Clara Subbasin into two groundwater management areas: the Santa Clara Plain and the Coyote Valley due to land use and management characteristics. Both the Santa Clara Plain and Llagas Subbasin have confined and recharge areas. Within the confined areas, low permeability clays and silts separate shallow and principal aquifers, with the latter defined as aquifer materials greater than about 150 feet below ground surface.

[3] Santa Clara Valley Water District Act, Water Code Appendix, Chapter 60.
[4] Santa Clara Valley Water District, Groundwater Management Plan, July 2012.
[5] AF = acre-feet. One acre-foot is equal to 325,900 gallons.

DWR is currently considering revisions to basin boundaries as allowed by SGMA. DWR conducted an internal review and is proposing to revise the boundaries of both the Santa Clara and Llagas Subbasins to correspond with the San Mateo, Alameda, and San Benito county lines. The District submitted a request to DWR to modify the eastern boundary of the Llagas Subbasin, which was recently approved by DWR. The eastern portion of the Llagas Subbasin as currently defined by DWR is underlain by bedrock and sediments that do not contain significant quantities of groundwater. Figure 1 illustrates the current DWR basin boundaries and the area proposed to be removed. The figures in this report will present the revised Llagas Subbasin.

The information in this report is summarized by groundwater management area or by groundwater charge zone (Figure 2). Charge Zone W-2 (North County) generally coincides with the Santa Clara Plain, while Zone W-5 generally overlaps the combined area of the Coyote Valley and Llagas Subbasin.

Report Content

In addition to this Introduction, this Annual Groundwater Report for 2015 includes the following chapters:

- Chapter 2: Groundwater Pumping, Recharge, and Water Balance
- Chapter 3: Groundwater Levels and Storage
- Chapter 4: Land Subsidence
- Chapter 5: Groundwater Quality
- Chapter 6: Other Groundwater Management Activities
- Chapter 7: Conclusions

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Figure 1 Santa Clara County Groundwater Subbasins

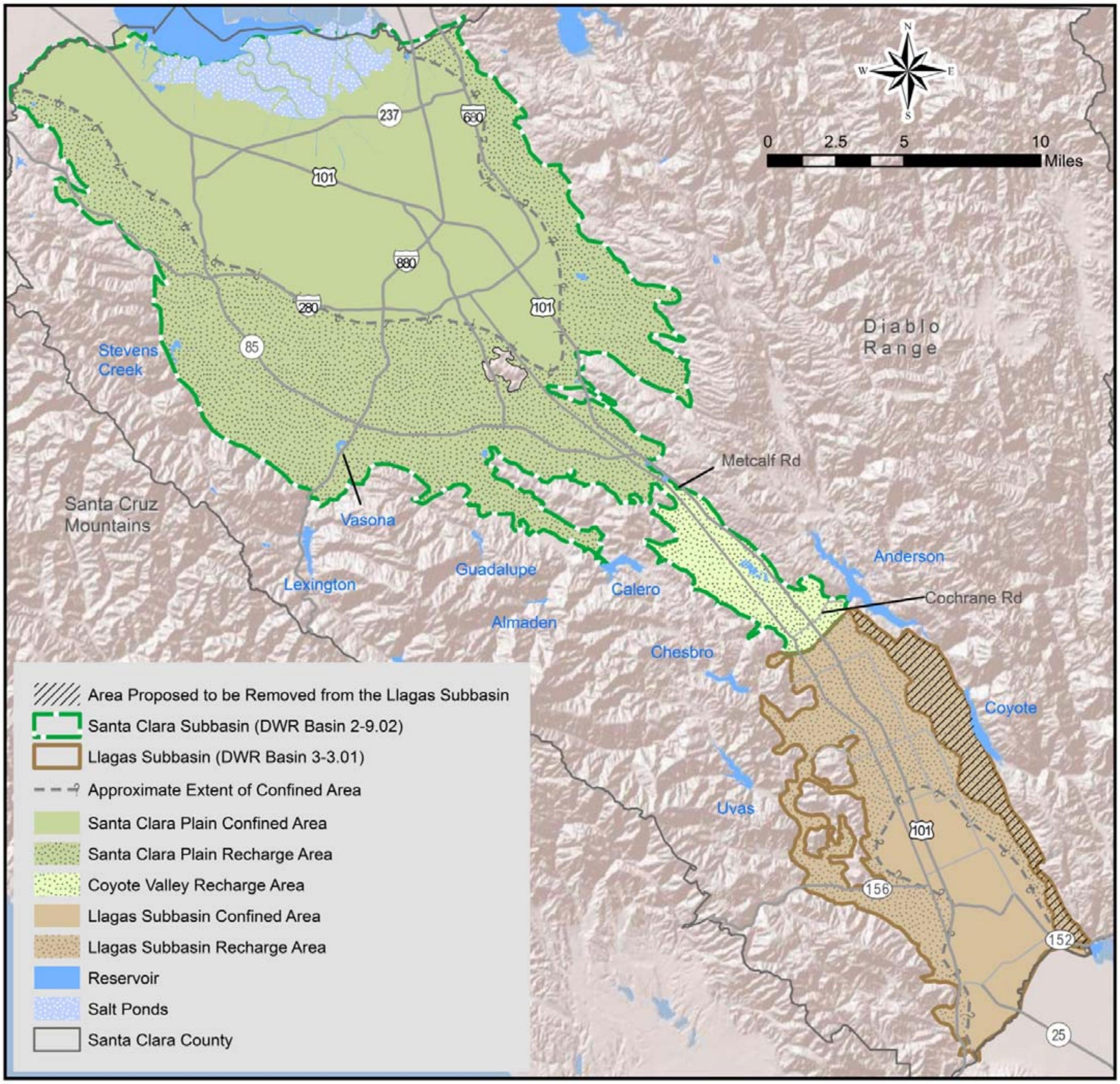
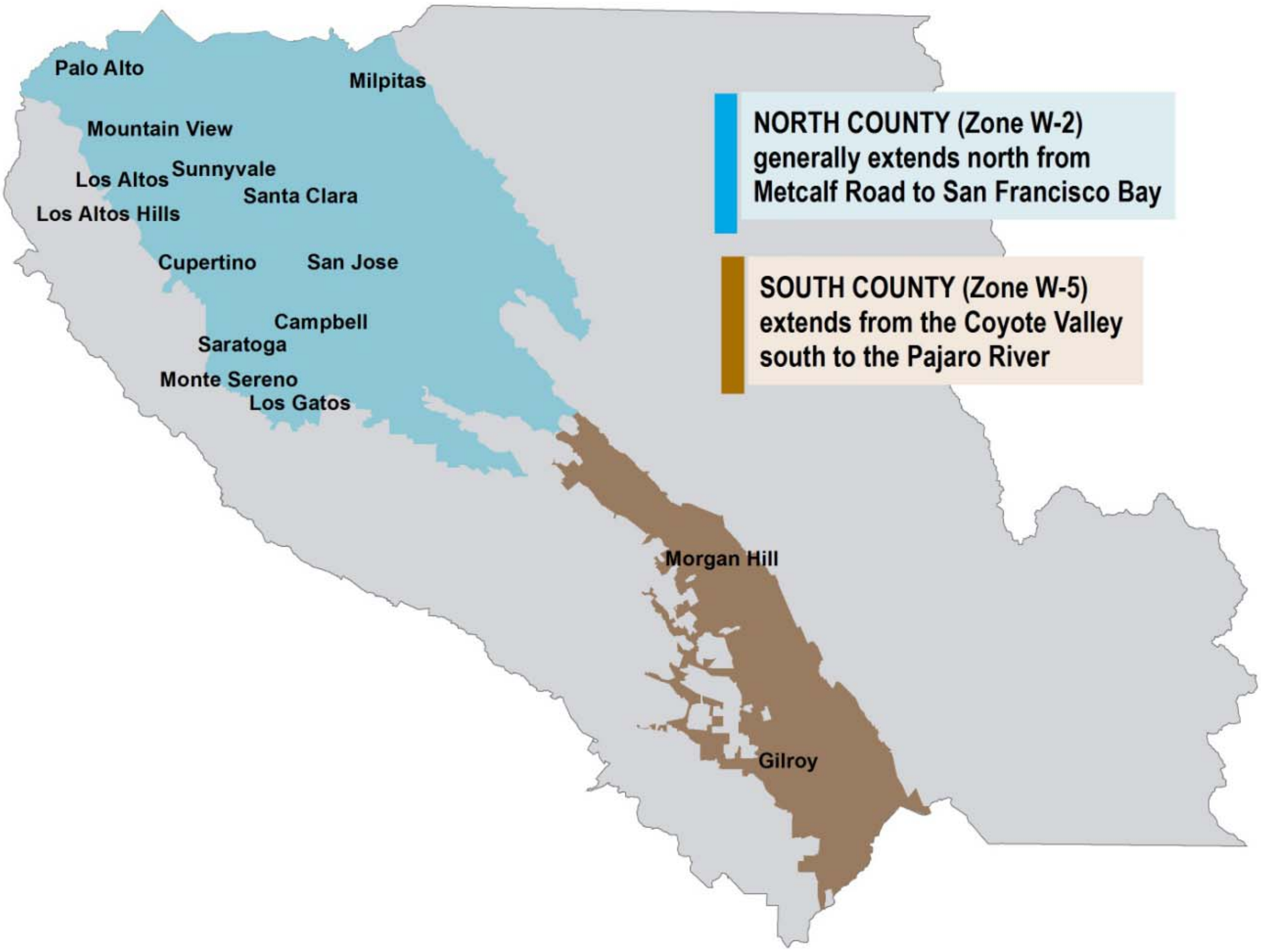


Figure 2 Groundwater Charge Zones



2. GROUNDWATER PUMPING, RECHARGE, AND WATER BALANCE

Countywide groundwater pumping in CY 2015 was 118,500 acre-feet (AF), providing about 42 percent of the water used by county residents and businesses. Compared to CY 2014, groundwater pumping decreased 42 percent in the Santa Clara Plain, 5 percent in Coyote Valley, and 3 percent in the Llagas Subbasin. Due to dry conditions and limited surface water supplies, the District operated a limited managed recharge program, using about 55,000 AF of local and imported water to replenish the groundwater subbasins. In-lieu recharge, including treated water deliveries, recycled water use, and water conservation programs reduced demands on groundwater by approximately 180,000 AF.

The primary inflow to the subbasins was managed recharge, providing over 57% of total inflow. Groundwater pumping accounted for over 96% of the subbasin outflows. Due to ongoing dry conditions, outflows exceeded inflows, resulting in a net decrease in storage of about 26,300 AF between 2014 and 2015.

2.1 Groundwater Pumping

Approximately 118,500 AF of groundwater was pumped in Santa Clara County in CY 2015, compared to 168,400 AF in CY 2014. Figures 3 and 4 show the location and volume of CY 2015 groundwater pumping, and Table 1 summarizes pumping by area and use category.

Table 1 CY 2015 Groundwater Pumping by Use (AF)

Use	Zone W-2 North County	Zone W-5 South County		Total
	Santa Clara Plain	Coyote Valley	Llagas Subbasin	
Municipal & Industrial (M&I)	65,450	6,460	16,930	88,840
Domestic	350	220	2,240	2,810
Agricultural	530	3,270	23,050	26,850
Total	**66,330**	**9,950**	**42,220**	**118,500**

Groundwater in North County is used primarily for M&I purposes, with minimal agricultural or domestic use. In South County, agricultural use is more significant. This is especially evident in the Llagas Subbasin, where more than half of the use is for agriculture. While the quantity of groundwater used for domestic purposes is relatively small in South County, there are a large number of individual wells that reported groundwater use (Table 2).

Table 2 Wells Reporting Groundwater Use in CY 2015

Use	Zone W-2 North County	Zone W-5 South County	
	Santa Clara Plain	Coyote Valley	Llagas Subbasin
Municipal & Industrial (M&I)	756	58	261
Domestic	399	336	2,716
Agricultural	42	92	577

Note: Some wells may report pumping for more than one use category (e.g., domestic and agricultural).

Figure 3 CY 2015 Zone W2 Groundwater Pumping

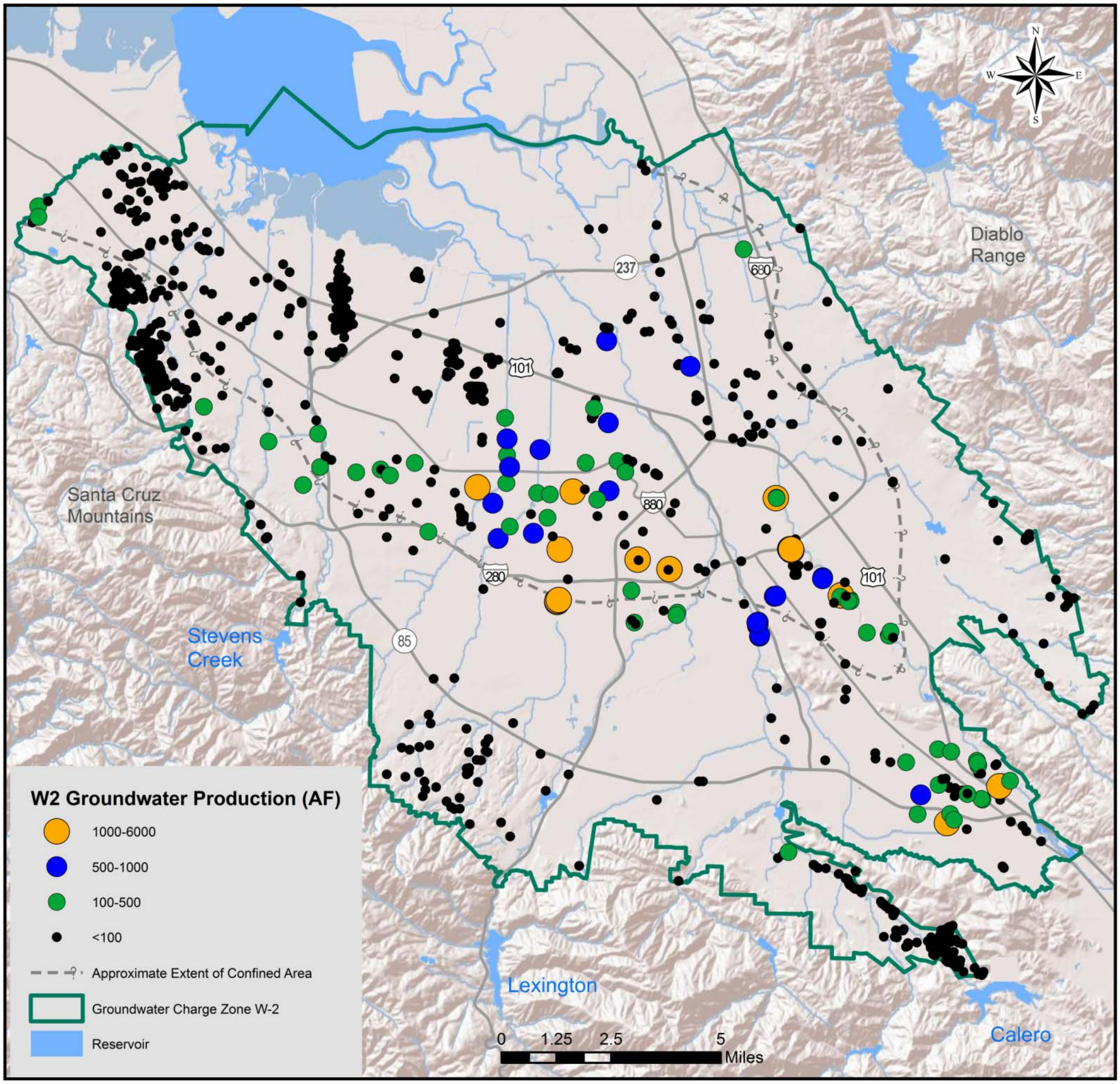
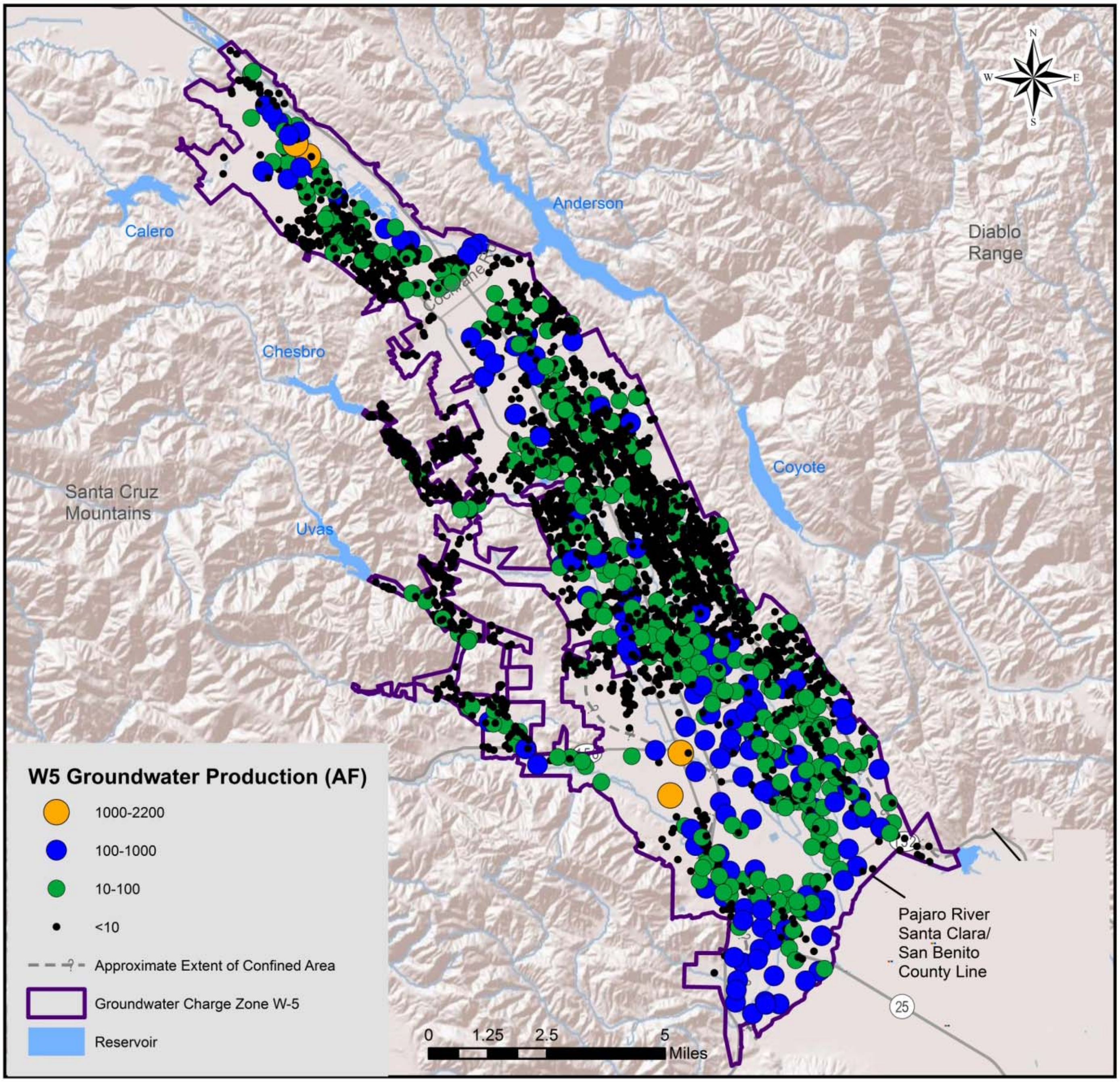


Figure 4 CY 2015 Zone W5 Groundwater Pumping



Groundwater Pumping Trends

Groundwater pumping is largely offset by the District's managed recharge of local and imported surface water in normal or wet years (Figure 5). Over the last 25 years, managed recharge has averaged 65% of the amount of groundwater pumped.

Total water use decreased in CY 2015 in all three groundwater areas due to water use reduction efforts in response to the drought. Countywide groundwater pumping was down approximately 30% from the previous year (Table 3). Groundwater use decreased 42%, 4% and 3% in the Santa Clara Plain, Coyote Valley, and Llagas Subbasin, respectively. Since groundwater is the only potable water supply for the Coyote Valley and Llagas Subbasin, the decrease in total water use is reflected in pumping. Figure 6 shows the countywide water use by source, including groundwater, treated water, SFPUC supplies, local surface water and recycled water. Groundwater provided about 42% of the total water used countywide in CY 2015.

Groundwater pumping and use patterns over time are shown in Figure 7 for each of the groundwater management areas. In the Santa Clara Plain, a significant drop in groundwater pumping is noted in the late 1980s following completion of the District's Santa Teresa Water Treatment Plant (WTP). Since then, pumping has averaged about 100,000 AF per year in the Santa Clara Plain. A notable increase in pumping in the Coyote Valley occurred in 2006 when a water retailer installed new wells and began extracting water to serve customers in the Santa Clara Plain. This increased the average annual pumping volume by about 5,000 AF. Pumping in the Llagas Subbasin has remained relatively stable over the period of record.

Major Groundwater Users

The largest groundwater users in each charge zone are shown on Figure 8. Water retailers are the primary users in North County, accounting for over 88% of all pumping. San Jose Water Company is the largest individual user, followed by other retailers and a few large industrial users. Unlike North County, about half of pumping in South County is from numerous individual pumpers including agricultural and domestic users. In South County, water retailer pumping accounts for about 33% of groundwater use. Other large users include golf courses and industrial users.

Table 3 CY 2015 Groundwater Pumping Compared to Other Indices (AF)

Groundwater Subbasin/Area	2015	2014	5 Year Average (2010-2014)	Period of Record (Average)
Santa Clara Subbasin, Santa Clara Plain	66,300	114,500	88,400	114,900
Santa Clara Subbasin, Coyote Valley	10,000	10,400	11,700	8,700
Llagas Subbasin	42,200	43,500	42,800	42,700
Total	**118,500**	**168,400**	**142,900**	**166,300**

Note: The period of record is 1981-2015 for the Santa Clara Plain and 1988-2015 for Coyote Valley and Llagas Subbasin.

Figure 5 Countywide Groundwater Pumping and Managed Recharge

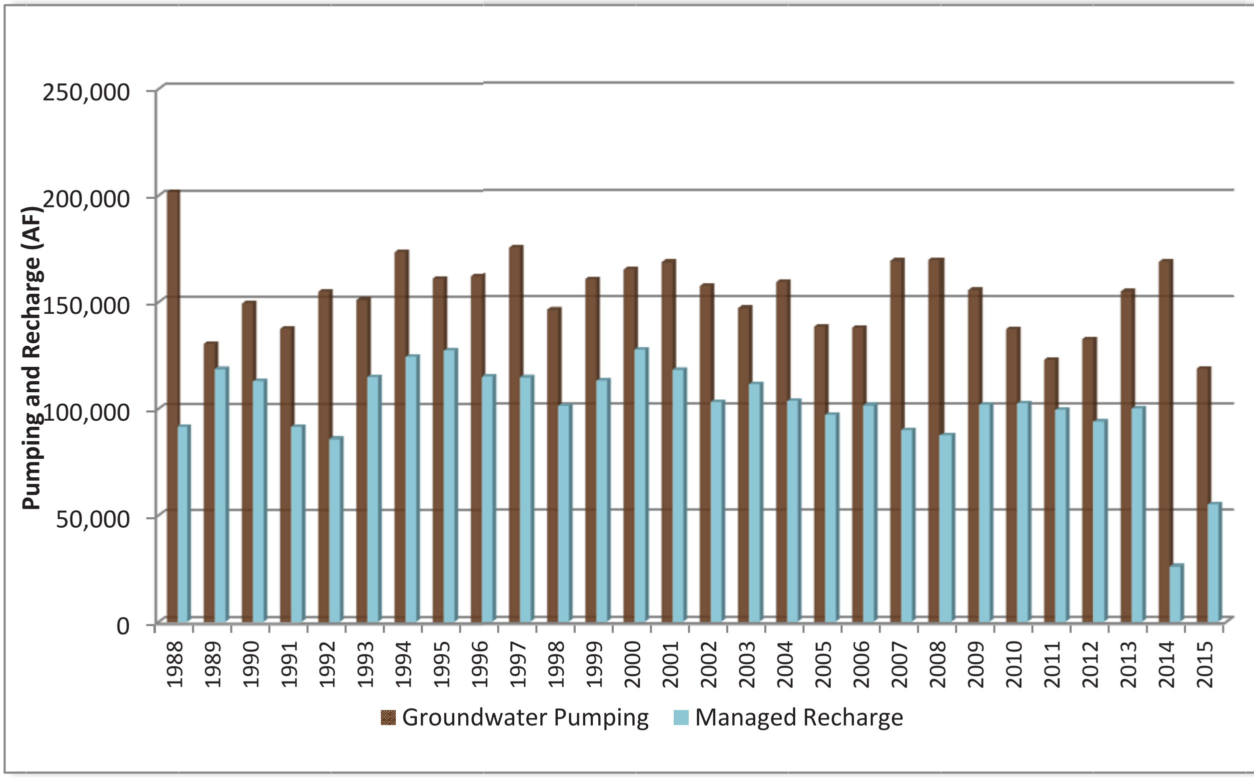


Figure 6 Countywide Water Use

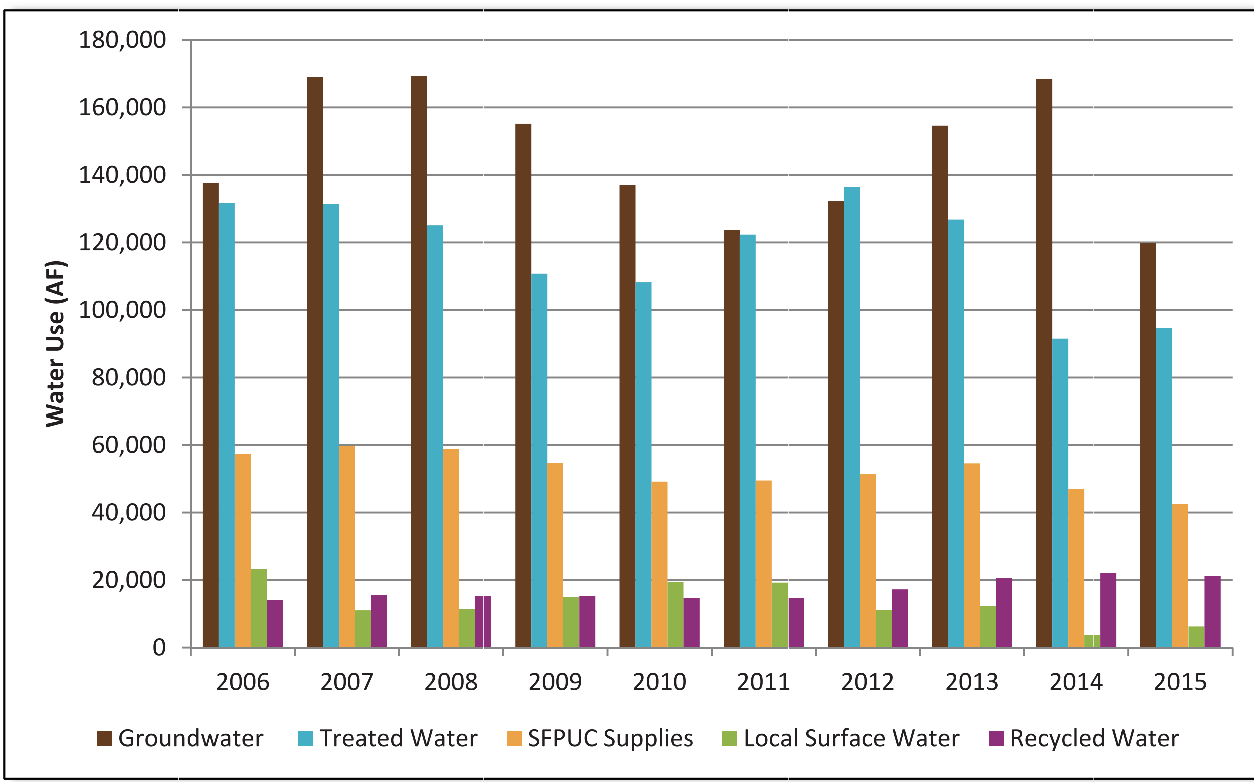


Figure 7 Groundwater Pumping by Use Category

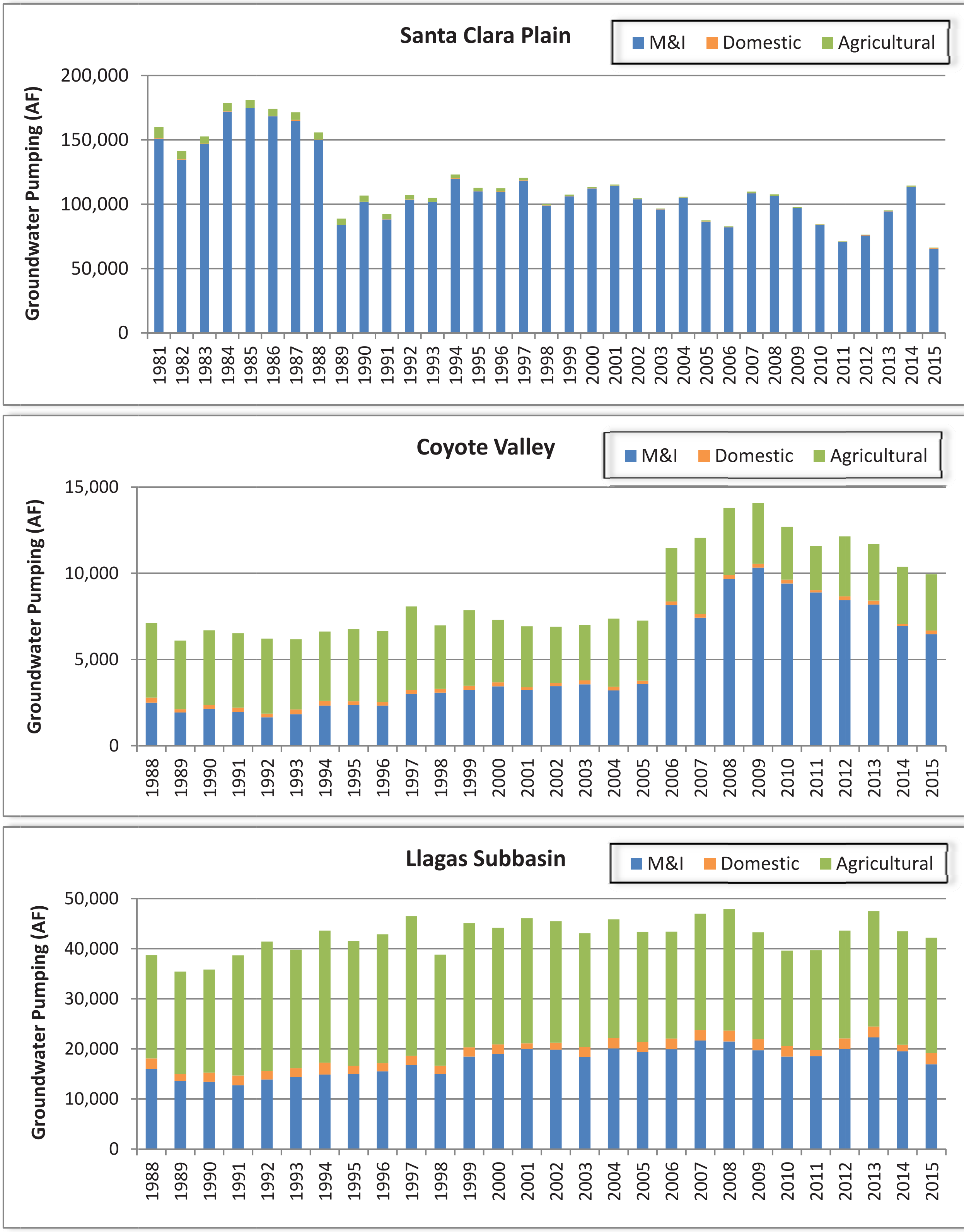
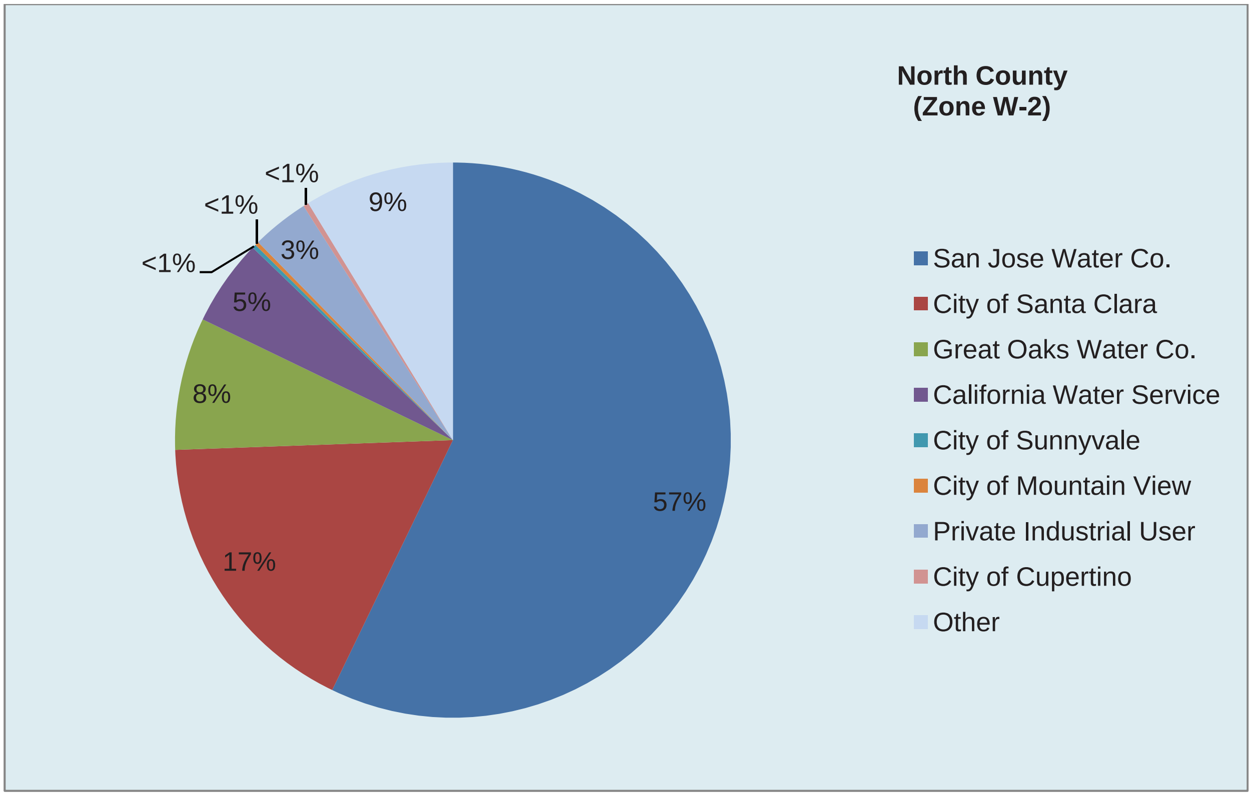
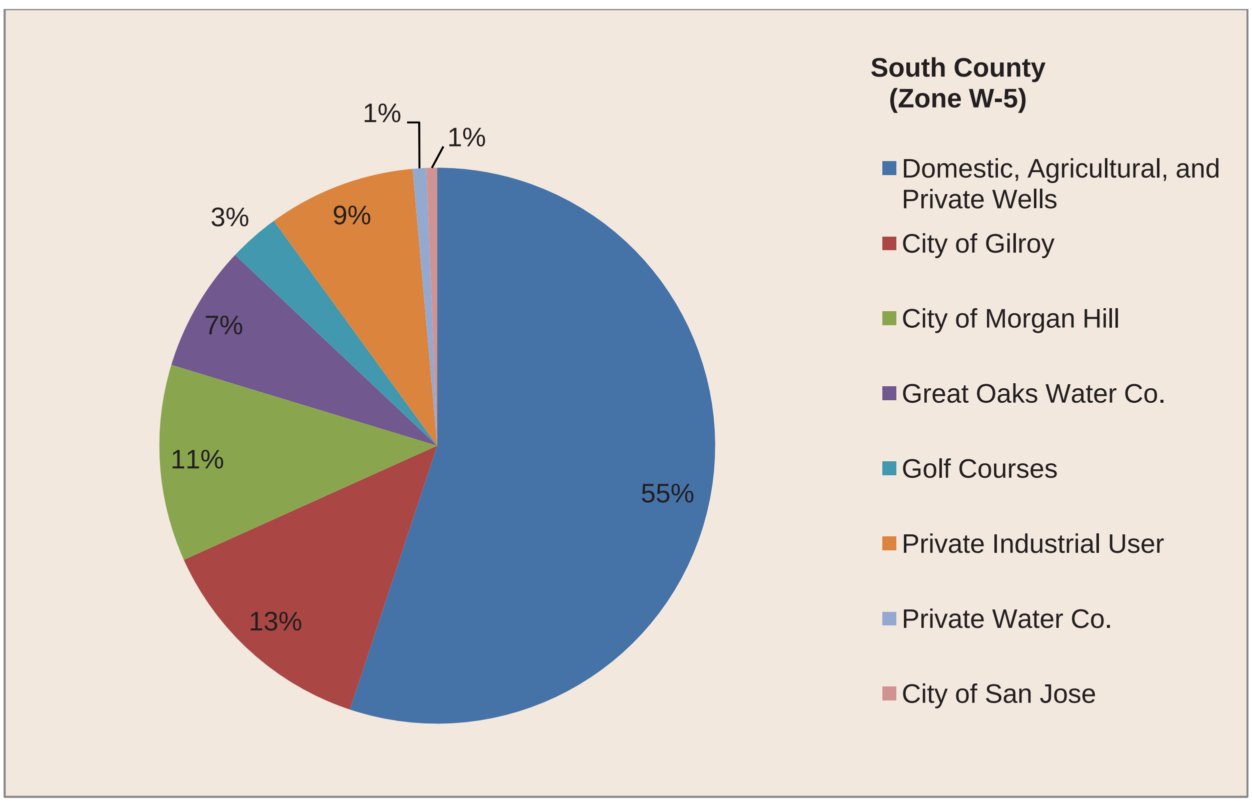


Figure 8 Percent of Total Pumping by Major Groundwater Users in 2015

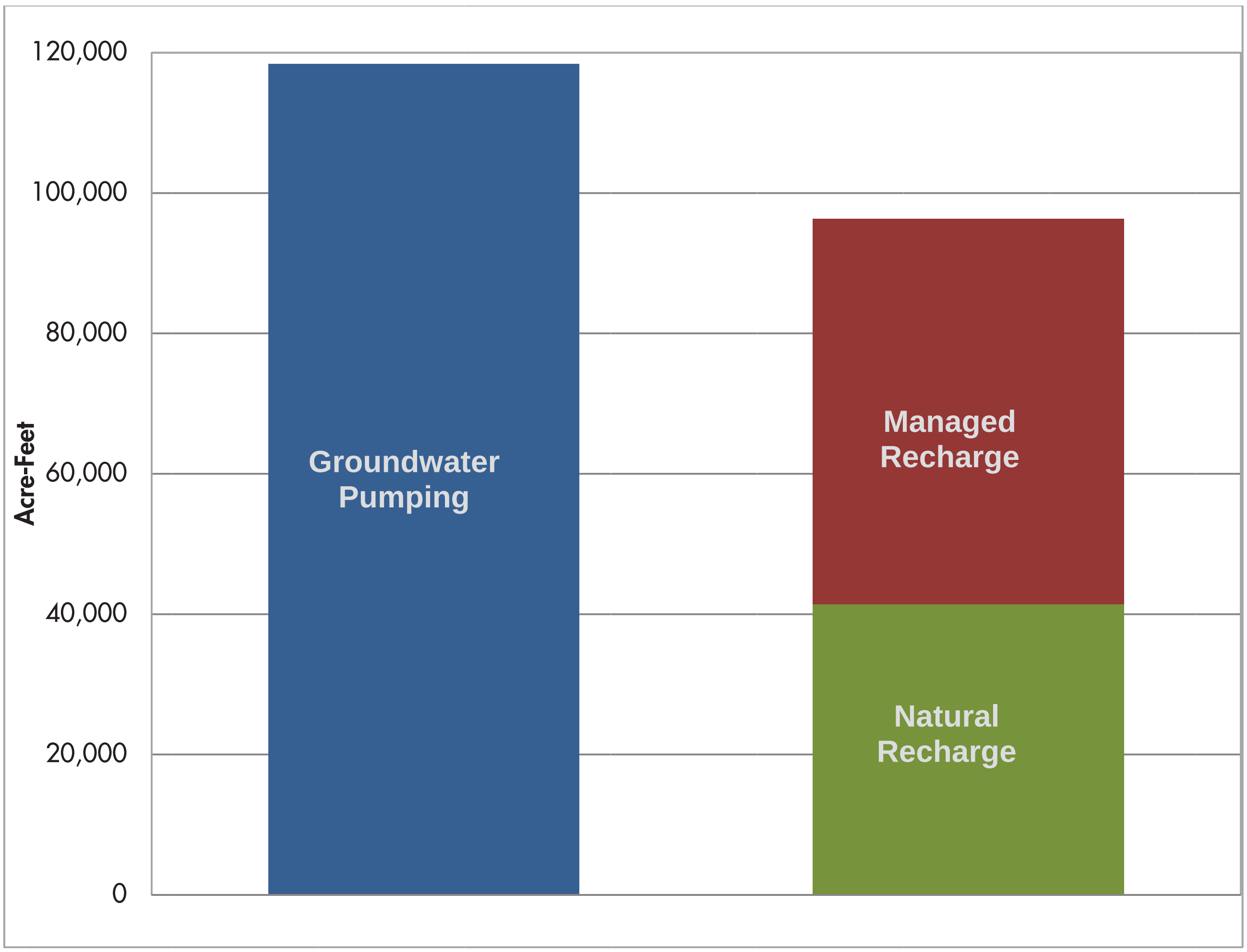




2.2 Groundwater Recharge

Since the 1930s, the District's water supply strategy has been to maximize the conjunctive management of surface water and groundwater. The annual amount of groundwater pumped far exceeds what is replenished naturally by rainfall, so the District's managed recharge and in-lieu recharge activities are critical to ensuring water supply reliability (Figure 9). Groundwater pumping exceeded total recharge in 2015 due to the reduced availability of surface water for managed recharge as a result of continued dry conditions.

Figure 9 Countywide Groundwater Pumping and Recharge in CY 2015



Managed Recharge

The District replenishes the groundwater subbasins with imported water and local runoff captured in 10 local reservoirs. District recharge facilities include more than 300 acres of recharge ponds and over 90 miles of creeks (Figure 10). Imported sources include the federal Central Valley Project (CVP) and the State Water Project (SWP). The use of imported or local water for managed recharge in a given year depends on a number of factors including hydrology,

imported water allocations, treatment plant demands, and environmental needs. In general, a greater percentage of local water is used for recharge in wet years due to increased capture of local storm runoff in local reservoirs.

About 54,900 AF of local and imported water was recharged through District facilities in CY 2015 (Table 4). This represents only about 50% of the managed recharge program in normal years. The low recharge volume was due to limited supplies of local and imported surface water due to continued drought. Approximately 62% of the District managed recharge was in-stream recharge. Approximately equal amounts of local and imported water were recharged in South County, while imported water accounted for about 83% of the water recharged in North County (Figure 11).

Table 4 CY 2015 Managed Recharge (AF)

Zone	In-Stream Recharge (Creeks)	Off-Stream Recharge (Recharge Ponds)	Total
W-2 (North County)	11,600	16,600	28,200
W-5 (South County)	22,300	4,400	26,700
Total	33,900	21,000	54,900

The District's 10 reservoirs were constructed in the 1930s and 1950s. Based on recent seismic studies, operating restrictions have been imposed on several District reservoirs while seismic stability concerns are mitigated. This limits the amount of water that can be stored for groundwater recharge, but is needed to provide an adequate level of safety to the public downstream and prevent the uncontrolled release of water while related retrofit projects to strengthen the dams are implemented. Major upcoming capital projects include seismic retrofit of Anderson, Calero, Guadalupe, and Almaden dams.

In-Lieu Recharge

The District's treated surface water deliveries, water conservation, and recycled water programs play a critical role in maintaining groundwater storage by reducing demand on groundwater. In 2015, treated water and recycled water provided about 94,500 and 20,000 AF of water, respectively. The District's long-term water conservation programs also saved approximately 64,000 AF[6].

The District's Silicon Valley Advanced Water Purification Center began operating in 2014. This state-of-the-art facility in San Jose produces up to 8 million gallons per day of highly purified water by treating tertiary-treated recycled water with microfiltration, reverse osmosis, and ultraviolet light. Purified water is blended with tertiary treated recycled water to lower the salt content of recycled water used for landscape irrigation and industrial uses. This facility supports the District's goal of expanding the use of recycled water, which reduces the demand on groundwater.

[6] Santa Clara Valley Water District, Protection and Augmentation of Water Supplies, FY 2016-17, 45th Annual Report, February 2016.

Figure 10 District Managed Recharge Facilities

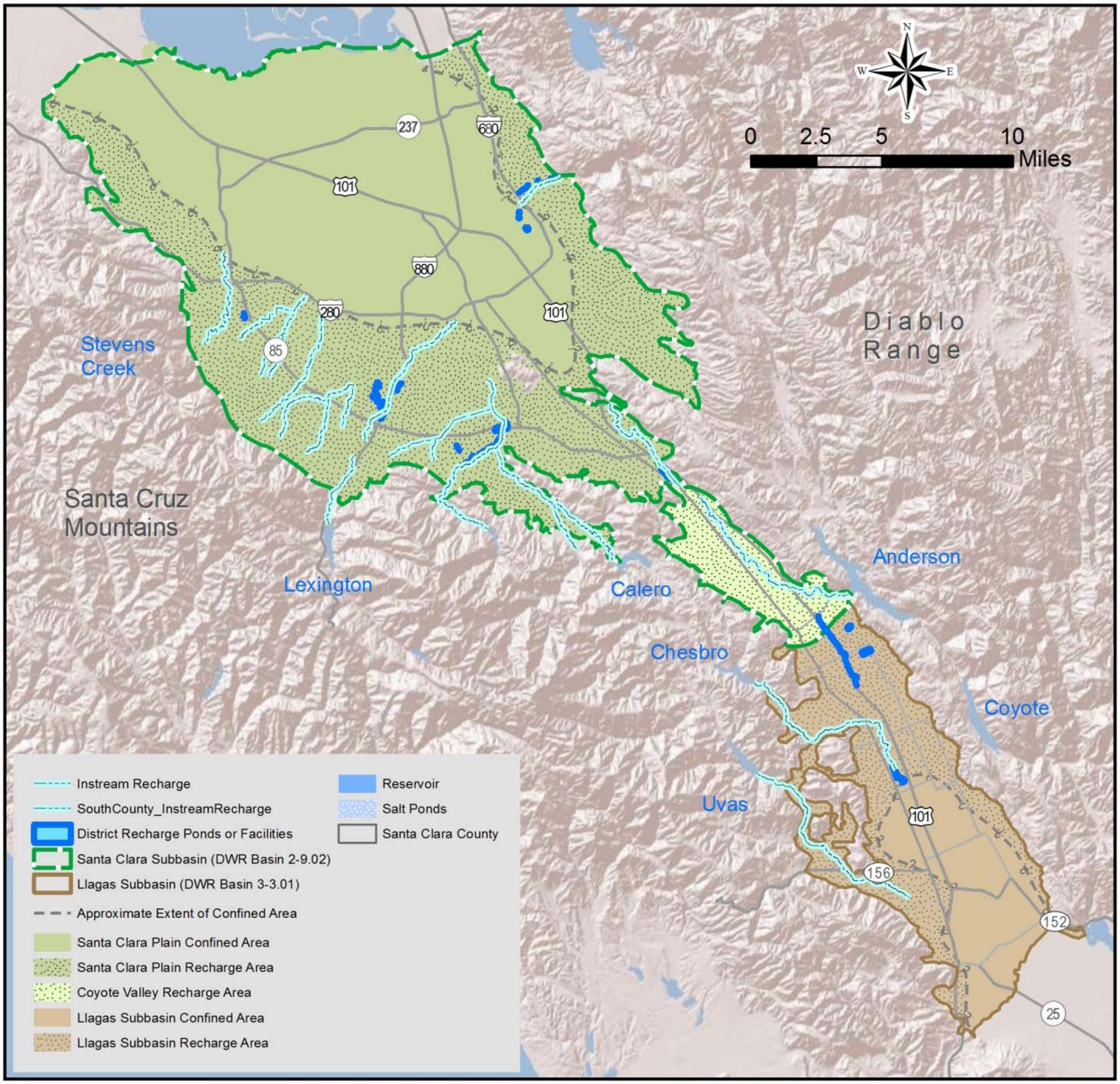
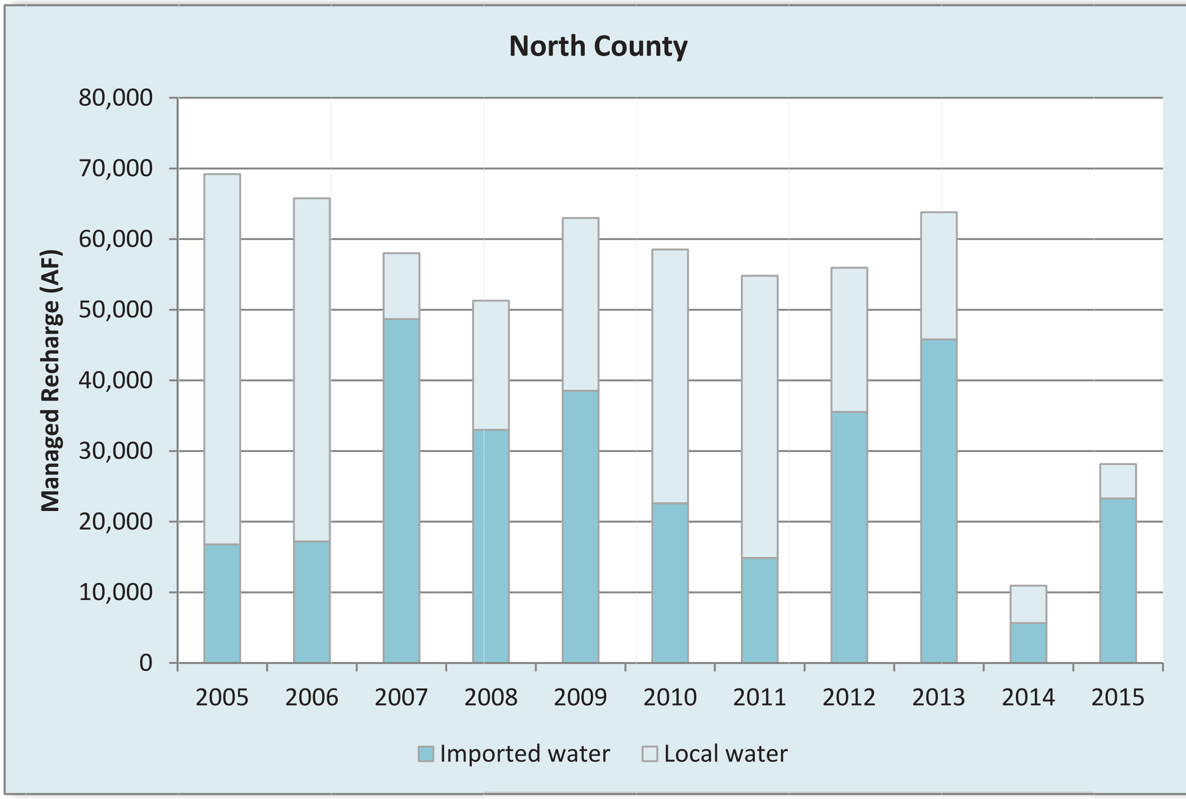
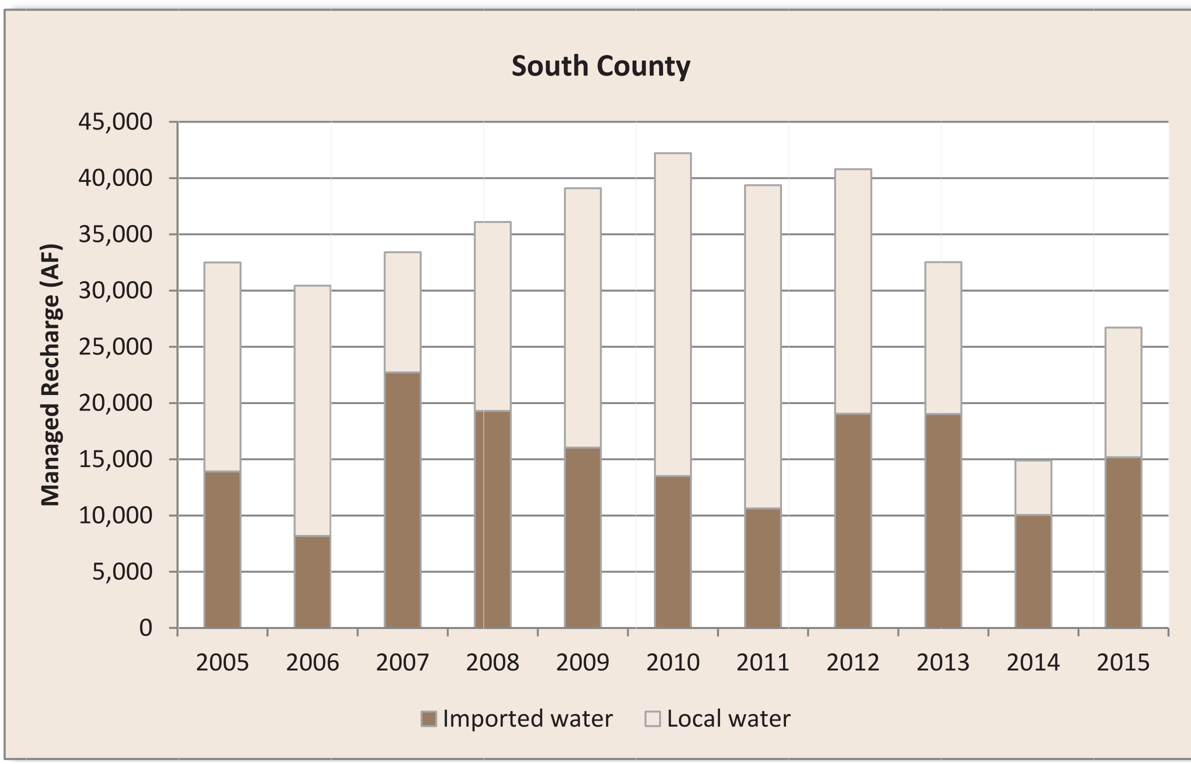


Figure 11 Managed Recharge By Source





2.3 Groundwater Balance

The groundwater balance provides an assessment of annual inflows and outflows for the Santa Clara Plain, Coyote Valley, and Llagas Subbasin, as shown in Figure 12. It should be noted that some terms presented in the groundwater balance cannot be directly measured and represent estimated values from the District's groundwater flow models.

Inflows

Major inflows to the subbasins are primarily controlled by hydrologic conditions and include:

- Managed recharge by the District using local and imported surface water, and
- Natural recharge, which includes deep percolation of rainfall, natural seepage through creeks, subsurface inflow from adjacent aquifer systems (Coyote Valley and Bolsa Subbasin), and return flows from septic systems and irrigation.

Total inflows to the subbasins were 96,300 AF in 2015, with natural recharge and other inflows providing about 43% of the total. Managed recharge provided about 57% of total inflows.

Outflows

The primary outflow of groundwater is pumping, which accounted for about 97% of the total outflow of 122,600 AF in CY 2015. Subsurface outflow to adjacent aquifer systems was about 4,200 AF, or about 3% of the total outflow.

Change in Storage

Based on the estimated inflows and outflows, there was an estimated decrease in storage of 26,300 AF in CY 2015 due to ongoing dry conditions and reduced managed recharge. Storage in the Santa Clara Plain, Coyote Valley, and Llagas Subbasin decreased by about 19,800 AF, 5,000 AF, and 1,500 AF, respectively.

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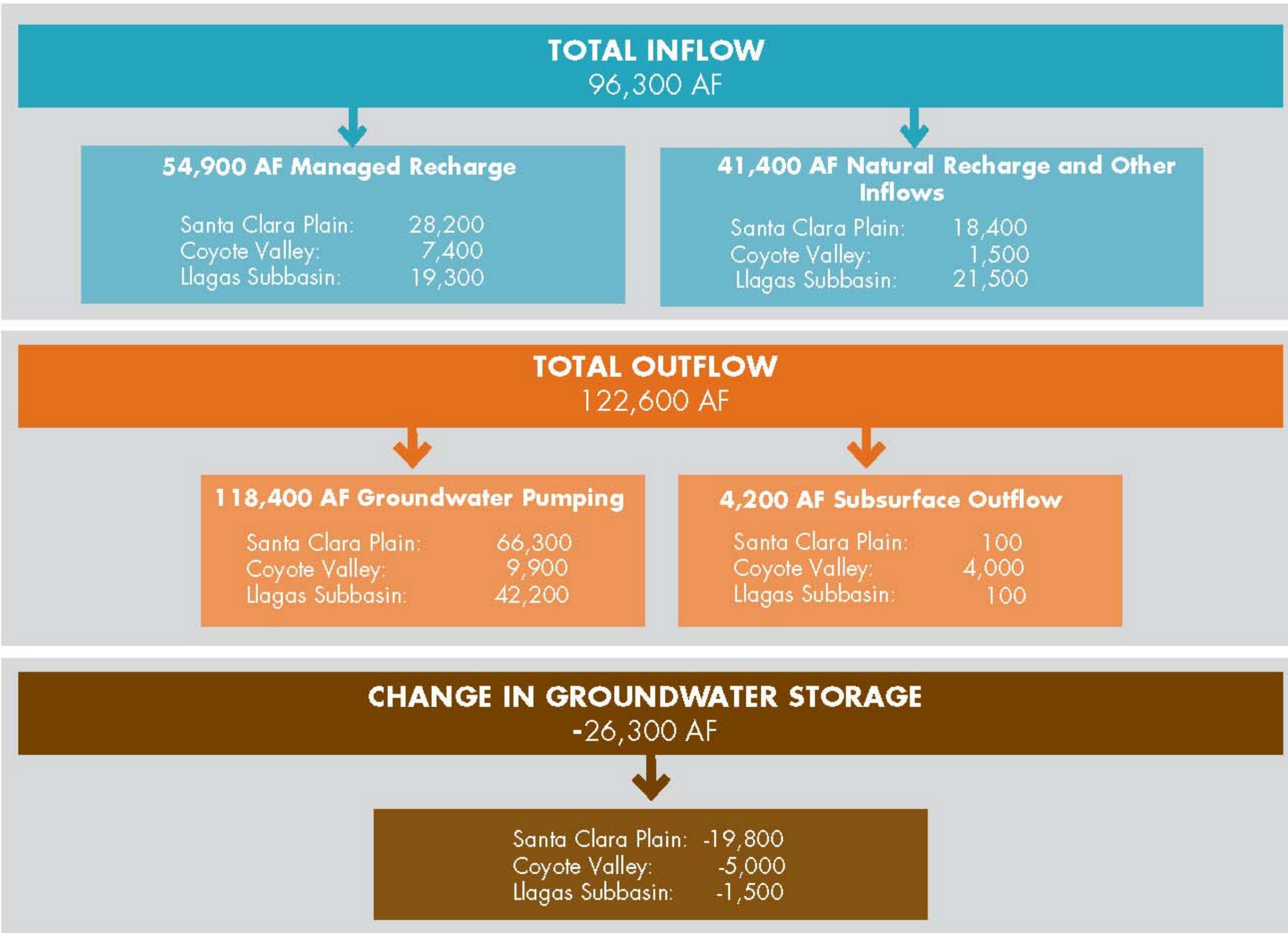
Figure 12 CY 2015 Groundwater Balance



Notes:

1) Groundwater balance terms presented are estimates as of March 2016, and are refined as additional data becomes available. Values shown are based on measured quantities or calibrated groundwater flow models, with all values rounded to the nearest 100 AF.
2) Managed recharge represents direct replenishment by the District using local and imported water. Estimates from the groundwater models may differ slightly from surface water accounting estimates.
3) Natural recharge and other inflows include the deep percolation of rainfall, septic system and/or irrigation return flows, natural seepage through creeks, and inflow from adjacent aquifer systems.
4) The groundwater pumping estimate is based on pumping measured by the District or reported by water supply well owners.
5) Subsurface outflow represents outflow to adjacent aquifer systems. In the Santa Clara Plain, this includes outflows to San Francisco Bay. In Coyote Valley, this includes outflow to the Santa Clara Plain, and in the Llagas Subbasin, this includes outflows to the Bolsa Subbasin in San Benito County.

3. Groundwater Levels and Storage

The District collected monthly water level measurements from 220 wells in CY 2015, and also evaluated water levels from 110 wells measured by water retailers. Groundwater levels at regional groundwater level index wells were generally higher than 2014 in the Santa Clara Plain and Coyote Valley due to improved rainfall; however, water levels were slightly lower in the Llagas Subbasin. Estimated end of year groundwater storage decreased by 26,300 AF from between 2014 and 2015 mainly due to limited managed recharge in the Santa Clara Plain. The GWMP storage target was not met for all three groundwater management areas in CY 2015 and the projected end of year storage for CY 2016 is below the 300,000 AF target. In accordance with the Water Shortage Contingency Plan, the District set a 30% water use reduction target in March 2015. Countywide, water retailers achieved a water use reduction of 27% in CY 2015 when compared to CY 2013. Groundwater reserves decreased in CY 2015, but much less than in CY 2014.

3.1 Groundwater Levels

Comprehensive and accurate monitoring data allows the District to evaluate groundwater level and storage conditions to support operational decisions and water supply planning efforts. The District measured depth to water data from 220 wells on a daily or monthly basis as shown in Figure 13. The District also evaluated water levels from 110 water supply wells measured by water retailers. As the designated monitoring entity for Santa Clara County under the California Statewide Groundwater Elevation Monitoring (CASGEM) program, the District uploaded almost 1,100 groundwater elevation measurements to the CASGEM website in CY 2015.

Three groundwater level index wells are used to represent regional groundwater elevations in the Santa Clara Plain, Coyote Valley, and the Llagas Subbasin (Figure 14). Table 5 shows March and October groundwater elevations for the index wells, which typically represent the seasonal high and low groundwater elevations, respectively. Due to improved rainfall, average groundwater elevations were 8 feet higher than the previous year in the Santa Clara Plain, 2 feet higher in Coyote Valley and 4 feet lower in the Llagas Subbasin. Groundwater elevations remained above the historically observed minimums and levels seen during the last major drought of 1987-1992 (Figure 13). Groundwater elevations were also above the thresholds established to minimize the risk of land subsidence in all 10 subsidence index wells throughout 2015 (see Section 4).

In the Santa Clara Subbasin, groundwater elevations are highest in the Coyote Valley and the recharge areas of the Santa Clara Plain. Groundwater elevations generally decrease within the interior, confined area of the subbasin, and the general groundwater flow direction is northwest toward San Francisco Bay (Figure 15). The District's managed recharge helps maintain adequate pressure in the principal aquifer zone such that groundwater flows toward the bay and maintains an upward vertical gradient near the bay. The upward gradient minimizes the potential for saltwater intrusion into the principal aquifers.

Groundwater elevation contours for the principal aquifer zone in March and October of 2015 are shown in Figures 15 and 16, respectively. The typical seasonal pattern is higher groundwater levels in the spring and lower levels in the fall due to increased pumping and less natural recharge in the summer and fall. However, this was not observed in CY 2015 because water savings increased as the year progressed and pumping was reduced in the summer months, which is atypical. Groundwater levels in the central portion of the Santa Clara Plain increased between spring and fall due to drought response; groundwater pumping was significantly reduced and there was increased managed recharge compared to the previous year. The October 2015 contours indicate that groundwater elevations in the interior of the Santa Clara Plain have recovered significantly as compared to October 2014.

Table 5 Groundwater Elevations at Regional Index Wells (feet above mean sea level)

Groundwater Subbasin/Area	Index Well	March 2015	October 2015	2015 Average	2014 Average	5 Year Average (2010-2014)	Period of Record Average
Santa Clara Subbasin, Santa Clara Plain	07S01W25L001	40.4	60	49.8	41.3	64.4	8.0
Santa Clara Subbasin, Coyote Valley	09S02E02J002	265.0	251.1	259.3	257.7	264.4	264.3
Llagas Subbasin	10S03E13D003	197.9	178.2	188.9	193.2	220.1	219.0

Note: The period of record for the index wells is 1936-2015 for the Santa Clara Plain, 1948-2015 for the Coyote Valley, and 1969-2015 for the Llagas Subbasin.

The groundwater flow patterns observed in Coyote Valley were similar to those observed in the past, with groundwater flow generally toward the northwest. The highest groundwater elevations in the Llagas Subbasin are in the recharge area in Morgan Hill, and groundwater generally flows southeast toward the Pajaro River and San Benito County. Managed and natural recharge within the recharge area maintains groundwater pressures within the confined area, where groundwater exists in partially to fully confined conditions.

3.2 Groundwater Storage

Estimated groundwater storage at the end of 2015 was below the GWMP outcome measure of 300,000 AF, and 26,300 AF lower than at the end of 2014 (Table 6). End of year groundwater storage of less than 300,000 AF indicates a potential for water shortages in the next year, per the District's Water Shortage Contingency Plan. Due to ongoing dry conditions, the projected end of year storage for 2016 is well below the 300,000 AF target. The District Board maintained the 30% water use reduction target through June 2016, when the target was reduced to 20% in light of improved water supplies.

Table 6 Estimated End of Year Groundwater Storage (AF)

Groundwater Subbasin/Area	GWMP Outcome Measure	End of Year 2014	End of Year 2015	Change in Storage
Santa Clara Subbasin Santa Clara Plain	278,000	234,600	214,800	-19,800
Santa Clara Subbasin Coyote Valley	5,000	5,400	400	-5,000
Llagas Subbasin	17,000	15,400	13,900	-1,500
Total	**300,000**	**255,400**	**229,100**	**-26,300**

Note: Groundwater storage estimates presented are as of March 2016. These estimates are based on accumulated groundwater storage since 1970, 1991, and 1990 for the Santa Clara Plain, Coyote Valley, and Llagas Subbasin, respectively. These estimates are refined as additional pumping and managed recharge data become available.

Figure 13 CY 2015 Groundwater Level Monitoring

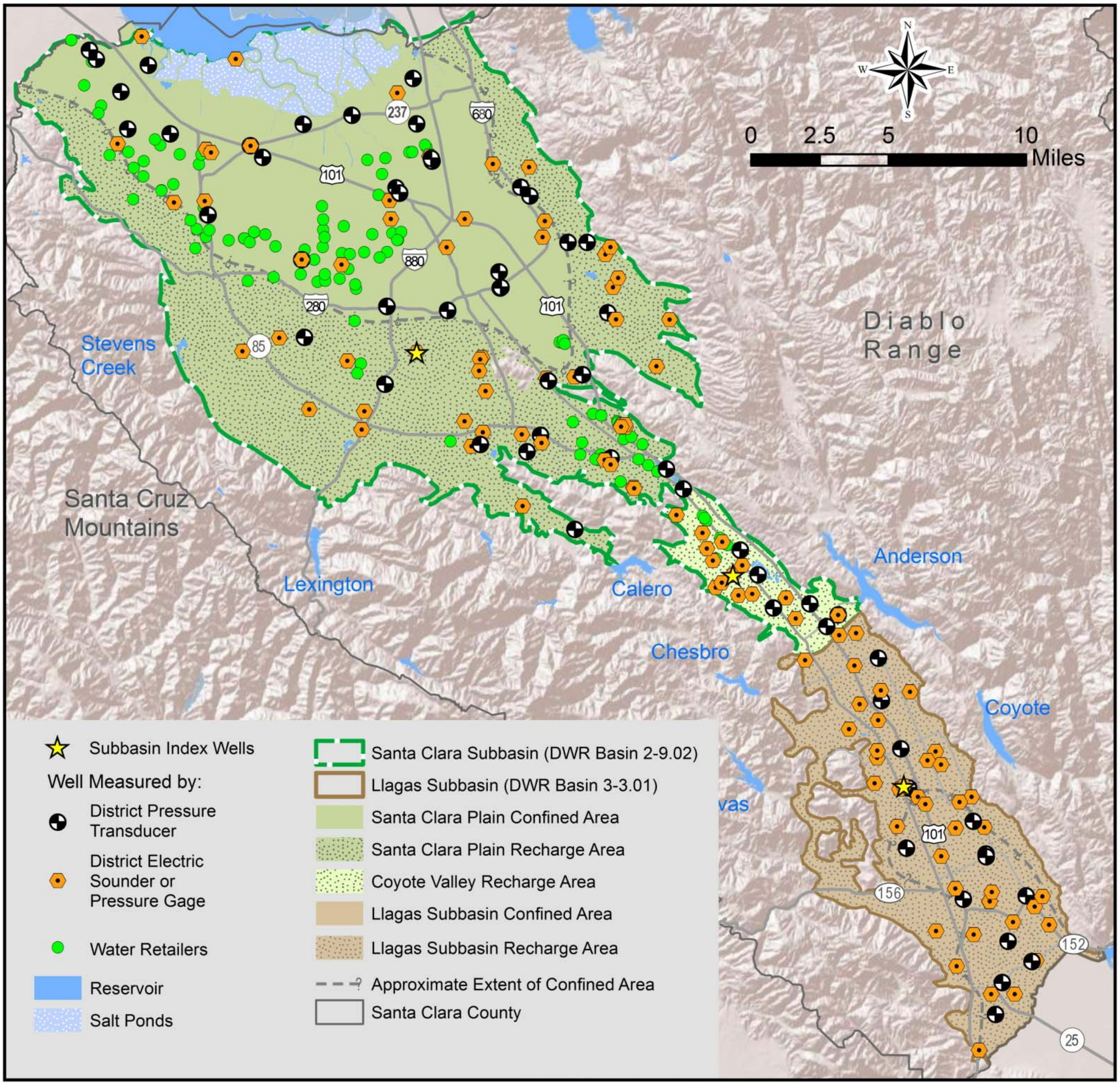
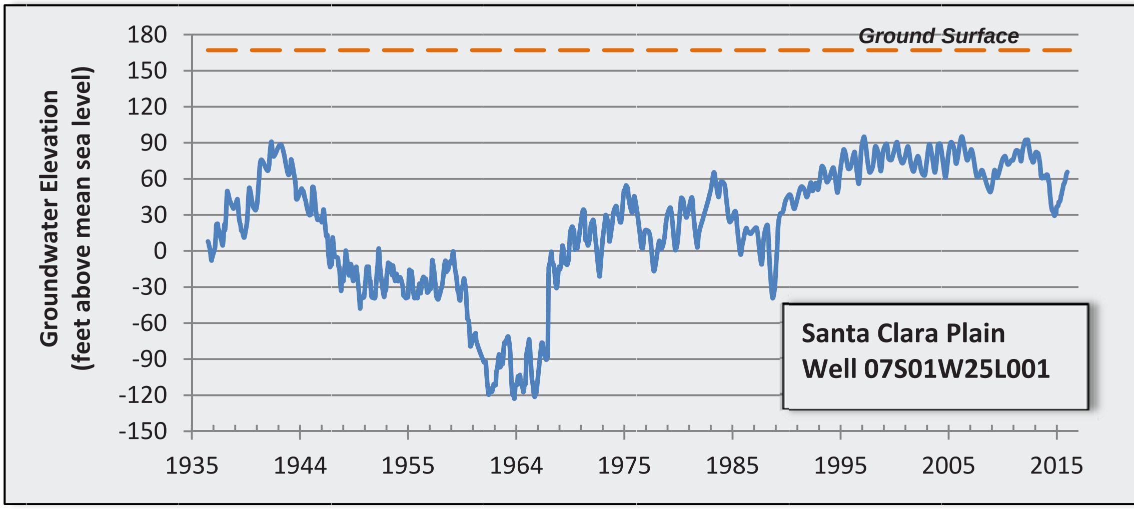
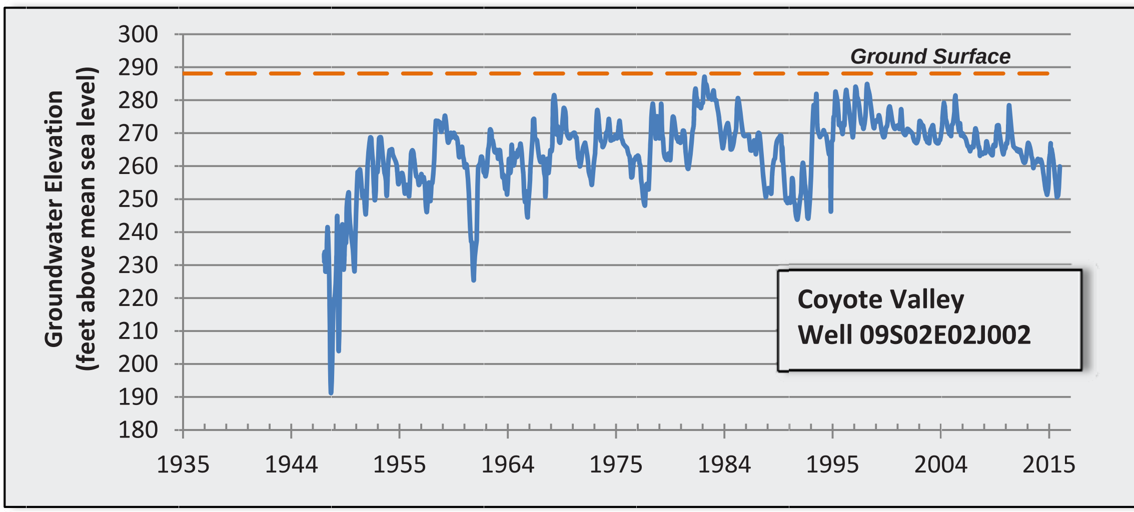


Figure 14 Groundwater Elevations at Regional Index Wells





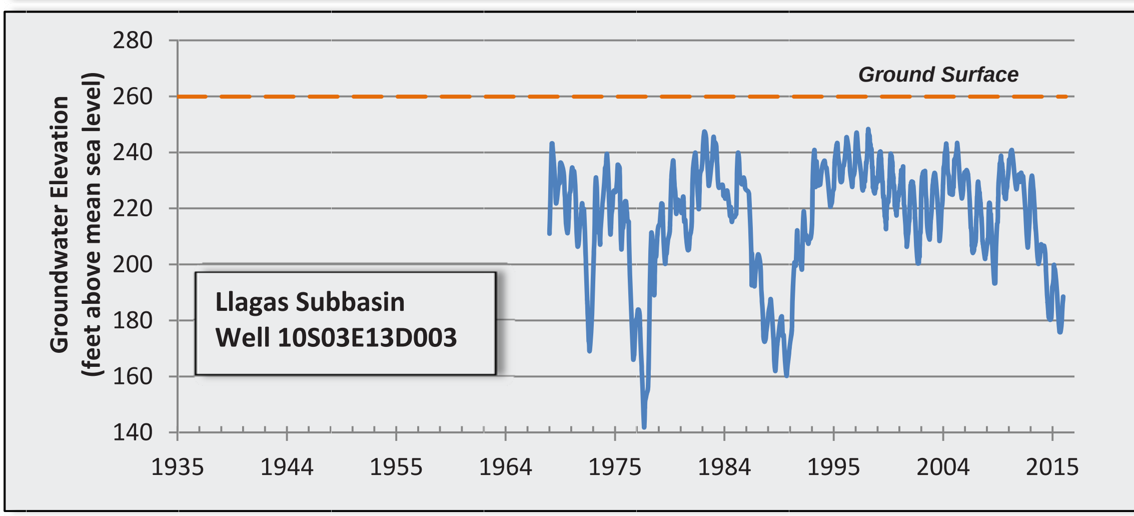


Figure 15 Spring 2015 Groundwater Elevation Contours

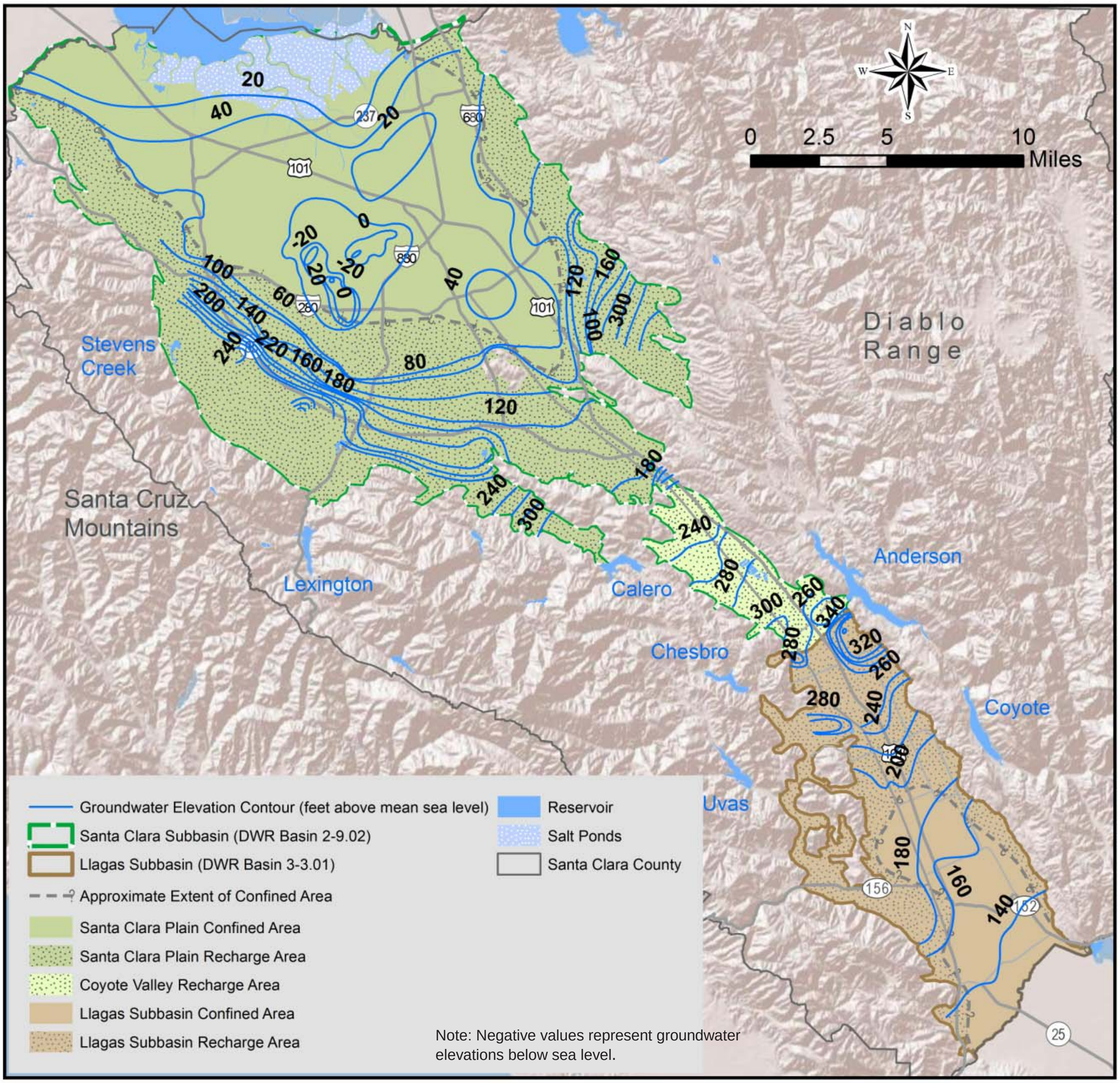
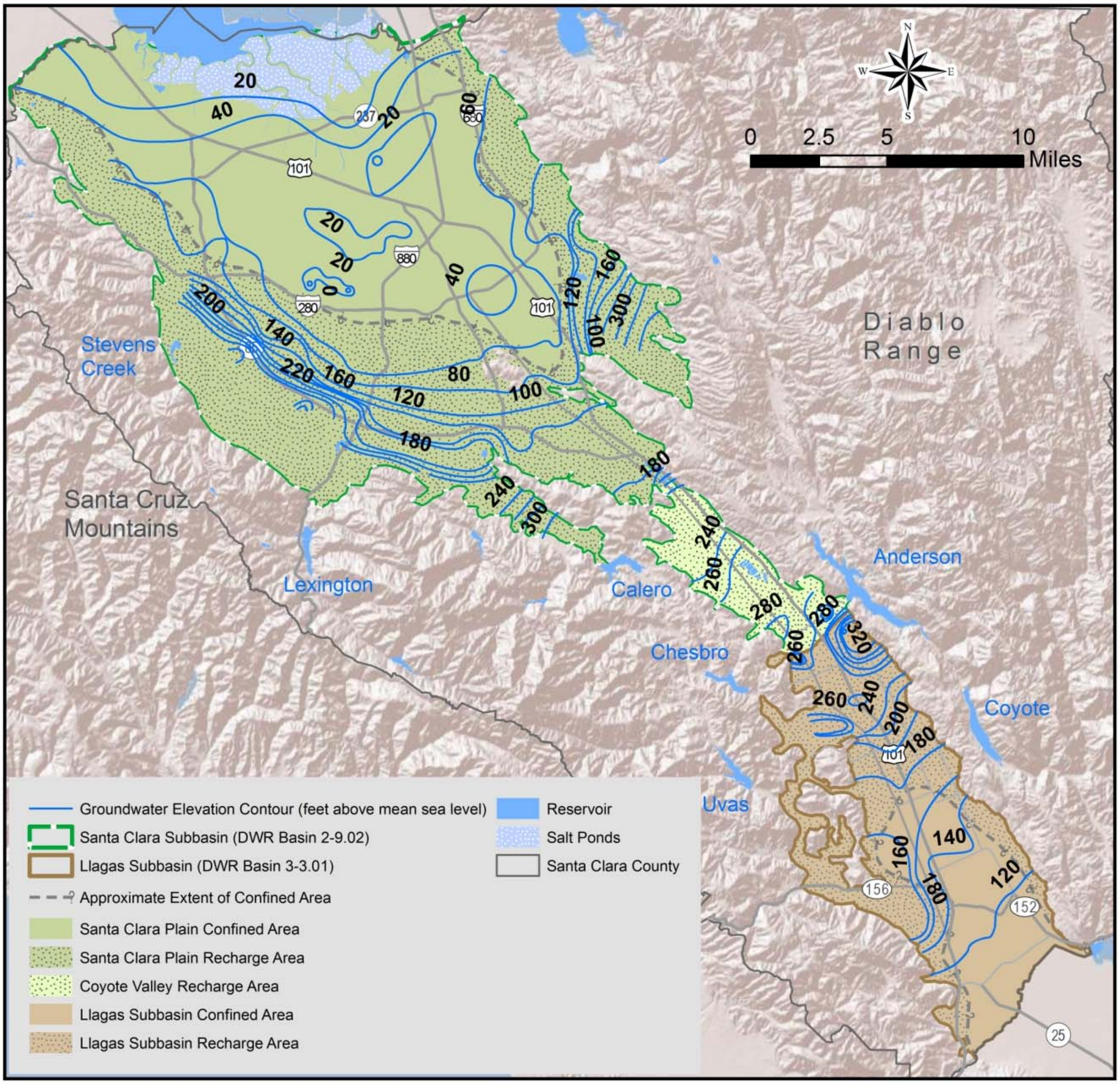


Figure 16 Fall 2015 Groundwater Elevation Contours



Groundwater Storage Outcome Measures

OM 2.1.1.a.
Greater than 278,000 AF of projected end of year groundwater storage in the Santa Clara Plain.

OM 2.1.1.b
Greater than 5,000 AF of projected end of year groundwater storage in the Coyote Valley.

OM 2.1.1.c.
Greater than 17,000 AF of projected end of year groundwater storage in the Llagas Subbasin.

The outcome measures for the Santa Clara Plain, Coyote Valley and Llagas Subbasin were not met in 2015, with an estimated end of year storage of 214,800 AF, 400 AF, and 13,900 AF, respectively. Based on the significant storage decline since 2013 and ongoing drought conditions, it is likely that the storage targets for all three groundwater areas will not be met in 2016.

4. LAND SUBSIDENCE

In CY 2015, the District measured subsidence at 145 benchmarks along three cross valley level circuits and two extensometers. Water levels at ten subsidence index wells were also monitored and compared to thresholds established to minimize the risk of permanent land subsidence. In CY 2015, all subsidence outcome measures were met.

The Santa Clara Plain is vulnerable to land subsidence with about 13 feet of inelastic (permanent) land subsidence observed in San Jose between 1915 and 1969 due to groundwater overdraft. Significant inelastic subsidence was essentially halted by about 1970 through the District's expanded conjunctive management programs, which allowed artesian heads to recover. A minor amount of elastic subsidence and recovery occurs annually in response to seasonal pumping and recharge as indicated by extensometer measurements, benchmark surveys, and Interferometric Synthetic Aperture Radar (InSAR)[7] data. To avoid resumption of permanent inelastic subsidence, the District has established subsidence thresholds at ten index wells in the Santa Clara Plain[8]. A tolerable rate of 0.01 feet per year of subsidence[9] was used to determine thresholds at these wells. These subsidence thresholds are the groundwater levels that must be maintained to ensure a low risk of land subsidence.

The District conducts ongoing monitoring of benchmarks on the land surface, extensometers, and groundwater levels at subsidence index wells to determine if land subsidence is occurring or threatening to exceed established thresholds. Subsidence monitoring points are shown in Figure 17. Monitoring data in 2015 from extensometers, benchmark surveys, and subsidence index wells indicates a low risk of subsidence, as described further below.

4.1 Extensometer Monitoring

The District monitors two 1,000-foot deep extensometers that measure vertical ground motion (or aquifer compaction) relative to a central, isolated pipe set beneath the water bearing units. The extensometers are located in Sunnyvale near Moffett Field ("Sunny") and near downtown San Jose ("Martha"), and are equipped with data loggers to provide hourly readings of aquifer compaction and water level. The District evaluates the average land subsidence measured during the last 11 years to determine if it meets the tolerable rate of land subsidence of 0.01 feet/year.

Figure 18 shows cumulative compaction measured at the extensometers for the period of record supplemented with nearby benchmark data. These figures indicate that land subsidence conditions over the last few decades have been relatively stable. The figures also show close correlations between the District's land subsidence model, which is used to forecast land subsidence, and actual measured data. Measured data show a negative compaction (i.e., aquifer expansion) at both sites in 2015. The average subsidence rate over the last 11 years (2005 to 2015) is 0.005 feet/year, which is below the tolerable subsidence rate of 0.01 feet/year. The average for the previous period (2004 to 2014) was 0.008 feet/year. The decreased average subsidence rate results from groundwater level recovery in 2015. Measured compaction is within the elastic range observed historically, but vigilant land subsidence monitoring and analysis are critical as the drought continues.

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[7] Schmidt, D.A. and Burgmann, R., Time-Dependent Land Uplift and Subsidence in the Santa Clara Valley, California from a Large Interferometric Synthetic Aperture Radar Data Set, Journal of Geophysical Research, Volume 108, No. B9, 2003.

[8] Geoscience Support Services Inc. for Santa Clara Valley Water District, Subsidence Thresholds in the North County Area of Santa Clara Valley, 1991.

[9] The tolerable subsidence rate of no more than 0.01 feet per year on average was endorsed by the District's Water Retailer Groundwater Subcommittee.

Figure 17 CY 2015 Land Subsidence Monitoring

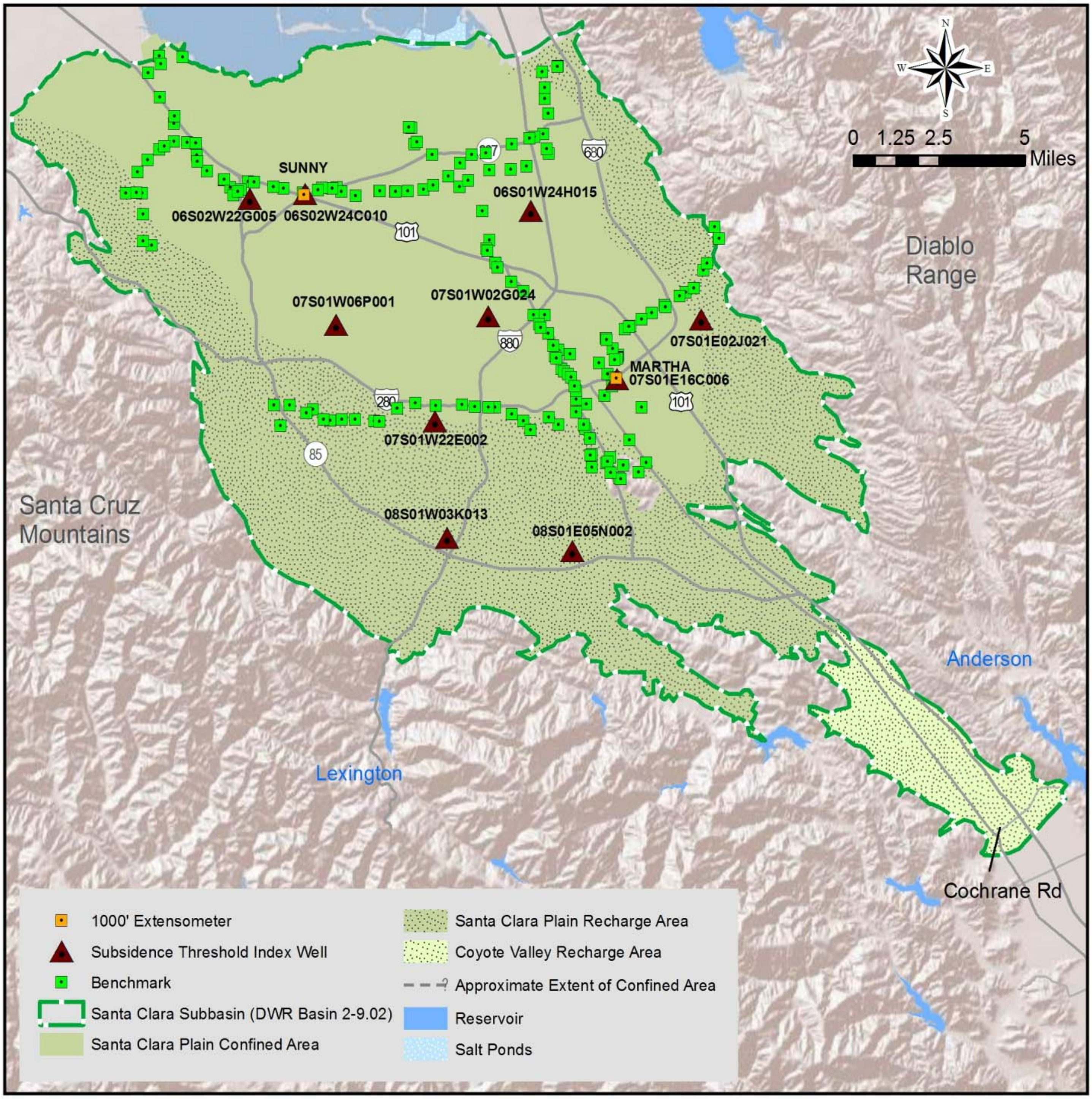
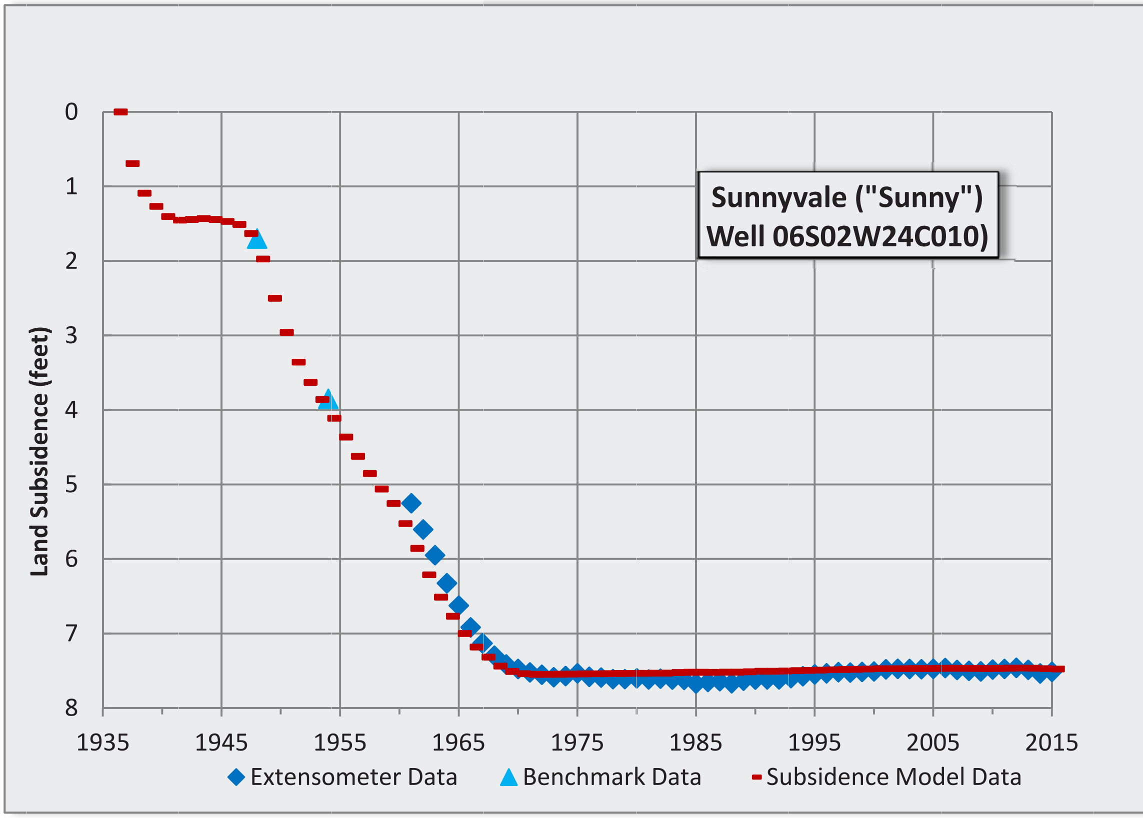
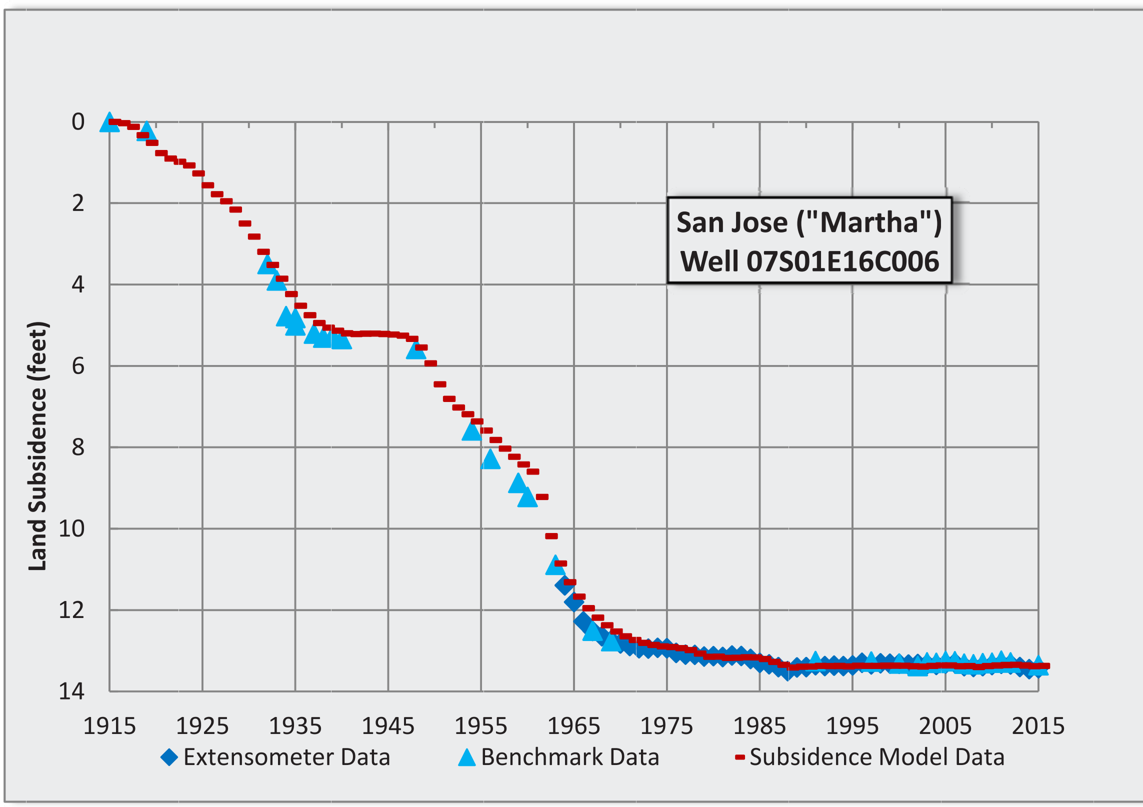


Figure 18 Cumulative Land Subsidence





4.2 Benchmark Elevation Surveys

Periodic benchmark surveys of land surface elevation have been conducted in Santa Clara County since 1912[10]. The District's current benchmark leveling program consists of annual surveys along three cross valley level circuits in the Santa Clara Plain. In 2015, the District analyzed land surface elevation data from 145 benchmarks to evaluate the spatial variability of land subsidence. Survey data at a majority of benchmarks show the land surface rising in 2015 due to significantly decreased pumping and increased recharge. Regional benchmark data is consistent with extensometer data, indicating the average annual change of land surface over the last 11 years does not exceed the tolerable rate of subsidence of 0.01 feet per year.

4.3 Subsidence Index Wells

Groundwater level measurements are an integral part of land subsidence monitoring because declining water levels due to long-term overdraft were the driving force of historical subsidence in the Santa Clara Plain. The District measures water levels at ten subsidence index wells on a daily to monthly basis to ensure they remain above established thresholds. If water levels drop below subsidence thresholds for extended periods, permanent land subsidence may resume, resulting in an increased risk of flooding, salt water intrusion, and damage to infrastructure and utilities.

Figure 19 shows groundwater levels and subsidence thresholds at ten subsidence index wells. The lowest historical water levels were generally observed in the 1960s and 1970s. Since then, groundwater levels have recovered, primarily due to the District's managed recharge and in-lieu recharge programs. In general, groundwater levels in 2015 were in recovery from water level declines in the previous year. End of 2015 water levels improved in 9 of 10 subsidence index wells and they slightly declined in one well. Three subsidence index wells located near the Baylands continue to have upward vertical gradients. In addition to keeping water levels above subsidence thresholds, maintaining an upward hydraulic gradient in principal aquifer zone wells is critical for preventing shallow groundwater with elevated TDS from entering the principal aquifer through abandoned wells and other vertical conduits. In 2015, both conditions were met at those wells. The District will continue to frequently track data from the subsidence index wells to support water supply operations and planning.

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[10] USGS, Land Subsidence in the Santa Clara Valley, California as of 1982, Professional Paper 497-F, 1988.

Figure 19 Groundwater Levels at Subsidence Index Wells (feet above mean sea level)

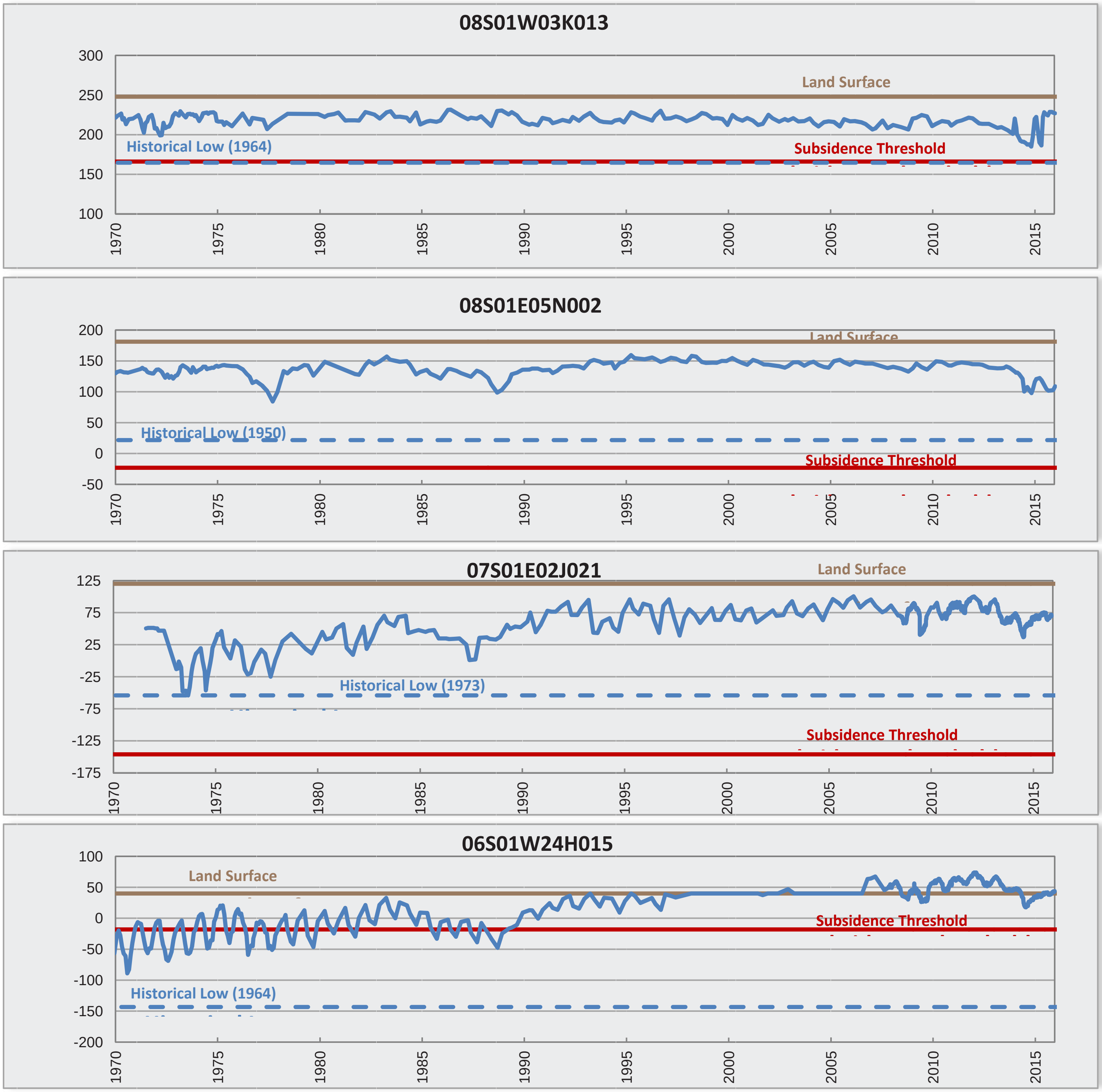


Figure 19 Groundwater Levels at Subsidence Index Wells (feet above mean sea level, continued)

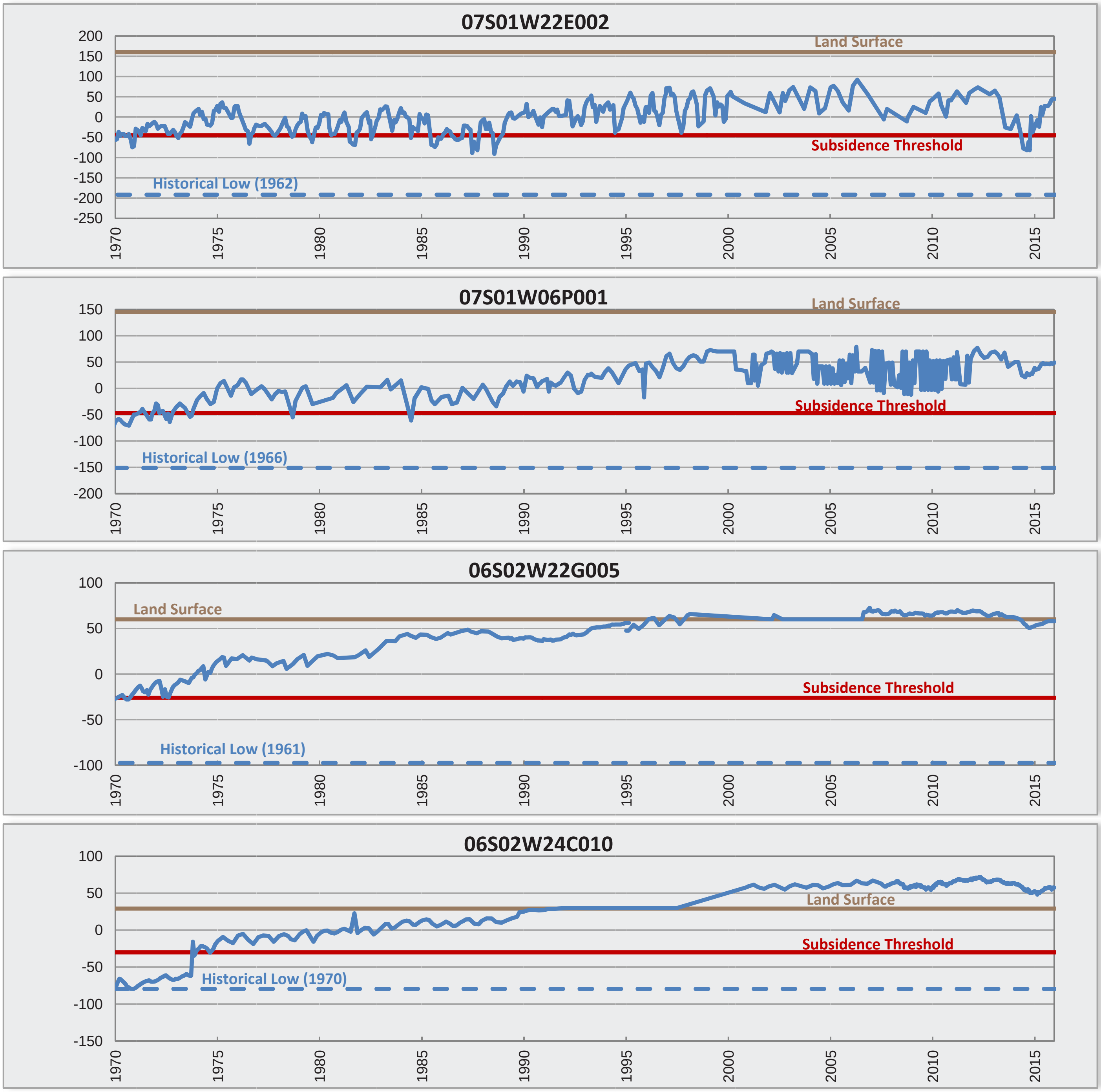
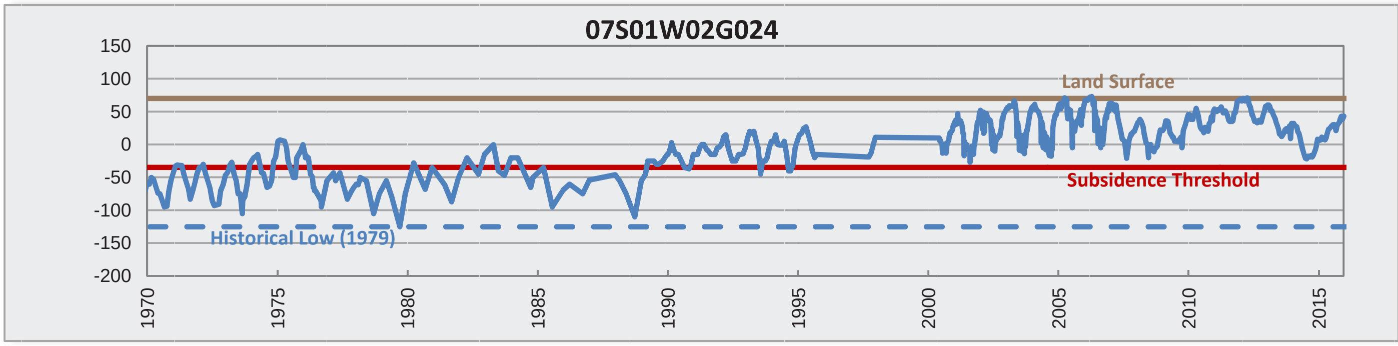
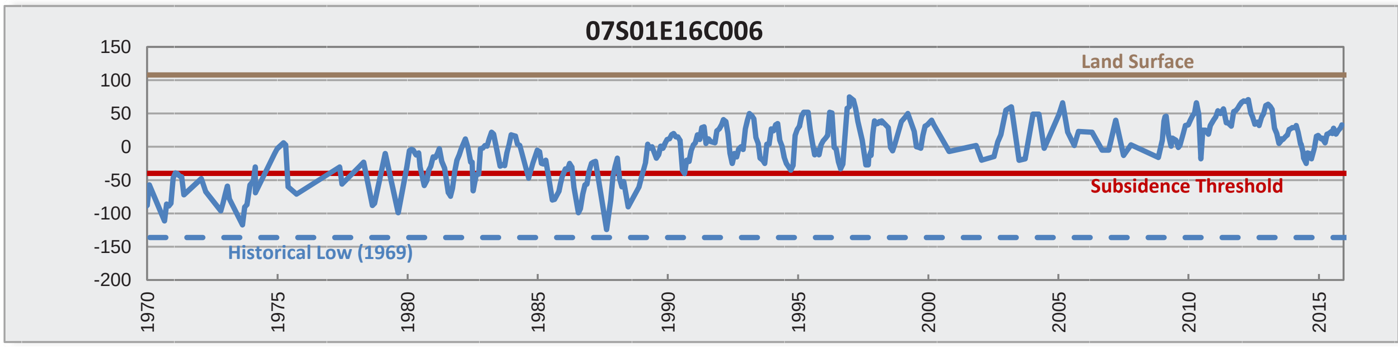


Figure 19 Groundwater Levels at Subsidence Index Wells (feet above mean sea level, continued)





Land Subsidence Outcome Measure

OM 2.1.1.d.
100% of subsidence index wells with groundwater levels above subsidence thresholds.

The outcome measure is met for calendar year 2015 as groundwater levels were above subsidence thresholds at all ten Santa Clara Plain subsidence index wells.

5. GROUNDWATER QUALITY

In CY 2015, the District tested groundwater quality at 318 wells, including 87 District monitoring locations, 214 domestic wells, and 17 wells near recycled water irrigation sites. The District also examined groundwater quality data from 225 public water supply wells and monitored recharge water quality at 8 locations.

Groundwater in the Santa Clara and Llagas Subbasins is generally of good quality that meets drinking water standards in most wells for all constituents tested. An exception is nitrate, which is elevated in 23% of South County water supply wells tested in 2015 (primarily domestic wells). Nitrate is present due to current and historic sources and primarily impacts private domestic wells. To address nitrate loading, the District completed Salt and Nutrient Management Plans in 2014 in coordination with basin stakeholders. The District continues to offer free water testing and rebates for nitrate treatment systems for domestic well users to reduce consumer exposure.

Samples were collected in September and December 2015 from the Los Gatos recharge system and the Upper Llagas recharge system. Results indicate recharge water quality continues to be of similar or better quality than groundwater for the parameters tested. Surface water quality indicators measured in CY 2015 were all within the normal range.

Past District groundwater monitoring near a recycled water irrigation study site in the Santa Clara Plain shows increasing trends for salts in some monitoring wells, as well as low-level detections of disinfection byproducts and other constituents. In 2015, recycled water irrigation monitoring wells at the Santa Clara Plain study site could not be sampled because they were dry due to the drought. In the Gilroy recycled water irrigation groundwater monitoring wells, disinfection byproducts are not detected, and salt concentrations are variable with no discernible trend. Perfluorinated compounds, which are also detected in recycled water, have been detected sporadically in several monitoring wells.

The District continues to coordinate with the state and federal agencies managing cleanup of groundwater contamination sites to track progress and issue recommendations for effective remediation measures. The District will continue to track water quality changes and work with stakeholders to identify ways to protect groundwater quality.

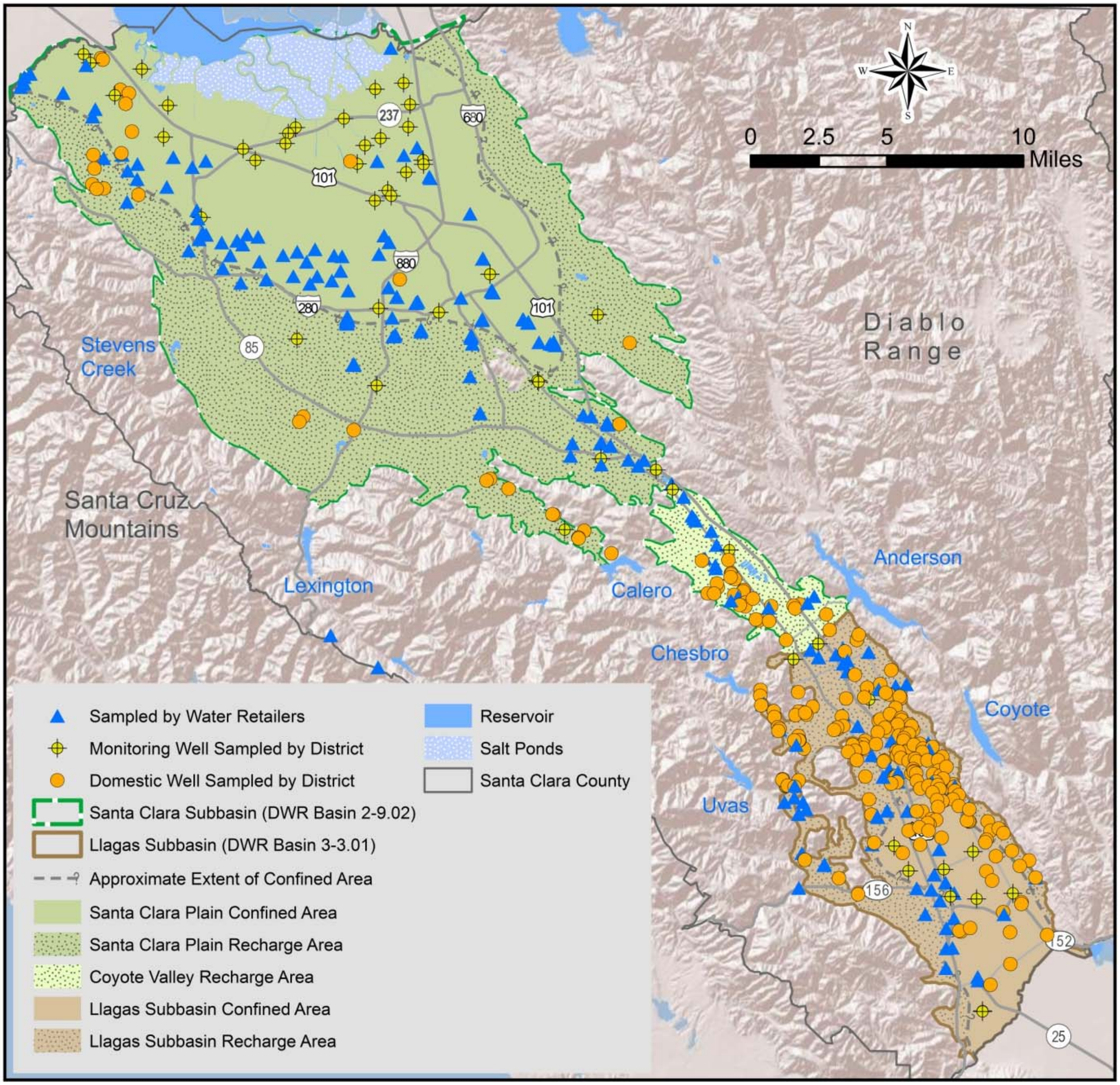
5.1 Regional Groundwater Quality

The District sampled groundwater quality at 87 wells, including 61 monitoring wells and 26 domestic wells, as part of the annual groundwater quality monitoring program (Figure 20)[11]. Seventy samples were analyzed for approximately 50 water quality parameters including major and minor ions, nutrients, and trace metals. Seventeen samples from monitoring wells near the San Francisco Bay were analyzed for 6 water quality parameters for saltwater intrusion monitoring. This report also incorporates data from 53 wells with known construction sampled through the District's domestic well sampling program. The District also evaluated data from 225 public water supply wells sampled by water retailers and reported to the State Water Resources Control Board Division of Drinking Water (DDW)[12].

[11] The District also collected limited water quality data at 214 domestic wells in 2015 as part of the Domestic Well Testing Program. In addition to monitoring well data, data from the 53 domestic wells with available well construction information are summarized in this section, where results are grouped by subbasin and aquifer zone. The results for all domestic wells are summarized in Section 5.3.

[12] Formerly the California Department of Public Health (CDPH).

Figure 20 CY 2015 Groundwater Quality Monitoring Wells



To evaluate regional water quality conditions, the District determined water quality parameter median and range for each subbasin and aquifer zone[13] (Appendix B). Results indicate groundwater in the Santa Clara and Llagas Subbasins is generally of high quality. Water quality indicators, ions, and trace elements were within the normal range expected in groundwater, with the exception of nitrate. Elevated nitrate is primarily an issue in South County due to historic and ongoing sources including synthetic fertilizer, septic systems, and animal enclosures. A few individual volatile organic compounds (VOCs) were detected; however, none were present at concentrations above their respective Maximum Contaminant Levels (MCLs). Seven different pesticide compounds were detected in four wells in the Santa Clara Plain principal aquifer, but none of the pesticides detected have established MCLs. The Coyote Valley and the Llagas Subbasin principal aquifers had no pesticide detections.

Recent sample median concentrations for nitrate and Total Dissolved Solids (TDS) are presented in Table 7. There is no statistically significant change for nitrate or TDS between CY 2014 and CY 2015 for all areas and aquifer zones per the Mann-Whitney Test, using a 95% confidence level. Fluctuations in sample medians are expected due to variation in which wells are tested each year, and amounts of recharge, pumping, and rainfall.

Table 7 Median Nitrate and TDS by Subbasin and Aquifer Zone (mg/L)

Parameter	Santa Clara Subbasin						Llagas Subbasin			
	Santa Clara Plain Shallow Aquifer		Santa Clara Plain Principal Aquifer		Coyote Valley		Shallow Aquifer		Principal Aquifer	
	2015	2014	2015	2014	2015	2014	2015	2014	2015	2014
Nitrate (as NO_3)	9.2	6.4	13	13	23.8	15.2	34	49.2	28.6	20.5
TDS	498	542	400	410	380	370	412	434	371	382

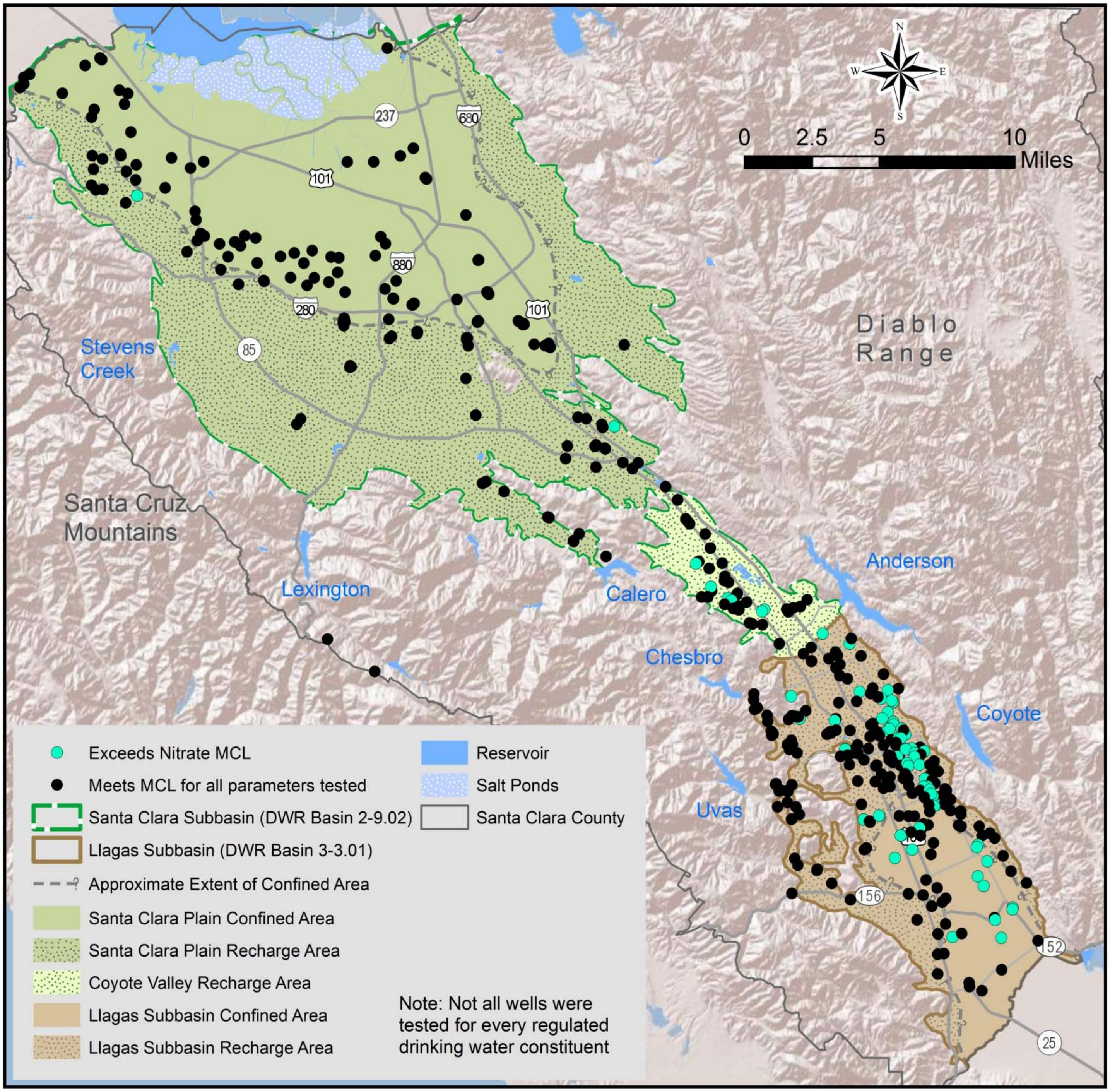
1) The shallow and principal aquifer zones are represented by wells primarily drawing water from depths less than and greater than 150 feet below ground surface, respectively.
2) Nitrate has a health-based MCL of 45 mg/L. TDS has an aesthetic-based MCL, which ranges from 500 to 1,000 mg/L (recommended and upper limit, respectively).
3) Table includes information for monitoring wells, public water supply wells, and domestic wells for which construction information is available. The set of wells sampled each year varies.
4) Median TDS in the Santa Clara Plain Shallow aquifer excludes wells within the region influenced by saltwater interaction.

Comparison to Drinking Water Standards

With the exception of nitrate, all water supply wells tested (including public water supply wells and domestic wells) met all MCLs; this drops to 84% if nitrate is included. 23% of South County water supply wells tested exceeded the nitrate MCL of 45 milligrams per liter (mg/L). Figure 21 presents the locations of wells with an MCL exceedance. Most of these detections were from private domestic wells that are not regulated by the state, while 10% (7 wells) were public water systems. Public water systems must comply with drinking water standards, which may require treatment or blending prior to customer delivery. Most domestic well owners contacted whose well water exceeds the nitrate MCL use bottled water for drinking and cooking, or reverse osmosis treatment to remove nitrate.

[13] Public water supply wells were assumed to represent the principal aquifer if no construction information was available as these are typically deep wells.

Figure 21 CY 2015 Water Supply Well Results With Regards to MCLs



While not used as a source of drinking water, some monitoring wells sampled are screened in the principal aquifer zone. Of these deep monitoring wells, only one had a detection of any constituent above its MCL (nitrate). Ten shallow aquifer zone monitoring wells were also affected by nitrate. With very few exceptions, the shallow aquifer is not directly used as a source of drinking water, although shallow groundwater recharges the principal aquifer in the long term.

Comparison to Agricultural Objectives

South County groundwater quality was evaluated against agricultural water quality objectives from the applicable Regional Water Quality Control Board Basin Plans[14] to assess its suitability for agricultural uses. Because the District has limited access to agricultural wells, water supply well data were used in this evaluation. 98 percent of all South County water supply wells met Basin Plan agricultural objectives. In Coyote Valley, all wells met the objectives except one well each for nitrate and electrical conductivity. In the Llagas Subbasin, four wells did not meet the nitrate objective.

5.2 Groundwater Quality Trends

To assess changes in water quality over time, the District evaluated statistical trends for chloride, nitrate, and TDS concentrations by groundwater management area and aquifer zone. Trend was evaluated for all wells (including water supply and monitoring wells) with at least 5 results over the last fifteen years (2001 through 2015). The results are shown in Figures 22 through 24 and summarized in Table 8, which indicates the majority of wells show a stable or decreasing trend. In general, chloride trends are stable or increasing in the Llagas Subbasin, stable in Coyote Valley, and mixed in the Santa Clara Plain. Potential causes for increasing trends in some shallow zone wells will be evaluated further. Nitrate is generally stable or decreasing throughout the county, and a cluster of wells with decreasing trends is observed in the southern portion of the Santa Clara Plain near the Coyote Valley (Figure 23). This may be the result of dilution from the managed recharge of water with low nitrate content through Coyote Creek. Though less well-defined, another cluster of wells with an upward nitrate trend is observed in the downtown area of San Jose. Only a small percentage of wells had increasing trend for TDS.

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[14] Groundwater in the Coyote Valley is compared to the limits in Table 3-6 of the San Francisco Bay Basin Water Quality Control Plan (March 2015). Groundwater in the Llagas Subbasin is compared to the upper range of the "increasing problems" range in Table 3-3 and Table 3-4 (irrigation supply) of the Water Quality Control Plan for the Central Coast Basin (March 2016).

Table 8 Chloride, Nitrate, and TDS Trends (2001 - 2015)

Groundwater Management Area	Parameter	Number of Wells Evaluated	Percent of Wells with Stable or Decreasing Trend	Number of Wells with Increasing Trend
Santa Clara Plain Shallow Aquifer	Chloride	27	67%	9
	Nitrate (as NO_3)	20	95%	1
	TDS	19	95%	1
Santa Clara Plain Principal Aquifer	Chloride	151	89%	16
	Nitrate (as NO_3)	250	88%	29
	TDS	149	96%	6
Coyote Valley	Chloride	18	100%	0
	Nitrate (as NO_3)	32	88%	4
	TDS	20	85%	3
Llagas Subbasin Shallow Aquifer	Chloride	22	55%	10
	Nitrate (as NO_3)	225	98%	5
	TDS	22	73%	6
Llagas Subbasin Principal Aquifer	Chloride	53	85%	8
	Nitrate (as NO_3)	110	95%	6
	TDS	52	98%	1
All Groundwater Management Areas	Chloride	271	84%	43
	Nitrate (as NO_3)	637	93%	45
	TDS	262	94%	17

Figure 22 Chloride Trends (2001 - 2015)

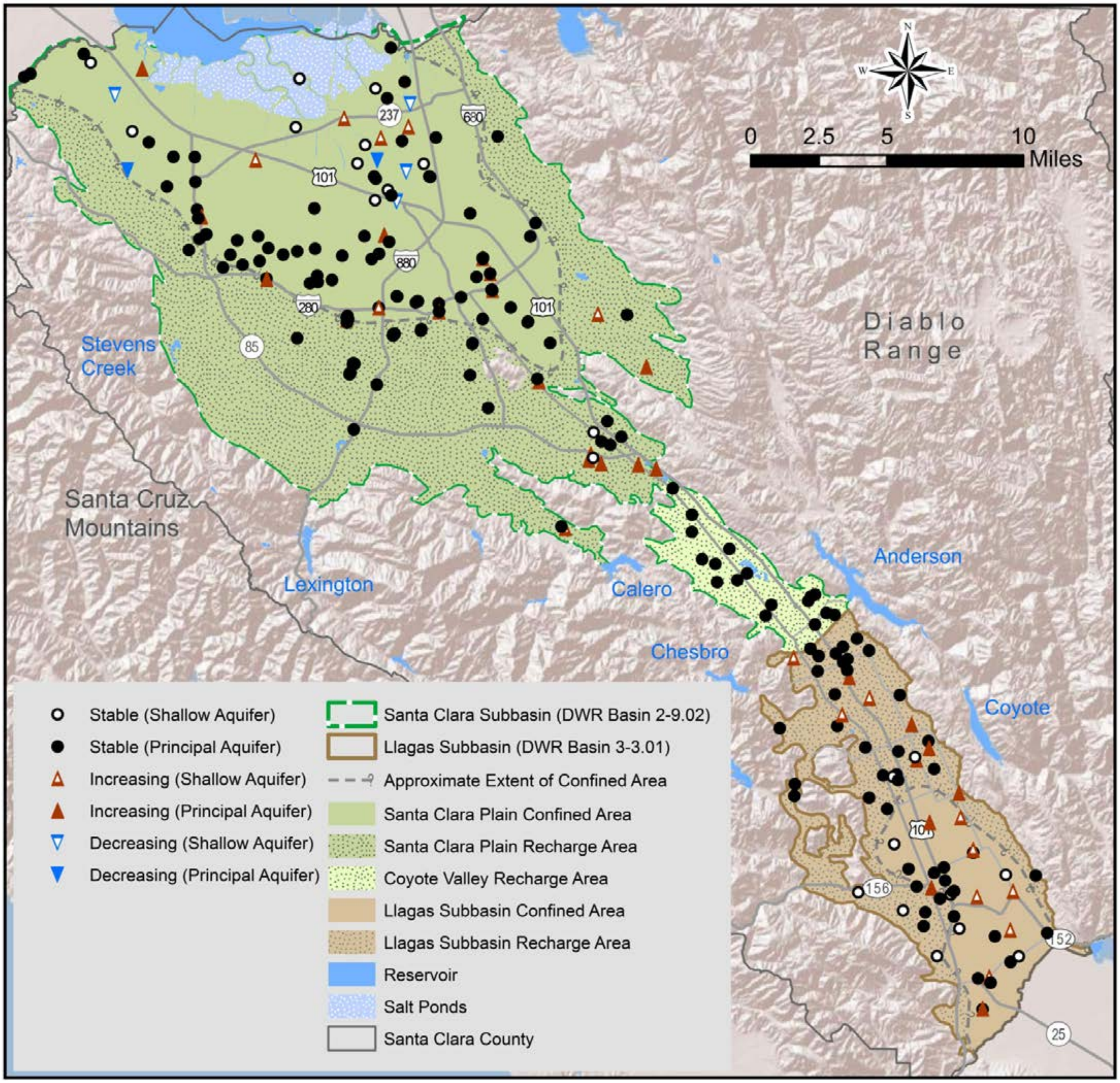


Figure 23 **Nitrate Trends (2001 - 2015)**

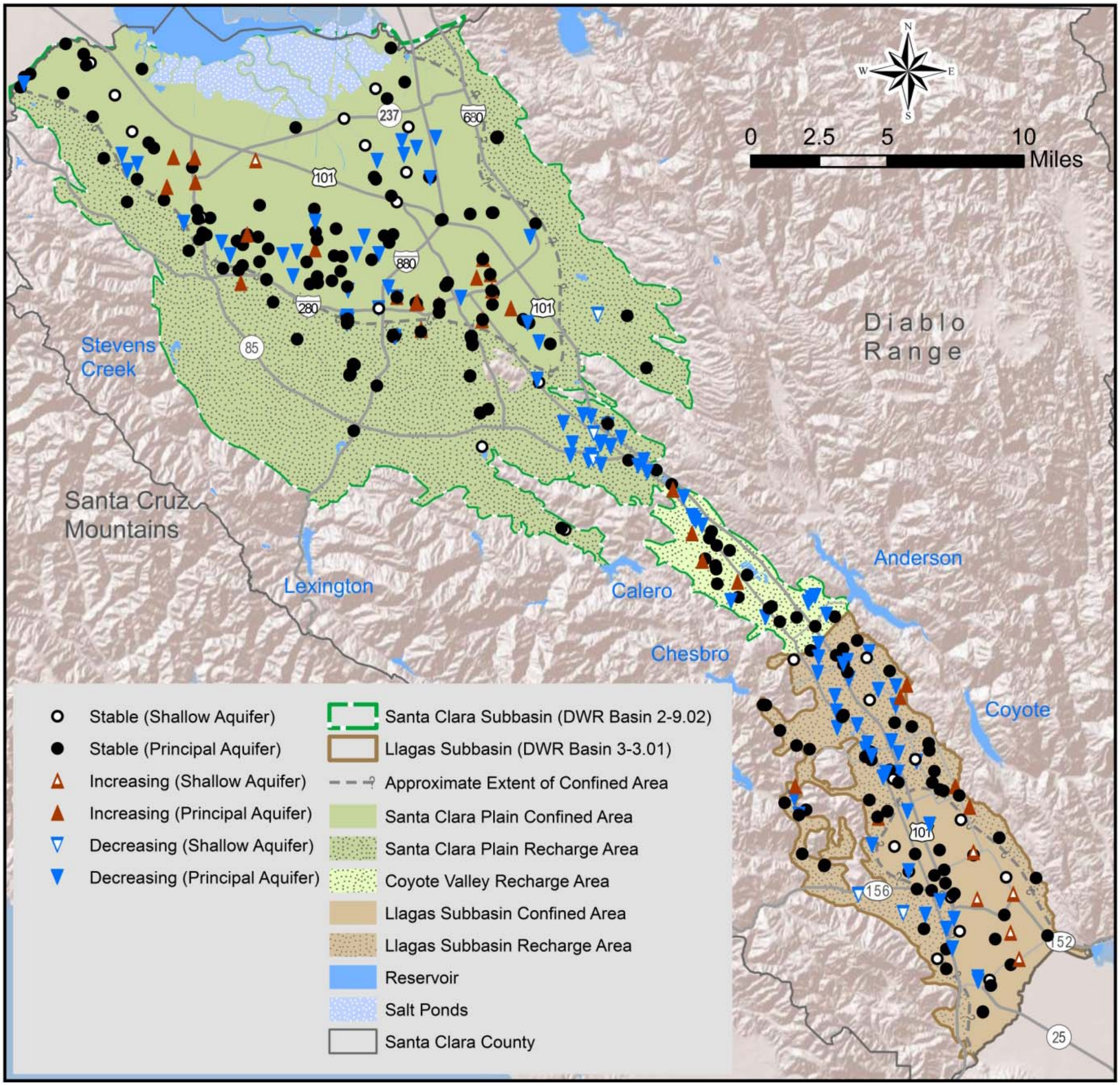
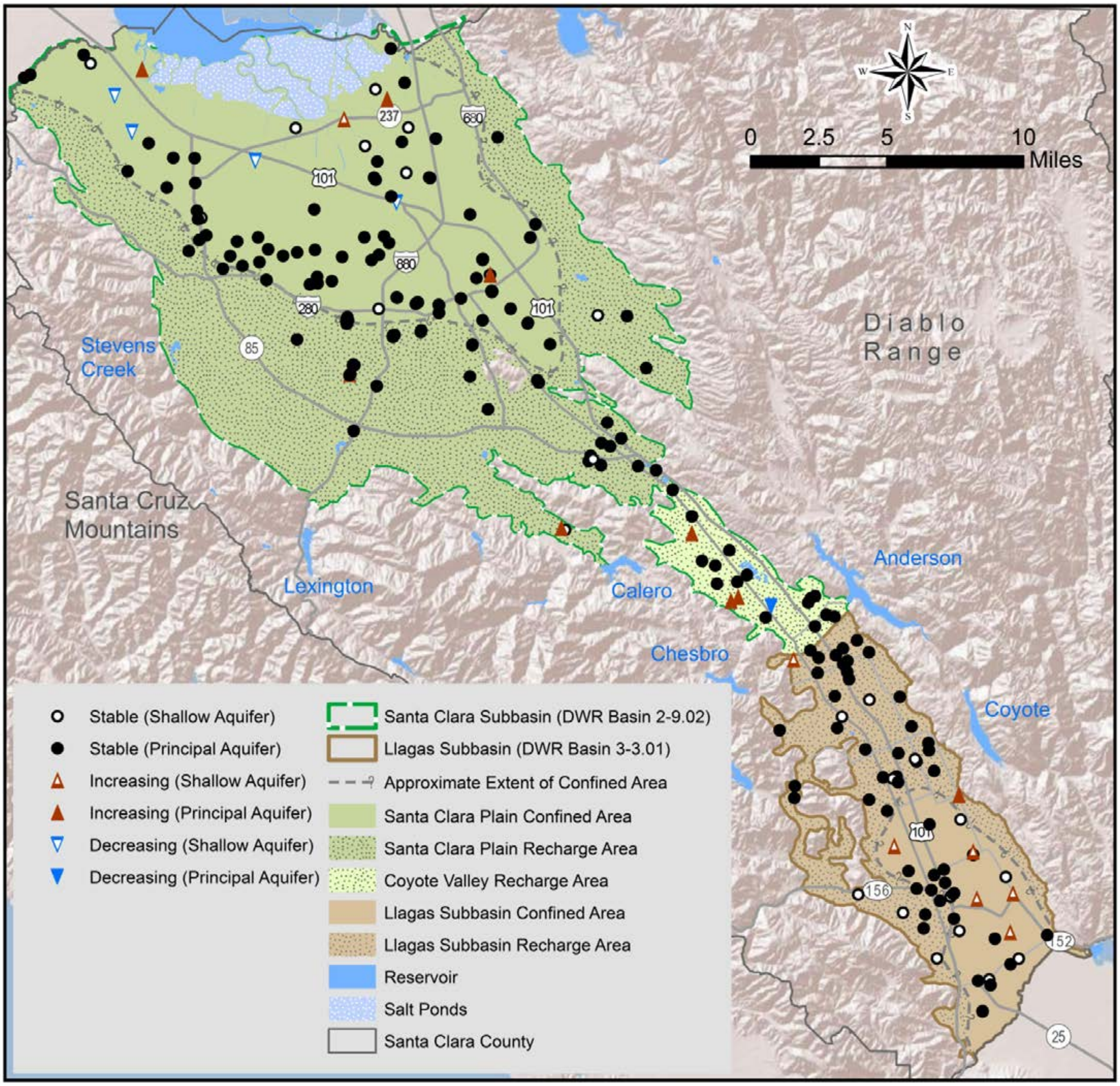


Figure 24 Total Dissolved Solids (TDS) Trends (2001 - 2015)



Groundwater and Salt Water Interaction

Salt water intrusion of shallow aquifers was observed historically near South San Francisco Bay and adjacent to the tidal reaches of the Guadalupe River, Coyote Creek, and other creeks in the northern portion of the Santa Clara Plain. As previously discussed, the District has implemented managed recharge and in-lieu recharge programs to minimize the risk of groundwater overdraft, land subsidence, and salt water intrusion.

Groundwater and salt water interaction in the shallow aquifer zone adjacent to southern San Francisco Bay and near tidal reaches of creeks was evaluated based on the chloride content of samples from shallow monitoring wells not used for domestic or municipal supply. The District uses a chloride concentration of 100 mg/L to indicate influence from salt water. This is a conservative indicator as the aesthetic-based secondary MCL for chloride is 250 mg/L.

As shown on Figure 25, wells in which chloride is over 100 mg/L are located in a narrow band adjacent to the former salt evaporation ponds, except in the areas adjacent to Guadalupe River and Coyote Creek. In these areas, a larger portion of the shallow aquifer is affected due to tidal incursion in these channels that occurs due to historic land subsidence. A significant increase in chloride content is observed near the levee system that defines former salt evaporation ponds. The majority of shallow wells in this area have downward trends for chloride, demonstrating that the salt water intrusion front appears to be stable or retreating.

Historically, few wells in the principal aquifer zone were found to have elevated TDS, and the chloride concentrations noted were relatively low. Salt water intrusion of the principal aquifer may occur from shallow saline groundwater via vertical conduits such as abandoned wells when the vertical hydraulic gradient is downward. The source of the elevated TDS in deeper wells in some areas has been characterized as connate water (trapped salt water from the geologic past), rather than recent saline intrusion. The District currently conducts only limited monitoring of the principal aquifer in the Baylands area because few deeper wells are available. Migration of saline shallow groundwater into the principal aquifer has been prevented due to the District's managed and in-lieu recharge programs, which maintains artesian conditions (upward vertical gradient) in the Baylands area. Tidal incursion in the bayward reaches of streams still occurs, and continues to introduce saline water to the shallow aquifer, as observed in elevated chloride concentrations in shallow aquifer wells in the Baylands area.

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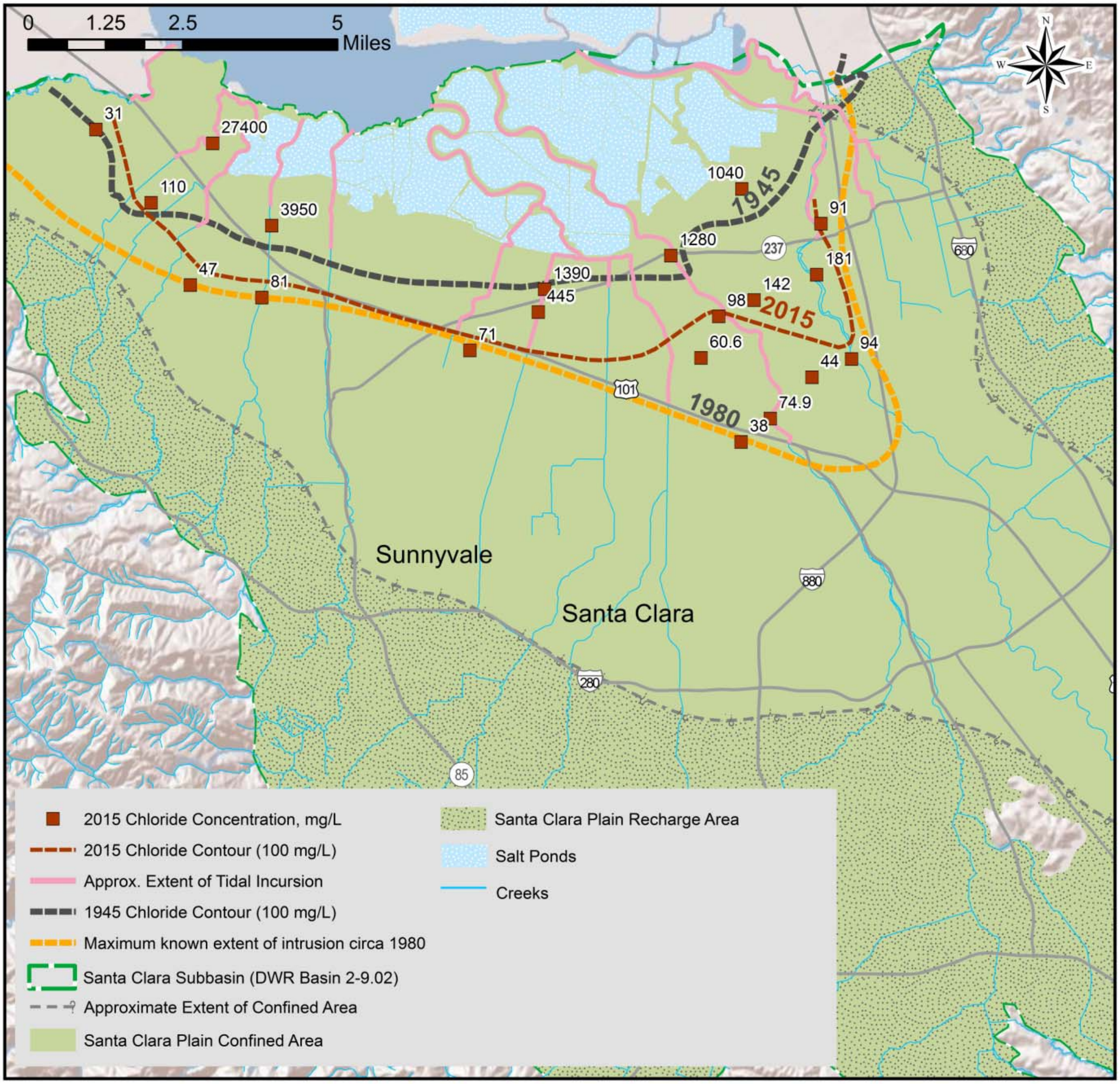
Figure 25 Groundwater and Salt Water Interaction in Shallow Aquifer



5.3 Domestic Well Water Quality

In addition to conducting regional groundwater monitoring, the District offers basic water quality testing to eligible domestic well owners within the District's groundwater charge zones. In CY 2015, the District tested 26 domestic wells in North County and 186 wells in South County. Basic water quality parameters tested include nitrate, bacteria, electrical conductivity, and hardness.

Domestic well data helps improve the District's understanding of the occurrence of common contaminants and provides important information that helps well owners understand their water quality. Although private domestic wells are not regulated by the state, the comparison to state drinking water standards provides context for results. Table 9 summarizes the results for each charge zone, and compares findings to drinking water standards.

Nitrate was detected above the MCL at 8% of North County and 26% of South County domestic wells tested. The median nitrate concentration in domestic wells in North County was 12.7 mg/L, and in South County the median was 29.3 mg/L. The 2015 median values for each groundwater subbasin were similar to the 2014 medians. Per Table 7, the CY 2015 regional median values for the Santa Clara Plain, Coyote Valley, and Llagas Subbasin, were 13, 23.8, and 28.6 mg/L, respectively.

Table 9 CY 2015 Domestic Well Testing Results

Parameter and Units	MCL[1]	Zone W-2 North County		Zone W-5 South County	
		Median	Wells above MCL[1] (%)	Median	Wells above MCL[1] (%)
Nitrate (mg/L)	45 (P)	12.7	8%	29.3	26%
Fluoride (mg/L)	2 (P)	0.10	0%	0.10	0%
Electrical Conductivity (uS/cm)	900 (S)	830	42%	645	14%
Sulfate (mg/L)	250 (S)	50.8	0%	35.8	0%
Hardness (mg/L as CaCO3)	--	384	--	271	--
		No. Wells with Bacteria Present	% Wells with Bacteria Present	No. Wells with Bacteria Present	Wells with Bacteria Present (%)
Total Coliform Bacteria	--[2]	11	42%	67	36%
E. Coli Bacteria	--[2]	1	4%	3	2%

Notes:

1) Maximum contaminant levels are established by the DDW for public water systems. (P) indicates the parameter has a health-based primary MCL and (S) indicates a secondary, aesthetic-based MCL. Hardness does not have a primary or secondary MCL but water with hardness above 180 mg/L is classified as very hard. Water quality in domestic wells is not regulated by the state.
2) Bacteria are measured as present or absent. Public water systems are required to ensure that fewer than 5% of samples have total coliform present and that no samples have E. Coli present.

Countywide, total coliform bacteria were detected in about 37% of the domestic wells tested, a slight increase over 2014 countywide detections. Coliform bacteria are naturally present in humans, animals, and the environment and do not normally cause illness, but they should not be present in drinking water. Escherichia coli (E. coli), a type of bacteria indicative of fecal contamination, were detected in about 2% of the domestic wells tested countywide.

The continued presence of nitrate above the MCL in many domestic wells highlights the need for continued efforts to reduce well owners' exposure to nitrate. The District began implementation of a multi-year rebate program for nitrate treatment systems in the fall of 2013 and continues to offer this program. This effort complements outreach and other efforts to reduce nitrate loading in coordination with the Central Coast Water Board and other basin stakeholders.

5.4 Recharge Water Quality

The District monitors surface water quality at selected in-stream and off-stream recharge facilities to characterize recharge water quality and assess how groundwater quality may be influenced by managed recharge. The source of managed recharge water at each facility varies, and may consist of imported water, local water, or a blend of the two. Monitoring is conducted in accordance with the District's Recharge Water Quality Monitoring Plan,[15] which includes sampling each recharge system every three years.

In 2015, the District monitored seven facilities in the Los Gatos and Upper Llagas recharge systems in September, and nine facilities in December (Table 10). Due to ongoing drought conditions, reservoir releases to creeks and ponds were reduced and some facilities were dry. The samples that could be collected were analyzed for major and minor ions, trace elements, and select organic compounds. Testing of organic compounds was conducted at recharge facilities located near potentially contaminating sources (e.g., industrial and automotive chemical sources or herbicide/pesticide application areas) to evaluate potential impacts from runoff during the wet sampling event in December.

Table 10 CY 2015 Recharge Water Quality Sampling Locations

Recharge System	Facilities Sampled	
	September 2015	December 2015
Los Gatos	Camden Ponds (2 locations) and Los Gatos Creek (2 locations)	Camden Ponds (2 locations), Los Gatos Creek (4 locations)
Upper Llagas	Madrone Channel (3 locations)	Madrone Channel (3 locations)

Although managed recharge water is not suitable for direct consumption before treatment or infiltration, comparing it to drinking water standards provides context for results. No parameters were detected above health-based drinking water standards in any of the recharge water samples. Volatile or semi-volatile organic compounds (including pesticides) were not detected in any samples. Table 11 and 12 provide water quality indicators for salinity, non-point source pollution, and trace metals. Results are compared against median groundwater concentrations for the corresponding groundwater subbasin area.

[15] Santa Clara Valley Water District, Recharge Water Quality Monitoring Plan, September 2012.

Table 11 Summary of Key Water Quality Indicators for All Recharge Systems Sampled in September 2015

Parameter	Units	Los Gatos System Median[1]	Upper Llagas System Median[1]	MCL	SMCL	Regional Groundwater Concentration[2]	
						Santa Clara Plain	Llagas
TDS	mg/L	340	370	-	500	400	371
Total Alkalinity (as CaCO3)	mg/L	123	94	-	-	229	192
Chloride	mg/L	67	111	-	250	46	40.7
Sulfate	mg/L	68	53	-	250	42	36
pH	pH units	8.3	8.5	-	6.6-8.5	7.4	7.7
Nitrate (as NO3)	mg/L	0.71	2.48	45	-	13	29
Aluminum	ug/L	ND	ND	1000	200	22.8	15.9
Iron	ug/L	0.05	0.05	-	300	20.7	9.1

Notes:

1) Table contains the median value for all stations sampled within the recharge system.

2) Typical groundwater concentration is the 2015 median for the principal zone of the Santa Clara Plain and Llagas Subbasin.

Table 12 Summary of Key Water Quality Indicators for All Recharge Systems Sampled in December 2015

Parameter	Units	Los Gatos System Median[1]	Upper Llagas System Median[1]	MCL	SMCL	Regional Groundwater Concentration[2]	
						Santa Clara Plain	Llagas
TDS	mg/L	347	398	-	500	400	371
Total Alkalinity (as CaCO3)	mg/L	110.5	94	-	-	229	192
Chloride	mg/L	79.5	118	-	250	46	40.7
Sulfate	mg/L	51.7	51.1	-	250	42	36
pH	pH units	7.65	NA	-	6.6-8.5	7.4	7.7
Nitrate (as NO3)	mg/L	0.96	0.80	45	-	13	29
Aluminum	ug/L	0.05	0.05	1000	200	22.8	15.9
Iron	ug/L	0.05	0.05	-	300	20.7	9.1

Notes:

1) Table contains the median value for all stations sampled within the recharge system.

2) Typical groundwater concentration is the 2015 median for the principal zone of the Santa Clara Plain and Llagas Subbasin.

5.5 Monitoring Near Recycled Water Irrigation Sites

The District partners with the four recycled water producers in the county[16] to expand recycled water use for non-potable purposes like large landscape irrigation, agriculture, and industrial uses. Tertiary treated recycled water generally has higher concentrations of salts, nutrients, disinfection byproducts, and emerging contaminants than local groundwater or treated water[17]. Contaminants may be introduced to groundwater through landscape irrigation, and previous studies near recycled water irrigation sites have noted evidence of significant recycled water contribution to shallow wells[18].

In 2011, the District completed the Recycled Water Irrigation and Groundwater (RWIG) Study[19] which included a field study at a recycled water irrigation site, the Integrated Device Technology (IDT) campus. The study did not find significant changes in groundwater quality for most constituents after recycled water irrigation. However, several constituents were detected at low levels, including perfluorochemicals (PFCs) and N-Nitrosodimethylamine (NDMA, a disinfection byproduct). The study suggested that best management practices and/or changes in recycled water treatment to remove emerging contaminants may be warranted for irrigating with recycled water in sensitive groundwater areas.

The District and South Bay Water Recycling (SBWR) have worked to improve recycled water quality for irrigation and other uses. Since March 2014, recycled water provided by SBWR has been blended with advanced treated water from the District's Silicon Valley Advanced Water Purification Center (SVAWPC), which produces up to eight million gallons of water a day using microfiltration, reverse osmosis, and ultraviolet light. The blended recycled water has improved water quality, with TDS lowered from about 750 mg/L to about 500 mg/L.

To monitor impacts to groundwater resources, the District evaluates potential groundwater quality changes near selected sites irrigated with tertiary treated recycled water. Figures 26 and 27 present monitoring wells near facilities using recycled water for irrigation. Over the past few years the District has monitored three sites where recycled water is used for irrigation, one in the Santa Clara Subbasin and two in the Llagas Subbasin. As part of recycled water expansion in the Llagas Subbasin, five new monitoring sites were added in 2014, and nine were added in December 2015 to establish baseline groundwater quality prior to recycled water use. The District also evaluates groundwater data at recycled water irrigation sites collected by SBWR and others as shown in Table 13. Statistical analysis of trends and geochemical methods are used to evaluate water quality changes.

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[16] Recycled water is produced at the Palo Alto Regional Water Quality Control Plant, San Jose/Santa Clara Water Pollution Control Plant (WPCP), the Sunnyvale WPCP and the South County Regional Wastewater Authority.
[17] Advanced Recycled Water Treatment Feasibility Project, Black & Veatch, Kennedy/Jenks for the Santa Clara Valley Water District, August 2003. In the Llagas subbasin, nutrient content of recycled water is lower than ambient groundwater concentrations (Llagas Subbasin Salt and Nutrient Management Plan).
[18] California GAMA Program: Fate and Transport of Wastewater Indicators: Results from Ambient Groundwater and from Groundwater Directly Influenced by Wastewater, Lawrence Livermore National Laboratory and California State Water Resources Control Board, June 2006.
[19] Locus Technologies for Santa Clara Valley Water District, Recycled Water Irrigation and Groundwater Study, Santa Clara and Llagas Groundwater Subbasins, Santa Clara County, California, August 2011.

Figure 26 Groundwater Monitoring Near Facilities Using Recycled Water - Santa Clara Subbasin

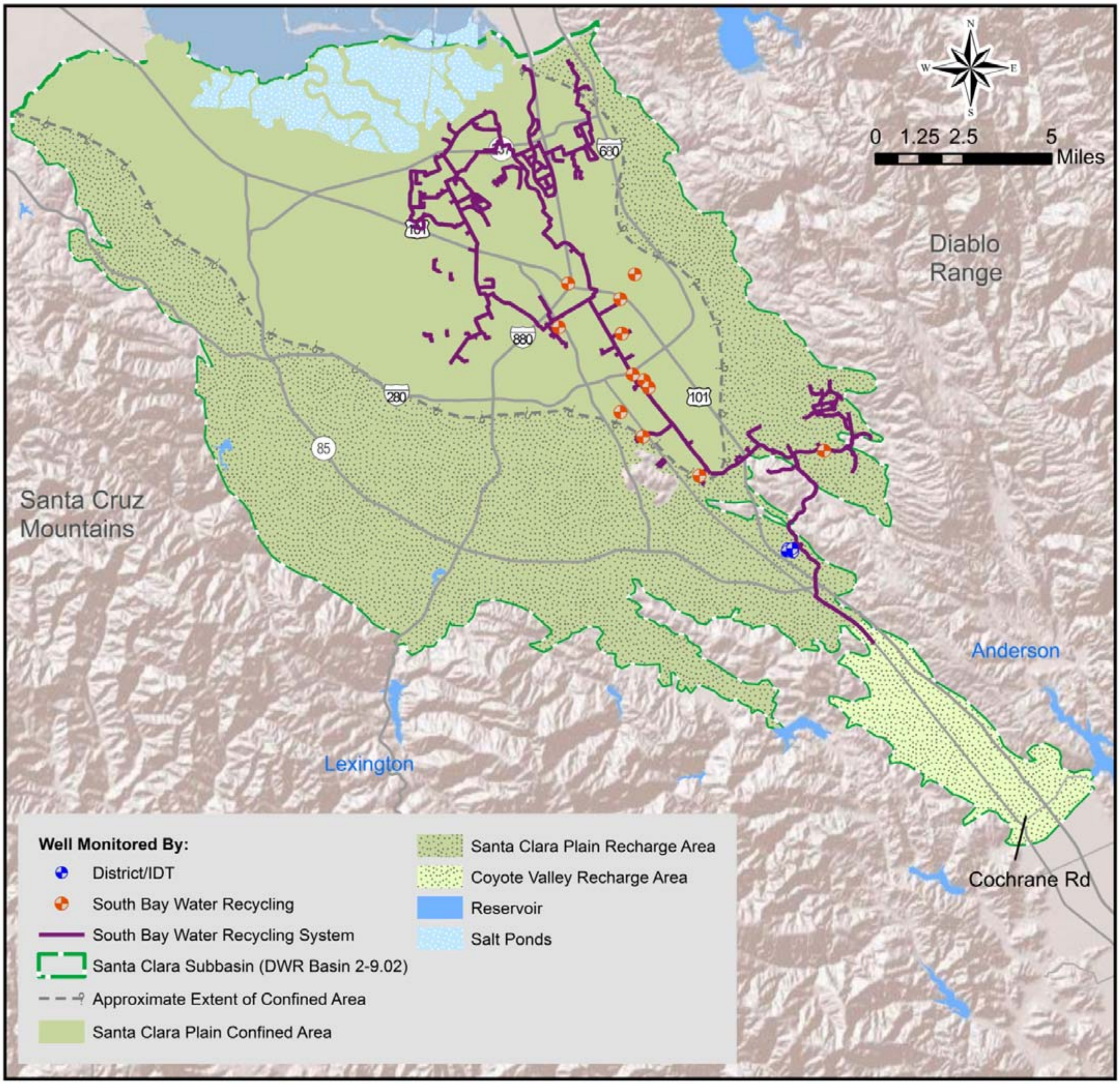

Figure 27 **Groundwater Monitoring Near Facilities Using Recycled Water - Llagas Subbasin**

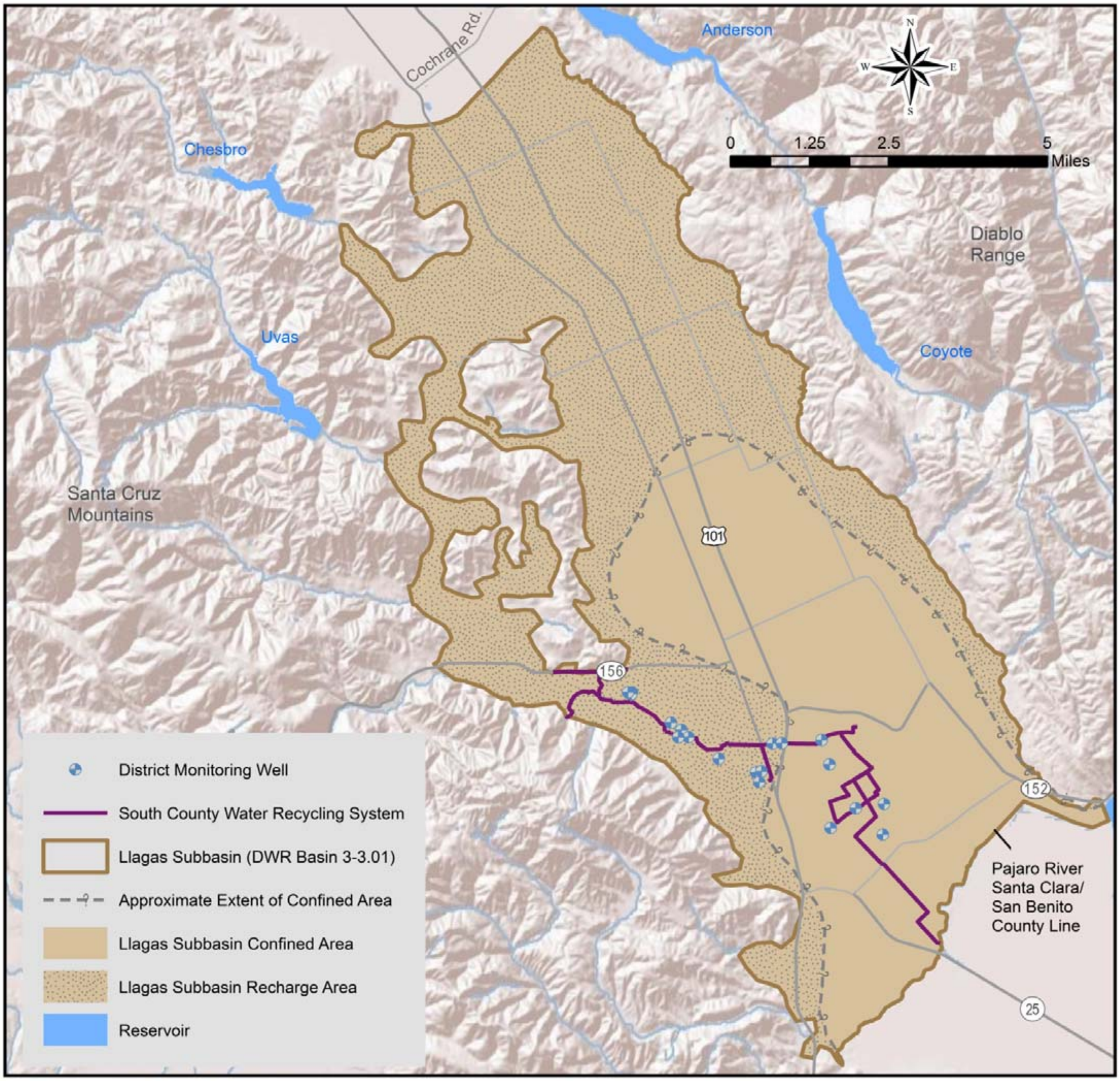

Table 13 2015 Groundwater Monitoring near Recycled Water Irrigation Sites

Subbasin	Location	Sampling Agency	Sampling Summary
Santa Clara Subbasin	Integrated Device Technology (IDT) Campus, Edenvale area of San Jose	IDT and District	• Although recycled water continues to be used for irrigation at this site, the 4 shallow wells were dry in 2015. • Recycled water delivered to this site was sampled in October 2015.
	Various Locations in San Jose	South Bay Water Recycling	• 5 shallow and 4 deep wells were monitored in February 2015 by the City of San Jose per their Groundwater Mitigation and Monitoring Plan (GMMP). • Parameters analyzed include basic salts and minerals, alkalinity and TDS.
Llagas Subbasin	Christmas Hill Park, Gilroy	District	• 3 shallow wells were sampled quarterly. • Parameters analyzed include basic water quality parameters, ions, DBPs, PFCs, bacterial parameters, and others commonly encountered in treated recycled water.
	Irrigated Land Near SCRWA Plant, Gilroy	District	• 4 shallow wells were sampled quarterly except one well that was dry in September. • Parameters analyzed include basic water quality parameters, ions, DBPs, PFCs, bacterial parameters, and others commonly encountered in treated recycled water.
	Irrigated Land Along Phase 1B Pipeline Alignment (West Gilroy)	District	• 3 shallow monitoring wells and 1 deep well were sampled quarterly. • One well remained dry in 2015. • Parameters analyzed include basic water quality parameters, ions, DBPs, PFCs, bacterial parameters, and others commonly encountered in treated recycled water.

As shown in Table 14, monitoring results at several sites show increasing trends for salts and low-level detections of NDMA, PFCs, and other constituents. In most cases, these contaminants were not present prior to the use of recycled water. There is some evidence that recycled water is mixing with shallow groundwater based on the geochemical analysis of groundwater. Based on these findings, it is likely that changes in shallow groundwater quality are occurring as a result of irrigation with recycled water. The District will continue to analyze data from these sites, and will evaluate if shallow groundwater quality improves with time due to improved recycled water quality resulting from the blending of tertiary treated recycled water and purified water from SVAWPC.

Table 14 Key Findings from Recycled Water Irrigation Site Monitoring

Subbasin	Location	Highlights
Santa Clara Subbasin	IDT	• Due to continued drought conditions, these wells were dry throughout 2015. District staff continues to check water levels monthly. Once water levels return to normal the District will resume sampling from these wells.
	SBWR	• The basic chemical composition for various shallow wells indicates a shift towards more saline water, primarily due to increasing chloride at the Kelley Park and Columbus Park wells. • Increasing trends continue to be observed for chloride, boron, sodium, and sulfate at many of the GMMP wells monitored in 2015.
Llagas Subbasin	Christmas Hill Park	• Groundwater quality at wells 11S03E12A002 and 11S03E12A003 have similar sodium and chloride molar ratios as recycled water and show a slight ionic shift towards recycled water. • Groundwater quality at well 11S03E01Q002 continues to be influenced by adjacent Uvas Creek, although chloride trends appear to be increasing. • Chloride and TDS trends in wells 11S03E12A002 and 11S03E12A003 are increasing. Sodium trends are decreasing in well 11S03E01Q002. • Continued detections (<1 ug/L) for PFOA and PFOS were observed in wells 11S03E12A002 and 11S03E12A003. • NDMA was detected twice in the source water and an overall decreasing trend is apparent. PFOA was detected twice in the source water.
	Irrigated Land Near SCRWA	• Groundwater quality at wells 11S04E15M002, 110S04E16F001 and 11S04E16M011 indicate similar molar ratios as recycled water. • The basic chemical composition for all wells (except deep well 11S04E16G003) indicates mixing with recycled water, in particular for chloride and sulfate. • Increasing trends were observed for most salts in well 11S04E15M002. • Decreasing trends were observed for most salts at well 11S04E16G003. • The secondary MCL for TDS was exceeded in all wells. • Trends for PFOA are decreasing in the source water and wells 110S04E16F001 and 11S04E16G003. PFOS concentrations indicate a decreasing trend at well 11S04E15M002 and 11S04E16G003. • NDMA and NDPA were detected in all four quarters in the source water, but not in any wells. Trends appear to be decreasing for NDMA in the source water.
	Irrigated Land Along Phase 1B Pipeline Alignment in Gilroy	• With the exception of well 11S04E09M001, basic chemical composition continues to resemble background groundwater chemistry. • Sampling at well 11S04E09M001 indicates high alkalinity, calcium and magnesium concentrations. • Detected compounds in well 11S04E09M001 include NDMA, PFOA, PFOS and PFBA. • An increasing trend for chloride was observed at well 11S04E07F004.

5.6 Salt and Nutrient Management Plans

The State Water Resources Control Board's 2009 Recycled Water Policy requires the development of regional Salt and Nutrient Management Plans (SNMPs). The purpose of the SNMPs is to address current and future regional salt and nutrient loading to groundwater from all sources, including recycled water and agricultural activity. The District completed two SNMPs for the Santa Clara and Llagas Subbasins by working with local stakeholders and regulators, and completing detailed salt balance analyses. The plans are posted to the District's website[20] and include: salt and nutrient source identification, loading and assimilative capacity estimates, water recycling and storm water recharge goals and objectives, implementation measures, groundwater monitoring provisions, and an anti-degradation analysis. The SNMPs were completed in 2014; the Central Coast and San Francisco Bay Water Boards will use these plans to update their basin plans and evaluate recycled water projects.

5.7 Contaminant Release Sites

There are over 400 open cases where non-fuel contaminants have been released to soil and/or groundwater in the county. These cases are overseen by the California Department of Toxic Substances Control, and the Central Coast and San Francisco Regional Water Quality Control Boards. There are also over 150 open fuel leak sites overseen by the Santa Clara County Department of Environmental Health (SCDEH) and 25 Superfund sites overseen by the United States Environmental Protection Agency (USEPA). Although there have been very limited impacts to principal drinking water aquifers from these sites, they pose a potential threat to groundwater quality.

Due to the large number of contaminated sites, District staff prioritizes which cases are closely tracked. Currently, staff monitors progress at several sites considered to be of the highest priority based on groundwater vulnerability, proximity to water supply wells or surface water, and contaminant concentration.

District staff reviews monitoring and progress reports submitted to regulatory agencies by responsible parties, as well as any regulatory orders or correspondence. Staff attends community meetings for the Olin, Middlefield-Ellis-Whisman (MEW), and Moffett Field cases, and advocates for expedited cleanup of high-threat cases through collaboration with regulatory agencies. The District also provides technical review of other contaminant release sites when requested by regulatory agencies.

Key 2015 activities related to high priority contaminant release cases are as follows:

- Olin Corporation, 425 Tennant Avenue, Morgan Hill

  Perchlorate cleanup activities by the responsible party, including the off-site extraction system, continued. As of December 2015, over 2,750 AF of water have been treated and 191 pounds of perchlorate have been removed. Sampling in preparation for the Gradient Driven Remediation (GDR) pilot study found perchlorate further east of the site than expected, which led to additional characterization activities to better define the extent of contamination. The Central Coast Water Quality Control Board issued a Monitoring and Reporting Program for the GDR pilot study in November 2015. The pilot study began in January 2016. Staff continues to participate in the Perchlorate Community Advisory Group meetings and advocate for expedited cleanup.

[20] http://www.valleywater.org/GroundwaterStudies/

- Hillview Cleaners, 1440 Big Basin Way, Saratoga

  The Hillview Cleaners site is a dry cleaner site that has released perchloroethylene (PCE) to soil and groundwater. PCE has also been detected in Saratoga Creek. District staff reviewed the December 18, 2015 Remedial Action Plan submitted to the San Francisco Regional Water Quality Control Board, which proposed offsite in-situ remediation methods. The District will continue to engage in the review of related site documents and advocate for timely and thorough cleanup.

- Moffett Field, Middlefield-Ellis-Whisman (MEW)

  This area includes four Superfund sites and more than 15 individual contaminant release sites with soil and shallow groundwater contamination by trichloroethylene (TCE) and other VOCs. District staff continues to participate in related MEW, Moffett Field Regional Advisory Board and EPA community meetings.

- United Technologies Corporation

  There were perchlorate detections up to 39 ug/L in the creek draining to Anderson Reservoir in 2015. However, perchlorate has not been detected in Anderson Reservoir above laboratory reporting limits. Between May 2014 and April 2015, 20 million gallons of groundwater were treated, removing 16.7 lbs of VOCs, 81.2 lbs perchlorate, and 0.6 lbs 1,4-dioxane. Concentrations of perchlorate, VOCs, and 1,4-dioxane in monitoring wells remained relatively constant in 2015. UTC prepared a feasibility study to eliminate discharge of groundwater containing as much as 100 mg/L perchlorate to a swale in Mixer Valley. UTC will implement a $1.1 million plan to fill the swale to prevent discharge of groundwater to surface water and to eliminate the potential for discharge to Mixer Creek. UTC has proposed reducing their reporting frequency to annually.

- Fuel Leak Cases

  District staff continues to coordinate with the SCDEH to provide technical support and review as necessary. The District received over 25 public notices of fuel leak site closures; all proposed closures appeared to be warranted and no comments were submitted.

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2015 Annual Groundwater Report

The evaluation of 2015 groundwater quality data against GWMP outcome measures is summarized below. Additional discussion of outcome measures, including planned action to address measures not being met, is presented in Section 7.

Groundwater Quality Outcome Measures

OM 2.1.1.e.
At least 95% of countywide water supply wells meet primary drinking water standards.

OM 2.1.1.f.
At least 90% of South County wells meet Basin Plan agricultural objectives.

OM 2.1.1.g.
At least 90% of wells in both the shallow and principal aquifer zones have stable or decreasing concentrations of nitrate, chloride, and total dissolved solids.

OM 2.1.1.e. is not met as 84% of countywide water supply wells tested in 2015 met primary drinking water standards. The exceedances were due to elevated nitrate in South County, primarily in domestic wells. If nitrate is not included, 100% of water supply wells met primary drinking water standards.

OM 2.1.1.f. is met as 98% of all South County wells met Basin Plan agricultural objectives in 2015.

OM 2.1.1.g. is partially met. This measure is not met for chloride, with 84% of wells showing stable or decreasing concentrations. This measure is met for nitrate as 93% of wells had stable or decreasing concentrations. This measure is met for total dissolved solids as 94% of wells had stable or decreasing concentrations.

6. OTHER GROUNDWATER MANAGEMENT ACTIVITIES

Other District groundwater management activities in CY 2015 included permitting and inspecting over 1,800 wells, reviewing relevant policy and land use proposals, and conducting public outreach on groundwater.

6.1 Well Ordinance Program

The District's well ordinance program helps ensure that wells and other deep excavations are properly constructed, maintained, and destroyed so they prevent vertical transport of contaminants into deep drinking water aquifers. The District issued over 1,900 well permits in 2015, primarily for well destruction and monitoring well construction. The District also inspected over 1,800 wells to ensure they were properly constructed or destroyed (Table 15).

Table 15 2015 District Well Permit and Inspection Summary

Permit Type	Number Processed
Well Construction - Water Producing Wells	115
Well Construction - Monitoring Wells	398
Well Destruction	1,253
Exploratory Boring	224
Total	**1,990**
Inspection Type	**Number Inspected**
Well Construction - Water Producing Wells	87
Well Construction - Monitoring Wells	349
Well Destruction	1,173
Exploratory Boring	247
Total	**1,856**

6.2 Policy and Legislation Review

The District reviews proposed legislation and policies (both statewide and local) to ensure the county's water resources and the District's ability to manage them are protected. Related 2015 reviews focused on Sustainable Groundwater Management Act (SGMA) required regulations and cleanup legislation. This included District review and comment on DWR proposed basin boundary modification regulations, and tracking of various assembly and senate bills.

The District is subject to SGMA requirements as the Santa Clara and Llagas Subbasins are designated as medium priority and high priority, respectively. SGMA requires the formation of Groundwater Sustainability Agencies (GSAs) for all groundwater subbasins classified as medium or high priority by June 30, 2017. A Groundwater Sustainability Plan (GSP) must be submitted for these basins by January 2020 for basins in critical overdraft, or by January 2022 for other basins. Alternatives to GSPs must be submitted by January 2017. SGMA provides broad authorities to GSAs, including the ability to meter wells, restrict pumping, implement conjunctive management projects and fund them through various fees. These authorities are in addition to any authority provided through existing statute, such as what is provided by the District Act.

Following a public hearing, the District Board adopted a resolution to become the GSA for the Santa Clara and Llagas Subbasins in May 2016. The state adopted regulations for GSPs and alternative plans in June 2016. It is assumed that the District's GWMP will require relatively minor updates to qualify as an alternative plan that meets SGMA requirements. The District plans to submit a Board-adopted alternative plan to DWR by the January 2017 statutory deadline.

6.3 Land Use Review

Threats to groundwater quality include urban runoff, industrial chemical releases, inefficient agricultural practices, and leaking underground storage tanks. Of particular concern are potentially contaminating activities over groundwater recharge areas, which are more vulnerable to contamination due to more permeable soils and higher groundwater flow rates. Proposed development and redevelopment may also result in additional groundwater demands or impacts to water supply reliability. Land use decisions fall under the authority of the local cities and the County of Santa Clara. The District reviews land use and development plans related to District facilities and watercourses under District jurisdiction, and provides technical review for other land use proposals as requested by the local agency. Water supply assessments for new developments are also reviewed and evaluated in the context of the District's long-term water supply planning assumptions. For all reviews, the District's groundwater-related comments focus on additional analysis or action needed to ensure groundwater resources are adequately protected.

In CY 2015, the District submitted groundwater-related comments to on the following land use proposals:

- The water supply assessment section of the Draft Environmental Impact Report for the North Gilroy Neighborhood Districts Urban Service Area Amendment.
- The Final Environmental Impact Report for City Place Santa Clara.

6.4 Public Outreach

Public outreach is an important component of the District's groundwater protection efforts. To help keep the public informed about current groundwater and water supply conditions, the District prepares monthly Water Tracker reports that are posted on the District website[21]. The District also posts monthly groundwater condition reports that contain more detailed information on groundwater pumping, recharge, and water levels.

Because groundwater is far removed from the public's view, it can be a challenge to make the connection that actions occurring on the land surface can impact groundwater quality. In 2015, the District celebrated Groundwater Awareness Week (March 8-14) by adopting a Board resolution commemorating the week, highlighting groundwater on the District website, and posting social media messages.

The District also maintained its status as a Groundwater Guardian Affiliate through the Groundwater Guardian Program sponsored by the Groundwater Foundation, a non-profit organization. Groundwater Guardian is an annually earned designation for communities and affiliates that take voluntary, proactive steps toward groundwater protection. District activities include the school program (which reaches thousands of students each year), implementation of groundwater

[21] www.valleywater.org/WaterTracker.aspx

protection programs, and participation in workshops such as the Small Acreage Stewardship series. At this series, District staff presents targeted information on wells and water quality protection to well owners.

The District mails the Annual Groundwater Quality Summary to all well owners in June to provide information on sampling by the District and local water suppliers. The 2015 Groundwater Quality Summary was mailed in June 2016 (Appendix A). This summary is similar to water retailer consumer confidence reports, and provides basic groundwater quality information to domestic well owners who do not typically receive water from a water retailer.

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7. CONCLUSIONS

Groundwater conditions improved in 2015 due to increased water supplies and the impressive 27% water use reduction achieved by customers served by water retailers as compared to 2013. However, groundwater levels and storage continued to be affected by the ongoing drought. Table 16 shows data for key indicators as compared to last year and the last five years (2010 to 2014). The managed recharge program was significantly increased compared to the previous year, but remained well below the 5-year average due to limited imported and local surface water. Groundwater pumping decreased significantly due to water use reduction efforts, but due to limited recharge groundwater storage decreased by 26,300 AF. The reduced groundwater pumping resulted in increased groundwater levels in many areas of the Santa Clara Plain and Coyote Valley, but levels continued to decrease in the Llagas Subbasin. Groundwater levels at all index wells were above historic lows. Groundwater quality conditions were generally similar to the previous year and the last five years, with nitrate remaining the primary groundwater protection challenge, particularly in South County.

Table 16 CY 2015 Groundwater Conditions as Compared to Other Indices

Index[1]	2015	Compared to 2014	Compared to Last 5 Years (2010 - 2014)
Managed Recharge (AF)	54,900	Up 113%	Down 35%
Groundwater Pumping (AF)	118,500	Down 30%	Down 17%
Groundwater as % of Total Water Use	42%	Down 9%	No Change
Groundwater Levels (feet)[2]			
Santa Clara Plain	49.8	Up 20%	Down 23%
Coyote Valley	259.3	Up 1%	Down 2%
Llagas Subbasin	188.9	Down 2%	Down 14%
End of Year Groundwater Storage (AF)	229,100	Down 10%	--
Land Subsidence (feet/year)[3]	0.005	Decrease	--
Groundwater Quality [4]			
Santa Clara Plain – Median TDS, mg/L	400	No Change[5]	No Change
Coyote Valley – Median TDS, mg/L	380	No Change	No Change
Llagas Subbasin – Median TDS, mg/L	371	No Change	No Change
Santa Clara Plain – Median Nitrate, mg/L	13	No Change	Decrease
Coyote Valley – Median Nitrate, mg/L	23.8	No Change	No Change
Llagas Subbasin – Median Nitrate, mg/L	28.6	No Change	No Change

1. Groundwater levels and quality are shown for three groundwater management areas: the Santa Clara Plain Principal Aquifer and Coyote Valley (which comprise the Santa Clara Subbasin) and the Llagas Subbasin Principal Aquifer.
2. Groundwater elevations represent the average of all readings at groundwater level index wells for the time period noted.
3. The established tolerable rate of 0.01 feet per year was not exceeded. Water levels at all subsidence index wells were above these thresholds throughout 2015.
4. Values shown represent median groundwater quality for all principal aquifer zone wells tested. Nitrate is measured as NO_3. Data from shallow monitoring wells is excluded, including wells with high TDS due to saline intrusion.
5. Individual wells sampled for TDS and nitrate vary each year so a straight numeric comparison of median values is not performed. “No change” indicates no significant difference using an appropriate statistical test (Mann-Whitney Test) at 95% confidence level. An entry of either “Increase” or “Decrease” indicates a statistically significant change for the time period indicated.

Outcome Measure Performance and Action Plan

The District's GWMP identifies several outcome measures to assess whether basin management objectives are being accomplished. The measurement of CY 2015 data against these measures is summarized in Table 17 below, along with recommended actions to address measures not being met.

Table 17 Summary of Outcome Measure Performance and Action Plan

Groundwater Storage	**OM 2.1.1.a.** Greater than 278,000 AF of projected end of year groundwater storage in the Santa Clara Plain. Estimated end of 2015 Storage: 214,800 AF **OM 2.1.1.b.** Greater than 5,000 AF of projected end of year groundwater storage in the Coyote Valley. Estimated end of 2015 Storage: 400 AF **OM 2.1.1.c.** Greater than 17,000 AF of projected end of year groundwater storage in the Llagas Subbasin. Estimated end of 2015 Storage: 13,900 AF **Action Plan for OM 2.1.1.a, b, and c:** In accordance with the Water Shortage Contingency Plan, the District Board of Directors called for a 30% countywide water use reduction in March 2015. In June 2016, this was adjusted to 20% in light of improved supplies.
Groundwater Levels and Subsidence	**OM 2.1.1.d.** 100% of subsidence index wells groundwater levels above subsidence thresholds. All ten subsidence index wells had groundwater levels above thresholds in 2015.
Groundwater Quality	**OM 2.1.1.e.** At least 95% of countywide water supply wells meet primary drinking water standards. Only 84% of countywide water supply wells tested in 2015 met primary drinking water standards due to elevated nitrate in South County (mainly in domestic wells). If nitrate is not included, 100% of water supply wells met primary drinking water standards. **OM 2.1.1.f.** At least 90% of South County wells meet Basin Plan agricultural objectives. Nearly all wells (98%) met Basin Plan agricultural objectives. **Action Plan for OM 2.1.1.e:** Implement Salt and Nutrient Management Plans to address salt loading, continue free testing program for domestic wells, and work to increase participation in the nitrate treatment system rebate program.
Groundwater Quality Trends	**OM 2.1.1.g.** At least 90% of wells in both the shallow and principal aquifer zones have stable or decreasing concentrations of nitrate, chloride, and total dissolved solids. This measure is nearly met for chloride, with 84% of wells showing stable or decreasing concentrations. This measure is met for nitrate and total dissolved solids as stable or decreasing concentrations were observed in 93% and 94% of wells, respectively. **Action Plan for OM 2.1.1.g:** Implement Salt and Nutrient Management Plans to address salt loading.

Outcome measure met

Outcome measure not met

Groundwater Outlook

Groundwater levels and storage have begun to recover with improved rainfall and increased surface water available for managed recharge in CY 2015. Groundwater storage has been critical in helping to meet the county's water supply needs during the ongoing drought. The estimated end of year storage for 2015 was below the 300,000 AF target but water levels did not exceed subsidence thresholds in related index wells. In accordance with the Water Shortage Contingency Plan, the District Board set a 30% water use reduction target (compared to 2013) in March 2015. The water use reduction target was adjusted to 20% in June 2016 due to improved water supply conditions.

The District continues to actively monitor groundwater levels, land subsidence, and water quality to support operational decisions and ensure groundwater resources are protected. To help ensure water supply reliability, the District is also working to expedite several IPR projects to provide a drought-proof source of purified water for groundwater replenishment. The District will also continue to track proposed legislation, policies, and regulatory standards that may impact groundwater resources or the District's ability to manage them.

Compliance with SGMA will be a major focus of District groundwater management in CY 2016. The District was deemed the exclusive Groundwater Sustainability Agency (GSA) for the Santa Clara and Llagas Subbasins on June 22, 2016 by DWR. The District's scientific basin boundary modification request for the Llagas Subbasin has been approved by DWR and will be included in a revised DWR Bulletin 118 in late 2016. The District will update the 2012 Groundwater Management Plan for submittal to DWR as an Alternative to a Groundwater Sustainability Plan under SGMA.

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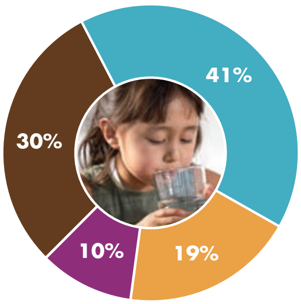
Appendix A
2015 Groundwater Quality Summary Provided to Well Owners

Santa Clara Valley Water District

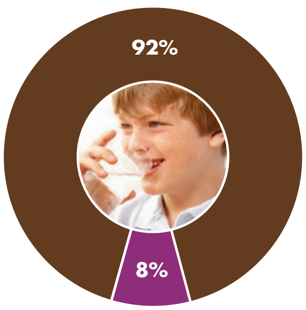
Groundwater Quality Summary Report

For Testing Performed in 2015

NORTH COUNTY WATER USE



SOUTH COUNTY WATER USE



- Groundwater
- Treated Water
- Hetch-Hetchy
- Other Local and Recycled Water

Protecting our Groundwater

Groundwater is an essential local resource, providing about half of the water used in Santa Clara County each year. In some areas, groundwater is the only source of drinking water. Protecting our groundwater helps ensure adequate supplies are available now and in the future.

The Santa Clara Valley Water District works to safeguard groundwater by:

- Replenishing groundwater with local and imported surface water.
- Reducing demands on groundwater through the delivery of treated water, water conservation and water recycling.
- Monitoring groundwater and implementing programs to protect against contamination.

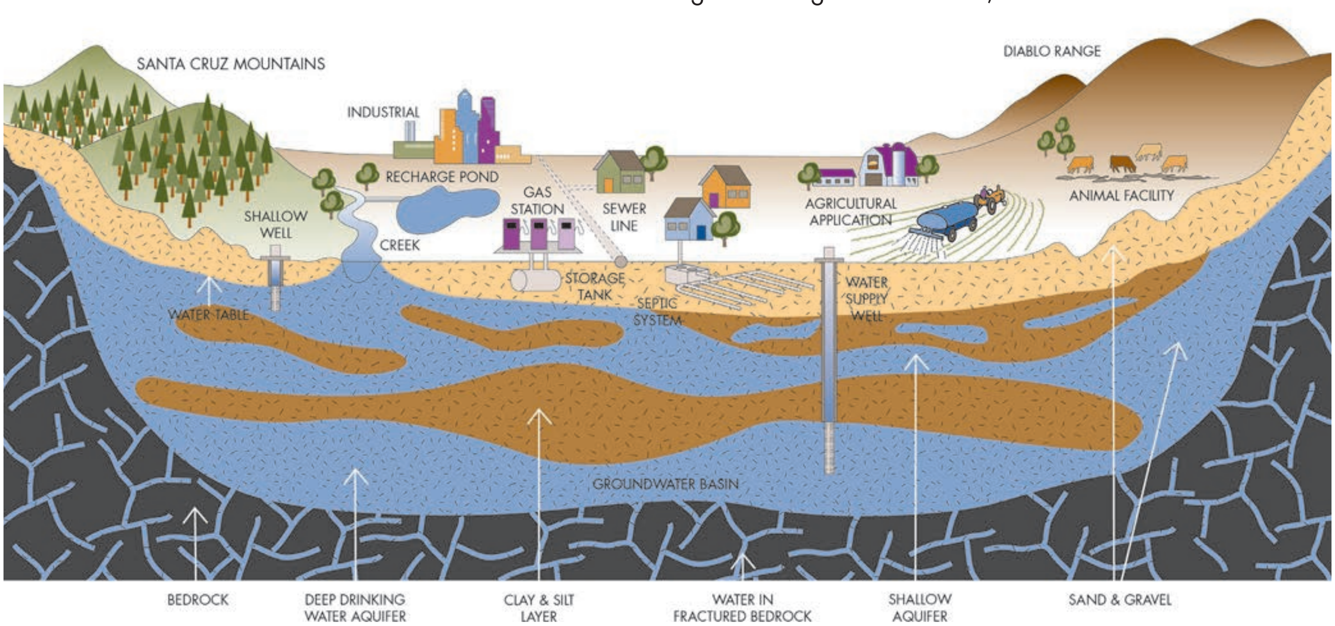
Regular well testing throughout the county indicates that groundwater quality is generally very good. Drinking water, including bottled water, may contain at least small amounts of some contaminants. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and radioactive materials, and can pick up substances from animal and human activities.

Contaminants that may be present include:

- Microbial contaminants such as viruses and bacteria that may come from sewage treatment plants, sewer lines, septic systems, agricultural operations and wildlife.
- Inorganic contaminants such as salts and metals that can be naturally occurring or result from stormwater runoff, industrial or domestic wastewater discharges, animal facilities, farming, and mining.
- Pesticides, fertilizers and herbicides that may come from agriculture, stormwater runoff and residential uses.
- Organic chemicals including synthetic and volatile organic chemicals from industrial processes, gas stations, dry cleaners, stormwater runoff, agricultural application and septic systems.
- Radioactive contaminants that are typically naturally occurring in our area.

The presence of natural or man-made contaminants does not necessarily indicate that water poses a health risk. State and federal drinking water standards identify maximum contaminant levels that relate to health risk.

Everyone has a role in protecting groundwater. Well owners should maintain their wells and septic systems, and create a zone of protection around the well where no contaminants are used or stored. See the water district's Guide for the Private Well Owner at **www.valleywater.org** for helpful tips. Residents can help by conserving water and by raising awareness that activities on the land surface can affect our largest drinking water reservoir, which is beneath our feet.



2015 Groundwater Quality Summary

Monitoring confirms generally high groundwater quality, but South County nitrate is a concern

In 2015, the water district sampled over 230 domestic water supply wells and evaluated data from over 225 local water supplier wells. The table below summarizes groundwater quality results for North and South County (see map on back page.) 2015 results show that nearly all wells tested meet drinking water standards with the notable exception of nitrate in South County domestic wells. The water district works with regulatory and land use agencies on this ongoing groundwater protection challenge.

Water from public water systems must meet Maximum Contaminant Levels (MCLs), but domestic systems are not subject to these standards. It should be noted that not every well was tested for all parameters shown, and only parameters that were detected in water supply wells are listed. Water quality standards, including MCLs, are shown to provide context for groundwater quality results. This is a regional summary and may not reflect the water quality in your well since every property and well is unique.

Primary Drinking Water Standards - Public Health Related Standards				North County		South County		
Inorganic Contaminants	UNITS	PRIMARY MCL	PHG	MEDIAN	RANGE	MEDIAN	RANGE	Typical Sources
Aluminum	ppb	1,000	600	12.96	ND - 89	17.73	ND - 220	Erosion of natural deposits
Arsenic	ppb	10	0.004	0.06	ND - 4	0.35	ND - 5	Erosion of natural deposits; glass and electronics production waste
Asbestos	MFL	7	7	ND	ND	0.33	ND - 2.1	Erosion of natural deposits
Barium	ppb	1,000	2,000	110	ND - 290	106	53.7 - 280	Erosion of natural deposits
Chromium (total)	ppb	50	—	1.0	ND - 17	1.57	ND - 17	Erosion of natural deposits; metal plating
Chromium-6 (hexavalent)	ppb	10	0.02	1.4	ND - 6.6	1.18	ND - 9.6	Erosion of natural deposits; metal plating and industrial discharges
Fluoride (natural source)	ppm	2	1	0.10	ND - 0.89	0.05	ND - 0.59	Erosion of natural deposits
Nickel	ppb	100	12	1.1	ND - 1.71	1.02	ND - 6.89	Erosion of natural deposits; discharge from metal industries
Nitrate (as NO3)	ppm	45	45	14.6	ND - 57.1	26	ND - 139	Runoff and leaching from fertilizer use; leaching from septic tanks and sewage; erosion of natural deposits
Nitrate + Nitrite (as N)	ppm	10	10	3.3	4.8 - 7.7	4.75	1.1 - 10	Runoff and leaching from fertilizer use; leaching from septic tanks and sewage; erosion of natural deposits
Nitrite (as N)	ppb	1,000	1,000	ND	ND	216	ND - 400	Runoff and leaching from fertilizer use; leaching from septic tanks and sewage; erosion of natural deposits
Perchlorate	ppb	6	6	ND	ND	1.32	ND - 5.6	Solid rocket propellant, fireworks, explosives, flares, matches, and a variety of industries
Selenium	ppb	50	30	ND	ND	1	ND - 2	Erosion of natural deposits
Radioactive Contaminants								
Gross Alpha	pCi/L	15	—	1.6	ND - 6	1.32	1.32 - 3.32	Erosion of natural deposits
Volatile Organic Chemicals								
1,1,1-Trichloroethane (1,1,1-TCA)	ppb	200	1,000	ND	ND - 1.8	ND	ND	Discharge from metal degreasing sites and other industrial processes
Tetrachloroethene (PCE)	ppb	5	0.06	ND	ND	ND	ND - 2.7	Discharge from industrial processes, dry cleaners, and automotive repair
Total Trihalomethanes (THMs)	ppb	80	—	0.7	0.5 - 1	NA	NA	Discharge from industrial processes, dry cleaners, and automotive repair
Xylenes (total)	ppb	1,750	1,800	ND	ND - 0.5	NA	NA	Discharge from industrial processes, dry cleaners, and automotive repair
Microbiological Contaminants[1]				**Present**	**Absent**	**Present**	**Absent**	**Typical Sources**
E. Coli Bacteria				1	25	3	185	Human and animal fecal waste
Total Coliform Bacteria				11	15	67	121	Naturally present in the environment

Notes: 1) The table shows the number of domestic wells tested that had bacteria present or absent. Public water systems are required to ensure that fewer than 5% of samples have total coliform present and that no samples have e.coli present. Domestic wells are not subject to these standards.

Terms and Definitions

Color units: A measure of color in water

Maximum Contaminant Level (MCL): The highest level of a contaminant allowed in public water systems. Primary MCLs are set as close to PHGs as is economically and technologically feasible. Secondary MCLs protect the odor,taste, and appearance of drinking water.

Median: The "middle" value of the results, with half of the values above the median and half of the values below the median.

MFL: = Million Fibers per Liter

NA: Not analyzed

ND: Not detected (at laboratory testing limit)

NTU: Nephelometric Turbidity Units

pCi/L: picoCuries per liter (a measure of radiation)

ppm: parts per million (milligrams per liter)

ppb: parts per billion (micrograms per liter)

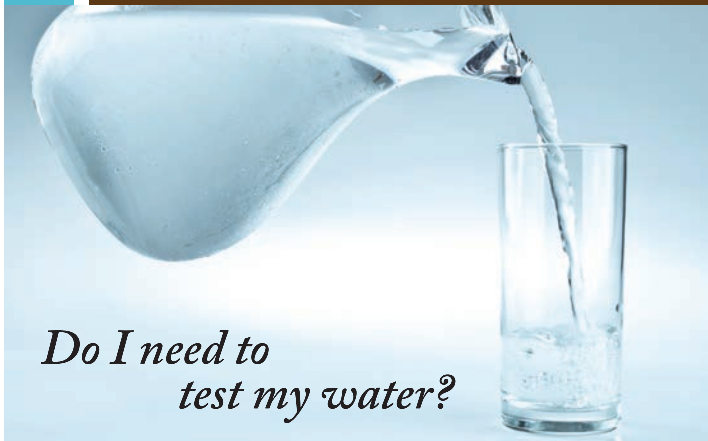
Public Health Goal (PHG): The level of a contaminant in drinking water below which there is no known or expected risk to human health. PHGs are set by the California EPA.

TON: Threshold Odor Number

uS/cm: microSiemens per centimeter (a measure of the dissolved inorganic salt content)

2015 Groundwater Quality Summary

Secondary Drinking Water Standards - Aesthetic Standards	UNITS	SECONDARY MCL	PHG	North County MEDIAN	North County RANGE	South County MEDIAN	South County RANGE	Typical Sources
Chloride	ppm	250	—	48	31 - 151	41	10 - 152	Runoff/leaching from natural deposits; seawater influence
Color	color units	15	—	ND	ND - 9	5	ND - 10	Naturally-occurring organic materials
Copper	ppb	1,000	300	1.22	0.74 - 1.7	3.77	0.85 - 68	Internal corrosion of household plumbing systems; erosion of natural deposits
Foaming Agents (MBAS)	ppb	500	—	ND	ND - 0.05	0.03	ND - 0.05	Non-point source pollution; discharges from industrial processes
Iron	ppb	300	—	29.9	ND - 1,100	14.99	4.4 - 1,500	Leaching from natural deposits; industrial wastes
Manganese	ppb	50	—	ND	ND - 120	0.8	ND - 120	Leaching from natural deposits; industrial wastes
Odor Threshold	TON	3	—	ND	ND - 1	ND	ND - 1	Naturally-occurring organic materials
pH	pH units	6.5 - 8.5	—	6.92	7.46 - 8	7.7	6.99 -8.5	Erosion of natural deposits; carbon dioxide emissions; rainfall
Specific Conductance	uS/cm	900	—	700	420 - 2,100	640	357 - 1,370	Substances that form ions when in water; seawater influence
Sulfate	ppm	250	—	43.4	5.1 - 239	36	5.3 - 140	Runoff/leaching from natural deposits; industrial wastes
Total Dissolved Solids (TDS)	ppm	500	—	410	260 - 620	376	180 - 760	Runoff/leaching from natural deposits
Turbidity	NTU	5	—	0.27	0.1 - 3.9	0.36	ND - 3.8	Soil runoff
Zinc	ppb	5,000	—	25.6	ND - 100	2.1	ND - 100	Runoff/leaching from natural deposits; industrial wastes
Other Water Quality Parameters								
Acifluorfen	ppb			ND	ND - 0.5	NA	NA	Herbicide
Alkalinity (total, as CaCO3)	ppm	—	—	230	81 - 380	190	94 - 370	Atmospheric and vadose zone carbon dioxide
Ammonia (NH3-N)	ppm			ND	ND - 0.05	NA	NA	Runoff and leaching from fertilizer use; leaching from septic tanks and sewage; erosion of natural deposits
Boron	ppb	—	—	ND	ND - 172	106	51.9 - 4,600	Erosion of natural deposits
Bromide	ppm	—	—	0.16	ND - 1.71	0.17	ND - 0.91	Erosion of natural deposits; seawater intrusion; sea spray
Caffeine	ppb	—	—	ND	ND - 0.05	NA	NA	Wastewater
Calcium	ppm	—	—	67	26 - 110	52	5.9 - 107	Erosion of natural deposits
Carbon Dioxide	ppm	—	—	15	2 - 54	NA	NA	Atmospheric sources; dissolution of carbonate rocks
Chloromethane	ppb	—	—	ND	ND	ND	ND - 0.97	Discharge from industrial processes, dry cleaners, and automotive repair
Cobalt	ppb	—	—	ND	ND - 1	ND	ND	Leaching from natural deposits; industrial wastes
Diazinon	ppb	—	—	ND	ND - 0.1	NA	NA	Insecticide
Dichlorodifluoromethane (Freon 12)	ppb	—	—	ND	ND - 12.95	ND	ND	Discharge from industrial processes, dry cleaners, and automotive repair
Diisopropyl Ether	ppb	—	—	ND	ND - 3	ND	ND	Leaking underground storage tanks; discharge from petroleum facilities
Dimethoate	ppb	—	—	ND	ND - 0.1	NA	NA	Insecticide
Hardness (Total, as CaCO3)	ppm	—	—	300	99 - 558	270	ND - 586	Erosion of natural deposits
Lead	ppb		0.2	0.66	ND - 1.06	0.26	ND - 5.6	Erosion of natural deposits; internal corrosion of household water plumbing systems; discharges from industrial manufacturers
Lithium	ppb	—	—	5	ND - 7.5	9.60	ND - 27	Erosion of natural deposits; discharge from industrial uses
Magnesium	ppm			25	8.6 - 58	31.0	9.2 - 72	Erosion of natural deposits
Methiocarb	ppb	—	—	1.13	ND - 2	NA	NA	Pesticide
Metolachlor	ppb			ND	ND - 0.05	NA	NA	Herbicide
Metribuzin	ppb	—	—	ND	ND - 0.05	NA	NA	Herbicide
Molybdenum	ppb	—	—	ND	ND - 2.3	ND	ND - 4.4	Erosion of natural deposits
Orthophosphate	ppm	—	—	0.14	ND - 1.18	0.08	ND - 1.66	Leaching from natural deposits; agricultural runoff
p-Isopropyltoluene	ppb	—	—	ND	ND - 0.5	ND	ND	Discharge from industrial processes, dry cleaners, and automotive repair
Potassium	ppm	—	—	1.2	0.8 - 1.8	1.3	ND - 2.6	Erosion of natural deposits
Propoxur	ppb	—	—	ND	ND - 2	NA	NA	Insecticide
Radium 228	pCi/L	—	0.019	ND	ND	0.045	0.045 - 0.045	Erosion of natural deposits
Silica	ppm	—	—	26.0	24.1 - 27	26.0	18.7 - 43	Erosion of natural deposits
Sodium	ppm	—	—	30.5	16.1 - 69	26.1	14 - 197	Erosion of natural deposits
Tert-Butyl Alcohol	ppb	—	—	ND	ND	ND	ND - 4.1	Discharge from industrial processes, dry cleaners, and automotive repair
Total Organic Carbon (TOC)	ppm	—	—	ND	ND - 0.3	NA	NA	Various natural and manmade sources
Vanadium	ppb	—	—	ND	ND	ND	ND - 12	Erosion of natural deposits; discharge from industrial uses



Do I need to test my water?

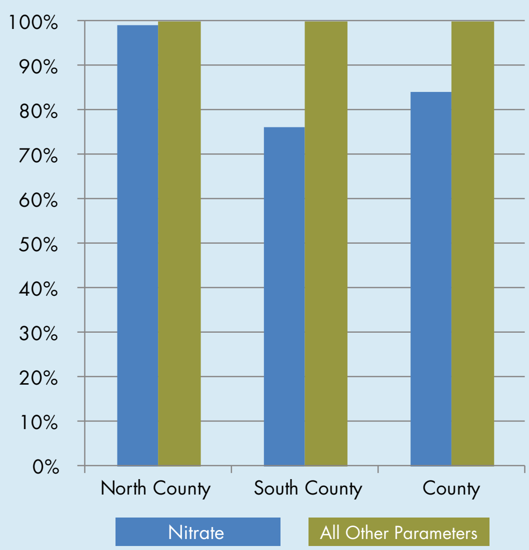
If your water comes from a public water supply, such as a city or water company, it is tested regularly to make sure that it meets state and federal drinking water standards.

If your water comes from a private well, you are responsible for making sure it is safe to drink. Although the water district monitors regional groundwater quality, every property and well has unique conditions. Some contaminants are colorless and odorless, so the first step in protecting your health is having your water tested.

The water district encourages private well owners to have their well water tested by a state-certified laboratory annually or more often if there is a change in taste, odor or appearance. If your water contains any contaminant above drinking water standards, you may want to install a treatment system or use an alternative source of water.

The water district currently offers free basic water quality testing for domestic wells and rebates of up to $500 for nitrate treatment systems — call the Groundwater Hotline at **(408) 630-2300** to find out if you are eligible.

PERCENTAGE OF WATER SUPPLY WELLS TESTED IN 2015 MEETING PRIMARY DRINKING WATER STANDARDS



Hot Topics in Water Quality

Nitrate

As shown in the chart to the left, nitrate is an ongoing groundwater protection challenge, particularly in South County. Common sources are fertilizers, septic systems and livestock waste, so nitrate is often higher in rural and agricultural areas. Nitrate can interfere with the blood's ability to transport oxygen and is of greatest concern for infants and pregnant women. Consuming high levels of nitrate may cause "blue baby syndrome;" symptoms include shortness of breath and blueness of the skin.

The water district monitors nitrate to assess hot spots and trends, recharges groundwater which helps dilute nitrate, and works with other agencies to address nitrate in groundwater. To help reduce domestic well owners' exposure to nitrate in drinking water, the water district is offering rebates of up to $500 for eligible treatment systems. Call the Groundwater Hotline at **(408) 630-2300** for more information.

Perchlorate

Perchlorate is a salt used for rocket fuel, highway flares, fireworks and other uses. Perchlorate can have adverse health effects at high levels as it can interfere with the thyroid gland, which can affect hormones that regulate metabolism and growth. Contamination from a former highway flare manufacturer in Morgan Hill was first discovered in 2000. At the urging of the water district and the community, the Central Coast Regional Water Quality Board has taken timely action to restore groundwater quality.

Due to cleanup activities and groundwater recharge, perchlorate levels have decreased dramatically. The area affected is also getting smaller, now extending from Tennant Avenue south to the San Martin Airport area. A few water supply wells still contain perchlorate above the drinking water standard and remediation by the responsible party is ongoing.

Chromium-6

Chromium-6, a suspected carcinogen, is a naturally occurring metal that is also used in several industrial processes. Geologic deposits containing chromium-6 are present in areas of Santa Clara County. California's drinking water standard of 10 parts per billion (ppb) for Chromium-6 became effective on July 1, 2014.

Lead

Lead and other metals are naturally present at low levels in groundwater due to the erosion of natural deposits. Groundwater is generally not corrosive by nature. Lead may be introduced to drinking water from faucets, plumbing fixtures and lead solder within the home and from lead service lines, if they are present. For more information, please visit **www.valleywater.org**.

You live on a groundwater basin

Health and education information

Drinking water, including bottled water, may reasonably be expected to contain small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained from the U.S. Environmental Protection Agency's Safe Drinking Water Hotline (**800-426-4791**), the CA Division of Drinking Water (**www.waterboards.ca.gov/drinking_water/programs**), the CA Office of Environmental Health Hazard Assessment (**www.oehha.ca.gov/water**), or from your healthcare provider.

CONTACT US

For more information, contact the water district's Groundwater Hotline at **(408) 630-2300.** Or use our **Access Valley Water** customer request and information system at valleywater.org to find out the latest information on district projects or to submit questions, complaints or compliments directly to a district staff person.

Follow us on: /scvwd /valleywater /valleywater

To get eNews, text **VALLEYWATER** to **22828**.

Appendix B
2015 Groundwater Quality Results by Subbasin and Zone

Table B-1 Summary of 2015 Water Quality Indicator Data

Parameter	Units[1]	Santa Clara Subbasin, Santa Clara Plain								Santa Clara Subbasin, Coyote Valley			
		Shallow Zone[2]				Principal Zone[3]							
		n[4]	Min[5]	Median[6]	Max	n	Min	Median	Max	n	Min	Median	Max
Aggressive Index (Corrosivity)	INDEX	--	--	--	--	37	11.47	12	13	3	11.7	11.7	11.75
Alkalinity - Hydroxide As $CaCO_3$	mg/L	13	-5	<5	-5	18	<5	<5	<5	8	<0.5	<5	<5
Alkalinity - Bicarbonate (As $CaCO_3$)	mg/L	13	160	302	597	18	135	227.5	358	8	146	224	282
Alkalinity (Total) As $CaCO_3$	mg/L	13	160	302	597	64	81	229	380	11	133	210	282
Alkalinty - Carbonate (As $CaCO_3$)	mg/L	13	<5	<5	<5	18	-5	<5	9	8	<0.5	<5	<5
Caffeine	ug/L	--	--	--	--	5	-0.05	<0.05	0.05	--	--	--	--
Carbonate (As CO_3)	mg/L	13	<5	<5	<5	38	<5	<5	5	10	<0.5	<5	<10
Color	Color units	--	--	--	--	22	<5		9	2	<3	<3	<3
E. Coli	P/A 100 ml	3	3 Absent	0 Present		1	1	0 Present		22	22 absent	0 Present	
Foaming Agents (MBAS)	ug/L	--	--	--	--	11	<0.05	<0.5	0.05	2	<0.05		<0.05
Hardness (Total) As $CaCO_3$	mg/L	16	229	488	730	66	79	280	465	33	-10	271	459
Heterotrophic Plate Count	CFU/100mL	--	--	--	--	--	--	--	--	--	--	--	--
Hydroxide Alkalinity	mg/L	13	<5	<5	<5	38	<5	<5	5	10	<0.5	<5	<5
Langelier Index @ 60 °C	INDEX	--	--	--	--	18	0.093	0.52	0.89	2	0.42	0.42	0.42
Langelier Index at Source Temp.	INDEX	--	--	--	--	17	-0.56	-0.01	0.3	2	-0.18	-0.18	-0.18
Odor Threshold @ 60 °C	TON	--	--	--	--	38	<1	<1	1	3	<1	1	1
Oxidation Reduction Potential	mV	24	-150	-12.45	85	13	-231	24	693	6	-25		86.25
pH[10]	pH units	42	6.47	7.35	8	133	6.5	7.47	8.3	15	7.1	7.5	7.9
Source Temperature °C	C	29	17.2	20	22.7	78	16	19.1	25.3	6	18.5	19.7	24.3
Specific Conductance [10]	uS/cm	33	571	1,022	2,185	90	387	614	1,020	39	397	643	1020
Total Coliform, MPN Per 100 mL[9]	P/A 100 ml	3	3 Absent	0 Present	--	1	1	0 Present	--	22	13 absent	9 present	
Total Organic Carbon (TOC)	mg/L	--	--	--	--	9	<0.1	<0.3	0.3	--	--	--	--
Turbidity[10]	NTU	42	0.05	0.77	122	68	0.04	0.27	16	16	-0.05	0.48	3

Table B-1 Summary of 2015 Water Quality Indicator Data

Parameter	Units[1]	Llagas Subbasin								Maximum Contaminant Levels	
		Shallow Zone				Principal Zone					
		n	Min	Median	Max	n	Min	Median	Max	MCL	SMCL[8]
Aggressive Index (Corrosivity)	INDEX	--	--	--	--	19	11.4	12	13	--	--
Alkalinity - Hydroxide As $CaCO_3$	mg/L	12	<5	<5	<5	19	<5	<5	<5	--	--
Alkalinity - Bicarbonate (As $CaCO_3$)	mg/L	12	121	171	344	19	94	223	368	--	--
Alkalinity (Total) As $CaCO_3$	mg/L	12	121	171	344	39	94	192	370	--	--
Alkalinty - Carbonate (As $CaCO_3$)	mg/L	12	<5	<5	<5	19	<5	<5	40	--	--
Caffeine	ug/L	--	--	--	--	--	--	--	--	--	--
Carbonate (As CO_3)	mg/L	12	<5	<5	<5	21	<5	<5	24	--	--
Color	Color units	--	--	--	--	9	<3	5	10	--	15
E. Coli	P/A 100 ml	11	9 Absent	2 present		17	17 Absent	0 present		--	--
Foaming Agents (MBAS)	ug/L	--	--	--	--	2	<0.025	0.03	0.05	--	500
Hardness (Total) As $CaCO_3$	mg/L	20	191	281	545	57	<10	252	586	--	--
Heterotrophic Plate Count	CFU/100mL	1	120	120	120	--	--	--	--		
Hydroxide Alkalinity	mg/L	12	<5	<5	<5	21	<5	<5	5	--	--
Langelier Index @ 60 °C	INDEX	--	--	--	--	18	-0.38	0.27	0.7	--	--
Langelier Index at Source Temp.	INDEX	--	--	--	--	1	<0.5	<0.5	<0.5	--	--
Odor Threshold @ 60 °C	TON	--	--	--	--	23	<1	<1	1	--	3
Oxidation Reduction Potential	mV	11	76	123	158.1	19	-44	108	165	--	--
pH[10]	pH units	22	6.75	7.29	7.9	62	6.9	7.7	8.5	--	--
Source Temperature °C	C	11	17	19.3	22.3	19	17.6	19.8	24.5	--	--
Specific Conductance [10]	uS/cm	32	411	629	1,180	136	410	619	1,240	--	900
Total Coliform, MPN Per 100 mL[9]	P/A 100 ml	11	8 Absent	3 present		17	6 Absent	11 Present		--	--
Total Organic Carbon (TOC)	mg/L	--	--	--	--	--	--	--	--	--	--
Turbidity[10]	NTU	22	0.05	0.56	6.8	50	0.07	0.37	17.5	--	5

Notes:

Table includes data for wells monitored by the District (monitoring wells and water supply wells) and public water system data reported to the CA Division of Drinking Water (DDW)

Only wells with known construction information are presented in this table. DDW wells are assumed to represent the principal zone if no construction information is available, as these are typically deep wells.

1. mg/L = milligrams per liter; CFU = Colony Forming Units; uS/cm = microSiemens per centimeter; NTU = Nephelometric Turbidity Units; TON = Threshold Odor Number

2. The shallow aquifer zone is represented by wells primarily drawing water from depths less than 150 feet.
3. The principal aquifer zone is represented by wells primarily drawing water from depths greater than 150 feet.
4. n = number of results for each parameter. Some parameters may have been analyzed in more than one sample from a particular well.
5. The minimum shown is the lowest detected value. The lowest reporting limit (e.g., <5) is shown when there are no quantified values at the lowest reporting limit.
6. For parameters with results reported at multiple reporting limits, the median was computed using the Maximum Likelihood Estimate (MLE) method.

7. MCL = Maximum Contaminant Level specified in Title 22 of the California Code of Regulations. The MCL is a health-based drinking water standard.

8. SMCL = Secondary Maximum Contaminant Level, or aesthetic-based standard, per DDW or US EPA. For SMCLs having a range, the lower, recommended threshold is listed first with the upper threshold in parentheses.

9. A public water system collecting <40 samples/month violates the total coliform MCL if >1 sample is positive or if there is a repeat positive for fecal coliform or *E. coli*. All wells sampled in 2015 were private domestic wells.
10. Summary statistics computed from combined laboratory and field measured data.

Table B-2 Summary of 2015 Inorganic Constituent Data

Parameter	Units[1]	Santa Clara Subbasin, Santa Clara Plain								Santa Clara Subbasin, Coyote Valley			
		Shallow Zone[2]				Principal Zone[3]							
		n[4]	Min[5]	Median[6]	Max	n	Min	Median	Max	n	Min	Median	Max
Major and Minor Ions													
Bicarbonate (As HCO3)	mg/L	13	195	369	729	65	99	280	460	11	162	260	344
Bromate	ug/L	--	--	--	--	3	<5	<5	<5	--	--	--	--
Bromide	mg/L	16	0.09	0.2	0.43	29	<0.05	0.12	0.31	32	<0.05	0.12	0.91
Calcium	mg/L	13	36.4	67.7	141	64	16.2	63	113	11	7	47.1	87
Calcium As CaCO3	mg/L	13	90.9	169	337	19	40.6	134	283	8	17.6	123.5	217
Carbon Dioxide	ug/L	--	--	--	--	19	2,000	15,000	54,000	--	--	--	--
Chloride	mg/L	30	31	62.3	144	65	11	46	151	11	14	40	83
Cyanide	ug/L	--	--	--	--	42	<100	<100	<100	4	<5	<5	<100
Fluoride (Natural Source)	mg/L	16	<0.05	<0.05	0.42	70	<0.1	0.11	0.89	34	<0.05	0.09	0.2
Magnesium	mg/L	13	21.3	45.3	90	64	6.5	25	58	11	22	36.5	72
Perchlorate	ug/L	13	<4	<4	<4	74	<4	<4	<4	13	<4	<4	<4
Potassium	mg/L	13	0.7	1.2	2.5	45	0.9	1.3	4.1	10	0.7	1.28	1.7
Silica	mg/L	13	15	24	32	27	13	25	43	8	18	22	36
Sodium	mg/L	13	24	35	268	64	16	32	109	11	23	26	100
Sodium Adsorption Ratio	ratio	13	0.67	0.98	5.52	58	0.53	0.95	5.84	9	0.6	0.81	3.37
Sulfate	mg/L	16	16	27	294	66	0.8	42	120	33	1.5	41	93
Total Dissolved Solids	mg/L	13	340	498	1490	65	226	400	642	19	300	380	492
Nutrients													
Ammonia	mg/L	--	--	--	--	7	<0.05	<0.05	<0.05	--	--	--	--
Nitrate (as NO3)	mg/L	16	<0.05	9	30	235	<2	13	40	58	<2	24	71
Nitrate (as N)	mg/L	--	--	--	--	14	1.9	5	9	5	1.2	5.7	12
Nitrate + Nitrite (as N)	ug/L	--	--	--	--	19	480	3,300	7,700	7	2,910	4,950	10,000
Nitrite (as N)	ug/L	--	--	--	--	49	<200	<400	<400	19	<400	<400	400
Phospahte, Ortho	mg/L	16	<0.05	0.15	0.9	29	0.05	0.13	1.96	30	<0.05	0.08	0.46
Trace Elements													
Aluminum	ug/L	13	<20	22	80	66	<20	23	380	13	<10	12	200
Antimony	ug/L	13	<1	<1	<1	66	<1	<6	<6	12	<1	<1	<6
Arsenic	ug/L	13	<1	<1	4	66	<1	0.29	4	12	<1	0.81	2
Asbestos	MFL	--	--	--	--	29	<0.2	<0.2	<0.2	--	--	--	--
Barium	ug/L	13	42	87	280	66	<100	112.3	290	12	84	109	260
Beryllium	ug/L	13	<1	<1	<1	66	<1	<1	<1	12	<1	<1	<1
Boron	ug/L	13	78.9	136	683	27	<100	119	281	8	<50	106	139
Cadmium	ug/L	13	<0.2	<0.2	<0.2	66	<0.2	<1	<1	12	<0.2	<0.2	<1
Chromium (Total)	ug/L	13	<1	<1	5.1	68	<1	1.0	17	12	<1	1.18	17
Chromium, Hexavalent	ug/L	13	<1	<1	2.07	51	<1	1.3	8.9	12	<1	1.59	9.6
Cobalt	ug/L	13	<1	<1	<1	28	<1	<1	1	8	<1	<1	<1
Copper	ug/L	13	0.57	1.3	15.6	65	<0.5	1.3	3.4	11	<0.5	1.47	3.8
Iron	ug/L	13	<20	<20	120	102	6.71	20.7	1,300	12	<10	8.1	320
Lead	ug/L	13	<0.5	<0.5	1.06	66	<0.5	<0.5	1.5	11	<0.5	0.78	1.3
Lithium	ug/L	13	-5	7.5	17	27	<5	6.6	25	8	8.2	11.0	21
Manganese	ug/L	13	<1	5.7	380	70	<1	2.1	146	11	<1	1.8	145
Mercury	ug/L	13	<1	<1	<1	66	<1	<1	<1	10	<0.5	<1	<1
Molybdenum	ug/L	13	<1	<1	13	28	<1	<1	10	8	<1	<1	15
Nickel	ug/L	13	<1	1.6	2.6	66	<1	<1	2.1	12	<1	0.77	1.6
Selenium	ug/L	13	<5	<5	5	66	<5	<5	<5	10	<2	1.5	2
Silver	ug/L	13	<1	<1	<1	65	<1	<10	<10	11	<1	<1	<10
Thallium	ug/L	13	<1	<1	<1	66	<1	<1	<1	12	<1	<1	<1
Vanadium	ug/L	13	<3	<3	3.3	28	<3	<3	3.1	8	<3	<3	8.7
Zinc	ug/L	13	<10	<10	<10	64	<10	9.3	100	11	<10	3.3	100

Table B-2 Summary of 2015 Inorganic Constituent Data

Parameter	Units[1]	Llagas Subbasin								Maximum Contaminant Levels	
		Shallow Zone				Principal Zone					
		n	Min	Median	Max	n	Min	Median	Max	MCL[7]	SMCL[8]
Major and Minor Ions											
Bicarbonate (As HCO3)	mg/L	12	147	208.5	420	40	115	237	460	--	--
Bromate	ug/L	--	--	--	--	--	--	--	--	10	--
Bromide	mg/L	21	<0.05	0.11	0.41	38	<0.05	0.18	1.12	--	--
Calcium	mg/L	12	38	55	94	40	5.9	53.3	107	--	--
Calcium As CaCO3	mg/L	12	94	137	234	20	82.3	145	269	--	--
Carbon Dioxide	ug/L	--	--	--	--	--	--	--	--	--	--
Chloride	mg/L	12	14	47	71	41	10	40.75	152	--	250
Cyanide	ug/L	--	--	--	--	27	<5	<100	<100	150	--
Fluoride (Natural Source)	mg/L	21	<0.05	<0.05	0.24	63	<0.05	0.05	0.23	2	--
Magnesium	mg/L	12	19.7	31.1	69	40	9.2	30	66	--	--
Perchlorate	ug/L	12	<4	<4	<4	92	<4	<4	5.6	6	--
Potassium	mg/L	12	<0.5	1.05	1.5	23	<0.5	1.3	2.6	--	--
Silica	mg/L	12	20	27	39	20	20	26	43	--	--
Sodium	mg/L	12	15	23	52	41	14	28	197	--	--
Sodium Adsorption Ratio	ratio	12	0.39	0.69	1.45	40	0.44	0.75	9.87	--	--
Sulfate	mg/L	21	19	35	101	58	11	36	140	--	250
Total Dissolved Solids	mg/L	12	304	412	678	41	180	371	760	--	500
Nutrients											
Ammonia	mg/L	--	--	--	--	--	--	--	--	--	--
Nitrate (as NO3)	mg/L	21	2.4	34	239	152	<0.05	29	124	45	--
Nitrate (as N)	mg/L	--	--	--	--	22	<0.4	4	19	10	--
Nitrate + Nitrite (as N)	ug/L	--	--	--	--	18	1,100	4,450	8,800	10,000	--
Nitrite (as N)	ug/L	--	--	--	--	61	<400	<400	<400	1,000	--
Phospahte, Ortho	mg/L	21	<0.05	0.09	0.27	37	<0.05	0.13	0.9	--	--
Trace Elements											
Aluminum	ug/L	12	<20	27	45	46	<20	16	220	1,000	200
Antimony	ug/L	12	<1	<1	<1	46	<0.5	<6	<6	6	--
Arsenic	ug/L	12	<1	<1	<1	46	<0.5	1.45	5	10	--
Asbestos	MFL	--	--	--	--	4	<0.2	<0.2	2.1	7	--
Barium	ug/L	12	12	100	440	46	<100	113	280	1,000	--
Beryllium	ug/L	12	<1	<1	<1	46	<1	<1	<1	4	--
Boron	ug/L	12	<50	106	137	23	52	106	4,600	--	--
Cadmium	ug/L	12	<0.2	<0.2	<0.2	46	<0.2	<0.5	<1	5	--
Chromium (Total)	ug/L	12	<1	1.35	5.5	46	<1	1.3	10	50	--
Chromium, Hexavalent	ug/L	11	<1	1.16	5.3	29	<1	1.1	5.7	10	--
Cobalt	ug/L	12	<1	<1	<1	20	<1	<1	<1	--	--
Copper	ug/L	12	<0.5	2.35	10.8	41	<0.5	2.7	68	--	1,000
Iron	ug/L	12	<20	<20	49.8	44	<20	9.1	1,500	--	300
Lead	ug/L	12	<0.5	<0.5	0.55	47	<0.2	0.17	5.6	--	--
Lithium	ug/L	12	<5	7.9	27	20	<5	9.6	27	--	--
Manganese	ug/L	12	<1	1.13	48.3	41	<1	1.33	120	--	50
Mercury	ug/L	11	<1	<1	<1	46	<0.05	<1	<1	2	--
Molybdenum	ug/L	12	<1	<1	1.1	20	<1	<1	4.4	--	--
Nickel	ug/L	12	<1	1.3	1.9	46	<1	1.0	6.9	100	--
Selenium	ug/L	12	<5	<5	7	46	<1	<5	<5	50	--
Silver	ug/L	12	<1	<1	<1	40	<0.2	<1	<10	--	100
Thallium	ug/L	12	<1	<1	<1	46	<0.5	<1	<1	2	--
Vanadium	ug/L	12	<3	<3	14	20	<3	<3	12	--	--
Zinc	ug/L	12	<10	<10	<10	40	<10	4.3	160	--	5,000

Notes:

Table includes data for wells monitored by the District (monitoring wells and water supply wells) and public water system data reported to the CA Division of Drinking Water (DDW)

Only wells with known construction information are presented in this table. DDW wells are assumed to represent the principal zone if no construction information is available, as these are typically deep wells.

1. mg/L = milligrams per liter; CFU = Colony Forming Units; uS/cm = microSiemens per centimeter; NTU = Nephelometric Turbidity Units; TON = Threshold Odor Number

2. The shallow aquifer zone is represented by wells primarily drawing water from depths less than 150 feet.
3. The principal aquifer zone is represented by wells primarily drawing water from depths greater than 150 feet.
4. n = number of results for each parameter. Some parameters may have been analyzed in more than one sample from a particular well.
5. The minimum shown is the lowest detected value. The lowest reporting limit (e.g., <5) is shown when there are no quantified values at the lowest reporting limit.
6. For parameters with results reported at multiple reporting limits, the median was computed using the Maximum Likelihood Estimate (MLE) method.
7. MCL = Maximum Contaminant Level specified in Title 22 of the California Code of Regulations. The MCL is a health-based drinking water standard.
8. SMCL = Secondary Maximum Contaminant Level, or aesthetic-based standard, per DDW or US EPA. For SMCLs having a range, the lower, recommended threshold is listed first with the upper threshold in parentheses.
9. A public water system collecting <40 samples/month violates the total coliform MCL if >1 sample is positive or if there is a repeat positive for fecal coliform or *E. coli*. All wells sampled in 2015 were private domestic wells.
10. Summary statistics computed from combined laboratory and field measured data.

Table B-3 Summary of 2015 Volatile Organic Compound (VOC) Data

Parameter	Units[1]	Santa Clara Subbasin, Santa Clara Plain						Santa Clara Subbasin, Coyote Valley			Llagas Subbasin						Maximum Contaminant Levels	
		Shallow Zone[2]			Principal Zone[3]						Shallow Zone			Principal Zone				
		n[4]	Result[5]	RL[6]	n	Result	RL	n	Result	RL	n	Result	RL	n	Result	RL	MCL[7]	SMCL[8]
1,1,1,2-Tetrachlorethane	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
1,1,2,2-Tetrachloroethane	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	1	--
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon 113)	ug/L	--	--	--	100	ND	<10	4	ND	<10	1	ND	<2	55	ND	<10	1,200	--
1,1,2-Trichloroethane	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	5	--
1,1-Dichloroethane	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	5	--
1,1-Dichloroethene	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	6	--
1,1-Dichloropropene	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
1,2,3-Trichlorobenzene	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
1,2,3-Trichloropropane	ug/L	--	--	--	19	ND	<0.00	1	ND	<0.5	1	ND	<0.5	--	--	--	--	--
1,2,4-Trichlorobenzene	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	5	--
1,2,4-Trimethylbenzene	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
1,2-Dichlorobenzene	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	600	--
1,2-Dichloroethane	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	0.5	--
1,2-Dichloropropane	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	5	--
1,3,5-Trimethylbenzene	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
1,3-Dichlorobenzene	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
1,3-Dichloropropane	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
1,3-Dichloropropylene (Total)	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	0.5	--
1,4-Dichlorobenzene	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	5	--
1-1-1-Trichloroethane	ug/L	--	--	--	100	D	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	200	--
1-Phenylpropane (n-Propylbenzene)	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
2,2-Dichloropropane	ug/L	--	--	--	16	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
2,4-Dinitrotoluene	ug/L	--	--	--	1	ND	<0.1	--	--	--	--	--	--	--	--	--	--	--
2-Chlorotoluene	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
4-Chlorotoluene	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
Benzene	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	1	--
Benzo (a) Pyrene	ug/L	--	--	--	27	ND	<0.1	3	ND	<0.1	--	--	--	19	ND	<0.1	0.2	--
Bromobenzene	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
Bromochloromethane	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
Bromodichloromethane (THM)	ug/L	--	--	--	29	ND	<1	3	ND	<1	1	ND	<0.5	55	ND	<1	--	--
Bromoform (THM)	ug/L	--	--	--	29	ND	<1	3	ND	<1	1	ND	<0.5	55	ND	<1	--	--
Bromomethane	ug/L	--	--	--	16	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
Carbon Disulfide	ug/L	--	--	--	1	ND	<0.5	--	--	--	--	--	--	--	--	--	--	--
Carbon Tetrachloride	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	0.5	--
Chloroethane	ug/L	--	--	--	16	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--

Table B-3 Summary of 2015 Volatile Organic Compound (VOC) Data

Parameter	Units[1]	Santa Clara Subbasin, Santa Clara Plain						Santa Clara Subbasin, Coyote Valley			Llagas Subbasin						Maximum Contaminant Levels	
		Shallow Zone[2]			Principal Zone[3]						Shallow Zone			Principal Zone				
		n[4]	Result[5]	RL[6]	n	Result	RL	n	Result	RL	n	Result	RL	n	Result	RL	MCL[7]	SMCL[8]
Chloroform (THM)	ug/L	--	--	--	29	ND	<1	3	ND	<1	1	ND	<0.5	55	ND	<1	--	--
Chloromethane	ug/L	--	--	--	16	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	D	<0.5	--	--
cis-1,2-Dichloroethene	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	6	--
Di(2-Ethylhexyl)Adipate	ug/L	--	--	--	27	ND	<5	3	ND	<5	--	--	--	19	ND	<5	400	--
Di(2-Ethylhexyl)Phthalate	ug/L	--	--	--	27	ND	<3	3	ND	<3	--	--	--	19	ND	<3	4	--
Dibromoacetic Acid	ug/L	--	--	--	--	--	--	--	--	--	1	ND	<1	--	--	--	--	--
Dibromochloromethane (THM)	ug/L	--	--	--	29	ND	<1	3	ND	<1	1	ND	<0.5	55	ND	<1	--	--
Dibromochloropropane (DBCP)	ug/L	--	--	--	26	ND	<0.01	3	ND	<0.01	--	--	--	19	ND	<0.01	0.2	--
Dibromomethane	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
Dichloroacetic	ug/L	--	--	--	--	--	--	--	--	--	1	ND	<1	--	--	--	--	--
Dichlorodifluoromethane (Freon 12)	ug/L	--	--	--	29	D	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
Dichloromethane	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	5	--
Diisopropyl Ether	ug/L	--	--	--	29	D	<3	3	ND	<3	1	ND	<2	55	ND	<3	--	--
Ethylbenzene	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	300	--
Ethylene Dibromide (EDB)	ug/L	--	--	--	26	ND	<0.02	3	ND	<0.02	--	--	--	19	ND	<0.02	0.05	--
Ethyl-tert-Butyl Ether	ug/L	--	--	--	29	ND	<3	3	ND	<3	1	ND	<2	55	ND	<3	--	--
Haloacetic Acids (5) (HAA5)	ug/L	--	--	--	--	--	--	--	--	--	1	ND	<0.5	--	--	--	60	--
Hexachlorobutadiene	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
Isopropylbenzene	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
m,p-Xylene	ug/L	--	--	--	35	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
Methyl Ethyl Ketone (MEK, Butanone)	ug/L	--	--	--	20	ND	<5	2	ND	<5	--	--	--	55	ND	<5	--	--
Methyl Isobutyl Ketone	ug/L	--	--	--	20	ND	<5	2	ND	<5	--	--	--	55	ND	<5	--	--
Methyl-tert-Butyl-Ether (MTBE)	ug/L	--	--	--	103	ND	<3	4	ND	<3	1	ND	<2	55	ND	<3	13	5
Monobromoacetic Acid (MBAA)	ug/L	--	--	--	--	--	--	--	--	--	1	ND	<1	--	--	--	--	--
Monochloroacetic Acid (MCAA)	ug/L	--	--	--	--	--	--	--	--	--	1	ND	<2	--	--	--	--	--
Monochlorobenzene	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	70	--
Naphthalene	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
n-Butylbenzene	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
o-Xylene	ug/L	--	--	--	35	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
PCB-1016	ug/L	--	--	--	6	ND	<0.5	1	ND	<0.5	--	--	--	--	--	--	0.5	--
PCB-1221	ug/L	--	--	--	6	ND	<0.5	1	ND	<0.5	--	--	--	--	--	--	0.5	--
PCB-1232	ug/L	--	--	--	6	ND	<0.5	1	ND	<0.5	--	--	--	--	--	--	0.5	--
PCB-1242	ug/L	--	--	--	6	ND	<0.5	1	ND	<0.5	--	--	--	--	--	--	0.5	--
PCB-1248	ug/L	--	--	--	6	ND	<0.5	1	ND	<0.5	--	--	--	--	--	--	0.5	--
PCB-1254	ug/L	--	--	--	6	ND	<0.5	1	ND	<0.5	--	--	--	--	--	--	0.5	--
PCB-1260	ug/L	--	--	--	6	ND	<0.5	1	ND	<0.5	--	--	--	--	--	--	--	--
p-Isopropyltoluene	ug/L	--	--	--	10	D	<0.5	1	ND	<0.5	1	ND	<0.5	--	--	--	--	--

Table B-3 Summary of 2015 Volatile Organic Compound (VOC) Data

Parameter	Units[1]	Santa Clara Subbasin, Santa Clara Plain						Santa Clara Subbasin, Coyote Valley			Llagas Subbasin						Maximum Contaminant Levels	
		Shallow Zone[2]			Principal Zone[3]						Shallow Zone			Principal Zone				
		n[4]	Result[5]	RL[6]	n	Result	RL	n	Result	RL	n	Result	RL	n	Result	RL	MCL[7]	SMCL[8]
Polychlorinated Biphenyls (Total PCB'S)	ug/L	--	--	--	23	ND	<0.5	3	ND	<0.5	--	--	--	11	ND	<0.5	0.5	--
sec-Butylbenzene	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
Styrene	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	100	--
tert-Amyl-Methyl Ether	ug/L	--	--	--	29	ND	<3	3	ND	<3	1	ND	<2	55	ND	<3	--	--
tert-Butyl Alcohol	ug/L	--	--	--	15	ND	<2	3	D	<15	1	ND	<2	55	D	<2	--	--
tert-Butylbenzene	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
Tetrachloroethene	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	D	<0.5	5	--
Toluene	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	150	--
Total Trihalomethanes	ug/L	--	--	--	3	D	0.5	--	--	--	--	--	--	--	--	--	80	--
trans-1,2-Dichloroethene	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	10	--
Trichloroacetic Acid	ug/L	--	--	--	--	--	--	--	--	--	1	ND	<1	--	--	--	--	--
Trichloroethene	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	5	--
Trichlorofluoromethane (Freon 11)	ug/L	--	--	--	100	ND	<5	4	ND	<5	1	ND	<2.5	55	ND	<5	150	--
Vinyl Chloride	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	0.5	--
Xylenes (Total)	ug/L	--	--	--	41	D	<1	--	--	--	1	ND	<0.5	--	--	--	1,750	--

Notes:

Table includes data for wells monitored by the District (monitoring wells and water supply wells) and public water system data reported to the CA Division of

Only wells with known construction information are presented. Unless construction is known, DDW wells are assumed to represent the principal zone, as these are typically deep wells.

1. ug/L = micrograms per liter.
2. The shallow aquifer zone is represented by wells primarily drawing water from depths less than 150 feet.
3. The principal aquifer zone is represented by wells primarily drawing water from depths greater than 150 feet.
4. n = number of results for each parameter. Some parameters may have been analyzed more than once at a particular well.
5. ND= not detected above laboratory reporting limit. NA = not analyzed. D = detection above reporting limit.
6. RL = Laboratory reporting limit. In the case of multiple reporting limits, the highest limit is shown. NA is shown if the reporting limit is not available.
7. MCL = Maximum Contaminant Level specified in Title 22 of the California Code of Regulations. The MCL is a health-based drinking water standard.
8. SMCL = Secondary Maximum Contaminant Level, or aesthetic-based standard, per DDW or US EPA.

Table B-4 Summary of 2015 Detected Volatile Organic Compounds (VOCs)

Parameter	Units[1]	Santa Clara Subbasin, Santa Clara Plain								Santa Clara Subbasin, Coyote Valley				Llagas Subbasin								Maximum Contaminant Levels	
		Shallow Zone[2]				Principal Zone[3]								Shallow Zone				Principal Zone					
		n[4]	Min[5]	Median[6]	Max	n	Min	Median	Max	n	Min	Median	Max	n	Min	Median	Max	n	Min	Median	Max	MCL[7]	SMCL[8]
Chloromethane	ug/L	--	--	--	--	16	<0.5	<0.5	<0.5	3	<0.5	<0.5	<0.5	1	<0.5	<0.5	<0.5	55	<0.5	<0.5	**0.97**	--	--
Tetrachloroethene	ug/L	--	--	--	--	100	<0.5	<0.5	<0.5	4	<0.5	<0.5	<0.5	1	<0.5	<0.5	<0.5	55	<0.5	<0.5	**2.7**	5	--
1-1-1-Trichloroethane	ug/L	--	--	--	--	100	<0.5	<0.5	**1.8**	4	<0.5	<0.5	<0.5	1	<0.5	<0.5	<0.5	55	<0.5	<0.5	<0.5	200	--
Dichlorodifluoromethane	ug/L	--	--	--	--	29	<0.5	<0.5	**13**	3	<0.5	<0.5	<0.5	1	<0.5	<0.5	<0.5	55	<0.5	<0.5	<0.5	--	--
tert-Butyl Alcohol	ug/L	--	--	--	--	15	<2	<2	<2	3	**2.7**	**3.4**	**4.1**	1	<2	<2	<2	55	<2	<2	**3.9**	--	--
Xylenes (Total)	ug/L	--	--	--	--	41	<0.5	<0.5	**0.5**	--	--	--	--	1	<0.5	<0.5	<0.5	--	--	--	--	1,750	--
Total Trihalomethanes	ug/L	--	--	--	--	3	**0.5**	**0.7**	**1**	--	--	--	--	--	--	--	--	--	--	--	--	80	--
p-Isopropyltoluene	ug/L	--	--	--	--	10	<0.5	<0.5	**0.5**	1	<0.5	<0.5	<0.5	1	<0.5	<0.5	<0.5	--	--	--	--	--	--
Diisopropyl Ether	ug/L	--	--	--	--	29	<3	<3	**3**	3	<3	<3	<3	1	<2	<2	<2	55	<3	<3	<3	--	--

Notes:
Table includes data for wells monitored by the District (monitoring wells and water supply wells) and public water system data reported to the CA Division of Drinking Water (DDW).

Only wells with known construction information are presented in this table. DDW wells are assumed to represent the principal zone if no construction information is available, as these are typically deep wells.

1. ug/L = micrograms per liter.
2. The shallow aquifer zone is represented by wells primarily drawing water from depths less than 150 feet.
3. The principal aquifer zone is represented by wells primarily drawing water from depths greater than 150 feet.
4. n = number of results for each parameter. Some parameters may have been analyzed more than once at a particular well.
5. The minimum shown is the lowest detected value. The lowest reporting limit (e.g., <5) is shown when there are no quantified values at the lowest reporting limit.
6. For parameters with results with multiple reporting limits, the median was computed using the Maximum Likelihood Estimate method.
7. MCL = Maximum Contaminant Level specified in Title 22 of the California Code of Regulations. The MCL is a health-based drinking water standard.
8. SMCL = Secondary Maximum Contaminant Level, or aesthetic-based standard, per DDW or US EPA.

Table B-5 Summary of 2015 Pesticide Data

Parameter	Units[1]	Santa Clara Subbasin, Santa Clara Plain						Santa Clara Subbasin, Coyote Valley			Llagas Subbasin						Maximum Contaminant Levels	
		Shallow Zone[2]			Principal Zone[3]						Shallow Zone			Principal Zone				
		n[4]	Result[5]	RL[6]	n	Result	RL	n	Result	RL	n	Result	RL	n	Result	RL	MCL[7]	SMCL[8]
2,3,7,8-TCDD (Dioxin)	ug/L	NA	NA	NA	23	ND	<5	3	ND	<0.000005	NA	NA	NA	19	ND	<0.000005	0.00003	--
2,4,5-TP (Silvex)	ug/L	NA	NA	NA	27	ND	<1	6	ND	<1	NA	NA	NA	28	ND	<1	50	--
2,4-D	ug/L	NA	NA	NA	33	ND	<10	7	ND	<10	NA	NA	NA	28	ND	<10	70	--
3-Hydroxycarbofuran	ug/L	NA	NA	NA	22	ND	<3	2	ND	<3	NA	NA	NA	19	ND	<3	--	--
Aciflurfen	ug/L	NA	NA	NA	9	**D**	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Alachlor	ug/L	NA	NA	NA	23	ND	<1	4	ND	<1	NA	NA	NA	29	ND	<1	2	--
Aldicarb	ug/L	NA	NA	NA	22	ND	<3	2	ND	<3	NA	NA	NA	19	ND	<3	--	--
Aldicarb Sulfone	ug/L	NA	NA	NA	22	ND	<4	2	ND	<4	NA	NA	NA	19	ND	<4	--	--
Aldicarb Sulfoxide	ug/L	NA	NA	NA	22	ND	<3	2	ND	<3	NA	NA	NA	19	ND	<3	--	--
Aldrin	ug/L	NA	NA	NA	22	ND	<0.075	2	ND	<0.075	NA	NA	NA	11	ND	<0.075	--	--
Atrazine	ug/L	NA	NA	NA	29	ND	<0.5	5	ND	<0.5	NA	NA	NA	29	ND	<0.5	1	--
Bentazon	ug/L	NA	NA	NA	27	ND	<2	6	ND	<1	NA	NA	NA	28	ND	<2	18	--
Bromacil	ug/L	NA	NA	NA	13	ND	<10	2	ND	<10	NA	NA	NA	19	ND	<10	--	--
Butachlor	ug/L	NA	NA	NA	13	ND	<0.38	2	ND	<0.38	NA	NA	NA	19	ND	<0.38	--	--
Carbaryl	ug/L	NA	NA	NA	22	ND	<5	2	ND	<5	NA	NA	NA	19	ND	<5	--	--
Carbofuran	ug/L	NA	NA	NA	23	ND	<5	3	ND	<5	NA	NA	NA	19	ND	<5	18	--
Chlordane	ug/L	NA	NA	NA	23	ND	<0.1	3	ND	<0.1	NA	NA	NA	11	ND	<0.1	0.1	--
cis-1,3-Dichloropropene	ug/L	NA	NA	NA	22	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	0.5	--
Dalapon	ug/L	NA	NA	NA	27	ND	<10	6	ND	<10	NA	NA	NA	28	ND	<10	200	--
DCPA (Total di & mono Acid Degradates)	ug/L	NA	NA	NA	5	ND	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--
Diazinon	ug/L	NA	NA	NA	5	**D**	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--
Dicamba	ug/L	NA	NA	NA	22	ND	<1.5	3	ND	<1.5	NA	NA	NA	28	ND	<1.5	--	--
Dieldrin	ug/L	NA	NA	NA	22	ND	<0.02	2	ND	<0.02	NA	NA	NA	11	ND	<0.02	--	--
Dimethoate	ug/L	NA	NA	NA	5	**D**	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--
Dinoseb	ug/L	NA	NA	NA	27	ND	<2	6	ND	<1	NA	NA	NA	28	ND	<2	7	--

Table B-5 Summary of 2015 Pesticide Data

Parameter	Units[1]	Santa Clara Subbasin, Santa Clara Plain						Santa Clara Subbasin, Coyote Valley			Llagas Subbasin						Maximum Contaminant Levels	
		Shallow Zone[2]			Principal Zone[3]						Shallow Zone			Principal Zone				
		n[4]	Result[5]	RL[6]	n	Result	RL	n	Result	RL	n	Result	RL	n	Result	RL	MCL[7]	SMCL[8]
Diquat	ug/L	NA	NA	NA	23	ND	<4	3	ND	<4	NA	NA	NA	19	ND	<4	20	--
Endothall	ug/L	NA	NA	NA	23	ND	<45	3	ND	<45	NA	NA	NA	19	ND	<45	100	--
Endrin	ug/L	NA	NA	NA	23	ND	<0.1	3	ND	<0.1	NA	NA	NA	11	ND	<0.1	2	--
Gamma-BHC (Lindane), Total	ug/L	NA	NA	NA	23	ND	<0.2	3	ND	<0.2	NA	NA	NA	11	ND	<0.2	0.2	--
Glyphosate	ug/L	NA	NA	NA	23	ND	<25	3	ND	<15	NA	NA	NA	10	ND	<25	700	--
Heptachlor	ug/L	NA	NA	NA	23	ND	<0.01	3	ND	<0.01	NA	NA	NA	11	ND	<0.01	0.01	--
Heptachlor Epoxide	ug/L	NA	NA	NA	23	ND	<0.01	3	ND	<0.01	NA	NA	NA	11	ND	<0.01	0.01	--
Hexachlorobenzene	ug/L	NA	NA	NA	23	ND	<0.5	3	ND	<0.5	NA	NA	NA	11	ND	<0.5	1	--
Hexachlorocyclopentadiene	ug/L	NA	NA	NA	23	ND	<1	3	ND	<1	NA	NA	NA	11	ND	<1	50	--
Methiocarb	ug/L	NA	NA	NA	14	**D**	<2	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--
Methomyl	ug/L	NA	NA	NA	22	ND	<2	2	ND	<1	NA	NA	NA	19	ND	<2	--	--
Methoxychlor	ug/L	NA	NA	NA	23	ND	<10	3	ND	<10	NA	NA	NA	11	ND	<10	30	--
Metolachlor	ug/L	NA	NA	NA	5	**D**	<0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--
Metribuzin	ug/L	NA	NA	NA	5	**D**	<0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--
Molinate	ug/L	NA	NA	NA	23	ND	<2	3	ND	<1	NA	NA	NA	19	ND	<2	20	--
Oxamyl	ug/L	NA	NA	NA	23	ND	<20	3	ND	<10	NA	NA	NA	19	ND	<20	50	--
Paraquat	ug/L	NA	NA	NA	3	ND	<20	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--
Pentachlorophenol	ug/L	NA	NA	NA	27	ND	<0.2	6	ND	<0.2	NA	NA	NA	28	ND	<0.2	1	--
Picloram	ug/L	NA	NA	NA	27	ND	<1	6	ND	<1	NA	NA	NA	28	ND	<1	500	--
Propachlor	ug/L	NA	NA	NA	13	ND	<0.5	2	ND	<0.5	NA	NA	NA	19	ND	<0.5	--	--
Propoxur	ug/L	NA	NA	NA	14	**D**	<2	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--
Simazine	ug/L	NA	NA	NA	29	ND	<1	5	ND	<1	NA	NA	NA	29	ND	<1	4	--
Terbacil	ug/L	NA	NA	NA	4	ND	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--
Terbuthylazine	ug/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	1	ND	<0.1	NA	NA	NA	--	--
Thiobencarb	ug/L	NA	NA	NA	23	ND	<1	3	ND	<1	NA	NA	NA	19	ND	<1	70	1

Table B-5 Summary of 2015 Pesticide Data

Parameter	Units[1]	Santa Clara Subbasin, Santa Clara Plain						Santa Clara Subbasin, Coyote Valley			Llagas Subbasin						Maximum Contaminant Levels	
		Shallow Zone[2]			Principal Zone[3]						Shallow Zone			Principal Zone				
		n[4]	Result[5]	RL[6]	n	Result	RL	n	Result	RL	n	Result	RL	n	Result	RL	MCL[7]	SMCL[8]
Toxaphene	ug/L	NA	NA	NA	23	ND	<1	3	ND	<1	NA	NA	NA	11	ND	<1	3	--
trans-1,3-Dichloropropene	ug/L	NA	NA	NA	22	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--

Notes:

Table includes data for wells monitored by the District (monitoring wells and water supply wells) and public water system data reported to the CA Division of Drinking Water (DDW).

Only wells with known construction information are presented in this table. DDW wells are assumed to represent the principal zone if no construction information is available, as these are typically deep wells.

1. ug/L = micrograms per liter.
2. The shallow aquifer zone is represented by wells primarily drawing water from depths less than 150 feet.
3. The principal aquifer zone is represented by wells primarily drawing water from depths greater than 150 feet.
4. n = number of results for each parameter. Some parameters may have been analyzed more than once at a particular well.
5. ND= not detected above laboratory reporting limit. NA = not analyzed. D = detection above reporting limit.
6. RL = Laboratory reporting limit. In the case of multiple reporting limits, the highest limit is shown. NA is shown if the reporting limit is not available.
7. MCL = Maximum Contaminant Level specified in Title 22 of the California Code of Regulations. The MCL is a health-based drinking water standard.
8. SMCL = Secondary Maximum Contaminant Level, or aesthetic-based standard, per DDW or US EPA

Table B-6 Summary of 2015 Detected Pesticides

Parameter	Units[1]	Santa Clara Subbasin, Santa Clara Plain								Santa Clara Subbasin, Coyote Valley				Llagas Subbasin								Maximum Contaminant Levels	
		Shallow Zone[2]				Principal Zone[3]								Shallow Zone				Principal Zone					
		n[4]	Min[5]	Median[6]	Max	n	Min	Median	Max	n	Min	Median	Max	n	Min	Median	Max	n	Min	Median	Max	MCL[7]	SMCL[8]
Dimethoate	ug/L	--	--	--	--	5	<0.1	<0.1	**0.1**	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methiocarb	ug/L	--	--	--	--	14	<0.5	< 2	**2**	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Propoxur	ug/L	--	--	--	--	14	<0.5	< 2	**2**	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metolachlor	ug/L	--	--	--	--	5	<0.5	<0.5	**0.5**	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Diazinon	ug/L	--	--	--	--	5	<0.1	<0.1	**0.1**	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metribuzin	ug/L	--	--	--	--	5	<0.5	<0.5	**0.5**	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Acifluorfen	ug/L	--	--	--	--	9	<0.5	<0.5	**0.5**	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:
Table includes data for wells monitored by the District (monitoring wells and water supply wells) and public water system data reported to the CA Division of Drinking Water (DDW).
Only wells with known construction information are presented in this table. DDW wells are assumed to represent the principal zone if no construction information is available, as

1. ug/L = micrograms per liter.
2. The shallow aquifer zone is represented by wells primarily drawing water from depths less than 150 feet.
3. The principal aquifer zone is represented by wells primarily drawing water from depths greater than 150 feet.
4. n = number of results for each parameter. Some parameters may have been analyzed more than once at a particular well.
5. The minimum shown is the lowest detected value. The lowest reporting limit (e.g., <5) is shown when there are no quantified values at the lowest reporting limit.
6. For parameters with results with multiple reporting limits, the median was computed using the Maximum Likelihood Estimate method.
7. MCL = Maximum Contaminant Level specified in Title 22 of the California Code of Regulations. The MCL is a health-based drinking water standard.
8. SMCL = Secondary Maximum Contaminant Level, or aesthetic-based standard, per DDW or US EPA.

Table B-7 Summary of 2015 Radioactive Constituent Data

Parameter	Units[1]	Santa Clara Subbasin, Santa Clara Plain								Santa Clara Subbasin, Coyote Valley				Llagas Subbasin								Maximum Contaminant Levels	
		Shallow Zone[2]				Principal Zone[3]								Shallow Zone				Principal Zone					
		n[4]	Min[5]	Median[6]	Max	n	Min	Median	Max	n	Min	Median	Max	n	Min	Median	Max	n	Min	Median	Max	MCL[7]	SMCL[8]
Gross Alpha	pCi/L	--	--	--	--	21	0.05	0.87	6	--	--	--	--	--	--	--	--	19	0.16	0.94	3.3	15	--
Gross Alpha Counting Error	pCi/L	--	--	--	--	21	1.1	2.4	3	--	--	--	--	--	--	--	--	18	0.11	0.15	1.13	--	--
Gross Alpha MDA95	pCi/L	--	--	--	--	21	1.1	2.2	3	--	--	--	--	--	--	--	--	19	0.76	1.17	2.15	--	--
Gross Beta	mrem/yr	--	--	--	--	9	<4	<4	<4	--	--	--	--	--	--	--	--	--	--	--	--	50	--
Gross Beta Counting Error	pCi/L	--	--	--	--	9	1.3	1.36	2.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Radium 226	pCi/L	--	--	--	--	10	<1	<1	<1	--	--	--	--	--	--	--	--	--	--	--	--	5	--
Radium 226 Counting Error	pCi/L	--	--	--	--	7	0.11	0.16	0.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Radium 226 MDA95	pCi/L	--	--	--	--	10	0.29	0.39	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Radium 228	pCi/L	--	--	--	--	13	<1	<1	<1	--	--	--	--	--	--	--	--	1	0.045	0.045	0.045	--	--
Radium 228 Counting Error	pCi/L	--	--	--	--	2	0.3	0.3	0.3	--	--	--	--	--	--	--	--	1	0.57	0.57	0.57	--	--
Radium 228 MdaDA95	pCi/L	--	--	--	--	13	0.63	0.89	1.2	--	--	--	--	--	--	--	--	1	0.2	0.2	0.2	--	--
Uranium	pCi/L	--	--	--	--	9	<1	<1	<1	--	--	--	--	--	--	--	--	--	--	--	--	20	--

Notes:
Table includes data for wells monitored by the District (monitoring wells and water supply wells) and public water system data reported to the CA Division of Drinking Water (DDW)
Only wells with known construction information are presented in this table. DDW wells are assumed to represent the principal zone if no construction information is available, as these are typically deep wells
1. pCi/l = picocuries per liter; mrem/yr = millirem per year.
2. The shallow aquifer zone is represented by wells primarily drawing water from depths less than 150 feet.
3. The principal aquifer zone is represented by wells primarily drawing water from depths greater than 150 feet
4. n = number of results for each parameter. Some parameters may have been analyzed more than once at a particular well.
5. The minimum shown is the lowest detected value. The lowest reporting limit (e.g., <5) is shown when there are no quantified values at the lowest reporting limit.
6. For parameters with results with multiple reporting limits, the median was computed using the Maximum Likelihood Estimate (MLE) method.
7. MCL = Maximum Contaminant Level specified in Title 22 of the California Code of Regulations. The MCL is a health-based drinking water standard
8. SMCL = Secondary Maximum Contaminant Level, or aesthetic-based standard, per DDW or US EPA.

Santa Clara Valley Water District

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Appendix D – District Managed Recharge Facilities

The District's managed recharge program uses both runoff captured in local reservoirs and imported water delivered by the raw water conveyance system to recharge the basin through more than 390 acres of off-stream ponds and over 90 miles of local creeks.

The recharge facilities have been organized into seven systems based on watersheds, as described below. The facilities have been sorted in this way to simplify describing management of a complex and interconnected network. These systems are not independent, but rather share sources of supply and recharge the same groundwater subbasins. Water recharged in one system may be extracted many miles away.

Coyote Recharge System

This system has a recharge capacity of approximately 27,000 AF per year. The major features of this system include Anderson and Coyote Reservoirs and Coyote Creek in-stream recharge. Water sources for this system include the large Coyote Creek watershed, draining much of the west-facing slope of the Diablo Range. After leaving the hills below Anderson Reservoir, Coyote Creek flows north to San Francisco Bay, recharging both the Santa Clara Plain and Coyote Valley. Through the Santa Clara Conduit, water from this system can also be diverted south into the Llagas Water Supply Management Systems, recharging the Llagas Subbasin. In addition to local water, imported water can be delivered to the system from the Santa Clara Conduit. Imported water can be stored in Anderson Reservoir using the Anderson Force Main, and later released to Coyote Creek or diverted to the Cross Valley Pipeline for recharge elsewhere or as a water supply source for the District's surface water treatment plants. Recharge operations have been conducted in this system since 1934.

Guadalupe Recharge System

This system has a recharge capacity of approximately 25,000 AF per year, The major features of this system include Almaden, Guadalupe, and Calero Reservoirs; Guadalupe Creek, Guadalupe River, Alamitos Creek, Calero, and Ross Creek in-stream recharge; and the Los Capitancillos, Alamitos, Kooser, and Guadalupe off-stream ponds. Water can be diverted from Almaden Reservoir to Calero Reservoir via the Almaden-Calero Canal. Local water supplies are developed from the Almaden, Guadalupe, and Calero Watersheds, and imported water from the State Water Project (SWP) and Central Valley Project (CVP) can be diverted into the system via the Cross Valley Pipeline, the Almaden Valley Pipeline, and the Central Pipeline. This system recharges the Santa Clara Plain, and water can also be diverted from Calero Reservoir to the District's surface water treatment plants via the Cross Valley Pipeline. Recharge operations have been conducted in this system since 1932.

Los Gatos Recharge System

The Los Gatos recharge system has a recharge capacity of approximately 30,000 AF per year. The major features of this system include Lexington and Vasona Reservoirs, Los Gatos Creek in-stream recharge, and several off-stream systems including Page, Kirk, Oka, McGlincy, Budd, Sunnyoaks, and Camden ponds. The majority of the source water for this system is from the Los Gatos Creek Watershed in the Santa Cruz Mountains, although imported water from SWP and CVP is also delivered to the system through the District's Central Pipeline. This system recharges the Santa Clara Plain. Recharge operations have been conducted in this system since 1934.

Penitencia Recharge System

This small system is predominately served by imported water from the SWP, although local water from the Penitencia Creek Watershed also contributes to in-stream recharge in Penitencia Creek and the Overfelt and Mabury ponds. The other facilities in the system, which exclusively recharge SWP water, include the Penitencia, Piedmont, Helmsley, Capitol, and City and County Park ponds. The system has a recharge capacity of about 7,000

AF per year and recharges the Santa Clara Plain. Recharge operations have been conducted in this system since 1934.

West Side Recharge System

This system has a recharge capacity of about 15,000 AF per year. Major facilities in the system include Stevens Creek Reservoir, the McClellan off-stream ponds, and the various streams receiving water from the Stevens Creek Pipeline including Stevens, Calabazas, Regnart, Rodeo, Saratoga, Wildcat, San Tomas, and Smith Creeks. In addition to local water from the west side watersheds, imported water from SWP and CVP is delivered to the system using the Stevens Creek Pipeline. This system recharges the Santa Clara Plain. Recharge operations have been conducted in this system since 1935.

Lower Llagas Recharge System

This system has a recharge capacity of about 21,000 AF per year. Major facilities in the system include Uvas and Chesbro Reservoirs, in-stream recharge in Llagas and Uvas Creeks, the Church off-stream ponds, and the Uvas-Llagas pipeline which can divert water from Uvas Reservoir to Llagas Creek. This system is entirely dependent on local water from the Uvas and Llagas Watersheds, and recharges the Llagas Subbasin. Recharge operations have been conducted in this system since 1955.

Upper Llagas Recharge System

This system has a recharge capacity of about 19,000 AF per year. Major facilities include Llagas in-stream recharge, the Madrone Channel, and the San Pedro and Main Avenue ponds. This system recharges the Llagas Subbasin, predominately with imported CVP water.

The facilities within each District recharge system and the associated recharge capacity are shown below in Table C-2. Table C-3 provides a summary of in-stream and off-stream recharge capacity for groundwater charge zones W2 and W5.

Appendix D – District Managed Recharge Facilities

Table D-1. District Recharge Facilities

Groundwater Charge Zone	Recharge System	In-Stream Recharge (Creeks)	Annual Creek Recharge Capacity (AF)[1]	Off-Stream Recharge (Ponds)	Annual Pond Recharge Capacity (AF)[1]
Zone W2	Penitencia	Upper Penitencia Creek	2,200		
				Penitencia Ponds	3,100
				Piedmont	
				City Park Pond	
				Helmsley	
				Mabury	
				County Park Pond	
				Capitol	
				Overfelt Ponds	1,500
		Creek Total	**2,200**	**Pond Total**	**4,600**
		Recharge System Total: 6,800			
	Los Gatos	Los Gatos Creek	5,800		
				Page Ponds	5,300
				Budd Ave Ponds	5,000
				Sunnyoaks Ponds	2,200
				Camden Ponds	2,200
				McGlincy Ponds	7,700
				Oka Ponds	1,500
		Creek Total	**5,800**	**Pond Total**	**23,900**
		Recharge System Total: 29,700			
	West Side	Regnart Creek	700		
		Calabazas Creek	2,600		
		Rodeo Creek	700		
		Saratoga Creek	4,400		
		Wildcat Creek	400		
		San Tomas Creek	400		
		Smith Creek[2]	700		
		Stevens Creek	3,600		
				McClellen Ponds	1,700
		Creek Total	**13,500**	**Pond Total**	**1,700**
		Recharge System Total: 15,200			
	Guadalupe	Alamitos Creek	2,200		
		Calero Creek	900		
		Guadalupe River	4,200		
		Guadalupe Creek	2,900		
		Ross Creek	2,200		
				Alamitos Ponds	1,500
				Guadalupe Ponds	6,600

Appendix D – District Managed Recharge Facilities

Groundwater Charge Zone	Recharge System	In-Stream Recharge (Creeks)	Annual Creek Recharge Capacity (AF)[1]	Off-Stream Recharge (Ponds)	Annual Pond Recharge Capacity (AF)[1]
Zone W2				Los Cap Ponds	2,900
				Kooser Ponds	1,700
		Creek Total	**12,400**	**Pond Total**	**12,700**
		Recharge System Total: 25,100			
	Coyote	Lower Coyote Creek	1,500		
				Coyote Percolation Pond[2]	10,900
Zone W5		Upper Coyote Creek	14,600		
		Creek Total	**16,100**	**Pond Total**	**10,900**
		Recharge System Total: 27,000			
	Upper Llagas	Madrone Channel[2]	10,000		
		Tennant Creek	-		
		East Little Llagas	1,100		
				Main Avenue Ponds	2,700
				San Pedro Ponds	4,700
		Creek Total	**11,100**	**Pond Total**	**7,400**
		Recharge System Total: 18,500			
	Lower Llagas	Uvas Creek	8,100		
		Llagas Creek	5,800		
				Church Ponds	7,300
		Creek Total	**13,900**	**Pond Total**	**7,300**
		Recharge System Total: 21,200			

1. The annual recharge capacity shown assumes water is available all year and that ponds are in normal operational condition.
2. Includes in-stream spreader dam facilities.

Table D-2. District Annual Managed Recharge Capacity Summary

Groundwater Charge Zone	In-Stream Recharge (AF)	Off-Stream Recharge (AF)	Total Recharge (AF)
Zone W2	35,400	53,800	89,200
Zone W5	39,600	14,700	54,300
Total	75,000	68,500	143,500

Appendix E – Monitoring Well Details

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Table E-1. Santa Clara Subbasin Groundwater Level Monitoring Network

Well Number	CASGEM WELL ID	Latitude	Longitude	Depth (ft bgs)	Top of First Screen (ft bgs)	Bottom of Last Screen (ft bgs)	Ground Surface Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Well Type	Method	Frequency	Measured by	Owner
05S02W32E002	NA	37.45815	-122.10861	218	185	198	6	7.6	MON (was AG)	ES	M	District	Other
05S02W35R001	374470N1220460W001	37.44704	-122.04603	300	190	280	4	4.15	MON (was AG)	ES	M	District	District
05S02W35R002	374471N1220460W001	37.44709	-122.04603	80	60	80	4	4.2	MON (was AG)	ES	M	District	District
05S03W35G010	NA	37.45553	-122.15508	840	108	822	44.5	44.5	MI	ES	M	Other	Other
05S03W36L012	NA	37.45086	-122.14288	NA	NA	NA	21.45	21.45	MI	ES	M	Other	Other
05S03W36P002	374502N1221430W001	37.45024	-122.14300	930	830	850	21.67	21.35	MON	PT	D	District	District
05S03W36P003	374502N1221430W002	37.45024	-122.14300	740	720	740	21.67	20.92	MON	PT	D	District	District
05S03W36P004	374502N1221430W003	37.45024	-122.14300	560	540	560	21.67	20.82	MON	PT	D	District	District
05S03W36P005	374502N1221430W004	37.45024	-122.14300	200	180	200	21.67	20.88	MON	PT	D	District	District
06S01E21M011	373938N1218748W001	37.39383	-121.87483	325	NA	NA	99.1	98.9	MON (was AG)	ES	M	District	District
06S01E22P002	NA	37.39241	-121.85085	519	NA	NA	181.1	180.7	MON (was AG)	ES	M	District	Other
06S01E27M006	NA	37.38149	-121.85641	262	NA	NA	149.9	149.3	MON (was AG)	PT	D	District	District
06S01E27P002	373772N1218499W001	37.37829	-121.85183	400	NA	NA	149.9	149.7	AG	PT	D	District	District
06S01E32M005	NA	37.36453	-121.89286	110	NA	NA	64	64.3	DO	ST	M	District	Other
06S01E35M011	NA	37.36409	-121.83976	369	180	345	129.9	130.9	MI	ES	M	District	Other
06S01W01M001	374376N1219291W001	37.43766	-121.92912	265	255	265	20.25	22.15	MI	PT	D	District	District
06S01W10N007	NA	37.41832	-121.96858	83	73	78	7	7	MON	PT	D	District	District
06S01W11B003	NA	37.43054	-121.93864	NA	NA	NA	6.9	8.4	MI	PG	M	District	Other
06S01W13C009	NA	37.41435	-121.92558	51	40	46	26	25.8	MON	PT	D	District	District
06S01W14P008	NA	37.40376	-121.94427	392	NA	NA	13	12	MON (was AG)	PG	M	District	Other
06S01W17F001	NA	37.41317	-122.00067	110	90	100	2.4	2.05	MON	PT	D	District	District
06S01W17F002	NA	37.41319	-122.00074	210	190	200	2.5	2.27	MON	PT	D	District	District
06S01W22K012	NA	37.39490	-121.95790	680	220	655	17.25	17.25	MI	ES	M	Other	Other
06S01W23L003	NA	37.39594	-121.94596	840	230	800	17.05	17.05	MI	ES	M	Other	Other
06S01W24B004	NA	37.40347	-121.91950	620	230	600	32.1	32.1	MI	ES	M	Other	Other
06S01W24B005	NA	37.40234	-121.91798	630	240	610	31.5	31.5	MI	ES	M	Other	Other
06S01W24E001	NA	37.39934	-121.92818	645	360	615	19.6	19.6	MI	ES	M	Other	Other
06S01W24E002	NA	37.39910	-121.93015	640	355	600	18.9	18.9	MI	ES	M	Other	Other
06S01W24H010	NA	37.39737	-121.91687	131	NA	NA	38	38.3	AG	ST	M	District	District

Table E-1. Santa Clara Subbasin Groundwater Level Monitoring Network Continued

Well Number	CASGEM WELL ID	Latitude	Longitude	Depth (ft bgs)	Top of First Screen (ft bgs)	Bottom of Last Screen (ft bgs)	Ground Surface Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Well Type	Method	Frequency	Measured by	Owner
06S01W24H015	373962N1219156W001	37.39685	-121.91535	588	NA	NA	40	39.55	MON (was AG)	PT	D	District	District
06S01W24J037	NA	37.39471	-121.91499	53	56	61	33	32.66	MON	PT	W	District	District
06S01W26D002	NA	37.38749	-121.94790	665	295	665	21.4	21.4	MI	ES	M	Other	Other
06S01W26K001	373804N1219385W001	37.38044	-121.93855	65	55	60	32	30.92	MON	PT	D	District	District
06S01W26N017	NA	37.37648	-121.95013	770	290	740	33.25	33.25	MI	ES	M	Other	Other
06S01W26P002	373738N1219428W001	37.37376	-121.94278	460	190	430	37.1	42.38	MI	ES	M	District	District
06S01W26R001	373776N1219362W001	37.37762	-121.93619	1370	810	830	26.84	28.2	MON	PT	M	District	District
06S01W26R002	373776N1219362W002	37.37763	-121.93619	600	580	600	26.84	28.47	MON	PT	M	District	District
06S01W26R003	373776N1219362W003	37.37763	-121.93619	460	440	460	26.84	28.2	MON	PT	M	District	District
06S01W26R004	373776N1219362W004	37.37763	-121.93622	330	310	330	26.84	28.31	MON	PT	M	District	District
06S01W32H001	NA	37.37010	-121.98741	650	290	650	51.3	51.3	MI	ES	M	Other	Other
06S01W33N001	NA	37.36315	-121.98647	528	288	486	58.8	58.8	MI	ES	M	Other	Other
06S01W33R005	NA	37.35978	-121.97277	840	340	820	62.4	62.4	MI	ES	M	Other	Other
06S01W35L001	373640N1219417W001	37.36400	-121.94174	458	NA	NA	44.9	44.55	MON	ES	M	District	District
06S02W05F001	374429N1221039W001	37.44288	-122.10389	31	15	25	5	6.85	MON	ES	M	District	District
06S02W05F002	374429N1221039W002	37.44288	-122.10389	50	40	50	6.9	8.62	MON	ES	M	District	District
06S02W05F003	374429N1221039W003	37.44288	-122.10389	200	190	200	6.9	7.4	MON	PT	D	District	District
06S02W07B023	NA	37.42870	-122.12170	45	28	45	16	14.85	MON	PT	D	District	District
06S02W16L021	374069N1220886W001	37.40689	-122.08864	40	20	40	38	37.5	MON	PT	D	District	District
06S02W17R001	NA	37.40385	-122.09854	520	258	520	49.9	49.9	MI	ES	W	Other	Other
06S02W18J001	374090N1221168W001	37.40905	-122.11677	54	NA	NA	46.9	46.58	MON	PT	D	District	District
06S02W19B002	NA	37.40130	-122.12327	465	110	292	81	82	MI	ES	M	District	Other
06S02W19H002	NA	37.39701	-122.11613	268	NA	NA	81	81	MI	ES	M	Other	Other
06S02W19M001	NA	37.39513	-122.12841	569	113	569	81	81	MI	ES	M	Other	Other
06S02W20L003	NA	37.39231	-122.10578	472	NA	NA	100	100	MI	ES	M	Other	Other
06S02W20N001	NA	37.38868	-122.11230	470	NA	NA	134.8	134.8	MI	ES	M	Other	Other
06S02W21D008	NA	37.40095	-122.09507	572	232	560	58.1	58.1	MI	ES	W	Other	Other
06S02W21H003	NA	37.39629	-122.08200	565	270	555	70	70	MON	ES	W	Other	Other
06S02W22G004	373992N1220645W001	37.39920	-122.06453	285	265	285	59.8	59.4	MON	ES	M	District	District

Table E-1. Santa Clara Subbasin Groundwater Level Monitoring Network Continued

Well Number	CASGEM WELL ID	Latitude	Longitude	Depth (ft bgs)	Top of First Screen (ft bgs)	Bottom of Last Screen (ft bgs)	Ground Surface Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Well Type	Method	Frequency	Measured by	Owner
06S02W22G005	373992N1220645W002	37.39919	-122.06454	452	414	449	60	59.5	MON	ES	M	District	District
06S02W22G006	373992N1220645W003	37.39918	-122.06455	335	303	333	60	59.5	MON	ES	M	District	District
06S02W22G009	NA	37.39631	-122.06776	680	290	510	74	74	MI	ES	W	Other	Other
06S02W22H012	373975N1220614W001	37.39752	-122.06138	360	315	359	62.1	61.6	MON	ES	M	District	District
06S02W22H014	373975N1220613W001	37.39751	-122.06135	420	374	419	62.1	61.7	MON	ES	M	District	District
06S02W22P002	NA	37.39115	-122.06925	676	200	476	75	75	MI	ES	W	Other	Other
06S02W24C008	374014N1220355W001	37.40138	-122.03548	250	NA	NA	30	32.34	MON	PT	D	District	District
06S02W24C009	NA	37.40141	-122.03540	550	NA	NA	30	31	MON	ES	M	District	District
06S02W24C010	NA	37.40143	-122.03532	1005	NA	NA	29	29.7	MON	ES	M	District	District
06S02W24J009	NA	37.39532	-122.02720	47	30	47	40	39.6	MON	PT	D	District	District
06S02W27G002	NA	37.38322	-122.06710	670	NA	NA	115	115	MI	ES	W	Other	Other
06S02W28K004	NA	37.38040	-122.08600	500	335	490	124	124	MI	ES	W	Other	Other
06S02W28N001	NA	37.37699	-122.09369	425	300	380	134.8	134.8	MI	ES	M	Other	Other
06S02W28N002	NA	37.37712	-122.09376	600	402	557	134.8	134.8	MI	ES	M	Other	Other
06S02W29F002	NA	37.38431	-122.10593	600	489	580	144	144	MI	ES	M	Other	Other
06S02W32D001	NA	37.37215	-122.11229	515	260	500	222.1	222.1	MI	ES	M	Other	Other
06S02W33B001	NA	37.37080	-122.08541	400	NA	NA	149	150.6	MI	ES	M	District	Other
06S02W34B006	373719N1220650W001	37.37186	-122.06499	NA	NA	NA	151.9	151.4	MON	ES	M	District	District
06S02W34G002	NA	37.36829	-122.06565	402	114	382	163.1	163.1	MI	ES	M	Other	Other
06S02W34J001	373646N1220626W001	37.36458	-122.06261	140	120	130	166.5	166.3	MON	PT	D	District	District
06S02W34K002	NA	37.36388	-122.06483	746	310	734	176.8	176.8	MI	ES	M	Other	Other
06S02W34N003	NA	37.36153	-122.07410	620	310	600	180.1	180.1	MI	ES	M	Other	Other
06S02W35M001	NA	37.36439	-122.05682	500	316	486	172.75	172.75	MI	ES	Q	Other	Other
06S02W36A002	NA	37.37159	-122.02396	620	208	610	98	98	MI	ES	Q	Other	Other
06S03W01B010	NA	37.44565	-122.13831	101	93.5	98.5	21	20.23	MON	PT	D	District	District
06S03W01B019	NA	37.44555	-122.13835	NA	NA	NA	17.75	17.75	MON	ES	M	Other	Other
06S03W01C012	NA	37.44435	-122.14122	900	158	882	24	24	MI	ES	M	Other	Other
06S03W02D032	NA	37.44456	-122.16712	NA	NA	NA	62.25	62.25	MI	ES	M	Other	Other
06S03W12D010	NA	37.43170	-122.14608	850	150	850	33.1	33.1	MI	ES	M	Other	Other

Table E-1. Santa Clara Subbasin Groundwater Level Monitoring Network Continued

Well Number	CASGEM WELL ID	Latitude	Longitude	Depth (ft bgs)	Top of First Screen (ft bgs)	Bottom of Last Screen (ft bgs)	Ground Surface Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Well Type	Method	Frequency	Measured by	Owner
06S03W12R010	NA	37.42110	-122.13464	1020	NA	NA	33.1	33.1	MI	ES	M	Other	Other
06S03W13A010	NA	37.41712	-122.13629	1066	142	924	42	42	MI	ES	M	Other	Other
07S01E01G001	373531N1218116W001	37.35313	-121.81160	400	NA	NA	180.1	181.3	MON (was AG)	PT	D	District	District
07S01E02J021	NA	37.35291	-121.82435	236	NA	NA	120.1	120.1	MON	PT	D	District	District
07S01E03H001	373556N1218411W001	37.35564	-121.84112	365	NA	NA	100.1	99.5	MON	ES	M	District	District
07S01E06L001	NA	37.34977	-121.90491	398	NA	NA	65.9	66.5	MI	ES	M	District	Other
07S01E09L004	373368N1218695W001	37.33678	-121.86955	1000	820	840	84.45	85.62	MON	PT	D	District	District
07S01E09L005	373368N1218695W002	37.33678	-121.86955	640	620	640	84.43	85.58	MON	PT	D	District	District
07S01E09L006	373368N1218695W003	37.33678	-121.86955	540	520	540	84.45	85.59	MON	PT	D	District	District
07S01E09L007	373368N1218695W004	37.33678	-121.86955	425	405	425	84.44	85.58	MON	PT	D	District	District
07S01E09L008	373368N1218695W005	37.33678	-121.86955	72	62	72	84.33	85.76	MON	PT	D	District	District
07S01E16C005	NA	37.32872	-121.86815	908	526	682	107.9	109.4	MI	PT	D	District	Other
07S01E16C006	NA	37.32820	-121.86852	716	508	697	107.9	107.9	MI	ES	M	Other	Other
07S01E16C011	NA	37.32830	-121.86872	1004	551	660	99.8	101.3	MON	PT	D	District	District
07S01E19B002	373162N1219032W001	37.31617	-121.90324	85	75	85	112.23	111.93	MON	PT	D	District	District
07S01E19B003	373161N1219033W001	37.31611	-121.90326	850	770	790	112.23	112.73	MON	PT	D	District	District
07S01E19B004	373161N1219033W002	37.31611	-121.90327	455	435	455	112.23	112.23	MON	PT	D	District	District
07S01E19B005	373161N1219033W003	37.31611	-121.90326	365	345	365	112.23	112.33	MON	PT	D	District	District
07S01E19B006	373161N1219033W004	37.31611	-121.90326	240	220	240	112.23	112.43	MON	PT	D	District	District
07S01E19B007	373161N1219033W005	37.31611	-121.90326	590	570	590	112.23	112.33	MON	PT	D	District	District
07S01E24P001	NA	37.28072	-121.83691	277	164	272	162.1	160.55	MON	ES	M	District	District
07S01E26A001	NA	37.29945	-121.82544	355	117	340	141.6	141.6	MI	AM	Q	Other	Other
07S01E26B002	NA	37.30140	-121.82655	355	144	364	154	154	MI	AM	Q	Other	Other
07S01E26B010	NA	37.30001	-121.82714	400	184	400	155.6	155.6	MI	AM	M	Other	Other
07S01E26B011	NA	37.30029	-121.82891	400	204	400	135.6	135.6	MI	AM	M	Other	Other
07S01E29J007	372916N1218802W001	37.29164	-121.88019	190	NA	NA	142.1	141.85	MON	ES	M	District	District
07S01E29Q001	372906N1218812W001	37.29060	-121.88124	280	NA	NA	144	143.65	MON	ES	M	District	District
07S01E32B001	372846N1218818W001	37.28464	-121.88183	250	NA	NA	149.9	149.35	MON	ES	M	District	District
07S01E32R003	NA	37.27399	-121.87739	350	NA	NA	155.8	155.2	MON	ES	M	District	Other

Table E-1. Santa Clara Subbasin Groundwater Level Monitoring Network Continued

Well Number	CASGEM WELL ID	Latitude	Longitude	Depth (ft bgs)	Top of First Screen (ft bgs)	Bottom of Last Screen (ft bgs)	Ground Surface Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Well Type	Method	Frequency	Measured by	Owner
07S01E35E001	NA	37.28128	-121.83741	300	NA	NA	163.1	162.8	MON	ES	M	District	Other
07S01E35E003	NA	37.27999	-121.83616	147	46	146	165	164.06	MON	PT	D	District	District
07S01E35L004	NA	37.27995	-121.83620	228	181	226	165	164.41	MON	PT	D	District	District
07S01E36G003	372833N1218135W001	37.28335	-121.81339	134	NA	NA	160.1	159.85	MON	PT	D	District	District
07S01E36L003	NA	37.28210	-121.81878	NA	NA	NA	169.9	169.55	MON	ES	M	District	District
07S01W02A010	NA	37.35716	-121.93474	900	570	880	40.9	40.9	MI	ES	M	Other	Other
07S01W02B001	NA	37.35641	-121.94059	830	558	810	44.9	44.9	MI	ES	M	Other	Other
07S01W02G024	NA	37.35286	-121.93722	890	300	380	70	70	MI	ES	BW	Other	Other
07S01W02P003	NA	37.34649	-121.94388	840	490	820	86.6	86.6	MI	ES	M	Other	Other
07S01W03H002	NA	37.35568	-121.95374	810	540	790	63.8	63.8	MI	ES	M	Other	Other
07S01W03Q001	NA	37.34615	-121.95893	784	346	712	89.4	89.4	MI	ES	M	Other	Other
07S01W04D001	NA	37.35776	-121.98636	580	471	559	70.1	70.1	MI	ES	M	Other	Other
07S01W04E002	NA	37.35381	-121.98528	570	309	557	83.3	83.3	MI	ES	M	Other	Other
07S01W04N002	NA	37.34857	-121.98647	594	310	563	93.3	93.3	MI	ES	M	Other	Other
07S01W04Q001	NA	37.34541	-121.97369	600	306	497	90.9	90.9	MI	ES	M	Other	Other
07S01W05P002	NA	37.34706	-121.99842	770	310	760	113.3	113.3	MI	ES	M	Other	Other
07S01W06R002	NA	37.34514	-122.00776	738	328	708	133	133	MI	ES	Q	Other	Other
07S01W07N001	NA	37.33227	-122.01864	750	320	730	186	186	MI	ES	M	Other	Other
07S01W07P002	NA	37.33203	-122.01842	900	310	880	182.75	182.75	MI	ES	M	Other	Other
07S01W08B002	NA	37.34180	-121.99196	800	290	780	117.7	117.7	MI	ES	M	Other	Other
07S01W08C003	373418N1220002W001	37.34182	-122.00022	398	388	398	129	128.5	MON	ES	M	District	District
07S01W08D001	373417N1220002W001	37.34175	-122.00021	480	460	475	129	129.8	MON	ES	M	District	District
07S01W08D002	373416N1220002W001	37.34163	-122.00022	340	320	335	130	129.4	MON	ES	M	District	District
07S01W08D003	373417N1220002W002	37.34169	-122.00023	440	420	435	129	129.42	MON	PT	D	District	District
07S01W08N001	NA	37.33408	-122.00071	604	302	586	146.5	146.5	MI	ES	M	Other	Other
07S01W09G011	NA	37.33954	-121.97380	300	NA	NA	101	102.4	MON	ES	M	District	Other
07S01W09J001	NA	37.33730	-121.96922	500	202	360	99.2	99.2	MI	ES	M	Other	Other
07S01W09N001	NA	37.33422	-121.98477	710	307	370	112.4	112.4	MI	ES	M	Other	Other
07S01W09N002	NA	37.33082	-121.98437	815	300	803	129.9	129.9	MI	ES	M	Other	Other
07S01W09Q001	NA	37.33206	-121.97497	572	280	461	114.2	114.2	MI	ES	M	Other	Other

Table E-1. Santa Clara Subbasin Groundwater Level Monitoring Network Continued

Well Number	CASGEM WELL ID	Latitude	Longitude	Depth (ft bgs)	Top of First Screen (ft bgs)	Bottom of Last Screen (ft bgs)	Ground Surface Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Well Type	Method	Frequency	Measured by	Owner
07S01W10D010	NA	37.34505	-121.96841	830	298	810	87.3	87.3	MI	ES	M	Other	Other
07S01W11D002	NA	37.34355	-121.94872	550	342	493	91	91	MI	ES	M	Other	Other
07S01W14P001	373177N1219435W001	37.31775	-121.94347	980	680	700	138.7	138.3	MON	PT	D	District	District
07S01W14P002	373177N1219435W002	37.31775	-121.94347	440	420	440	138.7	138.3	MON	PT	D	District	District
07S01W14P003	373177N1219435W003	37.31775	-121.94347	560	540	560	138.7	138.3	MON	PT	D	District	District
07S01W14P004	373177N1219435W004	37.31775	-121.94347	360	340	360	138.7	138.3	MON	PT	D	District	District
07S01W14P005	373177N1219435W005	37.31775	-121.94347	150	130	150	138.7	138.3	MON	PT	D	District	District
07S01W15D001	NA	37.32910	-121.96456	660	285	551	112.1	112.1	MI	ES	M	Other	Other
07S01W15E001	NA	37.32689	-121.96394	494	262	476	115	115	MI	ES	M	Other	Other
07S01W17A002	NA	37.33015	-121.98957	760	320	740	138.9	138.9	MI	ES	M	Other	Other
07S01W22E002	NA	37.30988	-121.96459	725	301	700	160.1	160.1	MI	ES	M	Other	Other
07S01W25L001	372938N1219233W001	37.29377	-121.92327	404	NA	NA	167	166.5	MON	ES	BW	District	District
07S01W27P009	NA	37.28731	-121.96003	546	300	524	194.7	196.46	MI	PT	D	District	District
07S01W28R001	NA	37.28865	-121.96880	450	NA	NA	201.1	201.6	MI	ES	M	District	Other
07S01W29C003	373008N1219975W001	37.30077	-121.99756	1000	630	650	228.37	229.84	MON	PT	D	District	District
07S01W29C004	373008N1219975W002	37.30077	-121.99756	550	530	550	228.37	229.47	MON	PT	D	District	District
07S01W29C005	373008N1219975W003	37.30077	-121.99756	380	360	380	228.37	229.47	MON	PT	D	District	District
07S01W29C006	373008N1219975W004	37.30077	-121.99756	270	250	270	228.37	229.47	MON	PT	D	District	District
07S01W30C002	373003N1220143W001	37.30029	-122.01426	620	NA	NA	250	250.2	MON	ES	M	District	District
07S01W35L013	372767N1219439W001	37.27668	-121.94390	530	510	530	216.58	215.58	MON	PT	D	District	District
07S01W35L014	372767N1219439W002	37.27668	-121.94390	410	390	410	216.58	215.68	MON	PT	D	District	District
07S01W35L015	372767N1219439W003	37.27668	-121.94390	300	280	300	216.58	215.68	MON	PT	D	District	District
07S01W35L016	372767N1219439W004	37.27668	-121.94391	180	160	180	216.58	215.68	MON	PT	D	District	District
07S01W35L017	372767N1219439W005	37.27668	-121.94390	850	630	650	216.58	215.98	MON	PT	D	District	District
07S02E06N004	NA	37.34693	-121.79943	516	225	455	187	187.5	MI	ES	M	District	Other
07S02E06Q001	NA	37.35080	-121.79625	402	NA	NA	259.8	259.3	MON	ES	M	District	District
07S02E07Q003	373346N1217908W001	37.33460	-121.79076	500	NA	NA	180.1	178.6	MON (was AG)	ES	M	District	District
07S02E18B001	NA	37.32966	-121.79412	520	NA	NA	153.9	153.4	MON	ES	M	District	Other
07S02E19B009	373127N1217917W001	37.31275	-121.79177	215	140	400	208	208.6	MON	ES	M	District	District
07S02E19C005	373161N1217973W001	37.31606	-121.79736	1030	740	760	186.4	185.7	MON	ES	M	District	District

Table E-1. Santa Clara Subbasin Groundwater Level Monitoring Network Continued

Well Number	CASGEM WELL ID	Latitude	Longitude	Depth (ft bgs)	Top of First Screen (ft bgs)	Bottom of Last Screen (ft bgs)	Ground Surface Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Well Type	Method	Frequency	Measured by	Owner
07S02E19C006	373161N1217973W002	37.31606	-121.79736	630	610	630	186.4	185.7	MON	ES	M	District	District
07S02E19C007	373161N1217973W003	37.31607	-121.79736	390	370	390	186.4	185.7	MON	ES	M	District	District
07S02E19C008	373161N1217973W004	37.31606	-121.79736	290	180	200	186.4	185.6	MON	ES	M	District	District
07S02E19C009	373161N1217973W005	37.31606	-121.79736	150	130	150	186.4	185.6	MON	PT	D	District	District
07S02E21G010	373130N1217564W001	37.31305	-121.75641	358	88	353	496.1	496.6	MON	ES	M	District	District
07S02E28N003	NA	37.28829	-121.76466	38	NA	NA	433	433.1	DO	ES	M	District	Other
07S02W01E002	NA	37.35239	-122.03844	845	305	825	169	169	MI	ES	M	Other	Other
07S02W01E003	NA	37.35241	-122.03861	780	315	760	169	169	MI	ES	M	Other	Other
07S02W01G005	NA	37.35584	-122.03196	620	336	605	147	147	MI	ES	M	Other	Other
07S02W01H001	NA	37.35473	-122.02456	708	260	688	141.1	141.1	MI	ES	M	Other	Other
07S02W01L001	NA	37.35045	-122.03473	840	300	820	147	147	MI	ES	M	Other	Other
07S02W02E001	NA	37.35535	-122.05940	530	290	483	202	200	MI	ES	BM	Other	Other
07S02W02K002	NA	37.35132	-122.04875	640	280	616	187	187	MI	ES	M	Other	Other
07S02W03A002	NA	37.35651	-122.06157	692	343	672	192.9	192.9	MI	ES	M	Other	Other
07S02W03C002	NA	37.35695	-122.07007	689	255	619	192.9	192.9	MI	ES	M	Other	Other
07S02W03H001	NA	37.35285	-122.06374	630	330	610	210	210	MI	ES	M	Other	Other
07S02W03P001	NA	37.34680	-122.07065	700	210	450	219.2	218	MI	ES	M	Other	Other
07S02W11G002	NA	37.33773	-122.04768	650	NA	NA	244	244	MI	ES	BM	Other	Other
07S02W12A001	NA	37.34158	-122.02340	760	340	750	176	176	MI	ES	BM	Other	Other
07S02W25M001	NA	37.29297	-122.03841	465	NA	NA	324.1	323.8	MON	ES	M	District	Other
08S01E01J002	NA	37.26268	-121.80619	300	110	287	190	190	MON	ES	M	Other	Other
08S01E05N002	NA	37.25789	-121.89097	200	NA	NA	181.1	180.55	MON	ES	M	District	Other
08S01E07Q003	372471N1219000W001	37.24708	-121.90005	200	NA	NA	229	228.6	MON	ES	M	District	District
08S01E08H004	372522N1218787W001	37.25220	-121.87872	220	NA	NA	185	184.6	MON	ES	M	District	District
08S01E08P003	372447N1218862W001	37.24469	-121.88621	225	NA	NA	201.1	200.4	MON	ES	M	District	District
08S01E08R001	372457N1218802W001	37.24484	-121.87780	255	18	202	200.1	199.25	MON	PT	D	District	District
08S01E09N010	NA	37.24521	-121.87333	23	8	23	191.6	191.3	MON	ES	M	District	District
08S01E10F004	NA	37.25099	-121.84932	NA	NA	NA	164	163.8	MON	ES	M	District	Other
08S01E10J002	NA	37.25098	-121.84071	191	NA	NA	162.1	161.75	MON	PT	D	District	Other
08S01E11N001	372470N1218400W001	37.24703	-121.83998	157	NA	NA	161.1	160.65	MON	ES	M	District	District

Table E-1. Santa Clara Subbasin Groundwater Level Monitoring Network Continued

Well Number	CASGEM WELL ID	Latitude	Longitude	Depth (ft bgs)	Top of First Screen (ft bgs)	Bottom of Last Screen (ft bgs)	Ground Surface Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Well Type	Method	Frequency	Measured by	Owner
08S01E12D010	NA	37.25824	-121.81934	275	102	266	179	179	MI	ES	M	Other	Other
08S01E12P001	NA	37.24746	-121.81309	260	80	260	183	183	MI	ES	M	Other	Other
08S01E13C003	NA	37.24077	-121.81422	200	95	190	180	180	MI	ES	M	Other	Other
08S01E13H010	NA	37.23880	-121.80410	275	NA	NA	188	188	MI	ES	M	Other	Other
08S01E15C007	372421N1218495W001	37.24215	-121.84950	435	NA	NA	164	163.7	MON	PT	D	District	District
08S01E25N003	372016N1218171W001	37.20264	-121.81966	90	21	60	344	345.57	MON	PT	D	District	District
08S01E27C002	NA	37.21358	-121.85178	70	NA	NA	273	273	DO	ES	M	District	Other
08S01W03K013	372624N1219572W001	37.26239	-121.95721	94	NA	NA	248	247.8	MON	ES	M	District	District
08S01W05K004	NA	37.26286	-121.99359	291	NA	NA	327.1	327.6	AG	ES	M	District	Other
08S01W10F002	NA	37.25279	-121.95866	458	98	245	280.8	282	AG	ES	M	District	Other
08S02E06M010	NA	37.26191	-121.80075	240	100	240	192	192	MI	ES	M	Other	Other
08S02E06R008	NA	37.25905	-121.79007	380	160	360	204	204	MI	ES	M	Other	Other
08S02E07A012	NA	37.25754	-121.78948	380	160	360	204	204	MI	AM	M	Other	Other
08S02E07A013	NA	37.25833	-121.78979	380	160	360	204	204	MI	AM	M	Other	Other
08S02E07A014	NA	37.25712	-121.78725	45	25	45	202.6	202	MON	ES	M	District	Other
08S02E07A015	NA	37.25617	-121.78762	45	25	45	204.5	203.9	MON	ES	M	District	Other
08S02E08D011	NA	37.25594	-121.78462	45	25	45	200.98	200.48	MON	ES	M	District	Other
08S02E08D012	NA	37.25736	-121.78489	45	25	45	201.81	201.46	MON	ES	M	District	Other
08S02E08M007	NA	37.24957	-121.78572	296	82	270	200	200	MI	ES	M	Other	Other
08S02E08Q001	NA	37.24696	-121.77320	320	165	300	207	207	MI	ES	M	Other	Other
08S02E08Q002	NA	37.25076	-121.78062	245	105	230	208	208	MI	ES	M	Other	Other
08S02E16K001	372341N1217571W001	37.23407	-121.75715	223	192	212	233	234.5	MON	PT	D	District	District
08S02E16P002	NA	37.23277	-121.76306	286	150	276	232	232	MI	ES	M	Other	Other
08S02E17G011	NA	37.23909	-121.77568	265	100	245	210	210	MI	ES	M	Other	Other
08S02E17J010	NA	37.23597	-121.76917	254	114	244	190	190	MI	ES	M	Other	Other
08S02E18D010	NA	37.24135	-121.80083	234	89	233	190	190	MI	ES	M	Other	Other
08S02E18E010	NA	37.23936	-121.79920	195	75	120	190	190	MI	ES	M	Other	Other
08S02E18E011	NA	37.23835	-121.80208	187	85	187	190	190	MI	ES	M	Other	Other

Table E-1. Santa Clara Subbasin Groundwater Level Monitoring Network Continued

Well Number	CASGEM WELL ID	Latitude	Longitude	Depth (ft bgs)	Top of First Screen (ft bgs)	Bottom of Last Screen (ft bgs)	Ground Surface Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Well Type	Method	Frequency	Measured by	Owner
08S02E18F016	372385N1217981W001	37.23853	-121.79814	179	147	177	191.5	191.15	MON	ES	M	District	District
08S02E18G010	372396N1217939W001	37.23959	-121.79389	178	138	178	195.4	197.3	MON	PT	D	District	District
08S02E18K010	NA	37.23640	-121.79381	200	70	180	190	190	MI	ES	M	Other	Other
08S02E18L001	372361N1217940W001	37.23609	-121.79402	200	NA	NA	190.9	192.9	AG	ES	BW	District	District
08S02E20F001	NA	37.22474	-121.77850	250	NA	NA	210	211.7	MI	ES	M	District	Other
08S02E20F002	NA	37.22381	-121.77831	170	NA	NA	210	212	MI	ES	M	District	Other
08S02E22E002	372237N1217459W001	37.22367	-121.74590	110	75	95	237.38	239.52	MON	PT	D	District	District
08S02E26M001	NA	37.20727	-121.73030	270	90	250	263	263	MI	PT	M	Other	Other
08S02E27H002	NA	37.20979	-121.73288	270	90	250	259	259	MI	PT	M	Other	Other
08S02E27J001	NA	37.20852	-121.73163	270	90	250	262	262	MI	PT	M	Other	Other
08S02E28H002	NA	37.20996	-121.75022	75	NA	NA	243.1	244.25	AG	ES	M	District	Other
08S02E34A001	NA	37.20073	-121.73285	60	NA	NA	256.9	257.4	AG	ES	M	District	Other
08S02E35B009	NA	37.19827	-121.72121	270	110	215	280	280	MI	ES	M	Other	Other
08S02E35G001	NA	37.19619	-121.71971	150	NA	NA	283.1	283.4	AG	ST	M	District	Other
08S02E35H008	NA	37.19449	-121.71622	270	150	250	290	290	MI	ES	Q	Other	Other
08S02E35M001	NA	37.19254	-121.72985	90	NA	NA	265.1	265.7	AG	ST	M	District	Other
08S02E35P002	NA	37.18731	-121.72386	220	90	200	272.25	272.25	MI	ES	M	Other	Other
08S02E36M007	371919N1217076W001	37.19190	-121.70766	120	95	110	291.5	293.75	MON	PT	D	District	District
09S02E01C001	NA	37.18387	-121.70646	150	NA	NA	298.85	299.25	DO	ES	M	District	Other
09S02E01J006	371790N1216958W001	37.17897	-121.69577	165	135	155	313.56	316.16	MON	PT	D	District	District
09S02E02C001	NA	37.18619	-121.72579	275	NA	NA	268	269.3	AG	ES	M	District	Other
09S02E02J002	NA	37.17864	-121.71247	114	NA	NA	288.1	289.3	AG	ES	BW	District	Other
09S02E02Q008	NA	37.17464	-121.71965	109	NA	NA	279.9	280.9	DO	ES	M	Other	Other
09S02E11C001	NA	37.17209	-121.72360	120	NA	NA	286.1	287.3	DO	ES	M	District	Other
09S02E12B001	NA	37.16888	-121.69950	180	NA	NA	312	312.5	AG	ES	M	District	Other
09S02E12E001	NA	37.16807	-121.70853	175	NA	NA	297.9	297.9	AG	ES	M	District	Other
09S03E07H003	NA	37.16706	-121.67712	300	NA	NA	345.1	346.3	AG	ES	M	District	Other
09S03E07L002	NA	37.16151	-121.68544	198	NA	NA	330.1	330.5	MON	PT	D	District	Other
09S03E08J016	NA	37.16397	-121.66135	285	NA	NA	366.1	366.4	AG	PT	D	District	Other

Table E-1. Santa Clara Subbasin Groundwater Level Monitoring Network Continued

Well Number	CASGEM WELL ID	Latitude	Longitude	Depth (ft bgs)	Top of First Screen (ft bgs)	Bottom of Last Screen (ft bgs)	Ground Surface Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Well Type	Method	Frequency	Measured by	Owner
09S03E09R004	371583N1216426W001	37.15833	-121.64264	380	NA	370	402.83	403.43	MON	PT	D	District	District
09S03E09R005	NA	37.15833	-121.64264	570	445	455	402.83	403.33	MON	ES	M	District	Other
09S03E16F002	371521N1216501W001	37.15214	-121.65009	520	480	500	378.7	378.5	MON	PT	D	District	District
09S03E17D004	371562N1216707W001	37.15620	-121.67068	232	NA	NA	351	353.6	MON (was MI)	ES	M	District	District

AG = Agricultural well	AM = Airline Method	Q = Quarterly
MI = Municipal well	ES = Electric Sounder	BM = Bimonthly
DO = Domestic well	PG = Pressure Gauge	M = Monthly
MON = Monitoring well	PT = Pressure Transducer	BW = Biweekly
ST = Steel Tape	D = Daily	W= Weekly

All elevations listed above are reported relative to the National Geodetic Vertical Datum of 1929 (NGVD 29). In Santa Clara County, the average conversion to obtain elevations relative to the North American Vertical Datum of 1988 (NAVD 88) is to add 2.75 feet.

NA = value not available

ft bgs = feet below ground surface

ft amsl = feet above mean sea level

Table E-2. Llagas Subbasin Groundwater Level Monitoring Network

Well Number	CASGEM WELL ID	Latitude	Longitude	Depth (ft bgs)	Top of First Screen (ft bgs)	Bottom of Last Screen (ft bgs)	Ground Surface Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Well Type	Method	Frequency	Measured by	Owner
09S03E15L013	371489N1216307W001	37.14893	-121.63068	200	NA	NA	390.10	390.10	DO	ES	M	District	District
09S03E16J001	NA	37.14770	-121.64181	400	NA	NA	384.8	385.3	AG	ES	M	District	Other
09S03E20K003	371343N1216641W001	37.13430	-121.66406	100	70	90	352.38	352.08	MON	ES	M	District	District
09S03E22P005	NA	37.13173	-121.63169	NA	NA	NA	354	355.1	MI	ES	M	District	Other
09S03E23L005	371357N1216158W001	37.13574	-121.61576	25	10	25	360.25	363.35	MON	PT	D	District	District
09S03E23P005	NA	37.13285	-121.61310	NA	NA	NA	354	356.91	MON	ES	M	District	Other
09S03E25P001	NA	37.11827	-121.59467	249	NA	NA	354.00	354.70	DO	ES	M	District	Other
09S03E26P001	NA	37.11889	-121.61384	250	NA	NA	329.1	329.8	AG	ES	M	District	Other
09S03E34G002	NA	37.11148	-121.62775	NA	NA	NA	315.90	316.30	AG	ES	M	District	Other
09S03E35C011	NA	37.11337	-121.61342	91	81	86	323	322.35	MON	PT	D	District	District
09S03E35P013	NA	37.10312	-121.61548	160	80	155	306.10	307.30	MI	ES	M	District	Other
10S03E01N005	370881N1216003W001	37.08730	-121.60056	132	NA	NA	285.1	286.4	MON	PT	D	District	District
10S03E02N002	NA	37.08706	-121.61571	215	155	215	286.00	286.30	DO	ES	M	District	Other
10S03E03D007	NA	37.09821	-121.63453	220	NA	NA	353	353	DO	ES	M	District	Other
10S03E11D010	NA	37.08326	-121.61586	181	80	181	279.10	279.40	AG	ES	M	District	Other
10S03E13D003	NA	37.06840	-121.59811	250	80	249	259.9	260.3	AG	ES	M	District	Other
10S03E13E006	NA	37.06696	-121.60075	51.5	31.5	51.5	257.70	261.10	MON	ES	M	District	District
10S03E13F005	NA	37.06748	-121.59489	52	32	52	262.03	265.13	MON	PT	D	District	District
10S03E13K004	NA	37.06291	-121.58871	NA	NA	NA	252.00	252.00	MI	ES	M	District	Other
10S03E14D001	NA	37.06980	-121.61729	200	NA	NA	271	271.2	DO	ES	M	District	Other
10S03E24M001	NA	37.04721	-121.60222	258	NA	NA	234.90	235.30	AG	ST	M	District	Other
10S03E25F001	370357N1215958W001	37.03570	-121.59581	165	125	145	219.2	219.1	MON	PT	D	District	District
10S04E06P009	NA	37.08693	-121.57733	200	NA	NA	306.10	307.10	DO	ES	BM	District	Other
10S04E07E031	NA	37.08216	-121.58266	160	NA	NA	287.1	287.7	DO	ES	M	District	Other
10S04E07F009	NA	37.08012	-121.57367	NA	NA	NA	300.90	301.70	AG	ES	M	District	Other
10S04E17K002	NA	37.06320	-121.55325	250	NA	NA	295.9	295.9	DO	ES	M	District	Other
10S04E17N002	NA	37.06038	-121.56122	425	NA	NA	255.90	256.00	DO	ES	M	District	Other
10S04E18N007	NA	37.05912	-121.58361	NA	NA	NA	244	243.25	MON	ES	M	District	Other
10S04E20G008	NA	37.05026	-121.55194	90	80	85	241.00	241.65	MON	PT	D	District	District

Table E-2. Llagas Subbasin Groundwater Level Monitoring Network continued

Well Number	CASGEM WELL ID	Latitude	Longitude	Depth (ft bgs)	Top of First Screen (ft bgs)	Bottom of Last Screen (ft bgs)	Ground Surface Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Well Type	Method	Frequency	Measured by	Owner
10S04E20M001	NA	37.04670	-121.56361	211	NA	NA	220.10	220.40	AG	ES	M	District	Other
10S04E21M002	NA	37.04705	-121.54469	NA	NA	NA	233.9	234.7	AG	ES	M	District	Other
10S04E28M005	370331N1215434W001	37.03314	-121.54339	60	50	60	203.00	202.74	MON	PT	D	District	District
10S04E28N006	370316N1215433W001	37.03163	-121.54328	572	532	552	206.99	209.12	MON	PT	D	District	District
10S04E30Q001	NA	37.03176	-121.57278	120	NA	NA	208.00	208.50	DO	ES	M	District	Other
10S04E32N003	NA	37.01480	-121.56329	NA	NA	NA	191.9	191.5	MON	ES	M	District	District
11S04E02D008	NA	37.01114	-121.50598	285	NA	NA	229.00	229.30	AG	ES	M	District	Other
11S04E02N001	NA	36.99622	-121.50133	430	NA	NA	175	176.2	AG	ES	M	District	Other
11S04E03G005	NA	37.01129	-121.51667	86	70	80	190.00	191.70	MON	PT	D	District	District
11S04E03J002	NA	37.00565	-121.51092	415	NA	NA	196	196.4	DO	ES	M	District	Other
11S04E04C008	NA	37.01309	-121.53925	250	NA	NA	191.00	192.00	DO	ES	M	District	Other
11S04E04F007	NA	37.00819	-121.54054	55	40	50	184	185.9	MON	ES	M	District	District
11S04E04Q012	NA	37.00217	-121.53701	39	NA	NA	185.50	185.25	MON	ES	M	District	District
11S04E05F001	370092N1215580W001	37.00916	-121.55801	107.5	NA	NA	187.05	187.25	MI	PT	D	District	District
11S04E05H002	370081N1215406W001	37.00812	-121.54066	260	120	260	184.00	186.50	MON	ES	M	District	District
11S04E07F004	369922N1215757W001	36.99221	-121.57567	200	160	180	207.8	207.5	MON	ES	M	District	District
11S04E08K002	NA	36.99064	-121.55087	300	53	274	178.10	178.30	AG	ES	M	District	Other
11S04E09J003	NA	36.99221	-121.53205	39	NA	NA	174.8	174.5	MON	ES	M	District	District
11S04E10D004	NA	36.99742	-121.52516	370	NA	NA	169.90	170.50	AG	ES	M	District	Other
11S04E10N001	369871N1215282W001	36.98714	-121.52825	550	510	530	164.8	164.49	MON	PT	D	District	District
11S04E15J002	NA	36.97736	-121.50958	NA	NA	NA	144.00	146.20	AG	ST	M	District	Other
11S04E15J003	NA	36.97668	-121.51234	53	48	53	147	146.7	MON	PT	D	District	District
11S04E17N004	NA	36.97376	-121.56188	80	NA	NA	180.10	181.30	AG	ES	M	District	Other
11S04E21G003	NA	36.96541	-121.53177	89	70	80	163	164.35	MON	PT	D	District	District
11S04E21P003	NA	36.95925	-121.53902	NA	NA	NA	155.00	155.90	AG	ES	M	District	Other
11S04E22N001	NA	36.95941	-121.52348	220	NA	NA	150	150.2	AG	ES	M	District	Other
11S04E28K001	369486N1215359W001	36.94856	-121.53592	335	295	335	136.35	139.60	MON	PT	D	District	District
11S04E28K002	NA	36.94832	-121.53596	100	85	95	136.25	138.75	MON	ES	M	District	District
11S04E32R002	369296N1215465W001	36.92961	-121.54654	170	NA	NA	140.10	140.60	AG	ES	M	District	District

All elevations listed above are reported relative to the National Geodetic Vertical Datum of 1929 (NGVD 29). In Santa Clara County, the average conversion to obtain elevations relative to the North American Vertical Datum of 1988 (NAVD 88) is to add 2.75 feet.

See Page E-12 for full legend

Table E-3. Santa Clara Subbasin Groundwater Quality Monitoring Network

Well Number	CASGEM WELL ID	Latitude	Longitude	Depth (ft bgs)	Top of First Screen (ft bgs)	Bottom of Last Screen (ft bgs)	Ground Surface Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Well Type	Frequency	Owner
05S03W36P005	374502N1221430W004	37.45024	-122.14299	200	180	200	21.67	20.88	MON	Annual	District
06S01W01M001	374376N1219291W001	37.43819	-121.92840	265	255	265	20.25	22.15	MON (was AG)	Annual	District
06S01W02N008	374339N1219478W001	37.43439	-121.94788	35	10	15	7	7	MON	Annual	District
06S01W10N007	374183N1219685W001	37.41831	-121.96857	83	73	78	7	7	MON	Annual	District
06S01W12G005	374263N1219245W001	37.42634	-121.92452	37	30.00	35.00	18.65	NA	MON	Annual	District
06S01W13C009	374143N1219255W001	37.41434	-121.92556	66	51	60	26	25.8	MON	Annual	District
06S01W14L005	374081N1219438W001	37.40819	-121.94386	47	37	42	15	15	MON	Annual	District
06S01W15R006	374042N1219541W001	37.40423	-121.95418	57	45	51	13	13	MON	Annual	District
06S01W17F002	374131N1220007W002	37.41317	-122.00068	210	190	200	2.5	2.27	MON	Annual	Other
06S01W17M009	374099N1220055W001	37.40997	-122.00554	45	20	45	11.25	NA	MON	Annual	District
06S01W18R007	374054N1220072W001	37.40458	-122.00727	45	20.00	45.00	15.25	NA	MON	Annual	District
06S01W22K010	373944N1219591W001	37.39443	-121.95919	100	60	65	23	23	MON	Annual	District
06S01W24H015	373962N1219156W001	37.39616	-121.91556	588	NA	NA	40	39.55	MON (was AG)	Annual	District
06S01W24J037	373947N1219149W001	37.39470	-121.91497	53	40	46	33	32.66	MON	Annual	District
06S01W24P007	373902N1219264W001	37.39027	-121.92647	96	81.00	86.00	27	27	MON	Annual	District
06S01W26K001	373804N1219385W001	37.38043	-121.93854	65	55	60	32	30.92	MON	Annual	District
06S01W26N006	373748N1219470W001	37.37486	-121.94703	100	77.00	82.00	40	40	MON	Annual	District
06S01W26R004	373776N1219362W004	37.37763	-121.93620	330	310	330	26.84	28.31	MON	Annual	District
06S01W36D004	373744N1219325W001	37.37441	-121.93253	70	60.00	65.00	26	26	MON	Annual	District
06S02W05F002	374429N1221039W002	37.44287	-122.10388	50	40	50	6.9	8.62	MON	Annual	District
06S02W05F003	374429N1221039W003	37.44288	-122.10388	200	190	200	6.9	7.4	MON	Annual	District
06S02W07B023	374287N1221216W001	37.42870	-122.12168	45	28	45	16	14.85	MON	Annual	District
06S02W09K021	374238N1220861W001	37.42380	-122.08610	47	20.00	45.00	14.45	NA	MON	Annual	District
06S02W16L021	374069N1220886W001	37.40688	-122.08863	40	20	40	38	37.5	MON	Annual	District
06S02W17L003	374095N1221097W001	37.40953	-122.10973	122	NA	NA	37.05	NA	DO	Annual	Other
06S02W24C008	374014N1220355W001	37.40137	-122.03546	250	NA	NA	30	32.34	MON	Annual	District
06S02W24J009	373953N1220272W001	37.39532	-122.02719	47	30	47	40	39.6	MON	Annual	Other
06S02W34J001	373646N1220626W001	37.36457	-122.06260	140	120	130	166.5	166.3	MON	Annual	District
06S03W01B010	374456N1221383W001	37.44565	-122.13829	101	93	98	21	20.23	MON	Annual	District

Table E-3. Santa Clara Subbasin Groundwater Quality Monitoring Network Continued

Well Number	CASGEM WELL ID	Latitude	Longitude	Depth (ft bgs)	Top of First Screen (ft bgs)	Bottom of Last Screen (ft bgs)	Ground Surface Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Well Type	Frequency	Owner
07S01E09L007	373368N1218695W004	37.33678	-121.86953	425	405	425	84.44	85.58	MON	Annual	District
07S01E09L008	373368N1218695W005	37.33677	-121.86953	72	62	72	84.33	85.76	MON	Annual	District
07S01E19B002	373162N1219032W001	37.31617	-121.90323	85	75	85	112.23	111.93	MON	Annual	District
07S01E19B006	373161N1219033W004	37.31611	-121.90325	240	220	240	112.23	112.43	MON	Annual	District
07S01E24P001	372807N1218369W001	37.28102	-121.83712	277	164	272	162.1	160.55	MON	Annual	Other
07S01E35E003	372799N1218361W001	37.27977	-121.83600	147	46	146	165	164.06	MON	Annual	Other
07S01W14P002	373177N1219435W002	37.31774	-121.94346	440	420	440	138.7	138.3	MON	Annual	District
07S01W14P005	373177N1219435W005	37.31774	-121.94346	150	130	150	138.7	138.3	MON	Annual	District
07S01W29C005	373008N1219975W003	37.30077	-121.99754	380	360	380	228.37	229.47	MON	Annual	District
07S01W35L015	372767N1219439W003	37.27667	-121.94389	300	280	300	216.58	215.68	MON	Annual	District
07S02E19C007	373161N1217973W003	37.31606	-121.79734	390	370	390	186.4	185.7	MON	Annual	District
07S02E19C009	373161N1217973W005	37.31606	-121.79735	150	130	150	186.4	185.6	MON	Annual	District
08S01E11N001	372470N1218400W001	37.24702	-121.83997	86	NA	NA	161.1	160.65	MON	Annual	District
08S01E21B001	372279N1218674W001	37.22797	-121.86740	80	40	80	217.25	NA	MI	Annual	Other
08S01E25N003	372016N1218171W001	37.20162	-121.81713	90	21	60	344	345.57	MI	Annual	District
08S01W10F002	372527N1219586W001	37.25260	-121.95883	458	NA	NA	280.8	282	AG	Annual	Other
08S02E16K001	372341N1217571W001	37.23406	-121.75714	223	195	215	233	234.5	MON	Annual	District
08S02E18G009	372395N1217938W001	37.23956	-121.79387	114	80	110	195.4	196.95	MON	Annual	Other
08S02E18G010	372396N1217939W001	37.23959	-121.79388	178	138	178	195.4	197.3	MON	Annual	District
08S02E22E002	372237N1217459W001	37.22366	-121.74588	110	75	95	237.38	239.52	MON	Annual	District
08S02E36M007	371919N1217076W001	37.19189	-121.70764	120	95	110	291.5	293.75	MON	Annual	District
09S02E02C001	371861N1217257W001	37.18618	-121.72578	275	NA	NA	268	269.3	AG/DO	Annual	Other
09S02E02R008	371741N1217156W001	37.17410	-121.71559	220	50	220	285.25	NA	AG/DO	Annual	Other
09S03E07J003	371624N1216793W001	37.16244	-121.67933	230	130	230	344	344	DO	Annual	Other
09S03E09R004	371583N1216426W001	37.15833	-121.64262	380	350	370	402.83	403.43	MON	Annual	Other

All elevations listed above are reported relative to the National Geodetic Vertical Datum of 1929 (NGVD 29). In Santa Clara County, the average conversion to obtain elevations relative to the North American Vertical Datum of 1988 (NAVD 88) is to add 2.75 feet.

NA = value not available
AG = Agricultural well
MI = Municipal well
DO = Domestic well
MON = Monitoring well

ft bgs = feet below ground surface
ft amsl = feet above mean sea level

Table E-4. Llagas Subbasin Groundwater Quality Monitoring Network

Well Number	CASGEM Well Number	Latitude	Longitude	Depth (ft bgs)	Top of First Screen (ft bgs)	Bottom of Last Screen (ft bgs)	Ground Surface Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Well Type	Frequency	Owner
09S03E15K009	371449N1216221W001	37.14494	-121.62218	250	150	250	380.75	NA	DO	Annual	Other
09S03E20K003	371343N1216641W001	37.13430	-121.66405	100	70	90	352.38	352.08	MON	Annual	District
09S03E21C003	371427N1216478W001	37.14271	-121.64779	200	100	200	372	372	DO	Annual	Other
09S03E34P001	371043N1216314W001	37.10426	-121.63142	163	103	163	318	318	DO/MI	Annual	Other
09S03E35C012	371134N1216134W001	37.11340	-121.61344	61	45	55	323	323	MON	Annual	District
09S03E36B007	371152N1215933W001	37.11519	-121.59327	225	165	225	347.85	NA	DO	Annual	Other
10S03E01A009	370996N1215852W001	37.09957	-121.58521	300	NA	NA	314	314	DO	Annual	Other
10S03E02N002	370870N1216157W001	37.08705	-121.61570	215	155	215	286	286.3	DO	Annual	Other
10S03E03D007	370982N1216345W001	37.09820	-121.63451	120	NA	NA	353	353	DO	Annual	Other
10S03E12P003	370728N1215949W001	37.07284	-121.59489	182	100	182	263.2	262.2	DO	Annual	Other
10S03E13F005	370674N1215948W001	37.06748	-121.59488	52	32	52	262.03	265.13	MON	Annual	District
10S03E14P005	370602N1216128W001	37.06026	-121.61284	198	140	198	262.2	262.2	DO	Annual	Other
10S03E25F001	370357N1215958W001	37.03570	-121.59580	165	125	145	219.2	219.1	MON	Annual	District
10S03E36H001	370226N1215861W001	37.02262	-121.58609	440	220	260	205.75	NA	MON	Annual	Other
10S04E07E031	370821N1215826W001	37.08216	-121.58265	130	NA	NA	287.1	287.7	DO	Annual	Other
10S04E07E033	370808N1215817W001	37.08081	-121.58166	228	180	228	282.35	NA	DO	Annual	Other
10S04E17K002	370632N1215532W001	37.06320	-121.55324	250	NA	NA	295.9	295.9	DO	Annual	Other
10S04E19K006	370474N1215725W001	37.04747	-121.57256	295	175	295	230	230	DO	Annual	Other
10S04E20G008	370502N1215519W001	37.05025	-121.55193	90	80	85	241	241.65	MON	Annual	District
10S04E28M005	370331N1215434W001	37.03313	-121.54338	60	50	60	203	202.74	MON	Annual	District
10S04E32E006	370236N1215627W001	37.02361	-121.56269	285	225	280	203.05	NA	MON	Annual	Other
11S03E01Q002	37004N1215894W001	37.00036	-121.58945	44	29	44	213.84	213.63	MON	Annual	District
11S03E02E001	370098N1216193W001	37.00977	-121.61935	100	60	100	238.55	NA	DO	Annual	Other
11S04E03G005	370112N1215166W001	37.01129	-121.51665	86	70	80	190	191.7	MON	Annual	District
11S04E04F007	370081N1215405W001	37.00818	-121.54053	55	40	50	184	185.9	MON	Annual	District
11S04E05F001	370092N1215580W001	37.00916	-121.55800	107	NA	NA	187.05	187.25	MON (was AG)	Annual	District
11S04E05H002	370081N1215406W001	37.00812	-121.54064	260	120	260	184	186.5	MON (was AG)	Annual	District
11S04E08K002	369906N1215508W001	36.99063	-121.55086	300	53	274	178.1	178.3	AG/DO	Annual	Other
11S04E08K008	369910N1215519W001	36.99108	-121.55194	103	48	98	181.75	NA	MON	Annual	Other

Table E-4. Llagas Subbasin Groundwater Quality Monitoring Network Continued

Well Number	CASGEM Well Number	Latitude	Longitude	Depth (ft bgs)	Top of First Screen (ft bgs)	Bottom of Last Screen (ft bgs)	Ground Surface Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Well Type	Frequency	Owner
11S04E10L017	369906N1215182W001	36.99058	-121.51823	150	50	150	161.55	NA	DO	Annual	Other
11S04E11J007	369893N1214936W001	36.98934	-121.49358	230	120	220	159.45	NA	DO	Annual	Other
11S04E15P003	369736N1215177W001	36.97366	-121.51771	248	161	242	150.25	NA	DO	Annual	Other
11S04E21J003	369625N1215308W001	36.96247	-121.53084	200	160	200	160.65	NA	DO	Annual	Other
11S04E28K001	369486N1215359W001	36.94856	-121.53591	335	295	335	136.35	139.6	MON	Annual	District
11S04E28K002	369483N1215359W001	36.94832	-121.53595	100	85	95	136.25	138.75	MON	Annual	District

All elevations listed above are reported relative to the National Geodetic Vertical Datum of 1929 (NGVD 29). In Santa Clara County, the average conversion to obtain elevations relative to the North American Vertical Datum of 1988 (NAVD 88) is to add 2.75 feet.

NA = value not available
AG = Agricultural well
MI = Municipal well
DO = Domestic well
MON = Monitoring well

ft bgs = feet below ground surface
ft amsl = feet above mean sea level

Table E-5. Santa Clara Subbasin Recycled Water Monitoring Network

Well Number	CASGEM WELL ID	Latitude	Longitude	Depth (ft bgs)	Top of First Screen (ft bgs)	Bottom of Last Screen ft bgs	Ground Surface Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Well Type	Frequency	Measured By	Owner
06S01E31K001	373651N1219028W001	37.36520	-121.90277	752	412	684	64	64	MI	Annual	SBWR	Other
06S01E33F006	373695N1218682W001	37.36955	-121.86818	680	267	603	94.2	94.2	MI	Annual	SBWR	Other
07S01E04D004	373592N1218756W001	37.35924	-121.87557	43	8	44	81.5	81.5	MON	Annual	SBWR	Other
07S01E07D031	373472N1219070W001	37.34725	-121.90705	37.5	14	34	63.4	63.4	MON	Annual	SBWR	Other
07S01E09D007	373449N1218744W001	37.34492	-121.87443	764	402	684	96	96	MI	Annual	SBWR	Other
07S01E09D008	373451N1218745W001	37.34511	-121.87450	850	446	830	95.7	95.7	MI	Annual	SBWR	Other
07S01E16C006	373252N1218685W001	37.32819	-121.86851	716	508	697	107.9	107.9	MI	Annual	SBWR	Other
07S01E16G019	373258N1218626W001	37.32582	-121.86260	51.5	28	48	108.7	108.7	MON	Annual	SBWR	Other
07S01E16J001	373226N1218610W001	37.32266	-121.86097	221	115	170	83	83	IRR	Annual	SBWR	Other
07S01E21E003	373126N1218745W001	37.31260	-121.87455	803	406	785	111.9	111.9	MI	Annual	SBWR	Other
07S01E28C002	373026N1218628W001	37.30262	-121.86277	92	69	89	121.6	121.6	MON	Annual	SBWR	Other
07S01E35D003	372869N1218333W001	37.28689	-121.83335	63.5	40	60	157.1	157.1	MON	Annual	SBWR	Other
07S02E29H005	372979N1217692W001	37.29787	-121.76916	59.5	36	56	345.4	345.4	MON	Annual	SBWR	Other
08S02E07A014	372571N1217872W001	37.25711	-121.78724	45	25	45	202.6	202	MON	Quarterly	IDT/District	Other
08S02E07A015	372562N1217876W001	37.25617	-121.78760	45	25	45	204.5	203.9	MON	Quarterly	IDT/District	Other
08S02E08D011	372559N1217846W001	37.25594	-121.78461	45	25	45	200.98	200.48	MON	Quarterly	IDT/District	Other
08S02E08D012	372573N1217849W001	37.25735	-121.78488	45	25	45	201.81	201.46	MON	Quarterly	IDT/District	Other

All elevations listed above are reported relative to the National Geodetic Vertical Datum of 1929 (NGVD 29). In Santa Clara County, the average conversion to obtain elevations relative to the North American Vertical Datum of 1988 (NAVD 88) is to add 2.75 feet.

Not all wells sampled by SBWR are sampled every year

ft bgs = feet below ground surface
ft amsl = feet above mean sea level
SBWR = South Bay Water Recycling
IDT = Integrated Device Technology, Inc.

MON = Monitoring Well
MI = Municipal Well
IRR = Irrigation Well

Table E-6. Llagas Subbasin Recycled Water Monitoring Network

Well Number	CASGEM Well Number	Latitude	Longitude	Depth (ft bgs)	Top of First Screen (ft bgs)	Bottom of Last Screen (ft bgs)	Ground Surface Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Well Type	Frequency	Measured By	Owner
11S03E01E003	370068N1216008W001	37.00680	-121.60083	100	77	97	221.7	221.24	MON	Quarterly	District	District
11S03E01E004	370073N1216006W001	37.00731	-121.60063	41	20	40	222.86	222.56	MON	Quarterly	District	District
11S03E01E005	370068N1216009W001	37.00683	-121.60086	42	20	40	221.93	221.5	MON	Quarterly	District	District
11S03E01Q002	370004N1215895W001	37.00036	-121.58945	44	29	44	213.84	213.63	MON	Quarterly	District	District
11S03E02H004	370072N1216017W001	37.00717	-121.60174	42	20	40	223.44	223.24	MON	Quarterly	District	District
11S03E12A002	369987N1215864W001	36.99870	-121.58642	45	29	44	207.88	207.47	MON	Quarterly	District	District
11S03E12A003	369971N1215843W001	36.99707	-121.58434	45	29	44	209.1	208.66	MON	Quarterly	District	District
11S04E07F004	369922N1215756W001	36.99220	-121.57566	200	160	180	207.8	207.5	MON	Quarterly	District	District
11S04E07J005	369893N1215650W001	36.98928	-121.56498	55.5	33	53	194.76	194.17	MON	Quarterly	District	District
11S04E08C003	369959N1215576W001	36.99594	-121.55764	45	NA	NA	188.97	189.45	MON	Quarterly	District	District
11S04E08D006	369958N1215604W001	36.99582	-121.56037	35	NA	NA	190.39	190.74	MON	Quarterly	District	District
11S04E08M013	369894N1215635W001	36.98942	-121.56354	54	36	51	191.63	191.22	MON	Quarterly	District	District
11S04E08M015	369893N1215634W001	36.98938	-121.56337	80	55	77	191.55	191.45	MON	Quarterly	District	District
11S04E08N009	369869N1215642W001	36.98691	-121.56419	60	37	57	190.61	190.01	MON	Quarterly	District	District
11S04E09D002	369967N121.5465W001	36.99670	-121.54648	38.8	NA	NA	178.01	177.82	MON	Quarterly	District	District
11S04E09M001	369913N1215440W001	36.99127	-121.54399	40	NA	NA	175.17	175.62	MON	Quarterly	District	District
11S04E15M002	369752N1215286W001	36.97519	-121.52860	39	10	30	153	156	MON	Quarterly	District	Other
11S04E16F001	369811N1215364W001	36.98117	-121.53637	40	NA	NA	169.4	171.56	MON	Quarterly	District	Other
11S04E16G003	369822N1215283W001	36.98223	-121.52833	125	100	110	156.65	158.9	MON	Quarterly	District	Other
11S04E16M011	369766N1215435W001	36.97659	-121.54347	47	NA	NA	173.1	175.68	MON	Quarterly	District	Other

All elevations listed above are reported relative to the National Geodetic Vertical Datum of 1929 (NGVD 29). In Santa Clara County, the average conversion to obtain elevations relative to the North American Vertical Datum of 1988 (NAVD 88) is to add 2.75 feet.

ft bgs = feet below ground surface

ft amsl = feet above mean sea level

MON = Monitoring Well

NA = Value not avilable

APPENDIX F

Modeling Assumptions

Modeling Assumption for UWMP					
1 Time Period					
Demand Year	**2025**	**2030**	**2035**	**2040**	**2045**
Simulation Period	**1922 – 2015**				
2 Demands					
Demand Projections	Valley Water Demand Model				
Conservation (2010 baseline)	40,000 AF	53,000 AF	58,000 AF	62,000 AF	62,000 AF
Total Countywide Demands with conservation included	330,000 AF	320,000 AF	330,000 AF	335,000 AF	345,000 AF
Water Shortage Actions	Stage 1 (Normal) occurs when Santa Clara Plain storage is above 278,000 AF (demand reduction factor = 0%); Stage 2 (Alert) occurs when Santa Clara Plain storage is <= 278,000 AF and above 232,000 AF (demand reduction factor = 10%); Stage 3 (Severe) occurs when Santa Clara Plain storage is <= 232,000 AF and above 185,000 AF (demand reduction factor = 20%); Stage 4 (Critical) occurs when Santa Clara Plain storage is <= 185,000 AF and above 139,000 AF (demand reduction factor/conservation = 40%); Stage 5 (Emergency) occurs when Santa Clara Plain storage is <= 139,000 AF (demand reduction factor/conservation = 50%)				
3 Surface Water Supplies					
Imported Water Allocations	2019 Delivery Capability Report - existing conditions	2019 Delivery Capability Report - future conditions			
Semitropic Participation	350,000 AF capacity; initial storage = 200,000 AF. Valley Water maximum annual Semitropic put is 31,675 AF. Annual take limits are based on SWP allocations.				
San Luis Reservoir	2019 Delivery Capability Report - existing conditions	2019 Delivery Capability Report - future conditions			
CVP Carryover	Up to 15,250 AF max per year; lost if San Luis Reservoir storage goes to 2,000,000 AF				
SWP Carryover	Up to 50,000 AF max per year; lost if San Luis Reservoir storage goes to 2,000,000 AF				
San Francisco Public Utilities Commission (SFPUC)	55,000 AF	56,000 AF	59,000 AF	61,000 AF	63,000 AF
Climate Change		Included in CalSim2 imported water allocations for future conditions			
4 Recycled Water					
Recycled Water Demands	16,000 AF	19,000 AF	22,000 AF	25,000 AF	28,000 AF
5 Groundwater					
Natural Groundwater Recharge (Annual Average)	61,000 AF	61,000 AF	62,000 AF	62,000 AF	62,000 AF

Groundwater Storage Capacity	Santa Clara Plain = 350,000 AF; Coyote Valley Study Area = 25,000 AF; Llagas = 155,000 AF				
Total recharge capacity	Santa Clara Plain = 92,600 AFY; Coyote = 17,100 AFY; Llagas = 39,300 AFY				
6 Reservoir Operations					
Fisheries and Aquatic Habitat Collaborative Effort (FAHCE) Operations	Active				
South County LSAA Reservoir Flow Requirements (Chesbro & Uvas)	Active				
Almaden	Capacity = 1,555 AF, restricted at 93% of capacity		Full capacity		
Anderson	Capacity = 89,278 AF, restricted at 3% of capacity	Full capacity			
Coyote	Capacity = 22,541 AF, restricted at 53% of capacity				
Calero	Capacity = 9,738 AF, restricted at 45% of capacity		Full capacity		
Guadalupe	Capacity = 3,320 AF, restricted at 64% of capacity	Full capacity			
Chesbro	Capacity = 7,945 AF				
Lexington	Capacity = 19,044 AF				
Stevens Creek	Capacity = 3,138 AF				
Uvas	Capacity = 9,835 AF				
Vasona	Capacity = 463 AF				
7 Treated Water					
Water Treatment Plant (WTP) Capacity	Rinconada WTP = 80 MGD Penitencia WTP = 40 MGD Santa Teresa WTP = 100 MGD				
Treated Water (Contract)	119,000 AF	121,000 AF	125,000 AF	130,000 AF	132,000 AF
Treated Water (Non-Contract)	20,000 AF	20,000 AF	20,000 AF	20,000 AF	20,000 AF
8 Project Implementation					
Dam Seismic Upgrades		Anderson and Guadalupe	Almaden, Anderson, Calero, and Guadalupe		
Recycled water	16,000 AF	19,000 AF	22,000 AF	25,000 AF	28,000 AF
Potable reuse		9,000 AF	9,000 AF	9,000 AF	9,000 AF

<table>
<tr><td>Pacheco Reservoir Expansion</td><td></td><td></td><td colspan="3">Active/Completed
140,000 AF reservoir with 85,000 AF of storage available to bank Valley Water supplies</td></tr>
<tr><td>Stormwater Capture</td><td></td><td></td><td>1,000 AF</td><td>1,000 AF</td><td>1,000 AF</td></tr>
<tr><td>Transfer Bethany Pipeline</td><td colspan="5">Active/Completed</td></tr>
</table>

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APPENDIX G

UWMP and WSCP Adoption and Submittal

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From:	Jing Wu
To:	Tom Francis; Danielle McPherson; nsandkula@bawsca.org; toddc@cityofcampbell.com; paulk@cityofcampbell.com; benjaminf@cupertino.org; rogerl@cupertino.org; girum.awoke@cityofgilroy.org; Karen.Garner@cityofgilroy.org; Julie.Wyrick@cityofgilroy.com; jbiggs@losaltosca.gov; vchen@losaltosca.gov; gpersicone@losaltosca.gov; serickson@ci.milpitas.ca.gov; nthomas@ci.milpitas.ca.gov; jeannie@cityofmontesereno.org; jessica@cityofmontesereno.org; jennifer.carman@morganhill.ca.gov; Anthony Eulo; michael.fuller@mountainview.gov; "Gregg Hosfeldt"; Aarti.Shrivastava@mountainview.gov; Brad.Eggleston@cityofpaloalto.org; Jonathan.Lait@cityofpaloalto.org; Jane.Ratchye@cityofpaloalto.org; Michael.Brilliot@sanjoseca.gov; Matt.Cano@sanjoseca.gov; Rosalynn.Hughey@sanjoseca.gov; kelly.kline@sanjoseca.gov; jim.reed@sanjoseca.gov; steve.plasecki@sanjoseca.gov; kerrie.romanow@sanjoseca.gov; rbrilliot@santaclaraca.gov; acrabtree@santaclaraca.gov; cmobeck@santaclaraca.gov; jcherbone@saratoga.ca.us; dpedro@saratoga.ca.us; TRyan@sunnyvale.ca.gov; CTaylor@sunnyvale.ca.gov; rob.eastwood@pln.sccgov.org; nbowersox@losaltoshills.ca.gov; zdahl@losaltoshills.ca.gov; mmorley@losgatosca.gov; jpaulson@losgatosca.gov; Obegi, Doug
Cc:	Metra Richert; Kirsten Struve; Vincent Gin
Subject:	Notice of Public Hearing for Valley Water's 2020 Urban Water Management Plan and Water Shortage Contingency Plan
Date:	Monday, May 17, 2021 2:18:00 PM
Attachments:	image004.png image005.png

Valley Water

Clean Water • Healthy Environment • Flood Protection

May 17, 2021 **VIA E-MAIL**

Subject: Notice of Public Hearing for Valley Water's 2020 Urban Water Management Plan and Water Shortage Contingency Plan

In accordance with the Urban Water Management Planning Act, Valley Water is reviewing and updating its Urban Water Management Plan (UWMP). As part of the 2020 UWMP, Valley Water expanded its Water Shortage Contingency Plan (WSCP) to a standalone document to establish actions and procedures for managing water shortages. In addition, Valley Water is appending to its 2015 UWMP through an addendum to meet the requirements of the Delta Plan Policy WR P1 ("Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance"; California Code of Regulations, Title 23, section 5003). The UWMP and WSCP are required to be submitted to the California Department of Water Resources by July 1, 2021.

Valley Water's 2020 UWMP documents current and projected water supplies and demands over the next 25 years during normal and drought years, as well as water shortage contingency planning and conservation efforts. The plan provides an overall picture of current and future water conditions and management in Santa Clara County. The 2020 UWMP updates and supersedes all previous Valley Water Urban Water Management Plans.

Valley Water's Board of Directors will hold a public hearing on **June 8, 2021 at 1:00 pm** to allow interested members of the public to participate in the review process. The hearing will be held virtually and can be accessed at https://valleywater.zoom.us/j/87355078274 (Or by phone: **+1 669 900 9128, Meeting ID: 87355078274#**). Local agencies, water retailers, and the public are encouraged to review the 2020 UWMP and WSCP and provide any comments prior to, or at, the public hearing.

Valley Water's 2020 UWMP, WSCP, and the Reduce Delta Reliance addendum are available for public review online at https://www.valleywater.org/your-water/water-supply-planning/your-water/water-supply-planning/urban-water-management-plan.

For more information on the public hearing or the 2020 UWMP and WSCP, please visit our website at www.valleywater.org or contact Jing Wu at (408) 630-2330 or jwu@valleywater.org.

Sincerely,

Vincent Gin
Deputy Operating Officer
Water Supply Division

Your Water

Where Your Water Comes From
Water Quality
Water Supply Planning
- Monthly Water Tracker
- Water Supply Master Plan
- Bay Area Regional Reliability Partnership
- CVPIA Water Management Plan
- Climate Change Action Plan
- Desalination
- Integrated Regional Water Management
- Urban Water Management Plan
- Water Conservation Programs
- Water Demand Study

Recycled and Purified Water
- Public-Private Partnership (P3)

Local Dams and Reservoirs
ALERT System Real Time Data
Current Water Charges
Find Your Water Retailer
Certified Laboratories
One Water Plan

Urban Water Management Plan

Every five years, urban water suppliers in California are required by State law to prepare an Urban Water Management Plan (UWMP). Valley Water meets the definition of an urban water wholesaler and is currently preparing its 2020 UWMP. Valley Water's 2020 UWMP documents current and projected water supplies and demands over the next 25 years during normal and drought years, as well as water shortage contingency planning and conservation efforts. The plan provides an overall picture of past, current, and future water conditions and management in Santa Clara County.

As part of the 2020 UWMP, Valley Water expanded its Water Shortage Contingency Plan (WSCP) to a standalone document to establish actions and procedures for managing water shortages. In addition, Valley Water is appending to its 2015 UWMP through an addendum to meet the requirements of the Delta Plan Policy WR P1.

Valley Water's Board of Directors will hold a public hearing on **June 8, 2021, at 1 p.m.** to allow interested members of the public to participate in the review process. Valley Water's 2020 UWMP, WSCP, and the Reduced Delta Reliance addendum are available below for public review. For more information about the public hearing or this plan, contact **Jing Wu** at **(408) 630-2330 or** jwu@valleywater.org.

- 2020 Urban Water Management Plan
- Reduced Delta Reliance
- Water Shortage Contingency Plan

Valley Water's 2015 UWMP is available below. Once the Board of Directors approves the 2020 UWMP, it will be uploaded.

- 2015 Urban Water Management Plan
- 2015 Urban Water Management Plan Appendices

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Lassen

FROM PAGE 1

administered vaccines and the Susanville Indian Rancheria, which received its own supply of vaccine from Indian Health Service, a division of the U.S. Department of Health and Human Services. Longo thinks the state might be including the people with access to these vaccines in the rural county's overall population count but isn't sure it's picking up the full scope of vaccination data.

"Those are numbers that could contribute to the discrepancy," she said.

CDPH did not directly respond to a question about how it calculates a county's population, but said in an email, "In many cases, members of the military and our tribal communities are vaccinated by health care providers outside of the Department of Defense or Indian Health Services, and many counties have allocated part of their vaccines to their local Department of Corrections and Rehabilitation institutions to improve their vaccination rates."

Longo isn't blaming any one in particular for what she considers a faulty vaccination rate and she has largely resisted publicly criticizing the state, but she's frustrated by the implication that her county's vaccine rollout has been lackluster.

"We've done incredible outreach in our community," Longo said. "We're just doing the best we can."

Classroom

FROM PAGE 1

pace, and access to useful technology.

An informal survey in late April by Decoding Dyslexia California, which advocates for students with dyslexia, found that 28% of parents think their child had a positive experience during distance learning. Just over half said their students had a negative experience. The rest said it was too early to tell.

"In April 2020, my 16-year-old sophomore daughter imploded from anxiety from isolation/quarantine, (but) by fall she had mastered online classes and is getting her best grades yet this year," one parent wrote in the Decoding Dyslexia survey. "Because all of her classes are at her desk, she rarely loses homework, is much better at staying organized, focused and gets her homework done on her own. It has been fantastic for her."

Jessica Maria, a parent in the North Bay Area, said distance learning was so ineffective for her two children — one of whom, a fifth grader, has dyslexia and attention deficit disorder — that last spring she withdrew them from school and opted for homeschool.

"Keeping my son focused and on task was impossible. For us, distance learning just meant me yelling at him all the time. It wasn't working," she said.

Instead, she found a project-based curriculum online and hired a private tutor to help her son with reading and writing. Her children did science experiments, art projects, cooking and other hands-on assignments. For one project, they made a cardboard map of the United States, to scale, and learned the capitals and facts about each state.

But because she and her husband are returning soon to their workplaces, they'll no longer be able to oversee their children's education, and the children will be attending a local magnet school that focuses on project-based learning.

"If cost wasn't a concern, I'd never send my son to traditional public school again. He's been let down so many times," Maria said. "But we're giving this a shot. I think it'll be good for them to socialize. In general, right now I'm hopeful."

Students with disabilities who do return to the classroom this fall might encounter another problem: a dearth of teachers. Some districts have seen large numbers of teachers quit or retire over the past year, and a shortage of substitutes has left administrators scrambling to fill vacancies. A shortage of special education teachers before the pandemic is now much worse, administrators said.

"The burnout is real. Teachers have been working long hours, with extra stress ... their personal and professional lives have been upended by the pandemic. They've been heroes throughout this, and it's been very hard," said Amy Andersen, director of personnel services for the El Dorado County Office of Education, who with her colleagues co-wrote a commentary for Policy Analysis for California Education on the challenges of reopening schools for students in special education.

Some districts are only allowing students to continue with distance learning in the fall if they're approved for independent study. A complicating factor is specialized services, like occupational therapy, outlined in a student's individualized education program. Those services will remain difficult to deliver virtually.

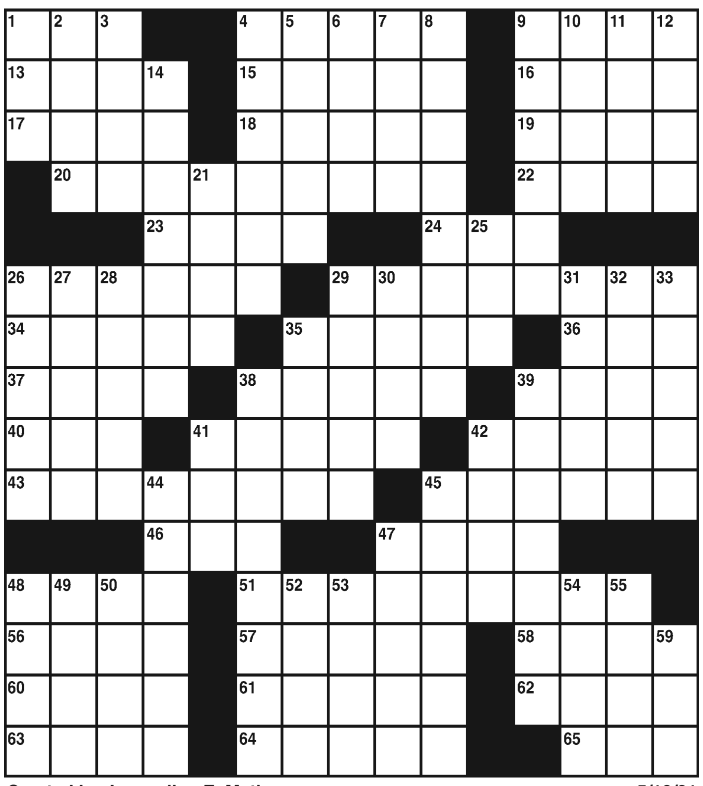
Ultimately, it's too early to know the full impact of campus closures on students with disabilities, said Whittaker of the National Center for Learning Disabilities. Until schools have done assessments and reported the data, any assumptions are purely speculative, she said.

"Unfortunately, no one has been able to actually study or measure this on a large scale," Whittaker said. "Every district has different ways of measuring student progress and nothing, so far, is public. Statewide assessments could be a good indicator of how students with disabilities (as a whole) are doing on grade-level standards compared to their peers, but I don't suspect we'll be seeing those administered fully this year, particularly where the majority of students are still learning virtually, or in a way that gives us enough good and valid data for students with disabilities."

Meanwhile, districts can take some steps to address staffing shortages, she said. She suggested they use some of their Covid relief funds to create partnerships with local colleges and teacher credential programs to build a staffing pipeline. She also suggested that districts contract out some tasks, such as evaluations or assessments, so teachers have more time in the classroom, and encourage parents to become trained as classroom aides.

Regardless of the challenges ahead, administrators are hopeful about the return of students with disabilities to the classroom. No matter how many obstacles students, families and teachers face, it won't be as bad as last year.

The Daily Commuter



Created by Jacqueline E. Mathews 5/18/21

ACROSS
1 Printer problem
4 Film genre
9 Breakfast order
13 "Somewhere __ the rainbow…"
15 Rosebush prickle
16 Give a pink slip to
17 "__ will tell"
18 Propelled a dinghy
19 __ as a pancake
20 Advanced degree
22 Hardwood trees
23 __ away; subtract
24 London broadcaster
26 Turn into
29 Spinning
34 Backsides
35 Word attached to wall or news
36 Home for an octopus
37 Fighting force
38 Summoned with a beeper
39 Sour
40 Perish
41 Steve or Tim
42 Take off
43 Always thinking of others
45 Sign of winter
46 "A rose __ rose…"
47 Metal corrosion
48 San __, CA
51 Dividing
56 Sups
57 High in the sky
58 Vittles
60 "Eyes Wide __"; Cruise/Kidman film
61 Gallant
62 Days of __; bygone times
63 Canned fish
64 Rough woolen fabric
65 Baseball's __ Griffey Jr.

DOWN
1 __ down; put on paper
2 Ardent
3 Office message
4 Pet a pet
5 Household task
6 Midwest state
7 Worry
8 Owing gratitude
9 Result
10 Fish's breathing organ
11 Metric weight
12 __ up; arranges
14 Priest's home
21 Flat caps
25 Forbid entry to
26 Pitt's namesakes
27 Creepy
28 Bedouin's transport
29 Becomes livid
30 __ house; realtor's event
31 Late singer Hayes
32 Optic __; part of the eye
33 Microsoft's Bill
35 Compadres
38 Congenial; friendly
39 Take the witness stand
41 Capone's namesakes
42 Shopper's paper
44 Cinco de Mayo party
45 Played miniature golf
47 Soldier's weapon
48 In __; jokingly
49 Hawaiian island
50 Flabbergast
52 John Deere's invention
53 Frontal __; part of the brain
54 Cozy recess
55 Pierce
59 Extra bedroom, perhaps

Monday's Puzzle Solved

 5/18/21

Metro

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A locally owned company.

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FINE PRINT
Declared a legal newspaper of general circulation by the Superior Court of Santa Clara County Decree No. 651274, April 7, 1988. ISSN 0882-4290. Entire contents

Newspaper : The Mercury News Advertiser : SANTA CLARA VALLEY WATER DISTR
Issue Date : 05/25/2021 Ad Number : 6576212

DAI SUGANO — STAFF PHOTOGRAPHER

An interior view of the Los Altos estate once owned by Intel co-founder and Silicon Valley legend Robert Noyce, as seen on May 17. The land goes on the auction block in June.

Noyce

FROM PAGE 1

of landmark tech companies Fairchild Semiconductor and Intel.

For those less inclined toward history, agents say the 4.6-acre property can be easily subdivided into four lots and developed into new estates.

The property can be configured in several ways to fit a new owner's taste and investment, Sotheby's International Realty agent Greg Goumas said. "It's a chance to rewrite a new history."

The Noyce compound on Loyola Drive is certainly not the most expensive estate in the Silicon Valley — in 2012, tech investor Yuri Milner spent $100 million on a Los Altos Hills mansion three times the size — but it should fit the needs of most billionaires. The Los Altos estate has been on the market since 2018, originally listing for $21.8 million. It now goes up for online auction in June.

High-end real estate selling for more than $10 million has been moving briskly during the COVID-19 pandemic. At least 65 residential properties in Santa Clara and San Mateo counties sold for more than $10 million since March 2020, according to MLSListings in Sunnyvale. Many other high-priced estates have likely sold in private transactions not captured by the real estate data, according to the service.

The high-priced estates were concentrated in Atherton (27 homes), Hillsborough (10), Woodside (9), Palo Alto (7) and Los Altos Hills (4), according to the listing service.

Noyce began his career as a hot-shot engineer and became a prolific inventor and entrepreneur. Perhaps just as important to current Silicon Valley residents, Noyce extended stock options to his employees, leading to today's enormous personal wealth creation in the tech sector.

He bought the Los Altos home in 1960, a place for his wife and children with ample space to entertain for social and business functions, brokers said. The gated compound overlooks the first hole of the Los Altos Golf & Country Club. The main house is surrounded by amusements — a lagoon swimming pool with grotto, human-made pond, lighted tennis court and a three-quarter acre merlot vineyard.

The human-made pond, now under renovation, include a pump that created rapids for visitors to kayak through. Hiking paths wind throughout the property between the pool, courts and water features.

The French country-style home features wide patios and indoor and outdoor kitchens.

"This house was deigned to host large, large groups of people," listing agent Arthur Sharif of Sotheby's International Realty said.

The main house has four bedrooms with additional office and loft space. The bottom floor contains a game room and a 1,500-bottle wine cellar. A guest house on the property offers another two bedrooms and loft space.

Noyce died in 1990. The current owner, a semi-retired tech executive, purchased the property in 1995.

The family is downsizing and has chosen to sell the property in an online auction.

Goumas expects the estate will draw interest from international buyers looking to add a Silicon Valley house, and perhaps some history, to their portfolio.

Contact Louis Hansen at 408-920-5043.

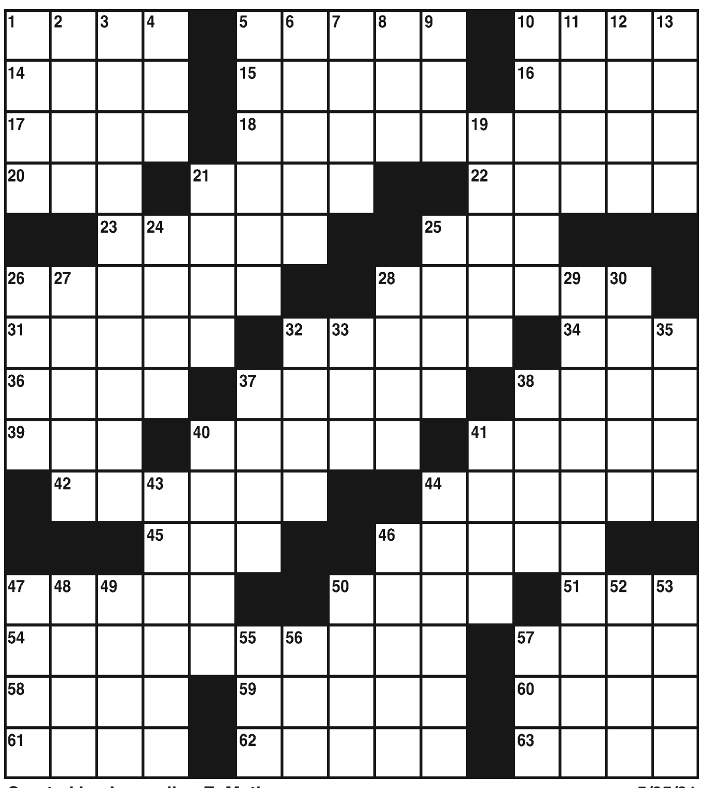
VTA

FROM PAGE 1

quired to do.

The Centers for Disease Control and Prevention changed its guidance in March to recommend 3-feet spacing in school settings where students and adults were masked; several other countries use 1 meter (about 3.3 feet) as their social distancing standard. Like VTA, Marin County's Golden Gate Transit made the same move to using a 3-foot standard on its buses last week.

The Daily Commuter



Created by Jacqueline E. Mathews 5/25/21

ACROSS

1 Have a yen for
5 Weight revealer
10 To boot
14 Not up yet
15 __ Sea; Great Barrier Reef's location
16 Nourish
17 Tire tracks
18 Bamboozled
20 Highest degree
21 Swindles
22 Dangers
23 African nation
25 Trumpeter Severinsen
26 Badger
28 Desert rovers
31 Let in
32 Refrain syllables
34 Mischievous fairy
36 "King of the Jungle"
37 Uncertainty
38 Skin marking
39 "__ Miserables"
40 Appears in the distance
41 Incline
42 Maximum
44 Raspy-voiced
45 Run up a tab
46 Punctuation mark
47 Make amends
50 Black Friday event
51 Cruise, for one
54 Smuggled goods
57 "Take a __!"; words to a pest
58 Symptom of hives
59 Actor Willem
60 Lobster recipe verb
61 Poor marks
62 Transparent
63 Dollar bills

DOWN

1 Admonish
2 Border on
3 Lowest
4 49ers' goals, for short
5 Ice cream portions
6 Dracula's title
7 Garfunkel's namesakes
8 __ Vegas
9 Lawn tree
10 Where to find Chad
11 Gives permission to
12 Hunt for
13 Bookie's figures
19 Odor
21 Bodily sac
24 Make progress
25 Blockhead
26 Corridor
27 "Bye, Pierre!"
28 Captures
29 Adornment
30 Smacks
32 Tugboat sound
33 "Yo-ho-ho and a bottle of __…"
35 Complimentary
37 Rx label info
38 Grand __; pitcher's horror
40 Reduce, as a price
41 Partial amount
43 March & others
44 Word attached to house or office
46 Narrow boat
47 Heartburn cause
48 Carry
49 In the past
50 Sound's partner, in phrase
52 Haggard's "__ from Muskogee"
53 Blanc & Gibson
55 Promos
56 Word of disgust
57 Premium cable channel

Monday's Puzzle Solved

M	I	S	T			P	U	S	S		E	T	C	H
O	T	H	E	R		O	M	I	T		X	R	A	Y
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S	H	E		C	O	T			T	O	U	P	E	E
		T	E	E	N	Y			S	U	M			
A	R	M	A	D	A			J	O	S	E	P	H	
L	O	U	S	E		P	H	O	N	E		E	A	R
P	O	S	T		L	O	O	T	S		T	R	U	E
S	K	I		B	I	T	E	S		S	U	I	T	E
	S	C	R	U	B	S			S	E	N	S	E	D
			E	Y	E			J	O	N	A	H		
B	R	A	C	E	R			A	S	A		A	C	T
L	A	C	E	R	A	T	E	D		T	A	B	L	E
A	G	E	S		T	U	N	E		E	L	L	E	N
B	E	D	S		E	V	E	S			L	E	F	T

 5/25/21

PUBLIC HEARING NOTICE

2020 Urban Water Management Plan and Water Shortage Contingency Plan

Valley Water

Topic: 2020 Urban Water Management Plan and Water Shortage Contingency Plan

Who: Santa Clara Valley Water District

What: Public Hearing

When: Tuesday, June 8, 2021, 1:00 p.m.

Where: Online at ***https://valleywater.zoom.us/j/87355078274***
By phone: +1 669 900 9128 US (San Jose) Meeting ID: 87355078274#

Santa Clara Valley Water District (Valley Water) invites you to a public hearing regarding the 2020 Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP).

In accordance with the Urban Water Management Planning Act, Valley Water is reviewing and updating its UWMP. As part of the 2020 UWMP, Valley Water expanded its WSCP to a standalone document to establish actions and procedures for managing water shortages. In addition, Valley Water is appending to its 2015 UWMP through an addendum to meet the requirements of the Delta Plan Policy WR P1 ("Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance"; California Code of Regulations, Title 23, section 5003). The UWMP and WSCP are required to be submitted to the California Department of Water Resources by July 1, 2021.

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Valley Water looks forward to listening to your ideas and is committed to ensuring that your concerns are addressed. Valley Water's 2020 UWMP, WSCP, and the Reduce Delta Reliance addendum are available for public review online at ***https://www.valleywater.org/your-water/water-supply-planning/your-water/water-supply-planning/urban-water-management-plan***.

For more information about this meeting or this plan, contact **Jing Wu at (408) 630-2330** or **jwu@valleywater.org**.

IMPORTANT NOTICES

This public hearing is being held in accordance with the Brown Act as currently in effect under the State Emergency Services Act, the Governor's Emergency Declaration related to COVID-19, and the Governor's Executive Order N-29-20 issued on March 17, 2020 that allows attendance by members of the Valley Water Board of Directors, Valley Water staff, and the public to participate and conduct the meeting by teleconference, videoconference, or both.

Valley Water, in complying with the Americans with Disabilities Act (ADA), requests individuals who require special accommodations to access and/or participate in Valley Water Board Meetings to please contact the Clerk of the Board's office at **(408) 630-2711**, at least three business days before the scheduled board meeting to ensure that Valley Water staff may assist you.

Valley Water, en cumplimiento con la Ley de Estadounidenses con Discapacidades (ADA), solicita que las personas que requieran adaptaciones especiales para acceder o participar en las reuniones de la Junta de Valley Water se comuniquen con el secretario de la oficina de la Junta al **(408) 630-2711**, al menos 3 días hábiles antes de la reunión programada de la Junta, para asegurarse de que el personal de Valley Water pueda ayudarles.

Theo Đạo Luật Người Mỹ Khuyết tật (ADA), Cục Nước Thung Lũng yêu cầu những cá nhân cần sự hỗ trợ đặc biệt để truy cập và/hoặc tham gia vào các Cuộc Họp Hội Đồng Quản Trị Của Valley Water xin hãy liên hệ với Thư ký văn phòng Hội Đồng Quản Trị theo số **(408) 630-2711** ít nhất 3 ngày làm việc trước khi diễn ra cuộc họp hội đồng theo lịch để đảm bảo rằng nhân viên của Valley Water có thể hỗ trợ quý vị.

按照《美国残疾人法案》(ADA)规定，Valley Water要求出席或参与Valley Water理事会会议的有特殊住宿需要的个人，在理事会会议之前至少3个工作日致电(408) 630-2711，与理事会办公室工作人员联系，以确保Valley Water员工可以为您提供帮助。

ValleyWater.org Clean Water • Healthy Environment • Flood Protection

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File No.: 21-0642

Agenda Date: 6/9/2021
Item No.: 2.2.

BOARD AGENDA MEMORANDUM

SUBJECT:
Public Hearing to Adopt the 2020 Urban Water Management Plan, Water Shortage Contingency Plan, and Reduced Delta Reliance Addendum to 2015 Urban Water Management Plan (Continued from June 8, 2021).

RECOMMENDATION:

A. Conduct Public Hearing on the draft 2020 Urban Water Management Plan and Water Shortage Contingency Plan;
B. Close the Public Hearing;
C. Adopt the Resolution ADOPTING THE 2020 URBAN WATER MANAGEMENT PLAN;
D. Adopt the Resolution ADOPTING THE WATER SHORTAGE CONTINGENCY PLAN; and
E. Adopt the Resolution ADOPTING APPENDIX H OF THE 2020 URBAN WATER MANAGEMENT PLAN AS AN ADDENDUM (REDUCED DELTA RELIANCE) TO THE 2015 URBAN WATER MANAGEMENT PLAN.

SUMMARY:
Every five years, urban water suppliers in California are required by State law to prepare an Urban Water Management Plan (UWMP). The plan is a water agency's long-term water resource planning document to ensure that adequate water supplies are available to meet existing and future water needs within its service area. The UWMP provides an overall picture of a water agency's current and future water conditions and management over the next 20 to 25 years.

Santa Clara Valley Water District (Valley Water) meets the definition of an urban water wholesaler and has prepared the 2020 UWMP update. Valley Water's 2020 UWMP documents current and projected water supplies and demands over the next 25 years during normal and drought years, as well as water reliability analysis and conservation efforts in Santa Clara County.

As part of the 2020 UWMP, Valley Water expanded its Water Shortage Contingency Plan (WSCP) to establish actions and procedures for managing water shortages due to droughts and other emergencies consistent with new state regulations. The statutory deadline to submit the 2020 UWMP and WSCP to the California Department of Water Resources (DWR) is July 1, 2021.

Valley Water's draft 2020 UWMP was prepared consistent with the UWMP Act, California Water Code Sections 10610 through 10656, and in accordance with DWR guidelines. Key elements of the plan

ADOPTED
JUN 09 2021

include Valley Water's system, demand projections, existing and future water supply, water supply reliability, water shortage contingency plan, and water conservation and demand management programs. In addition, the plan includes an appendix on reduced reliance on the Sacramento-San Joaquin Delta (Delta), consistent with the Delta Plan.

Water Demand Projections
Understanding water demands and how they may change over time allows Valley Water to manage the county's water supply and appropriately plan infrastructure investments. County-wide demands are projected to increase from 306,000 acre-feet per year (AFY) in 2020 to approximately 345,000 AFY in 2045. The projected demands are significantly lower than what was used in previous UWMPs and the Water Supply Master Plan 2040 (WSMP) based on a recently completed demand study for the county. County retailers have also reduced their projected demands and Valley Water's demands are within 1- 5% of the demand estimates by retailers from 2025 to 2040, and within 10% for 2045.

Existing and Planned Water Supply
Valley Water maintains diverse water supply sources to meet countywide demands, including local surface water and groundwater, imported water, and recycled water. Water conservation is also an important part of the water supply mix, helping to keep water rates lower while improving water supply reliability. Valley Water is considering investing in projects to help mitigate potential future supply reductions from climate change and new regulations. Valley Water's WSMP provides a strategy for meeting future water demands, and the Monitoring and Assessment Program (MAP) annually tracks WSMP implementation. This UWMP is based on WSMP recommended projects per Board direction and DWR's imported water allocations dataset. With the phased implementation of planned future projects, Valley Water's available supplies are projected to increase over time.

Water Supply Reliability
Based on Valley Water's existing and planned sources of supply, Valley Water will be able to meet countywide demands through 2045 under normal, a single dry, and five consecutive dry year conditions. If a prolonged drought were to occur in the next five years, Valley Water would employ a range of response actions to meet countywide demands, including water conservation, bringing back water stored in the Semitropic Groundwater Storage Bank, imported water transfers and exchanges, and calling for short-term water use reductions.

Water Shortage Contingency Plan
As part of the 2020 UWMP, Valley Water expanded its WSCP to a standalone document to establish actions and procedures for managing water supplies and demands during water shortages due to droughts and other emergencies. Valley Water uses projected countywide end-of-year groundwater storage as an indicator of potential water shortages and the trigger for WSCP actions. In the event of prolonged droughts or other emergency situations, Valley Water considers all available tools for managing available water supplies, including public education and community outreach, coordinating response among the County's municipalities and retailers, augmenting supplies by investing in supplemental supply sources, calling for short-term water use reductions, and balancing demands for treatment plants and recharge facilities, to maximize the use of available supplies in order to meet potential shortage. The WSCP also summarizes other planning efforts related to natural disaster, drought revenue impacts, and Valley Water's legal authority and communication protocol to respond

to water shortages.

The WSCP was developed in accordance with 2020 Urban Water Management Plan guidebook. Valley Water continuously seeks to improve its water shortage planning efforts, which may be reflected in future refinements to this WSCP. Under extraordinary circumstances and/or rapidly changing water supply conditions, Valley Water may need to undertake water conservation measures that are stricter than those set forth in this WSCP.

Demand Management Measures
Valley Water continues to be a leader in water conservation and has implemented a wide range of Demand Management Measures (DMMs) that help reduce water use. Valley Water's conservation programs include metering, public education and outreach, rebates for residential and commercial users, landscape rebates for lawn conversion, free water use audits and consultation, and many more. Collectively, conservation and stormwater capture accounted for about 75,000 AF of water savings in 2020 over a 1992 baseline. Valley Water has a target to increase these savings to 110,000 AFY by 2040.

Reduced Reliance on the Delta
The 2020 UWMP requires the suppliers receiving or planning to receive water from the Delta to demonstrate their reduced reliance on the Delta. Valley Water receives Delta water from the State Water Project (SWP), Central Valley Project (CVP), and water transfers and exchanges. Therefore, Valley Water falls under this requirement. Valley Water, with the support of all its retailers, has made significant investments in demand management and local supplies to increase regional self-reliance and reduce the county's reliance on the Delta. These investments include conservation and demand management; recycled and purified water; stormwater capture; seismic retrofits of local reservoirs; and regional collaborations. With these past efforts and planned expansion of water recycling and long-term water conservation savings recommended in the WSMP, water supply analysis estimates that Valley Water has reduced its reliance on imported water supplies from the Delta from the 2010 baseline, from 5.1% in 2015 to 13.8% in 2040, consistent with the Delta Plan, WR P1. The reduced Delta reliance was also appended to the 2015 UWMP, as required by DWR.

Coordination and Outreach
This UWMP was prepared in coordination with the 13 major water retailers in Santa Clara County. Throughout the plan development, Valley Water had numerous group and individual communications with retailers on issues related to demand and supply projections, reduced reliance on the Delta, reliability analyses, and the WSCP. Regular updates have been provided to various committee meetings. In addition, all cities within Santa Clara County, retailers, the County, San Francisco Public Utilities Commission, and Bay Area Water Conservation and Supply Agency were notified by letter (December, 2020) at least 60 days prior to the public hearing of Valley Water's efforts on updating its UWMP. Valley Water provided the retailers with the draft UWMP and WSCP for review. The draft plan was presented at the May Water Conservation and Demand Management Committee meeting. The Committee by a roll call vote unanimously approved Staff's recommendation to take the 2020 Urban Water Management Plan to the June 8, 2021 Board meeting for public hearing and plan adoption.

FINANCIAL IMPACT:
There is no financial impact associated with this item.

CEQA:
CEQA does not apply to the preparation and adoption of UWMPs (California Water Code Section 10652).

ATTACHMENTS:
Attachment 1: Resolution, 2020 UWMP
Attachment 2: Resolution, WSCP
Attachment 3: Resolution, Addendum to 2015 UWMP
Attachment 4: Draft UWMP
Attachment 5: Draft WSCP
Attachment 6: PowerPoint
Attachment 7: BAWSCA Letter
Handout 2.2-A: Friends of the River
Handout 2.2-B: Sierra Club

UNCLASSIFIED MANAGER:
Vincent Gin, 408-630-2633

BOARD OF DIRECTORS
SANTA CLARA VALLEY WATER DISTRICT

RESOLUTION NO. 21-69

ADOPTING THE 2020 URBAN WATER MANAGEMENT PLAN

WHEREAS, the California Urban Water Management Planning Act requires urban water suppliers providing water to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually for municipal purposes to prepare and adopt an Urban Water Management Plan every five years; and

WHEREAS, the Santa Clara Valley Water District (Valley Water) meets the definition of an urban water wholesaler and has prepared Urban Water Management Plans since 1985, with the last update in 2015; and

WHEREAS, Valley Water prepared the draft 2020 Urban Water Management Plan in accordance with the requirements and procedures set forth in the Urban Water Management Planning Act; and

WHEREAS, a public hearing on the said plan was set on the 8th day of June 2021 by teleconference Zoom meeting; and

WHEREAS, notice of the time and place of said public hearing was duly given and published pursuant to law; and

WHEREAS, the Valley Water Board of Directors considered the 2020 Urban Water Management Plan during the public hearing held on June 8, 2021.

NOW, THEREFORE BE IT RESOLVED that the Board of Directors of the Santa Clara Valley Water District does hereby:

1. Adopt the 2020 Urban Water Management Plan; and

2. Authorize and direct the Chief Executive Officer (CEO) to file the 2020 Urban Water Management Plan with the California Department of Water Resources, the California State Library, the County of Santa Clara, local cities and towns, and water retailers within 30 days of adoption as described in Section 10644(a) of the California Water Code; and

3. The CEO is hereby authorized and directed to implement the 2020 Urban Water Management Plan in accordance with the Urban Water Management Planning Act.

PASSED AND ADOPTED by the Board of Directors of the Santa Clara Valley Water District by the following vote on June 9, 2021:

AYES: Directors R. Santos, N. Hsueh, T. Estremera, B. Keegan, G. Kremen, L. LeZotte, J. Varela

NOES: Directors None

ABSENT: Directors None

ABSTAIN: Directors None

SANTA CLARA VALLEY WATER DISTRICT

TONY ESTREMERA
Chair, Board of Directors

ATTEST: MICHELE L. KING, CMC

Clerk, Board of Directors

BOARD OF DIRECTORS
SANTA CLARA VALLEY WATER DISTRICT

RESOLUTION NO. 21-70

ADOPTING THE WATER SHORTAGE CONTINGENCY PLAN

WHEREAS, the California Urban Water Management Planning Act requires urban water suppliers providing water to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually for municipal purposes to prepare and adopt an Urban Water Management Plan every five years; and

WHEREAS, the Santa Clara Valley Water District (Valley Water) meets the definition of an urban water wholesaler and has prepared Urban Water Management Plans since 1985, with the last update in 2015; and

WHEREAS, Valley Water prepared the draft 2020 Urban Water Management Plan in accordance with the requirements and procedures set forth in the Urban Water Management Planning Act; and

WHEREAS, as part of the 2020 Urban Water Management Plan, Valley Water developed a standalone Water Shortage Contingency Plan to establish actions and procedures for managing water supplies and demands during water shortages due to droughts and other emergencies; and

WHEREAS, a public hearing on the Water Shortage Contingency Plan was set on the 8th day of June 2021 by teleconference Zoom meeting; and

WHEREAS, notice of the time and place of said public hearing was duly given and published pursuant to law; and

WHEREAS, the Valley Water Board of Directors considered the Water Shortage Contingency Plan during a public hearing held on said 8th day of June 2021.

NOW, THEREFORE BE IT RESOLVED that the Board of Directors of the Santa Clara Valley Water District does hereby adopt the Water Shortage Contingency Plan.

PASSED AND ADOPTED by the Board of Directors of the Santa Clara Valley Water District by the following vote on June 9, 2021:

AYES: Directors R. Santos, N. Hsueh, T. Estremera, B. Keegan, G. Kremen L. LeZotte, J. Varela

NOES: Directors None

ABSENT: Directors None

ABSTAIN: Directors None

SANTA CLARA VALLEY WATER DISTRICT

TONY ESTREMERA
Chair, Board of Directors

ATTEST: MICHELE L. KING, CMC

Clerk, Board of Directors

BOARD OF DIRECTORS
SANTA CLARA VALLEY WATER DISTRICT

RESOLUTION NO. 21-71

ADOPTING APPENDIX H OF THE 2020 URBAN WATER MANAGEMENT PLAN AS AN ADDENDUM (REDUCED DELTA RELIANCE) TO THE 2015 URBAN WATER MANAGEMENT PLAN

WHEREAS, the California Urban Water Management Planning Act requires urban water suppliers providing water to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually for municipal purposes to prepare and adopt an Urban Water Management Plan every five years; and

WHEREAS, the Santa Clara Valley Water District (Valley Water) prepared and adopted its 2015 Urban Water Management Plan according to the requirements and procedures set forth in the Urban Water Management Planning Act; and

WHEREAS, the Delta Plan Policy WR P1, Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance (Cal. Code Regs. tit. 23, § 5003), specifies that certain elements be included in a water supplier's urban water management plan, commencing in 2015, to support a certification of consistency for a future covered action; and

WHEREAS, Valley Water's 2020 Urban Water Management Plan includes Appendix H that demonstrates Valley Water's improvement in regional self-reliance and reduction in reliance on the Sacramento-San Joaquin River Delta, in consistence with the Delta Plan Policy WR P1.

NOW, THEREFORE BE IT RESOLVED that the Board of Directors of the Santa Clara Valley Water District does hereby adopt Appendix H of Valley Water's 2020 Urban Water Management Plan as an addendum to Valley Water's 2015 Urban Water Management Plan for submittal to the State of California.

PASSED AND ADOPTED by the Board of Directors of the Santa Clara Valley Water District by the following vote on June 9, 2021:

AYES:	Directors	R. Santos, N. Hsueh, T. Estremera, B. Keegan, G. Kremen, L. LeZotte, J. Varela
NOES:	Directors	None
ABSENT:	Directors	None
ABSTAIN:	Directors	None

SANTA CLARA VALLEY WATER DISTRICT

TONY ESTREMERA
Chair, Board of Directors

ATTEST: MICHELE L. KING, CMC

Clerk, Board of Directors

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A complete copy of this report is available to view or download here:
https://www.valleywater.org/your-water/water-supply-planning/urban-water-management-plan

Valley Water

2020

Urban Water Management Plan

Attachment 4
Page 1 of 1

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A full copy of this report is available to view or download here:
https://www.valleywater.org/your-water/water-supply-planning/urban-water-management-plan

2020

Water Shortage Contingency Plan

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2020 Urban Water Management Plan

Presented by: **Jing Wu**, Ph.D., Senior Water Resources Specialist

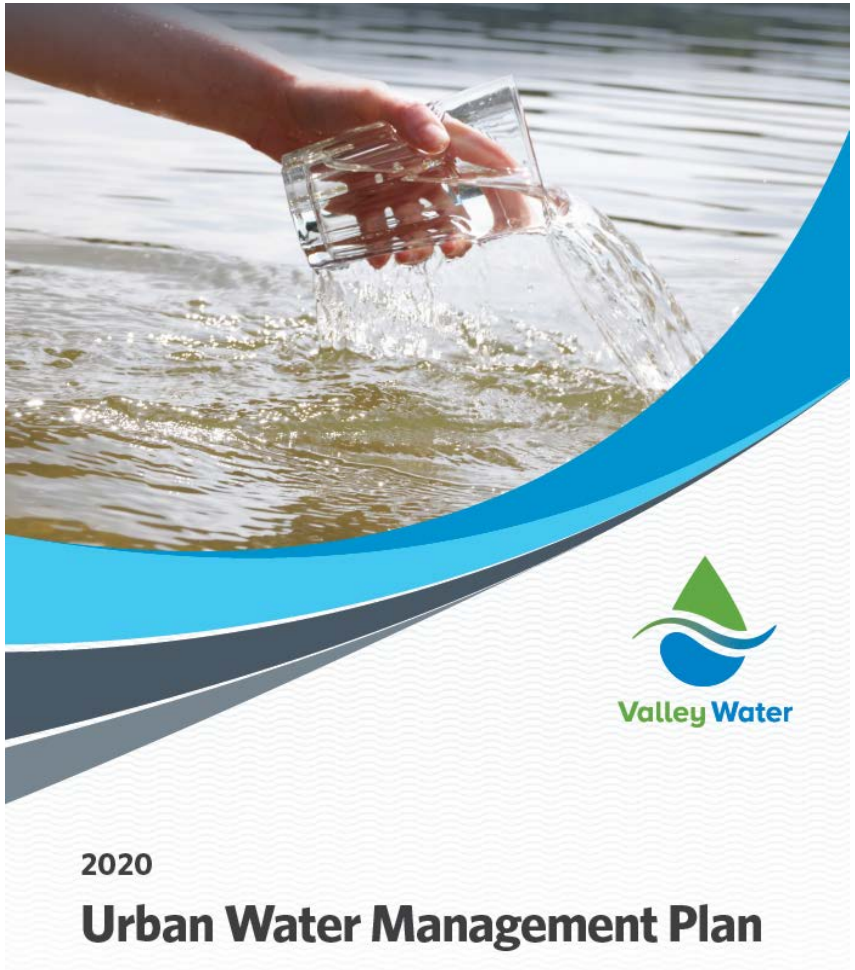
Board of Director Meeting

June 9, 2021

Valley Water

Urban Water Management Plan

- State requirement
- Water conditions and management
  - Demand
  - Supply
  - Reliability
  - Conservation
  - Contingency planning
- Statutory deadline - July 1, 2021



valleywater.org

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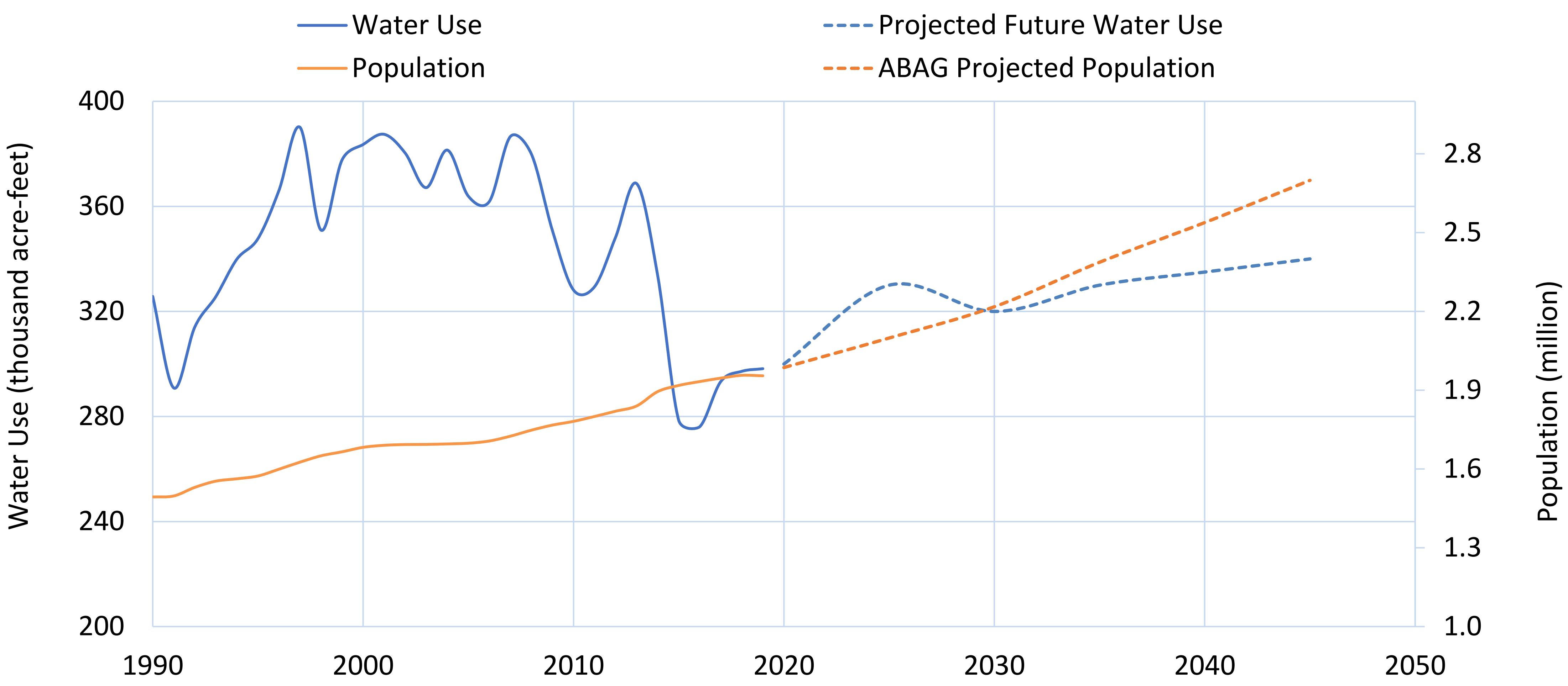
Demand Projection



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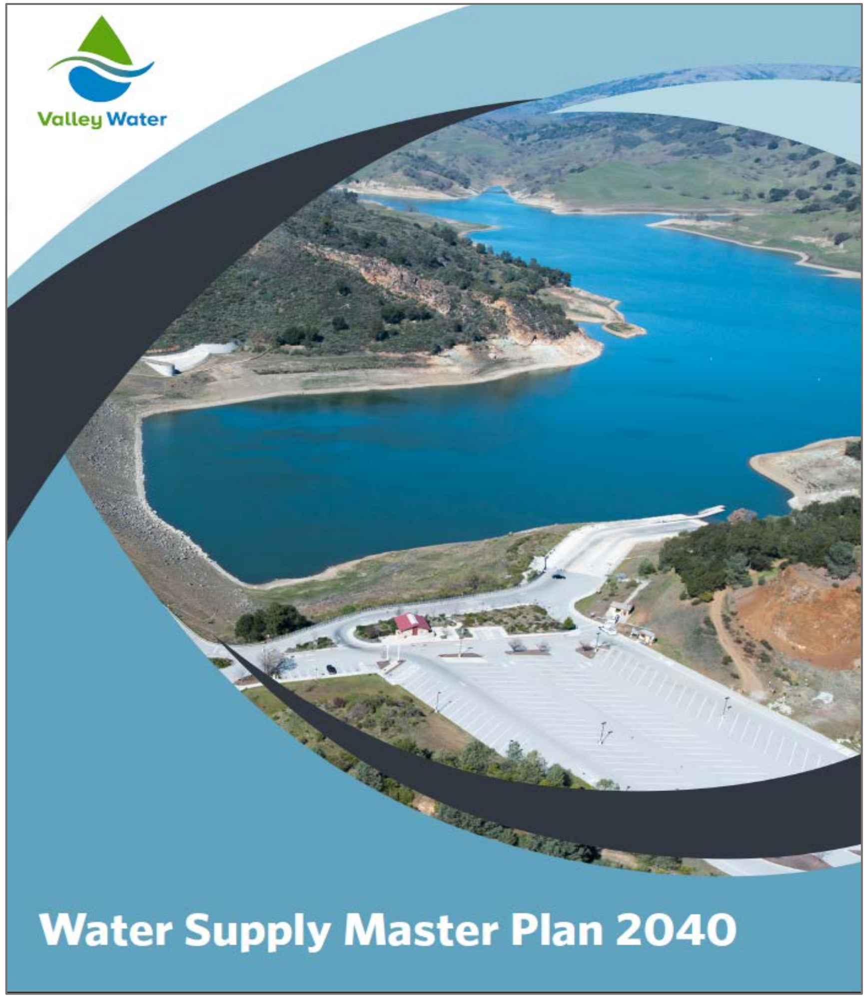
Valley Water

Existing and Projected Water Supplies

- Water Supply Master Plan recommended projects
- Delivery Capability Report 2019
- Meet Level of Service Goal



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Valley Water

Water Supply Reliability

- No shortage under normal and dry years
  - Lower demand
  - Planned water supply projects
  - Higher imported water delivery

- Master Plan and MAP for evaluating investment strategy

Water Shortage Contingency Plan

- Actions and procedures for managing water shortages
- Legal Authority
- Communication
- Financial impact

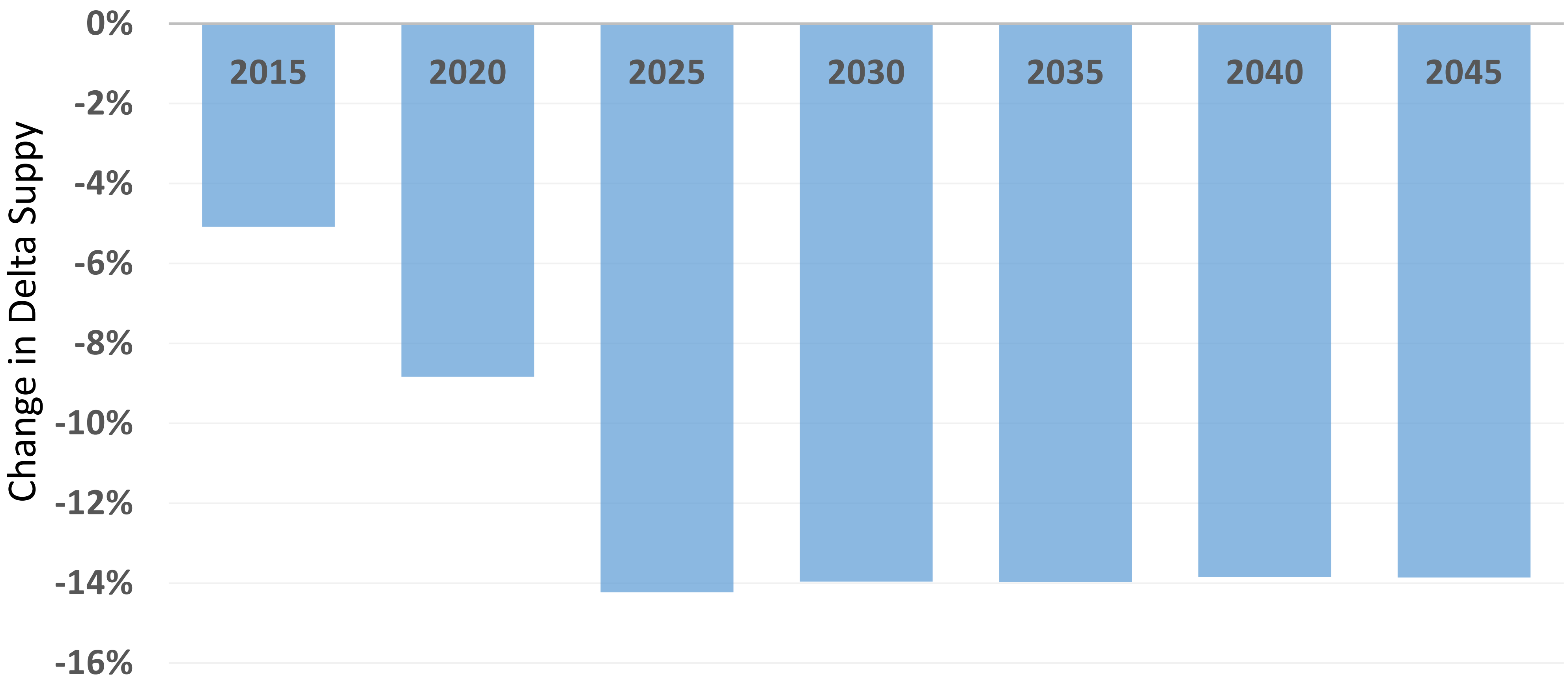
Stage	Title	Projected Countywide End of Year Groundwater Storage (AF)	Suggested short-term reduction in water use
1	**Normal**	>300,000	None
2	**Alert**	300,000 - 250,000	0-10%
3	**Severe**	250,000 - 200,000	10-20%
4	**Critical**	200,000 - 150,000	20-40%
5	**Emergency**	<150,000	Over 40%

Stage	Standard water shortage levels
1	Up to 10%
2	10 to 20%
3	20 to 30%
4	30 to 40%
5	40 to 50%
6	> 50%

Valley Water

Reduced Delta Reliance

Change in Delta Supplies in Valley Water's Water Supply Portfolio from 2010 Baseline



Valley Water

valleywater.org

Next Steps

- Finalize the plan

- Submit plan to State, County, and cities

Recommendations

- Adopt 2020 Urban Water Management Plan
- Adopt Water Shortage Contingency Plan
- Adopt Delta Reliance Addendum to 2015 Plan

QUESTIONS

Bay Area Water Supply & Conservation Agency

May 24, 2021

Vincent Gin
Deputy Operating Officer
Water Supply Division
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

Subject: Valley Water's 2020 Urban Water Management Plan – BAWSCA Comments

Dear Mr. Gin,

The Bay Area Water Supply and Conservation Agency (BAWSCA) appreciates the opportunity to provide public comment on the Santa Clara Valley Water District (Valley Water) Draft 2020 Urban Water Management Plan (UWMP). BAWSCA represents the interests of the 26 cities and water agencies in San Mateo, Santa Clara, and Alameda Counties that purchase approximately two thirds of their water from the San Francisco Public Utilities Commission (SFPUC). Eight BAWSCA member agencies lie in Santa Clara County and have a relationship with and/or are provided water by Valley Water.

The SFPUC's Draft 2020 UWMP[1] assumes the Bay-Delta Plan Amendment, as adopted in 2018, will be fully implemented in 2023. Under this scenario, the SFPUC's supply reliability modeling shows system-wide shortages between 30 and 49 percent in single and multiple dry years. These shortages translate to cutbacks between 36 and 54 percent to the SFPUC's wholesale customers. If such cutbacks occur, the cities and water agencies that also rely on Valley Water will most likely request to increase their purchases from Valley Water or increase groundwater pumping to meet demand.

BAWSCA requests that Valley Water's 2020 UWMP acknowledge this possible scenario by modifying the following paragraph from Chapter 6 as follows:

> *Retailers with SFPUC contracts currently use less than their Individual Supply Guarantees and are projected to increase their use of this source of supply. The SFPUC normal year supply projection in Table 6-1 is based on projections by SFPUC wholesale customers. These projections do not account for potential decreases in supply allocations by the SFPUC during dry years. The total supply projection increases modestly through the planning horizon and remains below the sum of Individual Supply Guarantees for the county.* ***If SFPUC supplies available to its wholesale customers are cut back significantly, the retailers with SFPUC contracts may request increase their use of Valley Water supplies or increase groundwater pumping.***

Thank you for considering this request. Please contact Tom Francis, Water Resources Manager, at tfrancis@bawsca.org with any questions.

[1] SFPUC Draft 2020 UWMP: https://www.sfpuc.org/sites/default/files/documents/UWMP%20Public%20Review%20Draft%2004012021%20FINAL.pdf

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Sincerely,

Nicole Sandkulla
CEO/General Manager

cc: Jing Wu, Valley Water
Samantha Greene, Valley Water
Metra Richert, Valley Water
BAWSCA Board of Directors
BAWSCA Water Management Representatives
Allison Schutte, Hanson Bridgett

Michele King

Subject: FW: Extension Request to Review Valley Water's 2020 Urban Water Management Plan
Attachments: FOR Valley Water 2020 UWMP Extension Request Letter 05282021.pdf

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From: Ashley Overhouse <ashley@friendsoftheriver.org>
Sent: Friday, May 28, 2021 11:55 AM
To: Board of Directors <board@valleywater.org>
Cc: Eric Wesselman <Eric@friendsoftheriver.org>
Subject: Extension Request to Review Valley Water's 2020 Urban Water Management Plan

Dear Mr. Callender, Chair Estremera, and Directors Varela, LeZotte, Vogler, Santos, Kremen and Hsieh,

Please find attached a letter from Friends of the River Foundation respectfully requesting additional time to review and comment on Valley Water District's 2020 Urban Water Management Plan. We sincerely appreciate consideration of this request, and welcome additional dialogue.

On a personal note, I'm a resident of San Jose on the border of Valley Water Districts 2 and 3. Thank you for your dedication and leadership to a sustainable water future for myself and other community members.

Sincerely,

Ashley Overhouse
Resilient Rivers Director
Friends of the River
1418 20th Street, Ste. 100
Sacramento, CA 95811
(408) 472-4522
Pronouns: she, her, hers
Help us protect California's rivers

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JUN 09 2021

FRIENDS OF THE RIVER

1418 20TH STREET, SUITE 100, SACRAMENTO, CA 95811

PHONE: 916/442-3155 ● FAX: 916/442-3396

WWW.FRIENDSOFTHERIVER.ORG

May 28, 2021

Rick Callender, Chief Executive Officer
Tony Estremera, District 6, Chair, Board of Directors
John Varela, District 1, Board Member
Linda LeZotte, District 4, Board Member
Barbara Keegan, District 2, Board Member
Richard Santos, District 3, Board Member
Gary Kremen, District 7, Board Member
Nai Hsieh, District 5, Board Member

Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

Re: Request for Additional Time to Review the 2020 Urban Water Management Plan

Dear Mr. Callender, Chair Estremera and Directors Varela, LeZotte, Vogler, Santos, Kremen and Hsieh,

Friends of the River is a statewide organization that is dedicated to saving rivers through revolutionary water solutions. We envision a climate resilient water future with healthy rivers, safe and affordable drinking water, and a thriving sustainable economy for all Californians. Friends of the River thanks Valley Water District for its dedication to providing Silicon Valley with safe, clean water for a healthy life, environment, and economy, and for the extensive time and preparation given to updating the critical planning document, the 2020 Urban Water Management Plan (UWMP).

Friends of the River respectfully requests additional time to review the UWMP and important associated documents such as the Water Storage Contingency Plan and Appendix H, Reduced Delta Reliance. The plan was first released to the public this past Monday, May 24, 2021. This gives only a short two weeks before the Public Hearing on June 8, 2021. This is also the first time the draft Plan will be presented in its entirety before the full Board. The UWMP document alone is hundreds of pages detailing the District's modeling and analysis for the sustainable water future of the Silicon Valley and the Guadalupe River watershed. This does not include review of the Water Storage Contingency Plan or associated UWMP Appendices.

In light of the new legislative requirements from AB 1668 and SB 606 in addition to the worsening drought, Friends of the River would appreciate an additional two weeks to review the Plan and submit comments to the Board. Friends of the River recognizes that the legal deadline for Valley Water to submit its plan to the California Department of Water Resources is July 1, 2021. Friends of the River therefore recommends the Board hold an informational workshop on June 8, 2021 and then hold the formal hearing at the next regularly scheduled Board meeting on June 22, 2021. This additional time will allow both Friends of the River and the public to truly understand and appreciate the state of the District's water supply, projected demand and planned actions to secure this important region's sustainable water future.

The Board's Policy Priority #4 states the intention to "Engage and Educate the Community, Elected Officials and Staff on Future Water Supply Strategies in Santa Clara County." Friends of the River thanks the Valley for this effort and believes this extension request aligns with the Board's motivations while still ensuring the District adheres to legal requirements.

Friends of the River looks forward to engaging with Valley Water in response to these c mments and reviewing the draft Urban Water Management Plan with the intent to inform Valley Water's important future water planning efforts. Please feel free to contact our Executive Director, Eric Wesselman, eric@friendsoftheriver.org, or Resilient Rivers Director, Ashley Overhouse, ashley@friendsoftheriver.org, if you have questions or concerns.

Sincerely,

Eric Wesselman
Executive Director
Friends of the River
1418 20th Street, Ste. 100
Sacramento, CA 95811
(916) 442-3155 x218
(510) 775-3797

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Michele King

Subject: FW: SCVWD Agenda Comment Form

From: system-generated@valleywater.org <system-generated@valleywater.org>
Sent: Thursday, June 3, 2021 11:41 AM
To: Clerk of the Board <clerkoftheboard@valleywater.org>
Subject: SCVWD Agenda Comment Form

Submitted on Thu, 06/03/2021 - 11:41 AM

Submitted values are:

Name
Katja Irvin

Address
215 S 19TH ST
SAN JOSE, California. 95116

Telephone
(408) 569-8214

Email
katja.irvin@sbcglobal.net

Agency, Business or Group (if applicable)
Sierra Club Loma Prieta Chapter

Board Meeting Date
2021-06-08

Agenda Item Number
2.8

I would like to
No Position--Comment Only

Comment Form
Dear Valley Water Staff and Board of Directors,

The Sierra Club Loma Prieta Chapter seconds the request from Friend of the River Foundation and respectfully requests additional time to review and comment on Valley Water's 2020 Urban Water Management Plan and Water Shortage Contingency Plan. We sincerely appreciate consideration of this request.

These are important documents and very little time has been provided to review the draft plans. Valley Water should welcome public input and suggestions to improve these plans which will be used to evaluate many actions (including water availability for new development) for the next five years. Even if it's known that these plans will be approved without changes, having substantial comments on the record with the staff report should be considered important to

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JUN 09 2021

inform future water supply planning efforts.

Continuing this item to the June 22, 2021 Board of Directors meeting will not impact Valley Water's ability to meet the July 1, 2021 deadline for submitting the plan to the Department of Water Resources. For the sake of public input and public participation, please continue this item and wait two weeks to approve these plans.

Thank you for your consideration.

APPENDIX H

Reduced Delta Reliance

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Appendix H - Reduced Delta Reliance

Valley Water manages an integrated water resources system to provide safe and clean water, flood protection, and stewardship of streams on behalf of Santa Clara County's ("County") nearly two million residents and 13 water retailers. Water supplies include local surface water and groundwater, imported water, and recycled water. Water conservation is also an important part of the of the water supply mix, which helps reduce water demands and improve reliability during droughts. Valley Water is also the Groundwater Sustainability Agency (GSA) for the Santa Clara and Llagas Subbasins, which are both identified as high priority basins by the Department of Water Resources (DWR). Valley Water sustainably manages its local groundwater basins to support beneficial use by water retailers, private well users, and the environment.

Since the 1930s, Valley Water's water supply strategy has been to maximize the conjunctive management of surface water and groundwater supplies to enhance water supply reliability and avoid land subsidence. Local groundwater resources make up the foundation of the County's water supply but need to be augmented by Valley Water's comprehensive water management activities to reliably meet the needs of county residents, businesses, agriculture, and the environment. These activities include managed recharge of imported and local supplies and in-lieu groundwater recharge through the provision of treated surface water and raw water, acquisition of supplemental water supplies, and water conservation and recycling.

Imported water diverted from the Delta watershed is an important component of Valley Water's current water supply portfolio, accounting for approximately 50% of its annual water supply on average. Imported supplies received from the State Water Project (SWP) and Central Valley Project (CVP) are either sent to one of Valley Water's three drinking water treatment plants, used for managed groundwater recharge, or stored in local and State reservoirs for use in subsequent years. Valley Water also stores some of its imported water in the Semitropic Groundwater Bank in the Central Valley for withdrawal during dry periods. Valley Water's retail water agencies do not control the amount of Delta watershed water they receive from Valley Water and the interconnected nature of the groundwater basins and blended use of sources in Valley Water infrastructure like reservoirs and pipelines make it infeasible to quantify imported water use at the retailer level.

Valley Water, Not Its Retailers, Manages How Imported and Local Water Supplies Are Utilized

Valley Water's retail water agencies do not control the amount of Delta watershed water that they receive from Valley Water, and Valley Water's use of blended local and imported water sources and "conjunctive use" approach to managing its surface water and groundwater supplies make it infeasible to quantify imported water use at the retailer level.

Instead, Valley Water's retailers rely on Valley Water to maintain sustainable water supplies, including managed groundwater recharge and in-lieu groundwater recharge (e.g., treated surface water deliveries, demand management programs, etc.) The interconnected nature of the groundwater basins and blended use of sources in Valley Water infrastructure like reservoirs and pipelines make it infeasible to quantify the blend of local and imported supplies at the retailer level. The system and operations are designed to integrate and work at a regional level.

Furthermore, depending on groundwater conditions and other drivers, Valley Water has some flexibility in adjusting its treated water pricing so as to promote the most effective use of available water resources. So, in addition to managing regional surface water and groundwater supplies through operational activities, Valley Water also uses pricing mechanisms to incentivize retailers as to how local and imported water supplies are used in the County. Together, these approaches support the balanced use of groundwater and surface water to maintain sustainable water supplies and avoid undesirable groundwater basin effects.

In addition, Valley Water manages most of the water conservation programs for the County with the support of retailers through water rates and cost share agreements.

As such, Valley Water believes that its quantification of the use of imported and local water supplies in the County and its showing of reduced reliance on the Delta watershed should apply to all of the local retail water agencies that it serves.

Short Term Impact of Valley Water's Largest Reservoir Being Maintained at Deadpool During Dam Retrofit Project (expected completion around 2030)

In 2020 the Dam Safety Division of the Federal Energy Regulatory Commission ordered that Valley Water's largest reservoir, Anderson Reservoir, capable of holding over 89,000 acre-feet (AF) of water supplies (both local and imported water) be drained to deadpool until it is seismically retrofitted. This is a ten-plus year project estimated to cost approximately $700 million. Because Valley Water does not have Anderson Reservoir for the next 10 years to store local rainfall and runoff as a source for treated water and managed groundwater recharge, Valley Water will, especially if drought conditions persist, need to *temporarily supplement its local water supplies with additional (i.e., more than normal) imported water supplies* during this period to meet its treated water contract obligations and keep its local groundwater basins from becoming severely depleted.

H.1 Regional Self Reliance

Water supplies that contribute to regional self-reliance are shown in Table C-3. Consistent development and funding of these supplies has resulted in reduced reliance on the percentage of water supplies imported from the Delta watershed as compared to overall water use in the County. Valley Water, with the financial support of all its retailers as reflected in its water rates, has made significant investments in demand management and developing local supplies to reduce Santa Clara County's reliance on the Delta watershed and increase regional self-reliance. These investments include:

- Conservation and demand management
- Recycled and purified water
- Stormwater capture
- Dam improvements/seismic retrofits to lift storage restrictions on local reservoirs
- Regional collaborations to increase self-reliance

Conservation and Demand Management

Valley Water has made significant investments to manage demands for water and continues to be a leader in water conservation in the region.

Valley Water manages most of Santa Clara County's water conservation programs with the support of retailers. Retailers support the conservation programs through water rates, outreach, cost share agreements, and grants. Over time, Valley Water has implemented

nearly 20 different ongoing water conservation programs that use a mix of incentives and rebates, free device installation, one-on-one home visits, site surveys, and education to reduce water use countywide (See Chapter 9 for a detailed description). Water savings from these programs are tracked on a countywide basis, not at the retailer level.

Collectively, Santa Clara County reduced water use by approximately 75,000 AF in 2020 as compared to 1992 through Valley Water's conservation and stormwater capture programs. In 2019, Valley Water updated its Water Supply Master Plan 2040 (WSMP), which includes a range of water conservation programs as well as stormwater capture/recharge programs that are designed to achieve a goal of increasing these savings to 110,000 AF per year (AFY) by 2040. In 2021, Valley Water will update its Water Conservation Strategic Plan to identify new or improved strategies to reach and expand long-term savings goals as well as future Water Use Objectives required by Assembly Bill 1668 and Senate Bill 606.

With the financial support of its retailers, Valley Water is able to engage in regional campaigns with wide-reaching impact. From 2012 to 2020 alone, Valley Water spent $47 million on water conservation programs. Regional investments in conservation and demand management programs benefit the entire region. These programs help to increase regional water supply reliability and reduce demands for imported water supplies.

Recycled and Purified Water

Valley Water actively promotes the use of recycled and purified water. Over the past decade, Valley Water has advanced water reuse in the County by leading water reuse planning efforts, developing wholesale recycled water programs, and constructing new infrastructure. In 2020, recycled water was about 5 percent (17,000 AFY) of the County's water supply that is distributed for non-potable uses.

Valley Water constructed the Silicon Valley Advanced Water Purification Center (SVAWPC) as a nationally-recognized pilot facility to develop purified water. The SVAWPC can produce up to 8 million gallons of purified water per day. Purified water is blended with tertiary treated water to create high quality recycled water that can be used by a wide variety of customers. Since March 2014, the SVAWPC has demonstrated the effectiveness of advanced treatment technologies (microfiltration, reverse osmosis, and advanced oxidation) to produce purified water and has set the stage for Valley Water to begin a potable reuse program. Potable reuse will involve using advanced purified water to augment groundwater or surface water supplies.

Valley Water is currently working with the cities of Palo Alto and Mountain View on additional recycled water options within those cities. In December 2019, Valley Water executed an agreement with the cities of Palo Alto and Mountain View that defined cost-sharing and supply commitments related to future water reuse. The agreement includes a minimum commitment of approximately 11,000 AFY of wastewater effluent provided to Valley Water for purified water production at a future regional Advanced Water Purification Facility. With this agreement, Valley Water is working on a location for a regional Advanced Water Purification Facility at the SVAWPC, to produce up to 11,000 AFY of potable reuse supply by 2028 to replenish groundwater.

Valley Water is completing a Countywide Water Reuse Master Plan (CoRe Plan) in 2021 to identify feasible opportunities to expand water reuse, improve water supply reliability, and increase regional self-reliance. The CoRe Plan outlines Valley Water's opportunities and strategies toward achieving up to 24,000 AFY for potable water reuse. Potable reuse would be managed by Valley Water to either augment groundwater or treated surface water. In both instances, it will be blended with several other sources before being used by retailers

making it infeasible to determine the proportion of potable recycled water going to each retailer compared to water supplies imported through the Delta.

Stormwater Capture

Valley Water managed recharge program includes capturing local runoff in reservoirs and releasing it to groundwater recharge facilities or drinking water treatment plants. Through its WSMP, Valley Water plans to increase local stormwater runoff capture to increase natural groundwater recharge as part of its 'ensure sustainability strategy.' Valley Water's stormwater projects for next 20 years include:

- **Green Infrastructure**. As part of its conservation program, Valley Water initiated a rebate program to incentivize the installation of rain barrels and cisterns, and the construction of rain gardens in residential and commercial landscapes.

- **Flood-Managed Aquifer Recharge (Flood-MAR).** Valley Water is working on a preliminary feasibility study to evaluate the potential for capturing and recharging stormwater on open space, a process referred to as Flood-MAR. The feasibility study will help identify potential areas where Flood-MAR projects could be implemented within Santa Clara County, evaluate potential program participation incentives, and assess the potential water supply benefit of Flood-MAR. The preliminary feasibility study is scheduled to be completed in 2022, with the goal of identifying a subsequent pilot program.

- **Centralized Stormwater Capture Projects.** Valley Water plans to develop two centralized stormwater capture projects in northern Santa Clara County. Centralized stormwater capture projects capture stormwater from multiple parcels for recharge in a single location and/or are municipal projects, including "green streets" projects. The Santa Clara Basin Storm Water Resources Plan completed in December 2018 identified potential projects throughout northern Santa Clara County. These projects would likely be partnerships with other jurisdictions and require outside funding. Regional investments in stormwater capture programs benefit the entire region.

These programs help to increase regional water supply reliability and reduce demands for imported water supplies. Water supplies developed through these stormwater capture programs are tracked on a countywide basis, not at the retailer level.

Dam Improvements/Seismic Retrofits to Lift Storage Restrictions on Local Reservoirs

Valley Water manages 10 dams and surface water reservoirs with a total storage capacity of about 166,000 acre-feet. Currently, five of Valley Water's 10 reservoirs are operating under various levels of restricted capacity due to seismic stability concerns. These are Almaden, Anderson, Calero, Coyote, and Guadalupe reservoirs. Future average use of local surface water supply is projected to increase over the planning horizon as Valley Water's dams are seismically retrofitted, allowing operating capacity restrictions to be lifted. The seismic retrofit of most these reservoirs (except Coyote) is expected to be completed by 2035 which will allow them to be operated at their full capacity.

Regional Collaborations to Increase Self-Reliance

Valley Water has partnered with seven water agencies in the Bay Area (Alameda County Water District, Bay Area Water Supply and Conservation Agency, Contra Costa Water

District, East Bay Municipal Utility District, Marin Municipal Water District, San Francisco Public Utilities Commission, and Zone 7 Water Agency) to investigate opportunities for regional collaboration. The purpose of this planning effort, known as Bay Area Regional Reliability (BARR), is to identify projects and processes to enhance water supply reliability across the region, leverage existing infrastructure investments, facilitate water transfers during critical shortages, and improve climate change resiliency. Projects to be considered include interagency interties and pipelines; treatment plant improvements and expansion; groundwater management and recharge; potable reuse; desalination; and water transfers. While no specific capacity or supply has been identified, this program may result in the addition of future supplies that would benefit Santa Clara County and increase the region's self-reliance. For example, pursuant to this program, and because Anderson Reservoir has been drained to deadpool, Valley Water and Contra Costa Water District are actively exploring mutually beneficial water transfer, exchange and storage projects and agreements.

Valley Water is also an active participant in the Bay Area and Pajaro River Watershed Integrated Regional Water Management (IRWM) programs. To date, Valley Water has received $86.3 million in IRWM grant funding awards to support various water resource management projects, including water recycling, water conservation, flood protection, and dam seismic retrofits.

H.2 Showing of Reduced Reliance on the Delta Watershed

Valley Water has used the example methodology set forth in Appendix C of the 2020 Urban Water Management Plan Guidebook to demonstrate its reduced reliance on the Delta watershed.

As indicated in Tables C-2 and C-3, based on its past and ongoing efforts to increase regionally developed water supplies, planned water supply projects including expansion of water recycling, and long-term water conservation savings recommended in the WSMP, Valley Water estimates that it and the County in general have reduced, and will continue to reduce, their reliance on imported water supplies diverted from the Delta watershed from the 2010 baseline year through 2040, in consistence with the Delta Plan and regulation WR P1. Tables C-2 and C-3 show estimated changes in Valley Water's Delta watershed supply from 2010 through 2045. *Compared to baseline, the projected percentage decrease of Delta watershed supply in Valley Water's portfolio ranges from 5.1% (2015) to 13.8% (2040).*

Data for the 2010 and 2015 time periods were developed using averages over the ten-year periods (2005-2014 and 2010-2019, respectively). Data for 2020 uses actual 2020 data. Annual demand and supply data were collected from Valley Water's Protection and Augmentation of Water Supplies (PAWS) reports that are published annually. Actual numbers from the relevant years were not used since supplies and demands are highly dependent on annual hydrology. Averaging values over a longer period allows sometimes extreme annual variation to be smoothed out to a value that is more indicative of conditions of that time.

All demand and supply data for 2025, 2030, 2035, 2040, and 2045 is from water supply modeling conducted for this effort. The WSMP has a time horizon of 2040; therefore, no new projects are included in the 2040 to 2045 timeframe.

All data for water conservation comes from Valley Water's Water Savings Model, which tracks water conservation savings since 1992.

Reduced Reliance Calculation

Table C-1: Optional Calculation of Water Use Efficiency -To be completed if Water Supplier does not specifically estimate Water Use Efficiency as a supply

Service Area Water Use Efficiency Demands (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Service Area Water Demands with Water Use Efficiency Accounted For								
Non-Potable Water Demands								
Potable Service Area Demands with Water Use Efficiency Accounted For	-	-	-	-	-	-	-	-

Total Service Area Population	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Service Area Population								

Water Use Efficiency Since Baseline (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Per Capita Water Use (GPCD)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Change in Per Capita Water Use from Baseline (GPCD)		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Estimated Water Use Efficiency Since Baseline		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Table C-2: Calculation of Service Area Water Demands Without Water Use Efficiency

Total Service Area Water Demands (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Service Area Water Demands with Water Use Efficiency Accounted For	355,000	315,000	306,000	330,000	325,000	330,000	335,000	345,000
Reported Water Use Efficiency or Estimated Water Use Efficiency Since Baseline	-	13,000	28,000	40,000	53,000	58,000	62,000	62,000
Service Area Water Demands without Water Use Efficiency Accounted For	355,000	328,000	334,000	370,000	378,000	388,000	397,000	407,000

Table C-3: Calculation of Supplies Contributing to Regional Self-Reliance

Water Supplies Contributing to Regional Self-Reliance (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Water Use Efficiency	-	13,000	28,000	40,000	53,000	58,000	62,000	62,000
Water Recycling	17,000	18,000	17,000	16,000	19,000	22,000	26,000	28,000
Stormwater Capture and Use							1,000	1,000
Advanced Water Technologies (purified water for potable use)	-	-	-	-	7,000	7,000	7,000	7,000

Conjunctive Use Projects (local surface water)	58,000	55,000	59,000	36,000	37,000	40,000	41,000	41,000
Local and Regional Water Supply and Storage Projects (Non-Valley Water controlled)	11,000	9,000	7,000	11,000	11,000	11,000	11,000	11,000
Other Programs that Contribute to Regional Self-Reliance (natural groundwater recharge)	61,000	61,000	61,000	61,000	61,000	62,000	62,000	62,000
Water Supplies Contributing to Regional Self-Reliance	147,000	156,000	172,000	164,000	188,000	200,000	210,000	212,000

Service Area Water Demands without Water Use Efficiency (Acre-Feet)	**Baseline (2010)**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045 (Optional)**
Service Area Water Demands without Water Use Efficiency Accounted For	355,000	328,000	334,000	370,000	378,000	388,000	397,000	407,000

Change in Regional Self Reliance (Acre-Feet)	**Baseline (2010)**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045 (Optional)**
Water Supplies Contributing to Regional Self-Reliance	147,000	156,000	172,000	164,000	188,000	200,000	210,000	212,000
Change in Water Supplies Contributing to Regional Self-Reliance		9,000	25,000	17,000	41,000	53,000	63,000	65,000

Percent Change in Regional Self Reliance (As Percent of Demand w/out WUE)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Percent of Water Supplies Contributing to Regional Self-Reliance	41.4%	47.6%	51.5%	44.3%	49.7%	51.5%	52.9%	52.1%
Change in Percent of Water Supplies Contributing to Regional Self-Reliance		6.2%	10.1%	2.9%	8.3%	10.1%	11.5%	10.7%

Table C-4: Calculation of Reliance on Water Supplies from the Delta Watershed

Water Supplies from the Delta Watershed (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
CVP/SWP Contract Supplies (including other imported water purchases)	173,000	146,000	139,000	130,000	134,000	136,000	139,000	142,000
Delta/Delta Tributary Diversions (diverted by SFPUC)	55,000	48,000	46,000	55,000	56,000	59,000	61,000	63,000
Transfers and Exchanges								
Other Water Supplies from the Delta Watershed								
Total Water Supplies from the Delta Watershed	228,000	194,000	185,000	185,000	190,000	195,000	200,000	205,000

Service Area Water Demands without Water Use Efficiency (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)

Service Area Water Demands without Water Use Efficiency Accounted For	355,000	328,000	334,000	370,000	378,000	388,000	397,000	407,000

Change in Supplies from the Delta Watershed (Acre-Feet)	**Baseline (2010)**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045 (Optional)**
Water Supplies from the Delta Watershed	228,000	194,000	185,000	185,000	190,000	195,000	200,000	205,000
Change in Water Supplies from the Delta Watershed		(34,000)	(43,000)	(43,000)	(38,000)	(33,000)	(28,000)	(23,000)

Percent Change in Supplies from the Delta Watershed(As a Percent of Demand w/out WUE)	**Baseline (2010)**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045(Optional)**
Percent of Water Supplies from the Delta Watershed	64.2%	59.1%	55.4%	50.0%	50.3%	50.3%	50.4%	50.4%
Change in Percent of Water Supplies from the Delta Watershed		-5.1%	-8.8%	-14.2%	-14.0%	-14.0%	-13.8%	-13.9%

Valley Water

Clean Water • Healthy Environment • Flood Protection

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