2010 Urban Water Management Plan
City of Santa Clara Water Utility

Ensuring a high quality supply of water for the community

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City of Santa Clara Resolution Number 11-7855

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ACKNOWLEDGEMENTS

A report such as this Urban Water Management Plan, is seldom the work of a single individual. The 2010 Urban Water Management Plan (UWMP) is no exception. The UWMP was a collaborative effort of several staff members of the Water and Sewer Utilities. We would like to acknowledge the many hours and hard work of the following individuals who contributed to this report.

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We would also like to thank the numerous individuals within the City of Santa Clara whose knowledge, experience, insights and comments were instrumental in the preparation of the 2010 UWMP.

The City of Santa Clara (City) has a long history of providing clean and abundant supplies of water for the residents and businesses in Santa Clara, beginning in 1895. Growing needs for water over the years have been met by finding new supplies: primarily by adding new wells to tap our groundwater resources and, since the 1960's, by delivery from the two supplies of imported water provided by San Francisco Public Utilities Commission (SFPUC) and the Santa Clara Valley Water District (District).

Several areas of concern and challenge must be successfully managed to continue meeting the needs of the community. These areas of concern primarily fall under the broad categories of water supply (quantity), of health and safety (quality) and infrastructure replacement (system reliability).

Water Supply

With projections for water demand used in this study of 11.7 % average annual growth for the next 5 years and slower 1% grow thereafter, the City of Santa Clara will continue to enjoy sufficient water availability from our four sources (three of potable water and one recycled source) to maintain the ability to deliver water to our community. This capacity is assured for the next seven years. Supplies are projected to be sufficient for all but the more severe drought years. The District in their *Draft 2010 Urban Water Management Plan* has stated that they will be able to provide all water demands for the Santa Clara County (including the City of Santa Clara) including drought scenarios through 2025. However, SFPUC projections indicate as much as a system wide water shortage of up to 20% in the event of a multiple year drought similar to the 1987-1992 drought. The City of Santa Clara has an interruptible contract for water deliveries from SFPUC; however, the *Water Shortage Allocation Plan* (a multi-party agreement adopted in 2009 and again in 2011 between the City, San Francisco and 27 other agency members of Bay Area Water Supply and Conservation Agency) provides the City of Santa Clara with a share of the City's usual supply from SFPUC during system wide water shortages up to 20%; this is currently 43% of the City's base allocation according to the Tier 2 Drought Implementation Plan. Although the City of Santa Clara could increase pumping from the underground aquifers to offset any short-term reduction in imported supplies, there are undoubtedly some limits to the firm yield from groundwater pumping and the City would need to participate in any regional effort towards water rationing. This plan addresses even more severe curtailment of water supplies that may result from a regional disaster.

While water supplies will be available through all but the driest years, the cost for new supplies for our region will be ever increasing as water becomes progressively scarcer throughout the State of California. In addition, both SFPUC and the District are expected to be replacing or improving aging infrastructure and water treatment facilities. In particular, SFPUC has identified projects for system replacement and improvements that could cost more than $4.6 billion over the next ten years. These expenditures are needed to improve both reliability and capacity in the system for all suburban water customers of SFPUC. The costs for these improvements must be repaid by increases in the SFPUC wholesale and retail water rates. If all of the improvements are completed and added to the rate base, the wholesale cost of water from San Francisco will become more than three times the current rate. While the supply from the SFPUC is currently only 11% of the City of Santa Clara's total water supply, the anticipated incurred costs for this portion of the City's water supply raises issues to be met by future policy decisions about whether to continue to take as much of SFPUC supply and how to incorporate the expected high wholesale cost into the City's retail water rate structure. In July 2009, the Water Supply Agreement (WSA) between the City and County of San Francisco and wholesale customers was finalized. All water supply policy decisions and water rates shall adhere to this regional agreement.

Any decision to reduce or eliminate SFPUC supplies will pose new challenges in obtaining added supplies from the City's two other potable water sources: groundwater and District treated water. Several improvements to the City's water system will need to be designed and constructed over the next few years to allow an increase in the capacity to receive and convey added water supplies from District treated water. Two new wells have been constructed to serve the area north of the Bayshore Freeway and to help mitigate any potential loss of SFPUC water.

The District has completed an update of their *Integrated Water Resource Plan.* The District has also prepared their own *Draft 2010 Urban Water Management Plan.* These documents help define the future water supply for Santa Clara County including quantities to be available to the City of Santa Clara. Portions of their Plan are incorporated in this Plan, as well as information from their July 2001 *Groundwater Management Plan*.[1] The District's sources of supply will be particularly important in the event of the loss of SFPUC water, either from natural disaster or policy change.

Recycled water offers one important new non-potable supply, a fourth source of water for the City and the region. The City is part owner of the South Bay Water Recycling Project (SBWRP), funded primarily by sewer utilities tributary to the San Jose/Santa Clara Water Pollution Control Plant. While recycled water is not intended to replace potable in all types of uses, it does provide a reliable drought-proof supply. It is approved by the State for "unrestricted use" and, as such, it does replace potable supplies for landscape irrigation and certain industrial uses. With the current distribution system, more than 10 percent of the City's total annual water demand is being met with recycled water.

Water Quality

All water provided by the City from the three potable sources continues to meet or better all State and Federal water quality standards. As stated above, the recycled water meets "unrestricted use" as defined by Title 22 of the California Code of Regulations. These standards have historically been growing ever more stringent. Future regulations and standards may require more extensive and expensive water treatment. While the City's groundwater continues to provide excellent quality water without any treatment, future State or Federal regulations could be imposed that would mandate some treatment, such as chlorination and/or fluoridation. Any costs for such "well-head treatment" have not been included in current water cost projections. The District has recently added, among other upgrades, the use of ozone in two of the county's three water treatment plants. Additional improvements to the third treatment plant are ongoing. These improvements are intended to

[1] The District has stated their intent to prepare an updated Ground Water Management Plan.

meet new State and Federal standards and regulations for treated surface water supplies and to improve the taste and odor of the treated water. Where costs for these water quality improvements have been identified for SFPUC and District supplies they have been included in the future water cost projections for the City of Santa Clara.

System Reliability

The City of Santa Clara is dependent on three sources of potable water and one of recycled water; all of these supplies have some possibility of interruption and differing degrees of reliability. According to engineering studies a major seismic (earthquake) event could interrupt the delivery of water from the San Francisco Hetch-Hetchy system for up to 2 months. The SFPUC is currently undertaking a multi-billion dollar capital improvement program to improve seismic reliability. A similar review of the District's potable and raw water delivery systems indicates the potential for a 2-week interruption of potable treated water deliveries to the City. Current planned projects include major capital improvements to both regional water systems for increased reliability. The reliability of the District's imported supplies (State and Federal water projects) is also threatened by possible failure of the Sacramento delta's levee systems, with interruptions possible for several months. Regional power supplies could also be interrupted, however the City has sufficient back-up power generation capacity to provide the expected potable water demand from City-owned wells and water storage tanks. This groundwater source can sustain the entire City's water demand for a limited period of time: that is for months, but not years.

The recycled water system serves primarily irrigation and some industrial customers. In an emergency that may interrupt the recycled water service, industrial customers have back-up potable water services. In addition, the recycled water system has a backup potable water supply for short-term outages. Landscaped areas can probably survive the time required for reinstatement of recycled water service.

The City's internal distribution system would also be compromised by a major seismic event. Since the majority of the City's growth has occurred over the past 40 to 50 years, and these distribution pipelines are networked throughout the City, the redundancy and reliability of the system should limit any interruptions of water service to those users that are nearest to any one pipeline break. An assessment of the vulnerability of the City's water system conducted in 2004 gave the water system fairly high marks for system security and reliability.

On all three counts, water supply, water quality and system reliability, the City has the ability to meet the needs of the community for the foreseeable future. The community must in turn be prepared to meet the fiscal requirements to support and fund the utility with retail water rates that are sufficient for these requirements.

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INTRODUCTION

The Urban Water Management Planning Act requires the preparation of an Urban Water Management Plan every five years by all water utilities serving more than 3,000 customers or supplying more than 3,000 acre feet annually. The City of Santa Clara meets this criterion and prepared an UWMP in 2000 and 2005. This current UWMP examines and updates the City's water demand projections, available supplies and implementation of conservation programs based on the changing conditions and new regulatory requirements enacted since the 2005 UWMP was prepared.

Long range water supply planning is critical to the state of California and the City of Santa Clara in order to assure the long-term reliability and sustainability of the high quality water supplies that the public expects and on which the future of the City relies. The City has taken great pride in providing reliable, high quality water at a reasonable price for the residents and businesses that call Santa Clara home.

This 2010 Urban Water Management Plan was prepared in compliance with the requirements of current Urban Water Management Act and under the guidance provided by the California Department of Water Resources.

Coordination of the UWMP Preparation

This Urban Water Management Plan (UWMP) was prepared in coordination with the two water wholesalers (San Francisco Public Utilities Commission and the Santa Clara Valley Water District) from which the City of Santa Clara purchases treated water, and with neighboring cities and water retailers.

The City of Santa Clara notified surrounding cities, the county, and the wholesale water suppliers of its intention to modify the UWMP. Additionally, the City sent notification letters or met separately with the Santa Clara Citizens Advisory Committee, Santa Clara Chamber of Commerce, and by request, to the Tuolumne River Trust. A letter was sent to each of these entities notifying them of the opportunity to participate in the development process and the availability of the draft UWMP for comments. A copy of the letter is included in Appendix A.

Coordination during development of this 2010 UWMP occurred during a series of joint meetings and working sessions with representatives from the two wholesale water suppliers, neighboring cities and the Bay Area Water Supply and Conservation Agency (BAWSCA). Meetings occurred on the following dates: June 17, 2010, October 28, 2010, and March 2, 2011. District retailer meetings and Water Supply Subcommittee Meetings were held on August 4, 2010, January 19, 2011 and March 23, 2011. During these meetings there were extensive discussions of water demand projections and water supply availability. Additionally, in order to comply with Senate Bill No.7, Steinberg (SBx7-7) 7^{th} Extraordinary Session, the City explored alternatives for forming regional alliances during these meetings to achieve regional conservation targets. In addition, the City discussed with these representatives how to incorporate such requirements into the various retailer UWMP's.

Plan Adoption, Submittal, and Implementation

This UMWP 2010 was prepared in 2011 in accordance with the Department of Water Resources *Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan (March 2011).* The plan was adopted on May 24^{th}, 2011, by the City of Santa Clara City Council at a public hearing and will serve as the required UWMP for submission to Department of Water Resources, per California Water Code section 10642. This UWMP will only be modified following a duly noticed public hearing as prescribed in Water Code section 10642. See Appendix B for the Resolution Approving the 2010 Urban Water Management Plan for the City of Santa Clara.

No later than 30 days following the adoption of this UWMP, the City of Santa Clara Water Utility will provide a copy of this plan to DWR, the California State Library, and both the City and County of Santa Clara.

This plan shall be implemented through the continued commitment of City Staff and Council to support and adhere to the various requirements set forth in this UWMP. This will be accomplished by use of continued demand management measures.

Table 1: Coordination with Appropriate Agencies

Coordination with appropriate agencies							
Coordinating Agencies	Participated in developing the plan	Commented on the draft	Attended public meetings	Was contacted for assistance	Was sent a copy of the draft plan	Was sent a notice of intention to adopt	Not involved / No information
SCVWD	x			x		x	
SFWD	x			x		x	
BAWSCA & member agencies	x			x		x	
County of Santa Clara						x	
Surrounding Cities[1]						x	
San Jose Water Co.						x	
California Water Service Co.						x	

[1]Includes the Cities of Brisbane, Burlingame, Daly City, Foster City, Hayward, Menlo Park, Millbrae, Milpitas, Mountain View, Palo Alto, Redwood City, San Bruno, Sunnyvale, along with the Alameda County Water District, Coastside County Water District, East Palo Alto Water District, Los Trancos Country Water District, Mid-Peninsula Water District, North Coast County Water District, Purissima Hills Water District, San Jose Municipal Water System, Stanford University, Town of Hillsborough, Westbourough Water District

Public Participation

The City of Santa Clara has sought public input and comments in the preparation process for this UWMP. On two occasions, the City also published announcements of the public hearing for both this UWMP, and SBx7-7, in a notice conforming with Government Code 6066 in *Inside Santa Clara*, a newspaper of general circulation distributed free of charge to all Santa Clara residents. Drafts of the UWMP were made available for public review and comment at public libraries in the City of Santa Clara from April 2011 to May 2011 following the public notice. A copy of the notice is located in Appendix C.

Service Area Physical Description

The City of Santa Clara Water Utility service area is outlined by the City limit boundaries of the City of Santa Clara. Santa Clara is located on the southern end of the San Francisco Bay, bounded on the north, east and south by San Jose, on the west by Sunnyvale, and on the southwest by Cupertino. Santa Clara occupies part of an alluvial plain, which stretches across the width of the south bay region. The City is approximately three miles wide by seven miles long. Ground elevations vary rather uniformly from near sea level at the north end of the City to 175 feet above sea level at the south end. The south San Francisco Bay area is has a high concentration of high technology industry, and is known as the "Silicon Valley."

The City of Santa Clara has four sources of water. These sources include two treated water sources, groundwater, and recycled water. The two treated water sources are the Santa Clara Valley Water District ("SCVWD" or "District") and the San Francisco Public Utilities Commission ("SFPUC"). The City of Santa Clara Water Utility distribution system consists of 334 miles of distribution mains, 7 storage tanks totaling 27.3 million gallons of storage capacity, 28 wells, and 3 booster pump stations. Sixty-eight percent of the 7.5 billion gallons of water that flows to Santa Clara customers each year is obtained from the City's own wells.[2]

The recycled water system has been in operation since 1989. In 2010, roughly eleven percent of the City's overall water supply was recycled water purchased from South Bay Water Recycling ("SBWR"). Currently 6.6 miles of recycled water pipeline is being constructed adding to the existing 20 miles through the use of funds from the American Recovery and Reinvestment Act (ARRA). Recycled water comes from the City of San Jose/Santa Clara Water Pollution Control Plant (WPCP), an advanced tertiary treatment facility located in San Jose near Alviso.

The City of Santa Clara Department of Water and Sewer Utilities is a utility enterprise which provides the planning, design, construction, maintenance and operation of the City's water production, distribution, metering and water quality monitoring. The Utility currently has approximately 60 employees both at City Hall and in the field headed by a Department Director. The fiscal year 2010/11 operating budget was $41.8 million.[3] In 2010, the Water Utility had approximately 25,628 water service connections. [4] The Utilities' maximum supply capacity is 88 million gallons/day (MGD) potable water; 18 MGD recycled water and average consumption is 20.9 MGD potable water; 2.5 MGD recycled water.[5]

[2] September 2010 City Budget 101 pamphlet, www.santaclaraca.gov (City website)
[3] City Manager's Transmittal Letter, Operating Budget Fiscal Year 2010-11
[4] Department of Water Resources – City of Santa Clara Annual Report 2010
[5] Community Economic Profile Pamphlet, City of Santa Clara, 2010

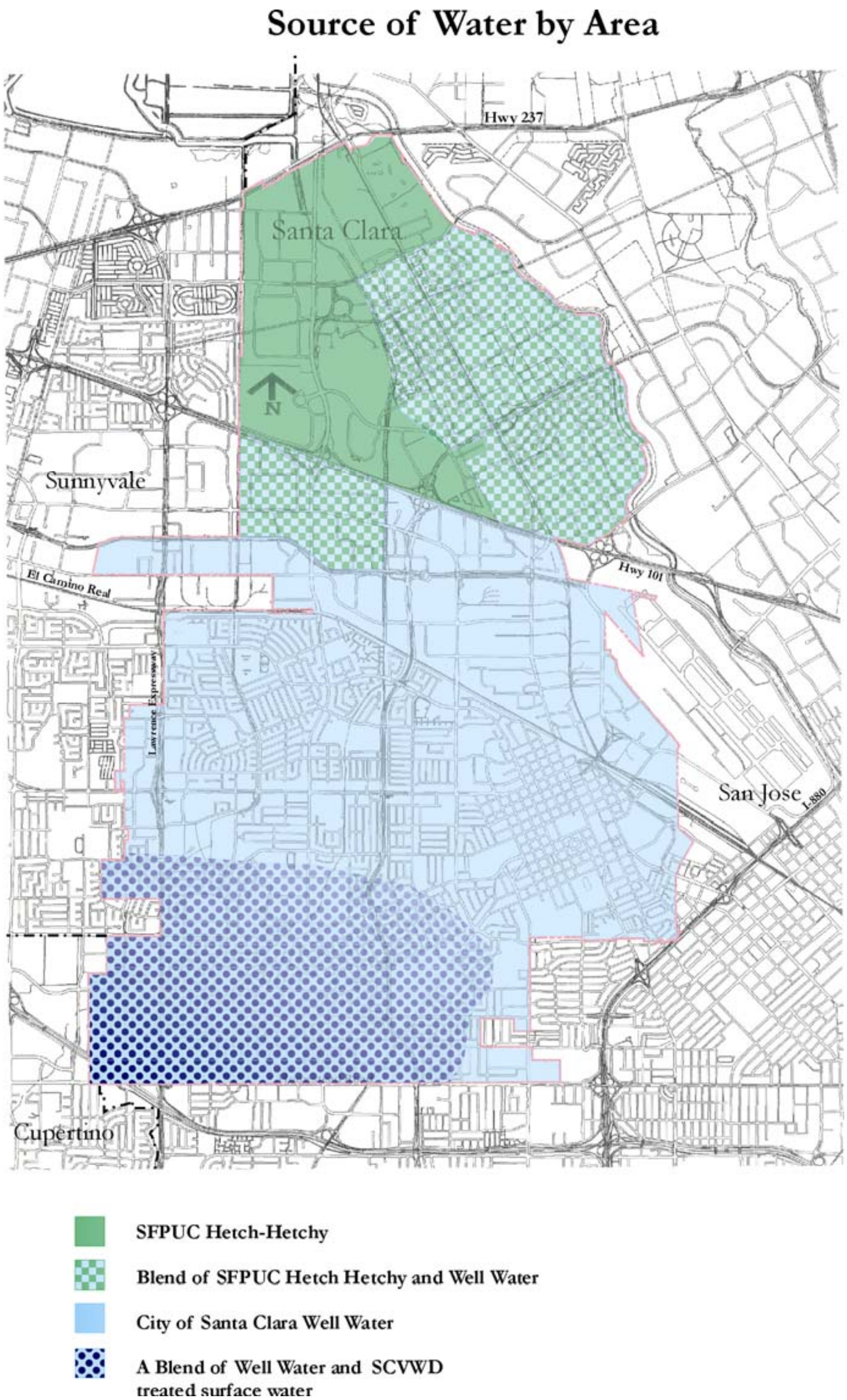

Figure 1: Geographic Area

Service Area Land Use

The present area of the City is 12,352 acres or 19.30 square miles. Santa Clara is built out, with over 97 percent of its land area developed primarily in a low density, suburban form. New businesses and residences will need to intensify existing development. Residential areas are currently approaching build out and further growth in this sector will most likely be high-density housing.

Although the City is essentially built out, a significant potential remains for redevelopment and on-site expansion. Some industrial facilities in the City have reserved land for future expansion on their current sites, and single story development has potential for conversion to higher density, multi-story development. Between 2000 and 2008, the number of housing units in Santa Clara increased from 39,521 to over 44,166 (approximately 12 percent). The majority of these units, 42 percent, are single-family detached units. However, housing developments with five or more units have been the fastest growing housing type in recent years, adding over 3,000 units (an increase of 24 percent) since 2000. This suggests an increase in higher-density, smaller, more affordable (though not necessarily subsidized) units.[6]

There are 2,291 acres in the city limits planned for light and heavy industry. Vacant industrial parcels range in size from 20,000 square feet to 15 acres, many of which are in industrial parks. There are more than 500 manufacturing plants in Santa Clara. Leading group classes of products are electronic equipment, communication equipment and fiberglass. However, the majority of more than 8000 businesses in Santa Clara are non-manufacturing. Leading group classes of services are electronic equipment, communications, software and education[6] At an increasing rate, large server farms, historically heavy users of water for evaporative cooling used to cool stacks of concentrated computer server equipment, are moving into the City. Many of the server farms are taking advantage of lower priced recycled water.

Service Area Climate Characteristics

The climate in Santa Clara is semi-arid with warm and dry weather lasting from late spring through early fall. The prevailing winds are from the northwest with a mean speed of 5.8 mph. The average annual precipitation is 14.8 inches per year which falls mostly between November and April. Average monthly rainfall from May to October is less than 1 inch per month, and drops to essentially zero in July and August. The average monthly temperature is 58.3 degrees Fahrenheit.[7] Detailed monthly data is listed in Table 2[8] below:

Table 2: Climate Statistics

	Average Temperature			Rain	Humidity	
Period	Min.	Mean	Max.	Inches	Noon	4 p.m.
January	42	50	59	2.76	64	66
April	48	60	72	1.17	51	54
July	58	71	84	0.06	49	50
October	52	64	76	0.89	50	54
Year	49.1	60	70.9	14.19	53	56

[6] City of Santa Clara, General Plan 2010
[7] Retrieved online from www.worldclimate.com
[8] Data compiled from Western Regional Climate Center

Service Area Demographic Factors

The City of Santa Clara is a diverse community. According to the 2000 Census[9], the racial make up of the City is 55.6% White, 29.3% Asian, 16.0% Hispanic or Latino, 2.3% African American, 0.5% Native American, 0.4%Pacific Islander, 6.9% other races and 5.0% from two or more races.

Nearly 30 percent of City of Santa Clara households have incomes over $100,000, another 37 percent have incomes between $50,000 and $100,000, and the remaining one-third of households have incomes below $50,000. Nine percent of people in the City of Santa Clara are considered in a condition of poverty.[10] The Association of Bay Area Governments (ABAG) estimated that there were 106,680 jobs in the City in 2008 and that the number of jobs in Santa Clara will increase to nearly 117,000 by 2015.

According to the City's 2010-2035 General Plan, there are 39,630 housing units within the City. Households are expected to grow at a similar rate as population, suggesting consistency in household size (about 2.6 persons per dwelling). There were roughly 44,166 households in 2008. Between 2010 and 2015 it is estimated that an additional 4,767 households are anticipated to be added by 2015 for a total of 48,933 households.[11] Race and ethnic characteristics of a population imply certain housing needs as some demographic and economic characteristics correlate with race. As mentioned earlier, the average household size for the City of Santa Clara was 2.6 in 2009. However, the average household size for Hispanics was 3.4 and for Asian or Pacific Islanders 3.0. These numbers reflect multi-generation families and/or a higher number of children which may require larger units with more bedrooms.

The City of Santa Clara has seen increases in young and older residents in recent years. Children under four and adults between the ages of 45 and 64 are the age cohorts with increasing percentages of the population. These two age groups represent the largest percent share increase of any age cohort. This data suggests that as the City becomes both older and younger, there may be a need for additional family housing, with two or more bedrooms, as well as housing for seniors.[6]

Service Area Population Projections

According to the U.S. Census, Santa Clara's population grew 49 percent between 1960 and 1980. Since that time, constraints on available land for residential development have limited housing development and population growth. During the 20-year period between 1980 and 2000, the City's population grew 17 percent, from 87,700 to 102,361. Despite some of the highest rents and home prices in the nation, more recently the Silicon Valley continued to attract new residents and experienced continuing increases in population. In the year 2006, the American Community Survey (ACS) reported a population of 112,098, an increase of ten percent since 2000. The Association of Bay Area Governments (ABAG) projects that the City will grow at a moderate rate over the next five years, resulting in a population of approximately 125,397 by 2015. The historic and projected population for Santa Clara through 2035 is based on the 2007 ABAG projections as shown in Table 3.

[9] 2000 U.S. Census Bureau fact sheet for City of Santa Clara, on line source accessed 1/31/2011
[10] United States Census: American Community Survey 2006
[11] Information provided with Carol Anne Painter, City Planning Department, 04/6/11

Table 3: Population – Current and Projected

Population — current and projected							
	2010	2015	2020	2025	2030	2035	Data source
Service area population	118,459	125,397	131,732	136,660	141,587	146,917	2007 ABAG

The population projections discussed above are based on the populous found within the city limits of the City of Santa Clara. The City's water service area covers all and only those water services connections found within the city limits, therefore the population projections above reflect the entire water service area.

Water Demands

For purposes of water use tracking and long range planning, the City's water accounts are categorized into six broad categories of users: single-family residential, multi-family residential, industrial, commercial, institutional and municipal. Landscape irrigation is not separated in a distinct category. Although separate landscape irrigation meters do exist within the City, these accounts are coded the same as the general account for each facility. Therefore, water delivered through an irrigation meter at a site is included as usage within that site category (e.g. industrial). A more detailed discussion of landscape demand appears under the section below entitled Landscape Irrigation.

Figure 2 shows the historic water demands by each user category. In examining the historical usage by user category, several facts become apparent. With the exception of industrial use, water use in all other categories remain relatively consistent even with an overall growth in the City. Additionally, single family residential water use has seen a decline since its peak in the late 1990s with sharper decline in the last three years. Multi-family residential water use has seen a slight decline from 2007-2010 after being relatively stable the previous 10 years. Commercial water use shows a continued, but gradual decline from 2007-2010 which coincides with the recent economic downturn. Industrial water use has seen a sharp decline since peak usage in 1996. This may be attributed to changes in the electronics industry as well as increases in the use of recycled water for industrial and commercial purposes. Institutional and municipal water use has been relatively flat for the past 12 years.

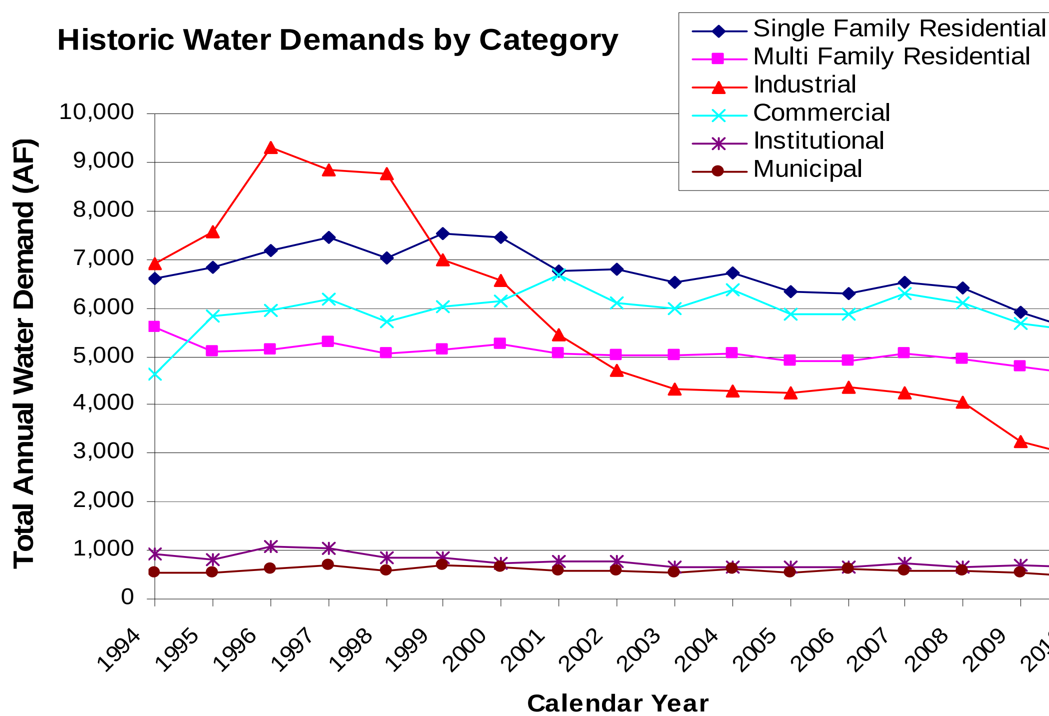

Figure 2: Historic Water Demands by Category

Table 4 shows that water use across all user categories were down in 2010 when compared to 2005 even as the number of residential and municipal accounts increased. Total annual water use decreased by nearly 3,000 acre-feet from 2005 to 2010. Most notably, there is an 800 AF decrease in single family residential water use and a 300 AF decrease in multi-family water use. The current economic downturn, water conservation measures, and increased rainfall have contributed to the decline in water use.

Table 4: Actual Water Deliveries

Water deliveries — actual, 2005, 2010 (Acre-feet/year)				
Water use sectors	2005 (metered)		2010 (metered)	
	# of accounts	Volume	# of accounts	Volume
Single family	16,872	6,345	16,919	5,506
Multi-family	4,552	4,911	4,790	4,626
Commercial	2,566	5,853	2,520	5,517
Industrial	437	4,235	417	2,932
Institutional	133	650	137	668
Municipal	340	555	275	472
Total	24,900	22,548	25,058	19,720

Water use is inherently variable. Water usage is dependent on a number of factors including weather, season, day, hour, customer category and, for certain industries, business climate and the economy. Some general patterns are obvious such as irrigation usage increases during summer months. Long-term general trends in overall usage are valuable in projecting future supply requirements for categories of users.

Determining the patterns of usage and peak demands is critical for long term water supply planning. Peak demand factors are also critical in calculating the distribution system's capability of meeting the peak hour, peak day and peak month demands. However, this UWMP only examines the City's ability to meet average annual demands.

Figure 3 shows the total sales by user classification for 2010. Residential uses account for about 52% of total water sales while the commercial/industrial sectors combine to account for roughly 43% of water sales. Municipal and Institutional sales account for 5% of water sold. The City has a diverse industrial base with many customers that are dependent on water as a part of their manufacturing processes. During the economic downturn, many of these processes were reduced or stopped altogether. This resulted in a significant decrease in industrial use and along with minor decreases in other user categories, contributed to significantly lower than projected water use.

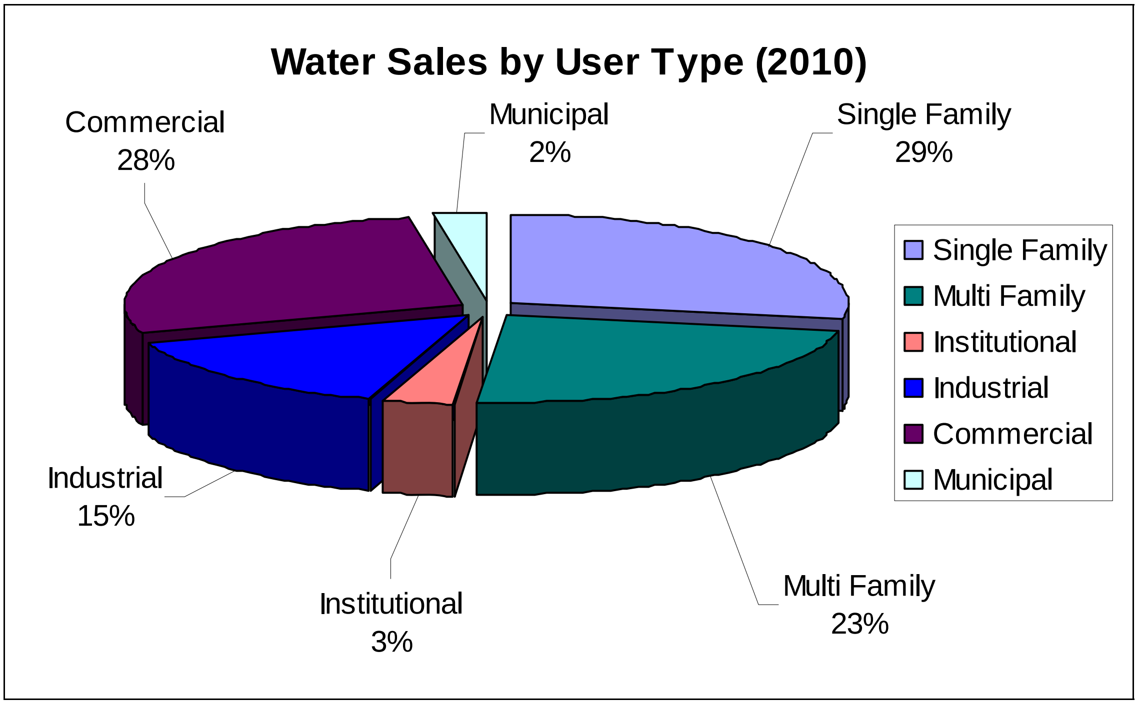

Figure 3: Water Sales by User Type (2010)

Baselines and Targets

In November 2009, the California state legislature passed the Water Conservation Act of 2009 (also known as SBx7-7). SBx7-7 requires the State of California to achieve a 20% reduction in urban per capita water use by the end of 2020. As part of this bill, the City of Santa Clara Water Department is required to set water use targets to be met by 2020. The City of Santa Clara is committed to meeting all requirements set forth in SBx7-7.

A historic water use baseline must be established in order to formulate a target water use goal for 2020. The baseline was calculated by first establishing the annual gross water use in the City. This was done by taking monthly meter readings at all sources of potable water within the City of Santa Clara water system. Meters were also read at connections with the Santa Clara Valley Water District, San Francisco Public Utilities Commission, and at all groundwater wells supplying potable water to the City. Figure 4 shows the location of metering points and the service area for the City of Santa Clara. Table 5 shows the metering data.

The annual gross water use was divided by 365 days and the result was divided again by population estimates given by the California Department of Finance to calculate a daily per capita water use. The average of the 10 year (1995-2004) daily per capita water use is the established 10 year water use baseline. Table 6 shows the calculations in detail.

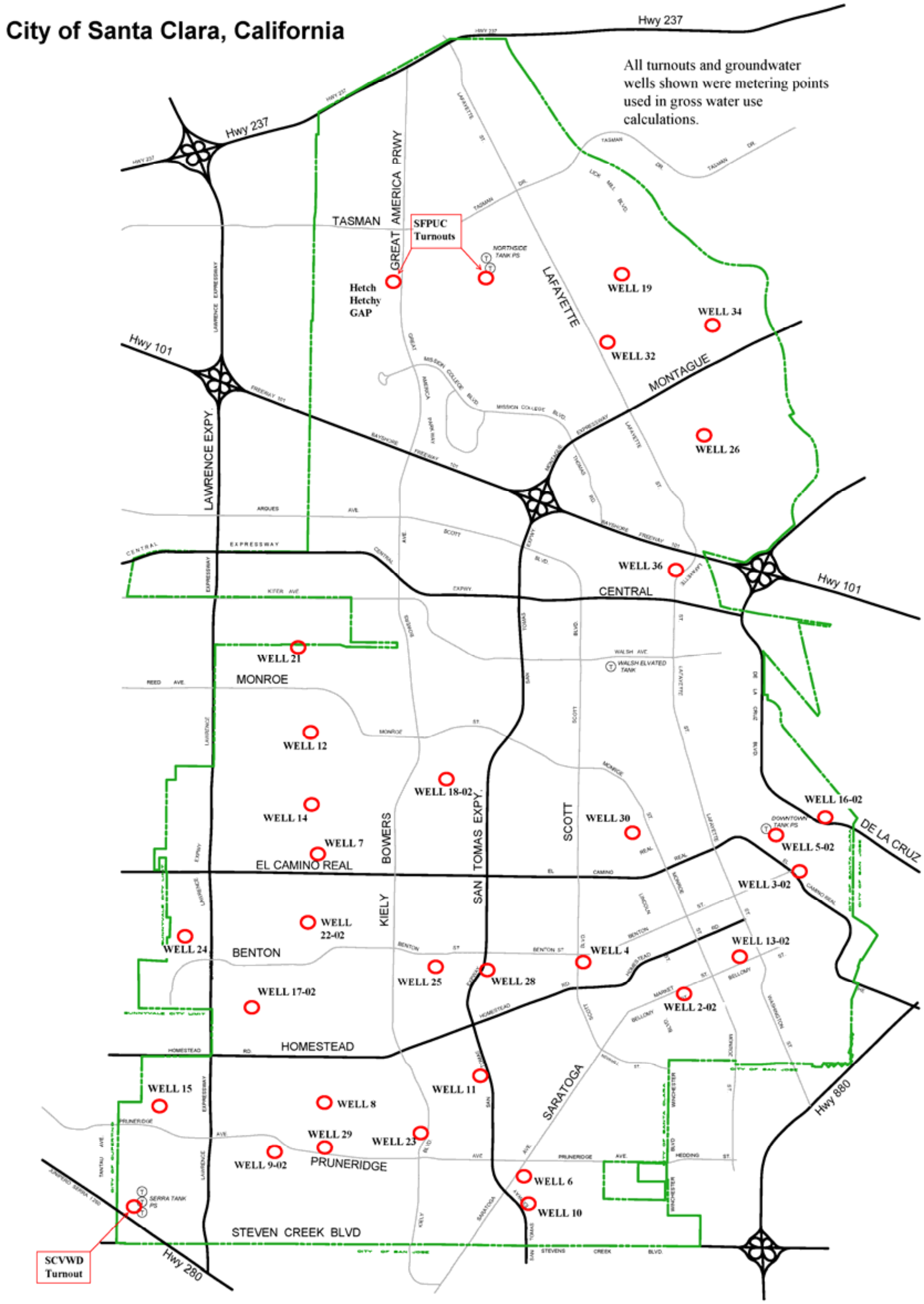

Figure 4: City of Santa Clara Distribution System and Source Metering Points

Table 5: Urban Metering Data for Urban Water Gross Water Use

Urban Retail Water Supplier Gross Water Use Calculation										
Utility Name: City of Santa Clara	12-month period: January 1st to December 31st Volume Units: Acre-feet									
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Groundwater Subtotal (volume from own sources)	18,338	20,417	20,508	18,188	17,188	18,440	17,222	15,919	15,353	15,942
SCVWD Imported Water	4,311	4,321	4,325	4,488	4,509	4,266	4,161	4,133	4,183	4,222
SFPUC Imported Water	4,829	4,345	4,968	5,529	5,145	4,692	4,285	4,455	4,150	4,232
Imported Water Subtotal:	9,140	8,666	9,293	10,017	9,654	8,958	8,446	8,588	8,333	8,454
Gross water use	27,478	29,082	29,801	28,205	26,842	27,398	25,668	24,507	23,686	24,396

Table 6: Base Daily Per Capita Use

Base daily per capita water use — 10 to 15 year range				
Base period year		Distribution System Population	Daily system gross water use (mgd)	Annual daily per capita water use (gpcd)
Sequence Year	Calendar Year			
Year 1	1995	96,915	25	253
Year 2	1996	97,774	26	266
Year 3	1997	99,201	27	268
Year 4	1998	100,602	25	250
Year 5	1999	101,307	24	237
Year 6	2000	101,605	24	241
Year 7	2001	103,386	23	222
Year 8	2002	104,031	22	210
Year 9	2003	105,581	21	200
Year 10	2004	107,616	22	202
Base Daily Per Capita Water Use				235

After consideration of all four methods in SBx7-7, the City of Santa Clara has selected to set its water use target by adopting method 1 of SBx7-7. This method allows the City of Santa Clara to set water use targets in compliance with SBx7-7 while allowing it to best utilize staff time. Additionally, it will help ensure that the City of Santa Clara contributes to a cumulative 20 percent reduction of water use in the State of California by 2020.

Method 1 of SBx7-7 states that the 2020 water use goal shall be 80% of the historic 10-year baseline of the water agency. This would result in a 2020 target of 187 gallons per capita per day (gpcd) for the City of Santa Clara following method 1. However, this target must be compared with 95% of a 5 year water use baseline. The lower number shall be used as the 2020 water use goal.

The 5 year baseline is established following the same methodology as the 10 year baseline. Calculations are shown below in Table 7. The 5 year baseline was selected (as seen in Appendix D) as the 5 year period which best represents the utility's peak historic water use, ending between 2004 and 2010. The 5 year baseline is taken from 2003-2007 and is calculated to be 196 gpcd. The maximum allowable water use target for 2020 is 95% of this 5 year baseline, which results in a goal of 186 gpcd for the City of Santa Clara. Since this target is less than the target generated by method 1, the City must adopt 186 gpcd as its 2020 water use target.

Additionally, an interim water target goal must also be set for 2015. This goal is the midpoint between the historic 10-year baseline water usage and the 2020 goal. The City of Santa Clara's 2015 goal is 210 gpcd. A summary of the baseline water use and water use targets are shown in Table 8: SBx7-7 Baselines and Water Use Targets.

Table 7: Base Daily Per Capita Water Use

Base daily per capita water use — 5-year range				
Base period year		Distribution System Population	Daily system gross water use (mgd)	Annual daily per capita water use (gpcd)
Sequence Year	Calendar Year			
Year 1	2003	105,581	21	200
Year 2	2004	107,616	22	202
Year 3	2005	108,717	21	193
Year 4	2006	110,682	21	193
Year 5	2007	113,575	22	190
Base Daily Per Capita Water Use				196

Table 8: SBx7-7 Baselines and Water Use Targets

SBX7-7 Baselines and Water Use Targets				
	Baseline Water Use	2015 mid-cycle (gpcd)	2020 Target (gpcd)	Reduction (gpcd)
Method 1 (80% of 10 year baseline)	235	210	187	47
Maximum Allowable 2020 Goal (95% of 5 year baseline)	196	n/a	186	46
City of Santa Clara Water Use Target	n/a	210	186	46

Water Demand Projections

One of the goals of this Plan is to forecast the future water demand to determine the capability of the water supply to meet projected future needs. In order to project future water demand a model or methodology must be selected.

The water demand projections were developed using an "End Use" model. Two main steps are involved in developing an End Use model: 1) Establishing base-year water demand at the end-use level (such as toilets, showers) and calibrating the model to initial conditions; and, 2) Forecasting future water demand based on future demands of existing water service accounts and future growth in the number of water service accounts.

Establishing the base-year water demand at the end-use level is accomplished by breaking down total historical water use for each type of water service account (single family, multifamily, commercial, irrigation, etc.) to specific end uses (such as toilets, faucets, showers, and irrigation).

Forecasting future water demand is accomplished by determining the growth in the number of water service accounts. Once these rates of change were determined, they were input into the model and applied to those accounts and their end water uses. The end use model also incorporates the effects of the plumbing and appliance codes on fixtures and appliances including toilets (1.6 gal/flush), showerheads (2.5 gal/minute), and washing machines (lower water use) on existing and future accounts.

The basic methodology of the model is to break down water usage into an average consumption per account type. Projections are made regarding potential reductions in average consumption based on water conservation programs, and natural replacement of less water efficient processes with more efficient processes. These projections are used to adjust the future average consumption per account figures. Projections of the future number of accounts for each user type of the future number of accounts are also calculated, typically based on other technical studies such as Association of Bay Area Governments (ABAG) projections or census data. The projected number of accounts is based on the projected number of housing units for residential or the projected number of jobs in the case of the industrial and commercial categories. Job projections were taken from the ABAG publication, “Silicon Valley Projections”. Once the number of accounts and the average consumption per account are calculated, the number of accounts for each future year is multiplied by the average consumption per account for that year to arrive at a total water demand for each user type. The projected demands for each user category are found below.

The City of Santa Clara recently updated its general plan. The 2010-2035 General Plan used population projections based on ABAG 2007 Projections with slight variances due to additional localized growth within the City of Santa Clara. The differences between the 2010-2035 General Plan population projections when compared to the ABAG 2007 Projections are minimal. Only residential water demand was adjusted by the percent difference of the two population estimates. However, the residential water demand is only a portion of the total water demand as noted in Table 9 and 10. The percent differences are captured in the table below. All population projections between the water demand model and General Plan Update 2035 are less than ±5% difference and are found to be negligible. For the purposes of the 2010-2035 General Plan, the City only adjusted water demand projections for the residential water use category. This reflects the population projections between the water demand model (ABAG 2007) and the General Plan population projections. Since the population differences cited below are found to be negligible, the City will use the demand projections found in Table 16 for the purposes of this UWMP, consistent with the end use model.

Table 9: Population Difference

Population Difference, ABAG 2007 and General Plan Update 2035						
Year	2010	2015	2020	2025	2030	2035
ABAG 2007	118,459	125,397	131,732	136,660	141,587	146,917
General Plan	122,853	128,955	135,057	141,159	147,261	153,363
% Difference	3.6%	2.8%	2.5%	3.2%	3.9%	4.2%

Table 10: Demand Difference

Demand Difference, ABAG 2007 and General Plan Update 2035						
Year	2010	2015	2020	2025	2030	2035
% Population Difference	3.6%	2.8%	2.5%	3.2%	3.9%	4.2%
Acre-ft /yr Difference (residential)	405	405	378	498	626	704
Adjusted Demand (acre-ft/yr)	26,578	26,578	27,995	29,422	30,967	32,359
% Difference in total demand	1.52%	1.52%	1.35%	1.69%	2.02%	2.18%

In addition to comparing the City's General Plan population growth to ABAG 2007 population projections, the utility has also examined future development projects which are anticipated to occur through 2021 within the City service area. A list of these projects is found in as Appendix E. This project list was provided by the City's Planning Department and coincides with the population growth from City of Santa Clara General Plan, seen in Table 9. Therefore these projects are included as the City's demand calculations and analysis found within this UWMP.

Residential

The water usage data for single and multi-family dwellings can be reduced to a per capita value by dividing the total residential water sales by the population of the City for that year. The per capita residential water usage has decreased over the past 15 years due to water conservation and water efficiency standards for devices such as ultra-low flush toilets and low-flow showerheads. During the 15 year period between 1995 and 2010, the per capita residential water use appears to be declining at a gradual rate, ending under 80 gpcd in 2010. Figure 5 illustrates this downward trend.

Single family and multi-family residential were separated in the projections for the residential sector. Population projections from ABAG Silicon Valley Projections were used in conjunction with the End Use Model to calculate future residential water demand.

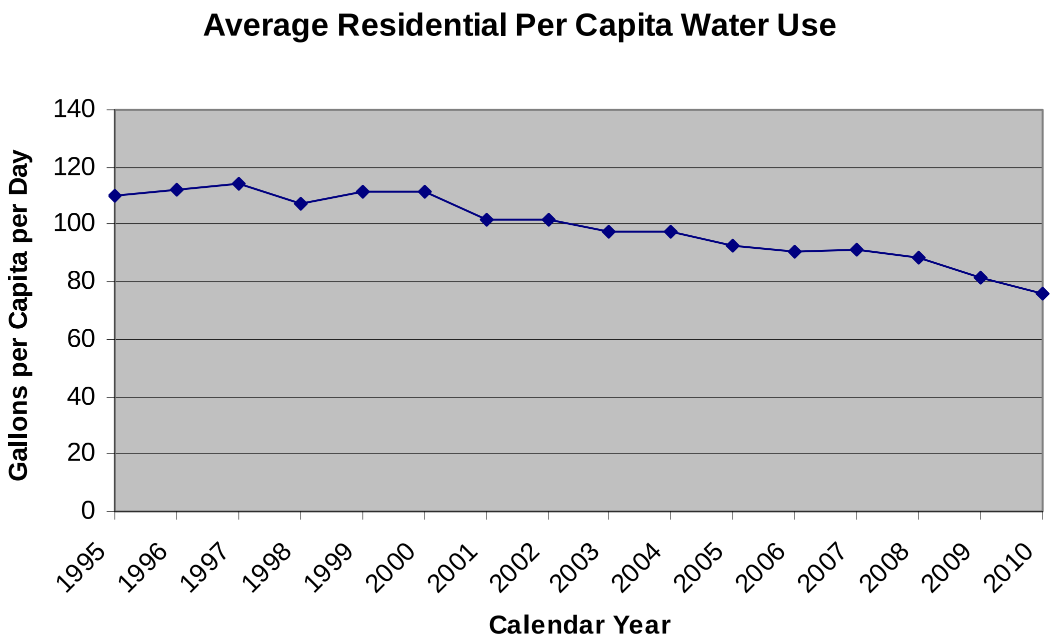

Figure 5: Average Residential Per Capita Water Usage

Industrial

The industrial sector, for purposes of this UWMP, consists of food manufacturers and processors, paper product manufacturers, industrial chemical manufacturers, metal finishing facilities, machinery manufacturers, electronics industry and measuring equipment manufacturers. The predominant industry within the City of Santa Clara is electronics manufacturing.

As can be seen in the graph in Figure 2, the water sales for the industrial sector has dramatically decreased since peak usage around 1996. This decrease in water sales to the industrial sector is due in part to the economic downturn experienced by the Silicon Valley region.

The economic downturn over the last few years had led to a loss of jobs in the area. While some of these job losses are temporary and some are permanent, the water projections assume that these jobs will return. This will result in lower actual water usage should the economy not completely rebound and/or jobs not return to the City.

Preparing projections of future water demand for the industrial category is problematic because a small number of large volume water users have a significant effect on the overall usage data. The water usage within this category is related most significantly to production levels within the electronics industry, which represents close to 80% of the water usage within the industrial category and 12% of the total water demand within the City, based on water sales for 2010.

Additionally, the expansion of the recycled water distribution system within the City will allow more industrial customers access to recycled water for their cooling towers and processing uses.

Commercial

The Commercial sector is comprised of all non-residential accounts that are also not classified as municipal, institutional, or industrial. The types of facilities that are included in this category are hotels, automotive repair, gas stations, automotive dealerships, retail stores and restaurants.

Water demand for this category has seen a gradual decrease since its peak in 2001. This corresponds to the implementation of new conservation measures and the loss of jobs due to the economic downturn. A continued decrease in demand is projected for this category for 2015 before a rebound in sales is projected in 2020 and beyond. As is the case with the industrial category, recycled water use is anticipated to meet an increasing amount of demand. The model compensates for this increase in the use of recycled water by reducing the projection for commercial accounts.

Institutional

The institutional base consists of the colleges and hospitals within the City. This category is relatively stable compared to other categories such as the commercial sector where a certain degree of business turn over is expected.

Municipal

This category includes City, county, and state buildings that are located in the City of Santa Clara, as well as parks, median strips and school district facilities. Municipal water use has remained relatively constant over the past 14 years. This category is typified by large green space, such as parks and school play fields. This is evident from the percentage of water demand that is attributable to external use. Additions (new accounts) to the municipal category have been offset by use of recycled water for landscape irrigation.

Landscape Irrigation

As noted earlier in this UWMP, landscape irrigation is not broken out as a separate category. The City of Santa Clara has 580 dedicated landscape meters but the usage through these meters is categorized the same as the main water meter for their related facility. During the course of preparing the water demand projections, the average amount of irrigation per category type was calculated based on comparisons between summer and winter water usage. The calculated percentages of outside usage are shown in Table 11 below.

Table 11: Calculated Landscape Water Use by Category

Internal vs. External (Landscape) Water Use		
	Internal	External
Single Family	50.47%	49.53%
Multi Family	76.41%	23.59%
Industrial	77.26%	22.74%
Commercial	60.80%	39.20%
Institutional	35.92%	64.08%
Municipal	26.66%	73.34%

System Losses

Water loss within the distribution system can occur due to leaks, breaks, malfunctioning valves, fire suppression and the difference between the actual and measured quantities from water meter inaccuracies. A certain amount of loss is anticipated and considered normal. Some water losses are legitimate unmetered uses such as for mainline flushing, tests of fire suppression systems, and street cleaning. Figure 6 shows the distribution system losses as a percentage of total sales over the last ten years.

The losses experienced by the Santa Clara water distribution system are substantially lower than the 10% losses normally experienced by systems in urban areas[12]. 95 percent of public water distribution systems experience losses between 7% and 15%. The City's low percentage of unaccounted for water is not typical and resulted in one area of deviation from the End Use Model prepared by Maddaus Water Management[13]. The system loss projections and total demand projection contained in this UWMP assume a future system loss percentage of 3.4%, which is the 10 year (2001-2010) average for the Utility. For purposes of projecting future demand, system losses will be calculated at 3.4% of the total of the water demand projections for all other user categories. Figure 6 shows an increase in system losses as a percentage of total water sales. Declines in total water sales have contributed to a higher percentage of unaccounted for water in recent years. Should water demands reach projected levels, it is anticipated that unaccounted for water will return to the 10 year average of 3.4% in future years.

[11] AWWA, Water Resource Planning; Manual of Water Supply Practices M50, 2001, p33
[13] End Use Model prepared by Maddaus Water Management

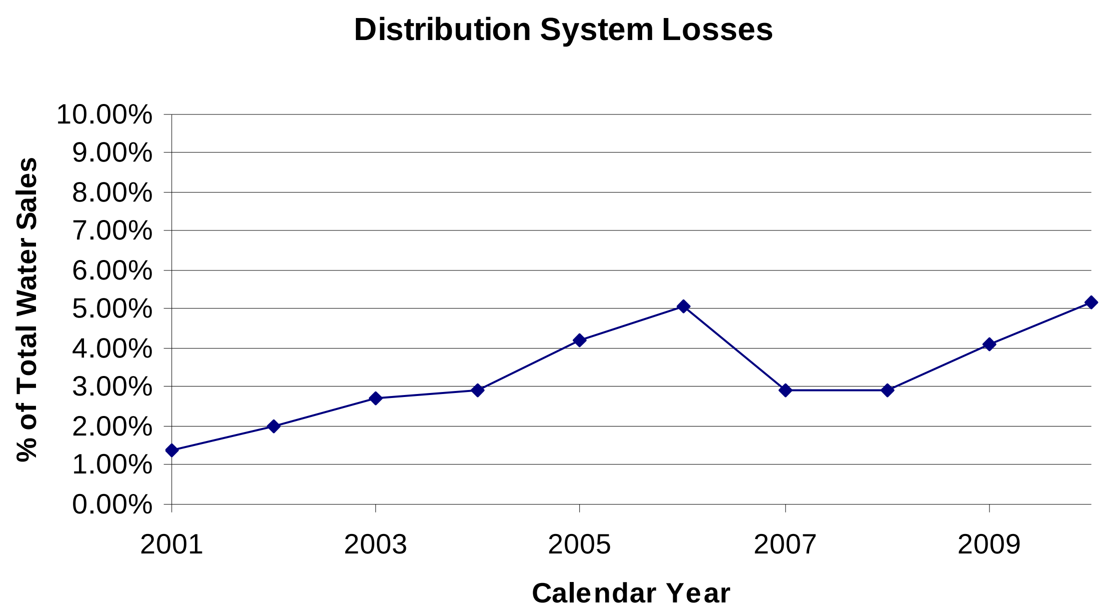

Figure 6: Distribution System Losses by Year

As noted earlier the projected water demands for each category of users were prepared using data from the End Use Model prepared by Maddaus Water Management. The projected water deliveries for each category of water users are calculated by multiplying the projected number of accounts by the projected average usage per account. The resulting projected water demand by category is shown in Table 12 and 13. These tables reflect only potable water demand.

Table 12: Water Deliveries Projected (2015-2020)

Water deliveries — projected, 2015, 2020 (acre-feet)				
Water use sectors	2015		2020	
	Metered		Metered	
	# of accounts	Volume	# of accounts	Volume
Single family	20,020	8,603	21,032	9,084
Multi-family	4,260	5,868	4,475	6,019
Commercial	2,163	4,879	2,373	5,238
Industrial	411	5,150	443	5,519
Institutional	139	950	146	998
Municipal	406	723	427	759
Total	27,399	26,173	28,896	27,617

Table 13: Water Deliveries Projected (2025-2035)

Water deliveries — projected 2025, 2030, and 2035 (acre-feet)						
Water use sectors	2025		2030		2035	
	metered		metered		metered	
	# of accounts	Volume	# of accounts	Volume	# of accounts	Volume
Single family	21,818	9,444	22,605	9,825	23,456	10,306
Multi-family	4,643	6,115	4,810	6,237	4,991	6,455
Commercial	2,594	5,633	2,829	6,067	2,877	6,158
Industrial	477	5,909	513	6,324	550	6,776
Institutional	152	1,035	157	1,072	163	1,113
Municipal	443	788	459	816	476	847
Total	30,127	28,924	31,373	30,341	32,513	31,655

Table 14 shows that, in general, the average usage per account is shown to decrease over time. This decrease is the result of conservation, reduction in usage due to equipment and fixture changes and improved efficiency. The residential development trends currently seen in the City are for high density housing with smaller landscaping areas resulting in decreased irrigation demands.

Table 14: Projected Water Usage per Account

Projected water usage per account in AF/Y					
Category Use	2015	2020	2025	2030	2035
Single family	0.43	0.43	0.43	0.43	0.44
Multi-family	1.38	1.35	1.32	1.30	1.29
Commercial	2.26	2.21	2.17	2.14	2.14
Industrial	12.54	12.46	12.39	12.33	12.32
Institutional	6.82	6.84	6.81	6.83	6.83
Municipal	1.78	1.78	1.78	1.78	1.78

Table 15: Total Water Use

Total water use (acre-feet/year)							
Water Use	2005 (actual)	2010 (actual)	2015	2020	2025	2030	2035
Total water deliveries	22,548	19,720	26,173	27,617	28,924	30,341	31,655
Sales to other water agencies [1]	0	0	0	0	0	0	0
Recycled water	2,817	2,409	4,000	4,300	4,500	4,500	4,500
Additional water uses and losses	1,051	1,085	1,086	1,136	1,181	1,230	1,278
Total	26,417	23,213	31,259	33,053	34,605	36,071	37,433

[1] *The City of Santa Clara does not retail water to other water agencies*

Table 15 summarizes the total projected water use adding recycled water and system losses. As discussed earlier, system losses are projected to be at 3.4% of water sales. Recycled water use is expected to increase as a number of new projects will be using recycled water for industrial or irrigation purposes. Recycled water will be discussed in further detail in the System Supplies section.

Water Use Reduction

The End Use Model produces conservation savings separate from the overall demand projections. These projected conservation savings must be taken into account before comparing demand projections with SBx7-7 goals. After accounting for anticipated conservation savings, the projected demand is divided by the projected population to generate a per capita water demand projection. Table 16 shows the calculations. Projected per capita water demand is projected to be significantly lower than the 2015 interim water use target and projected to meet the 2020 water use target.

2001 is used as the base year for the end use model because this was considered the most recent "normal" water year that did not include a drought or an economic recession. This provides a conservative estimate of demand projections. Should the economy not return to previous levels, water demand would be lower than the projections. Table 16 can be considered a worst case scenario of water demand.

Table 16: Comparison of Demand Projections to SBX7-7

Comparison of Demand Projections to SBX7-7 Goals		
	2015	2020
Projected Potable Water Demand (AF/Y)[1]	27,259	28,753
Conservation Savings (AF/Y)	1,031	1,362
Projected Potable Water Demand after Conservation (AF/Y)	26,228	27,391
Population Projection (ABAG 2007)	125,397	131,732
Projected per Capita Water Demand (gpcd)	187	186
SBX7-7 Water Use Goal (gpcd)	210	186

[1] Includes water losses

Lower Income Water Demand

Projected lower income water demands were calculated using data in the Housing element section of the 2010-2035 General Plan. ABAG 2009 projections provided total household projections for 2015-2035. Estimated lower income household numbers were available for the years 2000 and 2006 through the 2010-2035 General Plan. Lower income housing households as a percentage of total households remained the same for 2000 and 2006. The percentage is then extrapolated through 2035. The total projected residential water demand is multiplied by the percentage of lower income households in the city. Total projected lower income water demand is shown below in Table 18. Per unit lower income water demand was calculated as 0.33 AF/unit/year for 2000 and 0.27 AF/unit/year for 2006. The average value of 0.30 was chosen as the baseline per unit demand to be used for projections to 2035. The per unit lower income water demand was then multiplied by the number of projected lower income households in order to calculate total lower income water demand.

Table 17: Lower Income Water Demand

Lower Income Water Demand Calculations							
Year	2000[1]	2006[1]	2015	2020	2025	2030	2035
Lower income households	12,228	13,457	14,449	15,538	16,758	17,977	19,187
Moderate income and above households	26,281	28,921	31,061	33,402	36,022	38,643	41,243
Total households	38,509	42,378	45,510	48,940	52,780	56,620	60,430
Lower income households as percentage of total households	31.75%	31.75%	31.75%	31.75%	31.75%	31.75%	31.75%
Residential water use (AF/Y)	12,689	11,231	14,471	15,103	15,559	16,062	16,761
Lower income Water Demand (AF/Y)	4,029	3,566	4,335	4,662	5,027	5,393	5,756
Average lower income water demand per household	0.33	0.27	0.3	0.3	0.3	0.3	0.3

Total household projections for 2015-2035 were taken from ABAG 2009, which is also used in part to generate population data for the end use model. The water demand forecasts are generated by the End Use Model and thus, the lower income water demand is already accounted for in the demand projections shown previously in Table 12.

Demand Projections provided to Wholesalers

The City of Santa Clara purchases water from two urban water suppliers, the Santa Clara Valley Water District (SCVWD) and the San Francisco Public Utilities Commission (SFPUC). The following water demand projections, in Table 17, have been supplied to both wholesalers. As of 2018, the City's supply from the SFPUC may be interrupted. Because of this, demand projections given to SFPUC include a range of demand numbers from 2025 to 2035.

Table 18: Retail Demand Projections for Wholesale Suppliers

Retail agency demand projections provided to wholesale suppliers (acre-feet/year)							
Wholesaler	Contracted Volume	2010	2015	2020	2025	2030	2035
Santa Clara Valley Water District	4,570	4,570	4,570	4,570	4,570	4,570	4,570
San Francisco Public Utilities Commission	5,040	5,040	5,040	0 - 5,040	0 - 5,040	0 - 5,040	0 - 5,040

Water Sources

The sources of water supply in Santa Clara are: groundwater, imported water from the SFPUC Hetch-Hetchy system, imported treated water from the Santa Clara Valley Water District, and recycled water from South Bay Water Recycling. Tables 19A and 19B below show the City's water supply in acre-feet for 2010, as well as the projected supplies in acre-feet for 2015 to 2035. Table 19B accounts for the possibility of the City's SFPUC water supply being interrupted, which is discussed later in the section titled Treated Water from the San Francisco Public Utilities Commission.

Table 19A: Water Supplies – Current and Projected

Water supplies — current and projected (acre-feet/year)						
Water Supply Sources	2010	2015	2020	2025	2030	2035
SCVWD	4,372	4,570	4,570	4,570	4,570	4,570
SFPUC	2,454	5,040	5,040	5,040	5,040	5,040
Supplier-produced groundwater	13,980	23,048	23,048	23,048	23,048	23,048
Supplier-produced surface water	0	0	0	0	0	0
Transfers or Exchanges	0	0	0	0	0	0
Recycled Water	2,409	4,000	4,300	4,500	4,500	4,500
Desalinated Water	0	0	0	0	0	0
Conservation	0	694	795	874	930	930
Total	23,214	37,352	37,753	38,032	38,088	38,088

Table 19B: Water Supplies – Current and Projected

Water supplies — current and projected (acre-feet/year)						
Water Supply Sources	2010	2015	2020	2025	2030	2035
SCVWD	4,372	4,570	4,570	4,570	4,570	4,570
SFPUC	2,454	5,040	0	0	0	0
Supplier-produced groundwater[2]	13,980	23,048	23,048	23,048	23,048	23,048
Supplier-produced surface water	0	0	0	0	0	0
Transfers or Exchanges	0	0	0	0	0	0
Recycled Water	2,409	4,000	4,300	4,500	4,500	4,500
Desalinated Water	0	0	0	0	0	0
Conservation	0	694	795	874	930	930
Total	23,214	37,352	32,713	32,992	33,048	33,048

The Santa Clara water system is separated into four interconnected zones in order to provide optimum pressures throughout the City. In this manner the normal pressure ranges within the system are maintained between 50 psi and 92 psi; in any one area the pressures do not normally fluctuate more than 15 psi. A schematic diagram of the system is shown in Figure 7. A map of the zones within the City is shown in Figure 8.

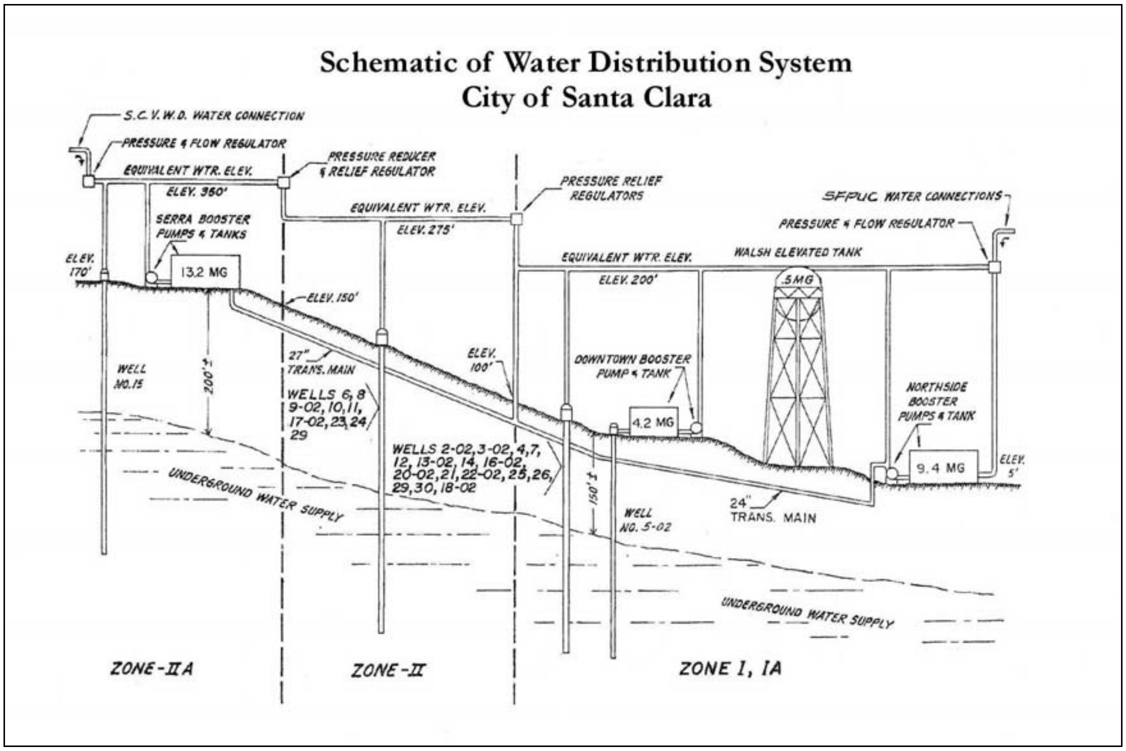

Figure 7: Distribution System Schematic

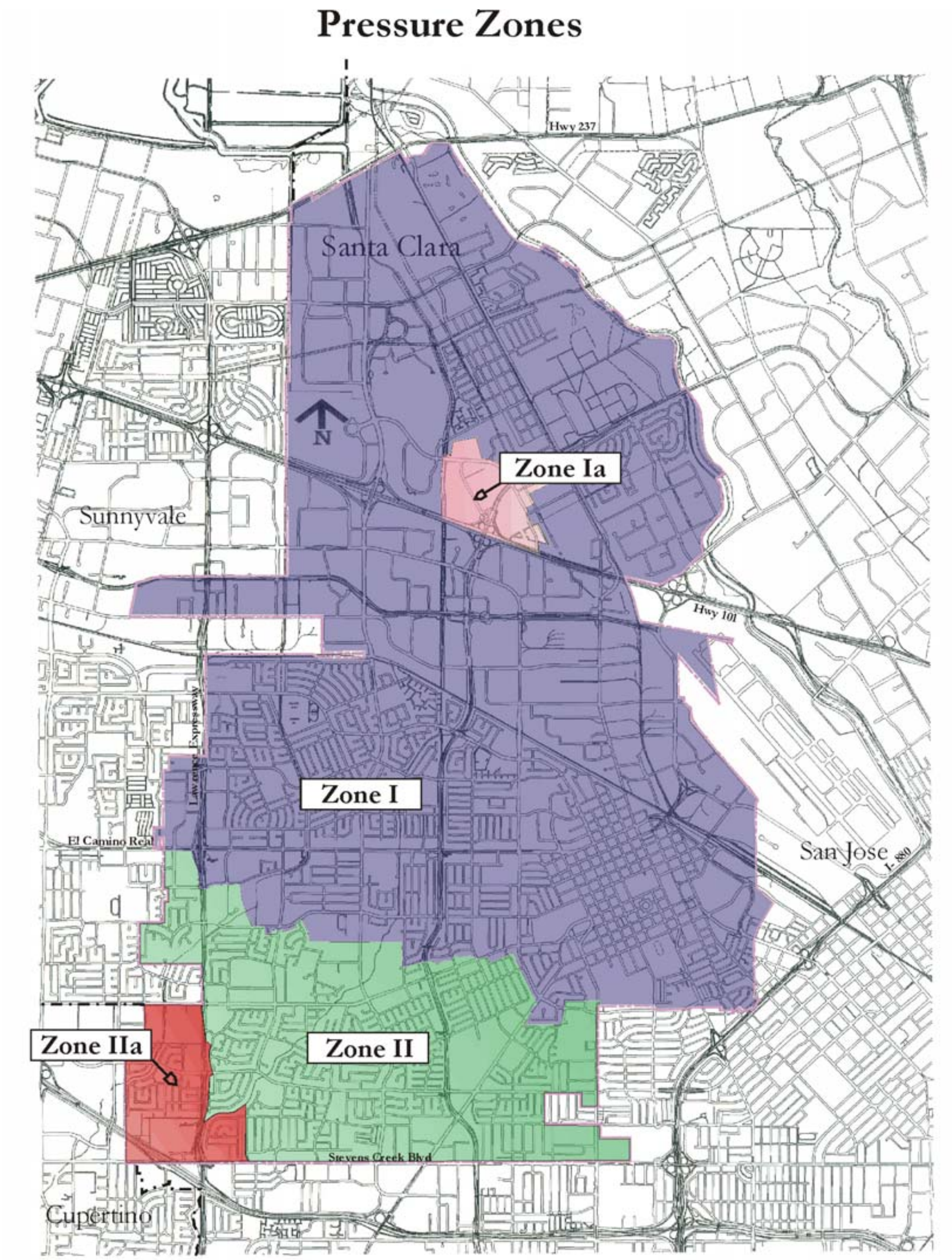

Figure 8: Pressure Zones

As seen in Figure 9, the predominant source of water within the City is groundwater from wells that are owned and operated by the City. Various areas within the City receive water from one or more sources depending on location. Figure 9 shows the approximate boundaries of the various sources. One section of the northwest portion of the City (designated Zone 1a) is designed to receive water solely from San Francisco Water's Hetch-Hetchy system. This area of the City has no well for groundwater supply; with the adjacent area north of Bayshore Freeway currently having only one operational well, two existing inactive wells and one well undergoing permitting for use as an emergency water supply.

The southern portion of the City receives a blend of water from City wells and treated water from the District. The blend of water in this area is approximately 60% well water and 40% treated surface water. The boundaries indicated on Figure 9 are approximate. The zones of influence from the various water sources are dynamic and will change depending on changes in supply and the overall demands on the system.

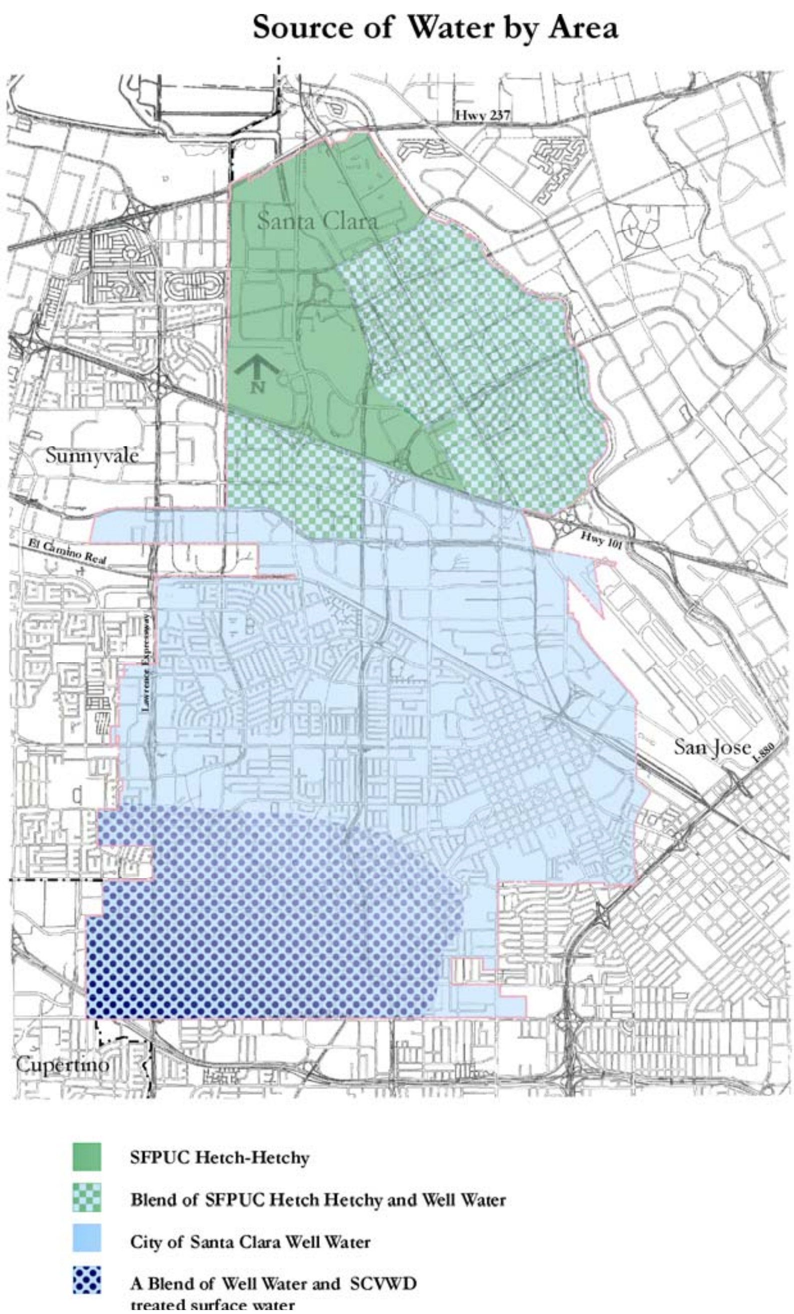

Figure 9: Water Source by Area

Groundwater

The local groundwater basin currently provides about two thirds of the City's potable water supply. It is the primary source of water for domestic, industrial, and agricultural use in the City since the area was first settled. This aquifer acts as a large underground reservoir that the City's 28 wells use as a water source.

The Santa Clara Valley groundwater basin extends from the Coyote Narrows at Metcalf Road in San Jose to Santa Clara County's northern boundary. It is bounded on the west by the Santa Cruz Mountains and on the east by the Diablo Range: these two mountain ranges converge at the Coyote Narrows to form the southern limit of the sub-basin. The sub-basin is 22 miles long and 15 miles wide at its widest point, with a surface area of 225 square miles. The southern area is an unconfined zone, or "forebay", where confining clay layers do not extend. Santa Clara Valley Water District staff estimates the operational storage capacity of the sub-basin to be 350,000 acre-feet with an estimated limit of 200,000 acre-feet maximum withdrawal in any one year. The Santa Clara Valley groundwater basin is shown in Figure 10 (225 square miles, 144,000 acres) and is the largest of three interconnected groundwater basins occupying a total of 240,000 acres of the 849,000 acres in Santa Clara County.

The Santa Clara Valley groundwater basin is not adjudicated. The most recent information from DWR indicates that neither the Santa Clara Valley Basin, nor the Santa Clara Sub Basin, is currently listed as overdrafted.[14] Even when the City was at the historic peak for groundwater production FY1986/87, the basin was not approaching overdraft. The Santa Clara Valley groundwater basin is not considered overdrafted by the Department of Water Resources and is not adjudicated, however the Santa Clara Valley District monitors the basin for local subsidence and works with various water retailers in the area to prevent subsidence and overdraft of the basin.

[14] Department of Water Resources, California's Groundwater Update 2003, DWR Bulletin 118 www.groundwater.water.ca.gov/bulletin118/update2003/

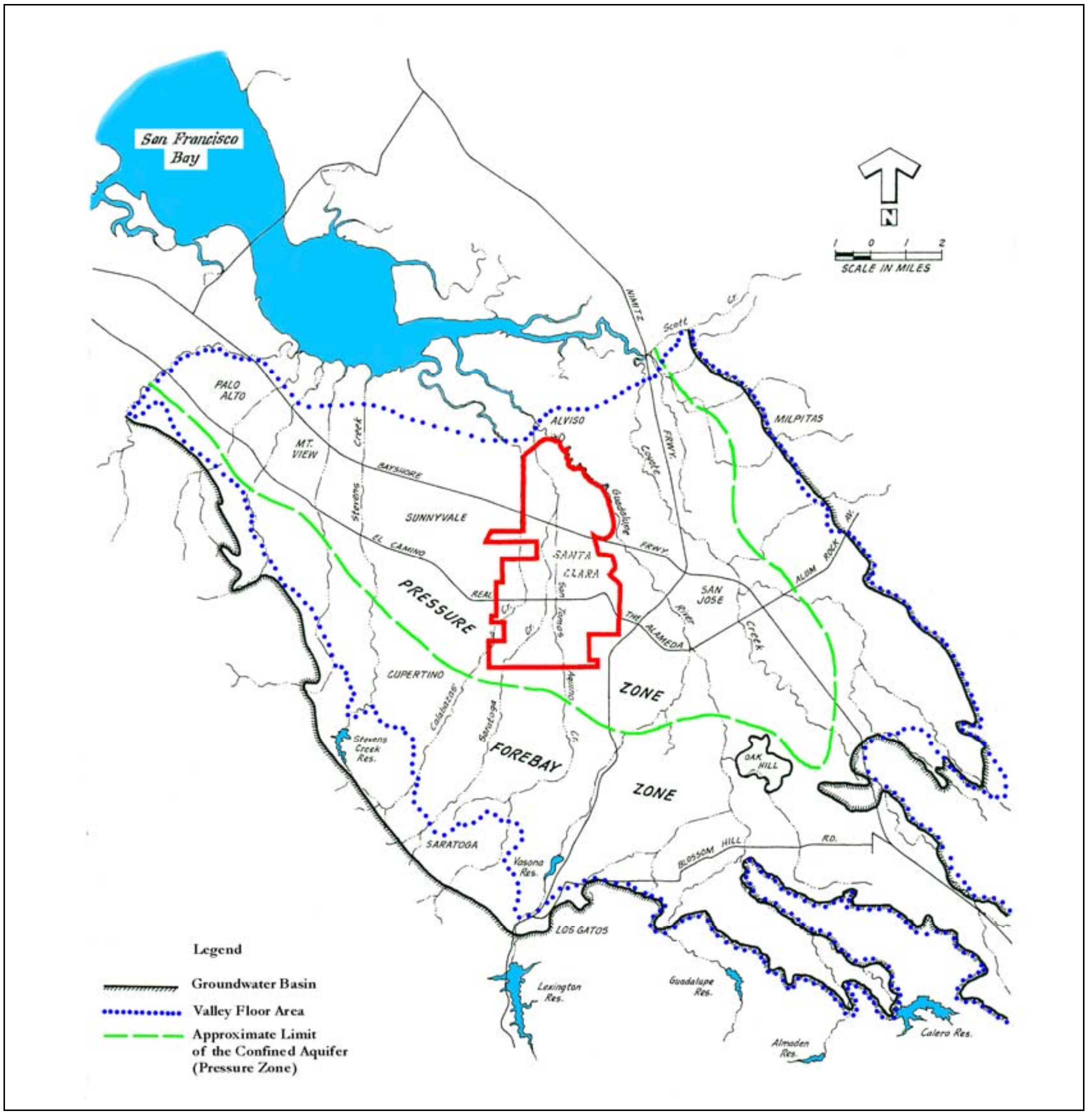

Figure 10: Map of Groundwater Basin

The allowable withdrawal or safe yield of groundwater by the City of Santa Clara is dependent upon a number of factors including: withdrawals by other water agencies, quantity of water recharged and the carry over storage from the previous year. Development and agricultural needs in the 1920s increased the demand on the water systems within the Santa Clara Valley. This increased extraction of groundwater led to subsidence in several of the aquifers. The Santa Clara Valley Water Conservation District (currently Santa Clara Valley Water District) was originally formed in 1929 to alleviate land surface subsidence in and around San Jose through artificial recharge of the groundwater. The rapid development of Santa Clara County occurred again in the 1960s and the corresponding increased demand on the existing water supply again resulted in the over-drafting of the groundwater basin. The continued over-drafting of the basin resulted in a significant lowering of the groundwater table, significant subsidence of the land in the northern portion of the valley and compaction of several aquifers. When an aquifer is compacted the storage capacity of the aquifer can be substantially reduced. Once lost, storage capacity cannot be regained.

In order to avoid any further subsidence and loss of aquifer capacity the District has attempted to operate the basin to maintain or increase groundwater storage through managed recharge with local supplies augmented with imported raw water. In the late 1960s/ early 1970s the District's conjunctive management of surface water and groundwater effectively halted the over-drafting and resulting subsidence. The District is currently using projected supply, carryover capacity and anticipated demand to predict potential water shortages. The July 2001 Santa Clara Valley Water District Groundwater Management Plan describes the groundwater recharge program in detail. This Groundwater Management Plan, the most recent formally adopted plan, is included in Appendix F. The Santa Clara Valley Water District is currently working to revise its Groundwater Management Plan. The updated Plan will not be finalized before this UWMP is completed.

The City's wells are strategically distributed around the City. This distribution of wells adds to the reliability of the water system and minimizes the possibility of localized subsidence due to localized over-drafting. To eliminate the possibility of long-term overdraft conditions, at all of the City's 28 production wells, the City monitors groundwater levels and meters the groundwater pumping. To further ensure that no over-drafting is occurring, in an effort to minimize the amount of groundwater pumped and consumed, the City operates a recycled water system and requires new development along the recycled water distribution system to use recycled water for irrigation and industrial uses. Additionally, as an effort to minimize the amount of groundwater used, the City encourages and promotes water conservation. The Santa Clara Valley Water District recharges the groundwater basins to bank water locally and protect against drought or emergency outages. This strategy allows the District to store surplus water in the groundwater basins and enables part of the county's supply to be carried over from wet years to dry years. The District operates and maintains 18 major recharge systems, which consist of both in-stream and off-stream facilities. Most of the local supply is recharged into the groundwater basin, either through natural stream channels, through canals, or through in-stream and off-stream ponds. In addition, imported water is delivered by the raw water conveyance system to streams and ponds for the District managed groundwater recharge program.[15] Appendix G shows the production for individual wells and the depth to water for Fiscal Years 2005/06 to 2009/10. Appendix G also shows the pressure zone in the distribution system within which the well is located. Minor seasonal fluctuations in the depth to water are seen in the table but there is no evidence of declining water table or over-drafting. The pressure zone designation gives an approximate geographic distribution for the wells. The exact location of the wells is not included in this UWMP for security reasons.

Groundwater quality is suitable for most urban uses with only local impairments. Santa Clara's groundwater basin is located close to the San Francisco Bay and the primary constituent of concern is high total dissolved solids[14].

Table 20 shows annual groundwater pumping volumes in acre-feet from 2006 to 2010. In 2010 a total of 13,980 acre-feet (4,555 million gallons) was pumped from the 27 production wells within Santa Clara. In 2010, groundwater from wells accounted for 60.2% of all water used in Santa Clara (including recycled water) and 67.2% of the total potable water supply.

[15] Santa Clara Valley Water District, Draft 2010 Urban Water Management Plan

Table 20: Groundwater Volume Pumped

Groundwater — volume pumped (acre-feet/year)						
Basin name	Metered or Unmetered	2006	2007	2008	2009	2010
Santa Clara Valley	Metered	14,711	15,450	15,923	14,826	13,980
Total groundwater pumped		14,711	15,450	15,923	14,826	13,980
Groundwater as a % total water supply		55.1%	56.70%	60.70%	61.40%	60.20%

Table 21 below shows projected groundwater pumping in acre-feet for years 2015 through 2035. The volume of water projected to be pumped is based on historic pumping volumes.

Table 21: Groundwater – Volume Projected to be Pumped

Groundwater — volume projected to be pumped (acre-ft/yr)					
Basin name(s)	2015	2020	2025	2030	2035
Santa Clara Valley	23,048	23,048	23,048	23,048	23,048
Total groundwater pumped	23,048	23,048	23,048	23,048	23,048
Percent of total water supply	60.8%	60.3%	59.9%	59.8%	59.8%

Treated Surface Water From Santa Clara Valley Water District

The City of Santa Clara receives treated surface water from the District’s Rinconada Water Treatment Plant via the Santa Clara “distributary” (pipeline) at the Serra Tank site at the southwest corner of the City. The City currently takes about 2500 to 2700 gallons per minute (gpm) from this supply and could construct an additional turnout to add more imported District water to our water supply. There is a limit to this: if the City were to utilize more than approximately 4,000 gpm total flow rate (5.76 MGD, average) the pressure loss through the District’s pipeline from this flow (along with that of other users from the pipeline) could require some or all of the following: Re-pumping (re-pressurizing) the water, modification of the City storage and transmission system, or other users would also need to re-pump District water at their connection sites to meet their system pressures.

A modification of the current District connection, or a separate connection would allow for greater flows than the current 4,000 gpm flow limit. The City is investigating a new connection or upgrade of existing turnout connection to allow for the District’s treated water to enter the City’s system at a new location: this would allow increased capacity to take this treated water and greater flexibility of operations. Significant increase in the City’s use of District treated water would probably require an expansion of the District’s Rinconada Water Treatment Plant, which is currently under design by the District.

In 2010 the Santa Clara Valley Water District treated water was the source of 4,372 acre-feet (1,424.5 million gallons) or 18.8% of the total potable water supply. Tables 22A and 22B below show the City’s projected wholesale supply of water, including volumes from the Santa Clara Valley Water District. Table 22B takes into account the possibility of the loss of water from the San Francisco Public Utilities Commission, as explained below.

Treated Surface Water From San Francisco Public Utilities Commission

The San Francisco Public Utilities Commission water supply system was planned during the late 1800s and constructed in the early 1900s. The first water was delivered to the Bay Area from the Hetch-Hetchy system in 1934. The San Francisco Public Utilities Commission is a department of the City and County of San Francisco that provides water, wastewater services, and municipal power to the City of San Francisco. Under a contractual agreement, 28 wholesale water agencies in Alameda, San Mateo, and Santa Clara counties purchase water supplies from the SFPUC. These 28 wholesale customers, including the City of Santa Clara, comprise the Bay Area Water Supply and Conservation Agency (BAWSCA). BAWSCA was created on May 27, 2003 to represent the interests of 26 cities and water districts, and two private utilities that purchase water on a wholesale basis from San Francisco. BAWSCA is the only entity having the authority to directly represent the needs of these entities that depend upon the San Francisco regional water system.

The San Francisco Public Utilities Commission obtains its water from the Tuolumne River watershed in the Sierra Nevada Mountains, from the Calaveras and San Antonio Reservoirs in Alameda and Santa Clara Counties, and from the Crystal Springs Reservoir on the San Francisco Peninsula. The various water sources utilized by San Francisco, water delivered direct from the Sierras along with local supplies from the Calaveras and San Antonio Reservoirs, are delivered to the San Francisco Bay Area through the Hetch-Hetchy Aqueduct. A branch of the aqueduct traverses the northern portion of the City of Santa Clara. This branch of the Hetch-Hetchy system is called the Bay Division Pipelines and consists of two pipelines (96" and 72") under high pressure. Within Santa Clara County, the Cities of Milpitas, San Jose, Sunnyvale, Palo Alto, Mountain View, Los Altos and Los Altos Hills obtain some or all of their water from the Hetch-Hetchy system.

The City of Santa Clara has two connections to the Hetch-Hetchy system to receive water from SFPUC. The combined capacity of these two turnouts is 7500 gpm or 10.8 million gallons per day, although current contractual arrangements limit the City's use to a maximum rate of 4.5 million gallons per day. The City's current understanding with San Francisco is that this source is to only supply that portion of the City of Santa Clara north of Bayshore (US Highway 101); the City's current expected average for this use is 5,040 Acre-feet per year, or 4.5 MGD annual average. This supply is pressurized and no additional pumping is needed. Water can also be taken into the Northside Storage tanks, which requires the use of the booster pump station. The area served by Hetch-Hetchy is primarily industrial and commercial, with several key industries in Santa Clara being supplied water that is predominately from the Hetch-Hetchy system. During Fiscal Year (FY) 2010 SFPUC Hetch-Hetchy system was the source of 2,454 acre-feet (799.6 MG) or 11.8% of the potable water supplied to Santa Clara.

All contracts for water service from San Francisco were re-negotiated in 2009. Currently the City of Santa Clara has an interruptible supply contract with San Francisco. The current contract with SFPUC indicates that if certain conditions are met, the City may be required to reduce or eliminate its take from SFPUC. If the City was required to eliminate the usage of water from SFPUC, the City would consider increasing groundwater utilization, increasing (SCVWD) imported surface water supply, or a combination of the two supplies.[16]

[16] City of Santa Clara 2002 Water Master Plan, City of Santa Clara 2002

Tables 22A and 22B below show the City's projected wholesale supply of water, including volumes from SFPUC. Table 22B shows the City's projected wholesale water supplies without an SFPUC supply.

Table 22A: Wholesale Supplies

Wholesale supplies — existing and planned sources of water (acre-feet/year)						
Wholesale sources	Contracted Volume	2015	2020	2025	2030	2035
SCVWD	4,570	4,570	4,570	4,570	4,570	4,570
SFPUC	5,040	5,040	5,040	5,040	5,040	5,040

Table 22B: Wholesale Supplies

Wholesale supplies — existing and planned sources of water (acre-feet/year)						
Wholesale sources	Contracted Volume	2015	2020	2025	2030	2035
SCVWD	4,570	4,570	4,570	4,570	4,570	4,570
SFPUC	5,040	5,040	0	0	0	0

Recycled Water

Recycled water within the City of Santa Clara is supplied from the jointly owned San Jose Santa Clara Water Pollution Control Plant (Plant). This recycled water meets the requirements of the California Code of Regulations (CCR) Title 22, Division 4. The City and all users of recycled water must insure that a number of regulatory requirements specified in CCR Title 22 are met. CCR Title 22 specifies the types of use and the conditions under which the use of recycled water is allowed.

The South Bay Water Recycling Program was initiated to reduce the discharge of treated water flowing from the Water Pollution Control Plant into the San Francisco Bay. A past Plant discharge permit placed a discharge limit of 120 million gallons each day during the summer ("dry-weather flow") to help maintain the salt marsh habitat of the south bay. As a result, the WPCP formed South Bay Water Recycling (SBWR), which purchased the City of Santa Clara's recycled water system and now is the regional recycled water wholesaler within the WPCP service area. SBWR provides oversight, promotes recycled water, operates the recycled water distribution system, and assists recycled water customers both technically and financially. The second driving force behind the water recycling efforts was changes in the State of California Water Code. In 1991, the state passed the Water Recycling Act of 1991, which is contained in Sections 13575-13583 of the California Water Code. The Water Recycling Act instructs water retailers to "identify potential uses for recycled water within their service areas, potential customers for recycled water service within their service area, and, within a reasonable time, potential sources of recycled water."[17] Within certain technical and financial considerations, water retailers are instructed by the Water Recycling Act to provide recycled water to customers that request it. To further encourage the use of recycled water, the Water Code was also changed to prohibit the use of potable water for certain uses, if recycled water is available.[18] The City Code includes this prohibition.

[17] California Water Code Section 13579(a)
[18] California Water Code Section 13550-13551

City Use of Recycled Water

Recycled water is primarily used for irrigation of large turf areas within the City such as golf courses, parks, and schools. Several industries use recycled water in industrial processes, cooling towers or for toilet flushing in dual plumbed buildings. The City's electric utility is operating the Don Van Raesfeld 147 mega-watt power plant, which uses recycled water exclusively for cooling water and steam for power production.

The recycled water system is owned by the Water Pollution Control Plant under the SBWR program. The City of Santa Clara maintains the system under an agreement with the City of San Jose, pursuant to which Santa Clara functions as lead administrative agency. Additional in-fill projects of smaller distribution lines should continue over the next 10 years. In 2010 recycled water was the source of 2,409 acre-feet (784.8 MG) of the water supplied to Santa Clara. In 2010 the combined volumes of potable water from Santa Clara Wells, Hetch-Hetchy, and the District was 20,806 acre-feet; recycled water represented 10.4% of the water used within the City. The City's 2002 Master Plan had estimated that the total annual use of recycled water in Santa Clara could reach 2,000 acre-feet per year (652 MG) by 2010, and so the City's use has exceeded expectations. In the next five years, recycled water sales are projected to be double what the City's 2002 Master Plan had projected for 2010.

Existing Supply Volumes

Historically the predominant source of water used to meet water demand in the City of Santa Clara has been groundwater. In 2010 groundwater represented 60.2% of total water sales. Over the last 15 years, the amount of recycled water used within the City has risen dramatically. As shown in Figure 11 below, in 2010 recycled water represented 10.4% of total water sales. Imported water, water from Hetch-Hetchy and SCVWD, represented 29.4% of the total water sales during this period.

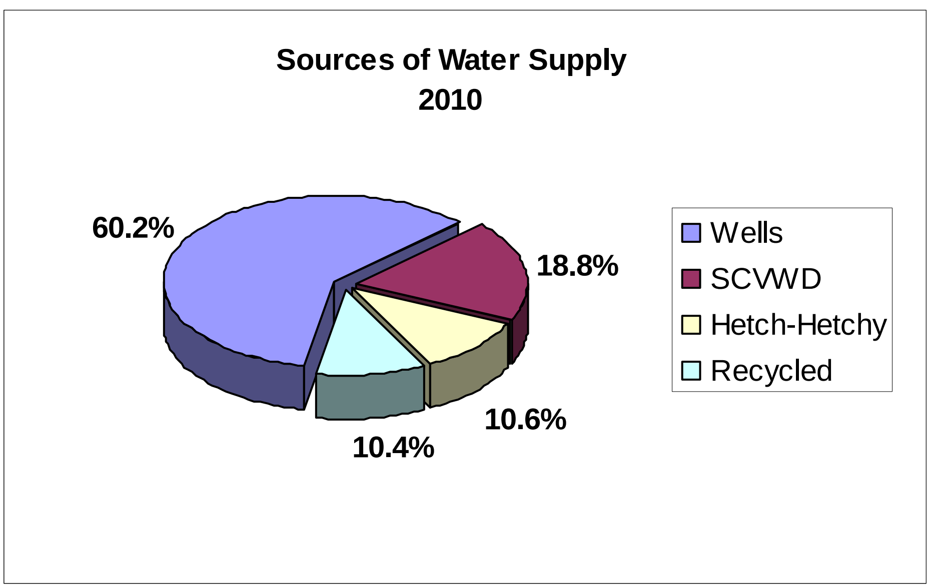

Figure 11: Sources of Water Supply, Fiscal Year 2010

Efforts to Minimize Imported Water and Maximize Resources

The City of Santa Clara has adopted several management strategies to minimize imported water use and maximize local resources. The use of recycled water to offset water demand resulting from growth is one of the key management strategies used by the City of Santa Clara to reduce the reliance on imported water. Also, SCVWD states in their UWMP as well as in their Integrated Water Resource Plan that the SCVWD manages their system to maximize the use of local supplies. This in turn reduces the reliance of the City on imported sources.

Recycled water has provided the City a drought proof water supply for customers who have acceptable uses. Recycled water has been used to offset growth in the potable water demand. The recently constructed Don Van Raesfeld Power Plant is the single largest recycled water user in Santa Clara. If the DVR Power Plant had not been supplied with recycled water, the City's potable demand would have increased by 1.5 MGD or approximately 7% when the DVR is at full production. Recycled water is also being used in the Rivermark development. Rivermark is the single largest development (mixed residential and commercial) in Santa Clara's history. Common areas, median strips, parks, commercial landscaping and home owner controlled landscaping are all irrigated with recycled water. Recycled water has a secondary benefit of reducing the potable demand during the high demand summer months. This reduction in the overall demand reduces dependence on imported water sources and groundwater (and provides greater reliability from the existing potable storage volumes). Recycled water accounted for 10.4% of the total water delivered in 2010 or approximately equivalent to the volume of water supplied by SFPUC.

The City's use of imported treated water at a relatively constant rate per our contracts allows for a controlled and predictable use of imported water. The City's use of groundwater to meet the variable demand (diurnal and seasonal) utilizes local supplies to the maximum extent practicable, although some imported water is used by the SCVWD to augment local supplies for groundwater recharge.

The District provides all the management of local resources and contracts for imported water other than the Hetch-Hetchy supply. While the District manages the county's water supplies to maximize the use of local supplies, it is imperative to augment local supplies so that the local supplies (mostly recharged to the groundwater basin) are not over used. See section on groundwater basin management for more details.

Wastewater and Recycled Water

Collection System Description

The wastewater collection system within the City of Santa Clara is owned and operated by the City. A total of 292 miles of sewer mains and 7 pump stations are used to convey an average of 15 million gallons per day of wastewater to the San Jose/Santa Clara Water Pollution Control Plant (WPCP).

The City of San Jose operates the WPCP under a 1959 Agreement (subsequently amended). The WPCP also treats wastewater from the cities of Milpitas, Campbell, Cupertino, Los Gatos, Monte Sereno, and Saratoga, as well as several unincorporated areas of Santa Clara County. The WPCP service area covers 300 square miles and a population of over 1.4

million people. The WPCP treated an average of 110 million gallons per day during calendar year 2010.

The WPCP is an advanced tertiary treatment plant. A portion of the effluent from the WPCP is re-chlorinated and distributed by South Bay Water Recycling at which point it meets the requirements of California Code of Regulations Title 22. The remainder of the wastewater is discharged to the Artesian Slough, which leads to the southern portion of the San Francisco Bay.

In 2010, the WPCP collected and treated 13,081 acre-feet of wastewater. Of that volume, 995.1 acre-feet was treated to meet Title 22 recycled water standards. 11,948 acre-feet of non-recycled wastewater was discharged to the San Francisco Bay.

Table 23: Recycled Water – Wastewater Collection and Treatment

Recycled water — wastewater collection and treatment (acre-feet/year)							
Type of Wastewater	2005	2010	2015	2020	2025	2030	2035
Wastewater collected & treated in service area	133,537	123,198	148,979	157,940	165,781	174,742	183,703
Volume that meets recycled water standard	8,035	9,372	15,682	21,283	22,403	22,403	22,403

Table 24: Recycled Water: Non-Recycled Wastewater Disposal

Recycled water — non-recycled wastewater disposal (acre-feet/year)							
Method of disposal	Treatment Level	2010	2015	2020	2025	2030	2035
Discharge to San Francisco Bay	Tertiary	112,530	133,297	136,657	143,378	152,339	161,300
Total		112,530	133,297	136,657	143,378	152,339	161,300

Current Recycled Water Use

The City's recycled water system has been in operation since 1989. The City has pursued the use of recycled water including use in industrial processes, residential irrigation and dual plumbed buildings for toilet and urinal flushing. The City has also pursued more traditional uses for recycled water as a drought proof water source for large turf area irrigation in commercial settings.

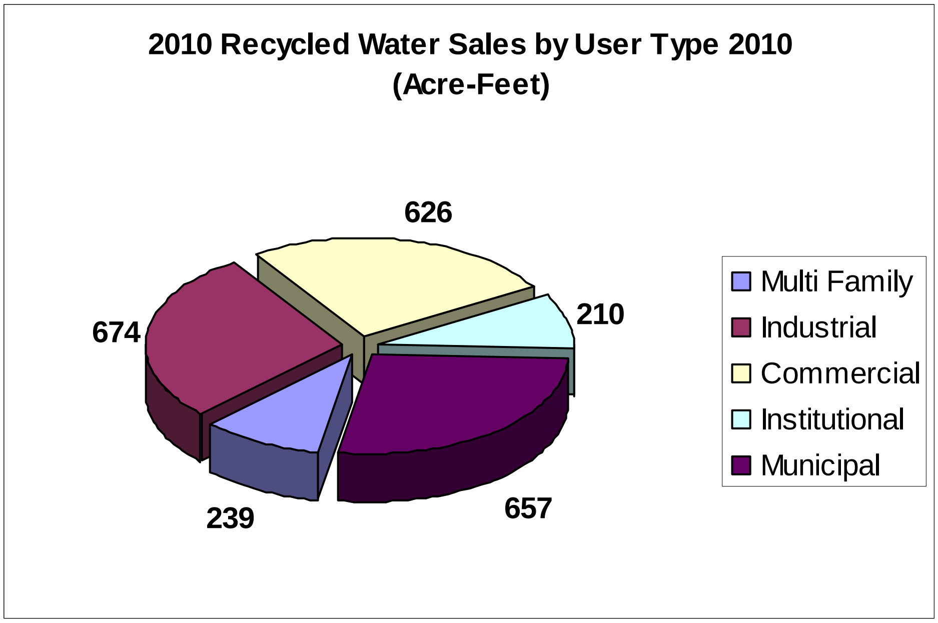

Figure 12: Recycled Water Sales by User Type 2010

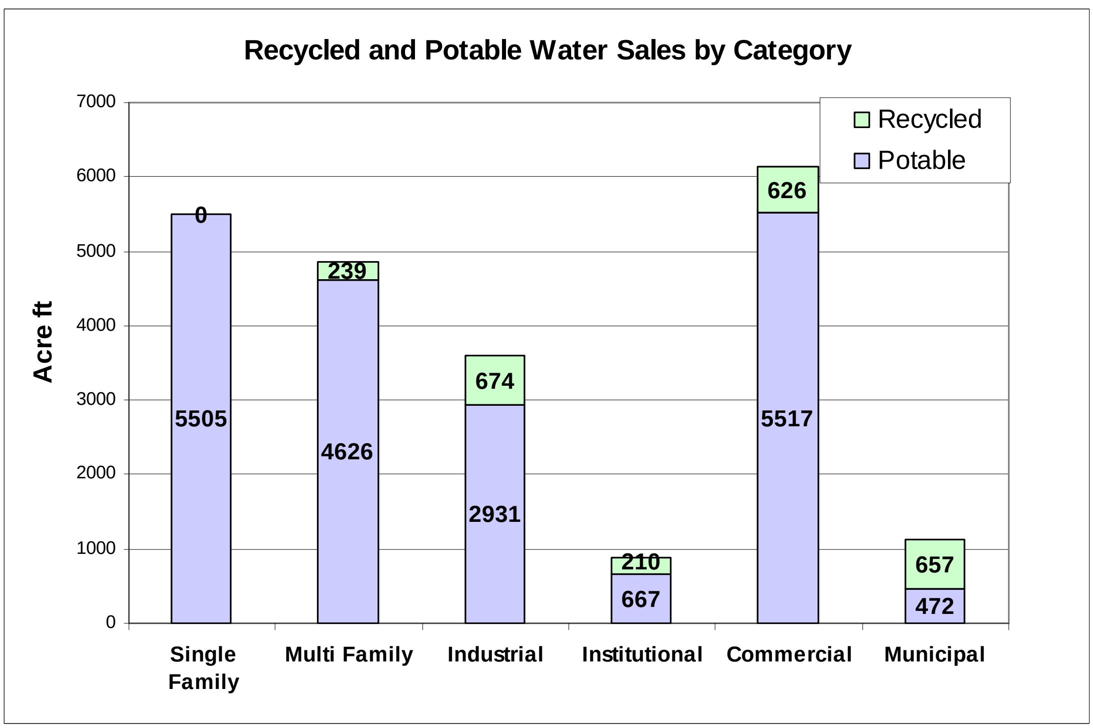

Figure 13: Recycled and Potable Water Sales by Category 2010

Table 25: Recycled and Potable Water Sales by Category 2010

Category	Total water sales in Acre ft (2010)	Recycled water sales in Acre ft (2010)	Recycled water as a percentage of total water sales by category
Single Family	5,505	0	0.0%
Multi Family	4,865	239	4.9%
Industrial	3,605	674	18.7%
Institutional	877	210	23.9%
Commercial	6,143	626	10.2%
Municipal	1,129	657	58.2%

Recycled water is currently used within the City for irrigation at golf courses, parks, landscape street medians and schools. Several industries use recycled water in industrial processes, cooling towers and for toilet flushing in dual plumbed buildings. The largest users of recycled water are California Paperboard, the Santa Clara Golf and Tennis Club, the Don Von Raesfeld Power Generation Facility and Air Products. California Paperboard uses recycled water in the process for producing paperboard. The DVR Power Generation Facility uses recycled water for cooling and for steam generation. The Santa Clara Golf and Tennis Club uses recycled water for irrigation. Although recycled water has been used in some industrial processes, the predominant use for recycled water remains irrigation. Equinix, a high tech data center, is the most recent facility to come online. Equinix started receiving recycled water for use in its cooling towers in December 2010.

The existing recycled water distribution system was laid out to maximize service to large potential recycled water customers. The recycled water distribution system is shown in Figure 14 below. Recycled water sales have grown dramatically since the inception of the system as shown in Figure 14 below. The current economic recession has resulted in a softening of recycled water sales in the City, however, expansion of the recycled water distribution system is projected to result in strong growth of recycled water use.

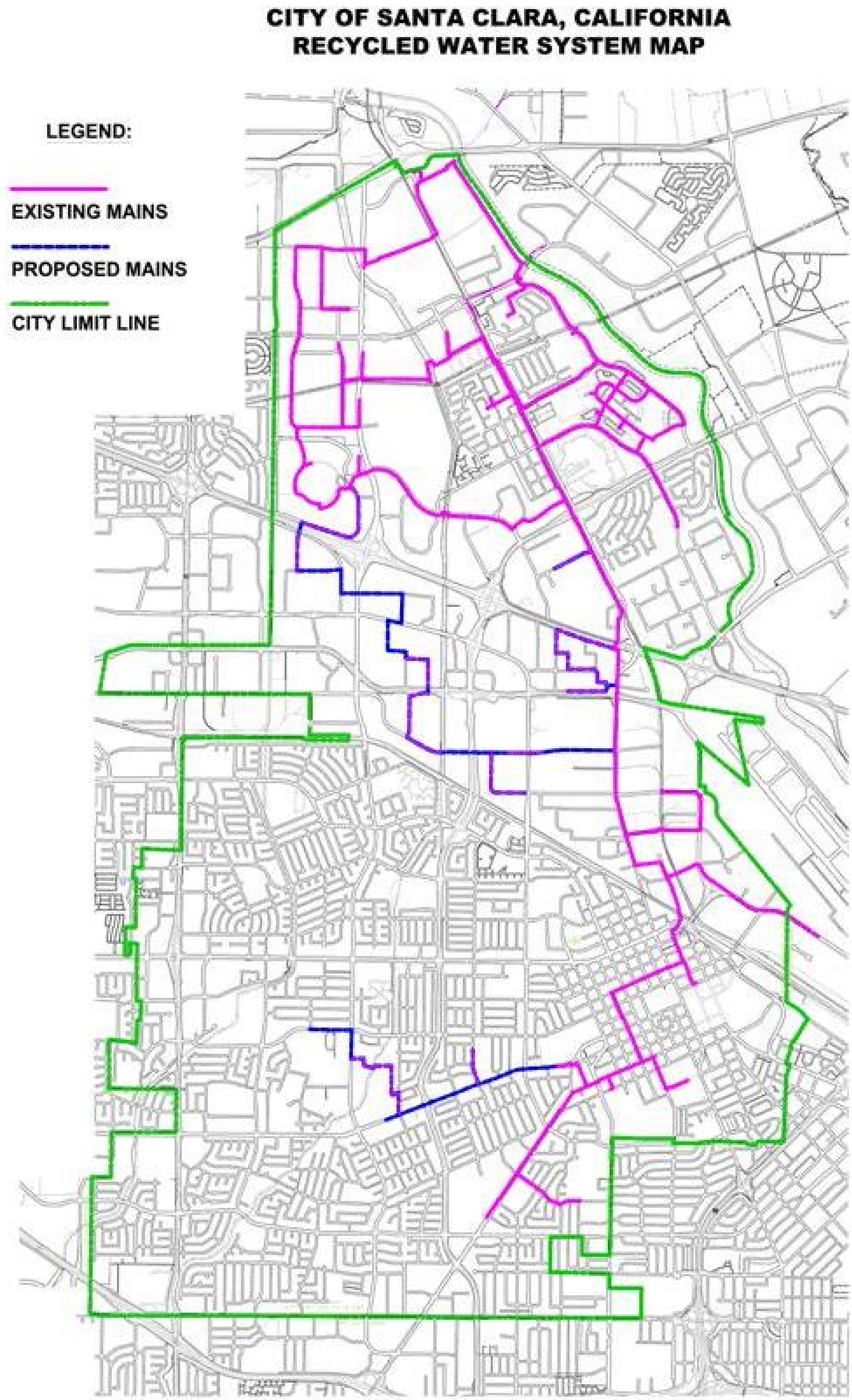

Figure 14: Recycled Water Distribution System

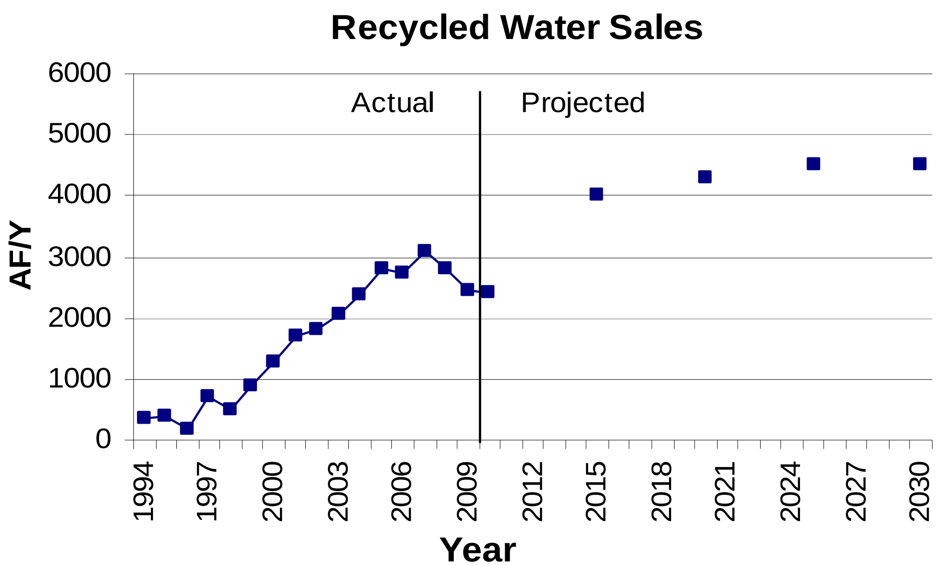

Figure 15: Actual and Projected Recycled Water Sales

Actual recycled water usage for 2005 and 2010, as well as projected recycled water use through 2030 are shown in Table 26 below.

Table 26: Recycled Water Uses – Actual and Projected

Recycled Water Uses - Actual and Projected in AF						
Year	2005	2010	2015	2020	2025	2030
Residential	102.2	239.1	210	300	310	310
Industrial	737.5	673.6	800	800	840	840
Institutional	252.9	210.2	340	350	370	370
Commercial	1,110.3	626.4	2,260	2,430	2,540	2,540
Municipal	652.1	658	390	420	440	440
Total	2,855.0	2,407.3	4,000	4,300	4,500	4,500

Table 27 below shows actual 2010 recycled water use compared to the 2005 UWMP projected 2010 use.

Table 27: Recycled Water Actual versus Projected 2010

Recycled water — 2005 UWMP use projection compared to 2010 actual		
Use type	2010 actual use	2005 Projection for 2010[1]
Agricultural irrigation	0	0
Landscape irrigation[1]	1,107	820
Commercial irrigation[2]	415	2,090
Golf course irrigation	211	0
Wildlife habitat	0	0
Wetlands	0	0
Industrial reuse	674	800
Groundwater recharge	0	0
Seawater barrier	0	0
Geothermal/Energy	0	0
Indirect potable reuse	0	0
Other (user type)	0	0
Other (user type)	0	0
Total	2,407	3,710

[1]Includes parks, schools, cemeteries, churches, residential, or other public facilities)
[2]Includes commercial building use such as landscaping, toilets, HVAC, cooling towers, etc) and commercial uses (car washes, laundries, nurseries, etc)

Potential Uses of Recycled Water

The potential future uses of recycled water are similar to the current uses: irrigation and industrial processes.

Current industrial process uses for recycled water include cooling towers and as process water in paperboard manufacturing. SBWR has undertaken a new program, the Cooling Tower Initiative, to increase the use of recycled water in cooling towers. SBWR is working with potential customers in Santa Clara to encourage recycled water use in new cooling towers, as well as convert existing cooling towers from potable to recycle water. Since the inception of the program, two data centers have converted their cooling towers from potable to recycled water. At the time of this report, the City is working on permitting three new data centers to use recycled water in their cooling towers. As more customers successfully use recycled water for cooling, it is anticipated that there will be an increase in industrial recycled water use for evaporative cooling.

The City is currently constructing approximately 7 miles of recycled water pipeline extensions. The extensions are being funded by SBWR through grants issued under the American Recovery and Reinvestment Act of 2009. One alignment under construction will supply recycled water to two City parks, including the City's Central Park, as well as three schools, which will add approximately 175 AF/year of recycled water usage. Another alignment under construction will supply recycled water to a recently opened data center and will add approximately 160 AF/year of recycled water usage. Grant funding was recently awarded for an alignment that will serve a data center projected to use approximately 320 AF/year of recycled water.

Based on these pipeline extensions, projections for recycled water use show a significant increase in recycled water use in 2015. However, after the larger customers along these alignments are converted to recycled water, sales of recycled water are expected to level out in the year 2025 and beyond based on the known potential recycled water customers. These potential customers are detailed in the section entitled Projected Uses of Recycled Water.

Projected Use of Recycled Water

All new developments that occur within a reasonable distance of the existing or proposed recycled water distribution system will be required to provide a landscape irrigation system and/or cooling towers constructed for the use of recycled water. Several infill projects may be developed along the recycled water distribution system that is currently in place. In addition to the facilities listed in Table 28, the City is projecting increased use by the current recycled water customers and added customers due to new development and redevelopment along the existing recycled water pipelines. While the largest potential recycled water users have already been converted to recycled water use, the City is currently becoming home to a large data center industry. The data centers may use large volumes of water in cooling towers. SBWR and the City are encouraging new data centers to use recycled water in their cooling towers. Based on data centers that have already started using recycled water, and projected demands of data centers currently in the permitting process to use recycled water, future recycled water use in the City of Santa Clara is expected to grow to 4,500 AF/year from the 2,409 AF/year in 2010.

Table 28: Potential Future Recycled Water Customers

Potential Future Recycled Water Customers		
Project	Estimated Annual Recycled Water Use (AFY)	Estimated Year of Conversion to Recycled Water
Central Park	65	2011
Santa Clara High School	50	2011
Milikin Elementary	25	2011
Haman Elementary	10	2011
Steve Carli Park	25	2011
Bay Area Internet Solutions	161.3	2011
Dupont Fabros Data Center	646.5	2011
Red Sea Data Center	0.2	2011
Pelio	322.6	2012
Total	1,305.6	

Table 29 below shows projected increases in recycled water use through 2035. With the recycled water pipeline extensions currently under construction, as well as an increased demand for recycled water for cooling towers in data centers, the projected usage shown in the table is highly feasible. Based on the potential future recycled water customers shown in Table 28 above, the 2015 projections shown in Table 29 may be exceeded. The City and SBWR are working with potential customers along the pipeline extensions to encourage, and in some instances, require recycled water use for irrigation and/or cooling towers.

Table 29: Recycled Water – Potential Future Use

Recycled water — potential future use (Acre-feet/year)						
User type	Description	2015	2020	2025	2030	2035
Agricultural irrigation	N/A					
Landscape irrigation[1]	New and Retrofit Landscapes	200	50	25	0	0
Commercial irrigation[2]	N/A					
Golf course irrigation	N/A					
Wildlife habitat	N/A					
Wetlands	N/A					
Industrial reuse	Cooling Towers in Data Centers	1,100	250	175	0	0
Groundwater recharge	N/A					
Seawater barrier	N/A					
Geothermal/Energy	N/A					
Indirect potable reuse	N/A					
Total		1,300	300	200	0	0

[1]Includes parks, schools, cemeteries, churches, residential, or other public facilities)
[2]Includes commercial building use such as landscaping, toilets, HVAC, etc) and commercial uses (car washes, laundries, nurseries, etc)

Some additional customers may be provided with recycled water once additional recycled water distribution mainline extensions are completed. Many of these potential customers represent a very small percentage of the potential recycled water sales. Due to the high cost of distribution system extensions and retrofit costs, it is usually not cost effective to convert smaller potential users to recycled water use.

Description of Actions and Financial Incentives

Pricing Incentives

Recycled water rates are approximately 40% below the comparable rate for potable water, currently $1.64 per HCF versus $2.74 for potable water. A much deeper discount is offered for customers that use recycled water to replace water from a private well. These rates are set so that the customer will see a savings compared with the groundwater production charge otherwise paid for well water to the District.

Retrofit Assistance

The City, through South Bay Water Recycling, offers design and construction of some customer retrofits to convert existing potable water uses to recycle water uses. In the past, financial assistance was also offered to defray the costs of onsite plumbing changes necessary for compliance with the use restrictions for recycled water. However, since the Plant is currently below its 120 MGD flow cap, all funding of onsite plumbing changes has been discontinued.

Technical Assistance

In addition to the design of retrofits, technical assistance is also offered for horticultural and landscaping problems and for the permit process of Department of Public Health for each recycled water use location.

Outreach

City staff are educating City residents and businesses of the benefits of using recycled water. Staff are attending environmental fairs hosted by the City as well as local business and promoting recycled water use. Additionally, in conjunction with the pipeline extensions under construction, City staff are sending information to businesses along the pipeline extension to educate and encourage conversion to recycled water.

Ordinance Requiring Use

The City of Santa Clara General Plan encourages new developments to use recycled water. General Plan Policy #5.3.1-P11 states: Encourage new developments proposed within a reasonable distance of an existing or proposed recycled water distribution system to utilize recycled water for landscape irrigation, industrial processes, cooling and other appropriate uses. Table 30 below shows the projected results of implementing methods that encourage recycled water use.

The Code of the City of Santa Clara, Section 13.15.160(a), states that it is the purpose and intent of the City Council to prohibit the use of potable water for landscape irrigation where recycled water is made available and meets all applicable standards. Section 13.15.160(b) states that it is also the purpose and intent of the City Council to require the use of recycled water for all other non-potable uses where recycled water is made available and meets all applicable standards for those uses and is determined to be suitable and economically feasible therefore.

Table 30: Methods to Encourage Recycled Water Use

Methods to encourage recycled water use						
Actions	Projected Results					
	2010	2015	2020	2025	2030	2035
Financial Incentives	100	300	50	25	0	0
Technical Assistance	100	200	50	25	0	0
Ordinance Requiring Use	100	300	100	100	0	0
Outreach	200	500	100	50	0	0
Total	500	1,300	300	200	0	0

Plan For Optimizing Recycled Water Use

The SCVWD and the San Jose/Santa Clara Water Pollution Control Plant are constructing an Advanced Water Treatment Facility at the Plant to enhance the quality of the recycled water currently produced by the Plant. Construction of the new facility began in October 2010 and when completed will produce up to 10 million gallons of highly purified recycled water per day. All recycled water customers would benefit from this advanced treatment. The facility has been designed so that it can be expanded in the future to four times its initial size.

Water that has undergone two levels of treatment at the adjacent Plant will undergo three additional advanced treatment stages: microfiltration, reverse osmosis and ultra-violet disinfection. The facility will be able to produce water that is as pure or purer than many potable water sources. The water that is produced will then be blended with recycled water from the SBWR program. The enhanced blend of water will help industrial users reduce operating costs, and it can be used on a wider variety of landscapes, due to a much lower level of salinity[19]. The reliability of the water chemistry from the treated water will benefit customers using cooling towers. In areas of the City served by groundwater, industrial customers will find the quality of treated recycled water to be more consistent than groundwater for cooling towers. Those cooling towers who receive groundwater could also receive a blend of multiple water sources based on system demand (e.g. groundwater blended with imported surface water) with slight variations in water quality, whereas those who receive recycled water would receive one consistent water source.

Transfer Opportunities

The City of Santa Clara has ability to directly contract for water transfers from outside the county. The July 2009 Water Supply Agreement, between the City and County of San Francisco and Wholesale Customers in Alameda County, San Mateo County and Santa Clara County outlines the ability for permanent transfers of individual supply guarantees. Section 3.04 of the agreement specifies that a wholesale customer that has an individual supply guarantee may transfer a portion of it to one or more other wholesale customers. Such a transfer must be a permanent transfer and no less than $1/10^{th}$ of a MGD.

Seven interties exist for emergency transfers with neighboring agencies (City of Sunnyvale, San Jose Municipal Water, San Jose Water Company and Cal-Water) These five automatic and two manual connections are intended only for water supply emergencies and are not intended for long-term water transfers.

During times of drought and subsequent reduced water supply, the Interim Water Shortage Allocation Plan (IWSAP) developed by BAWSCA and ratified by SFPUC, and each of its wholesale contractors allows for voluntary water shortage allocations for SFPUC wholesale customer agencies. Also, water “banked” by a SFPUC wholesale customer, through reductions in usage greater than required for a given shortage, may be transferred between agencies.

Desalinated Water Opportunities

The opportunities for the City of Santa Clara to use desalination as a potential source of water are limited. These limitations are due to geographic location and logistics. The City of Santa Clara is located inland for the San Francisco Bay and other sources of seawater or brackish water. Also the City lacks a practical means of brine disposal from a desalination process. The distance from a suitable location for an outfall is significant and the cost would be prohibitive.

[19] http://www.valleywater.org/Services/AWT.aspx

Future Water Projects

Table 31 describes water supply projects and programs that are expected to be undertaken in the near future to help increase the amount of water supply available to the City in average, single-dry, and multiple-dry water years.

Table 31: Future Water Supply Projects

Future water supply projects (acre-feet/year)								
Project name	Projected		Potential project constraints	Normal-year supply	Single-dry year supply	Multiple-dry year first year supply	Multiple-dry year second year supply	Multiple-dry year third year supply
	Start date	Completion date						
Upgrade SCVWD Turnout	mid 2011	end 2011	None	4,839	3,871	3,871	3,871	3,871
Well 32 permitted for general use	2004	end 2012	Manganese Treatment	570	570	570	570	570
Recycled Water System Expansion SC-6	2010	2011	In Progress	175	175	175	175	175
Recycled Water System Expansion 3B	2011	2013	Funding	450	450	450	450	450
Total			0	6,034	5,066	5,066	5,066	5,066

The existing 28 wells together with the water supplied by the two imported water wholesalers can provide the delivery capacity to supply the City of Santa Clara's expected water demand for the next 25 years. In the future additional imported supply will likely be required from the imported treated water purchased from the SCVWD. The City is investigating an additional turnout from the SCVWD's wholesale supply of treated imported water. This would contribute approximately 4,800 acre-ft of additional water to the City's portfolio. This additional turnout would also increase the flexibility of the water supply system, allowing the City the flexibility to increase treated surface water imports and decrease groundwater usage, if necessary. The work is planned to be completed by the end of calendar year 2011. The District is planning for an expansion of the Rinconada Water Treatment Plant which will allow for this added supply to the City of Santa Clara. Both the turnout and the expansion of the RWTP will be completed prior to the City's coming close to exceeding the yield of groundwater aquifer, which is well beyond the planning horizon of this Plan.

Since the 2005 UWMP, wells 32 and 34 have been constructed in the northern part of the City to allow for added reliability in light of the uncertainty of the San Francisco Water Department wholesale supply. Well 34 is currently providing water to the Rivermark housing development. Well 32 is still in the permitting phase. It requires a manganese treatment system at the well-head and at this time, due to staffing limitations, will only be used in emergency situations. The northern portion of the City is currently supplied by SFPUC but the City's water system is insufficient to convey peak-demand water from the primary area of well production south to the north of US 101 (Bayshore Freeway). These new wells, along with the extensive use of recycled water for summer peak irrigation demand will allow for sufficient supply in the case of a loss of SFPUC supply.

If well 32 was utilized to the same degree as comparable wells within the system, the utilization factor would be 25%. However, once operational (on-line), well 32 will run for extended periods due to the operational considerations of starting and stopping the associated manganese removal system. Therefore a utilization factor of 35% may also be realistic. The projected annual usage at a 25% utilization factor is 400 acre-ft per year and at 35% is 570 acre-feet per year. These estimated yields assume a wet to normal water year. The yield during single dry year or multiple dry years is similar to other wells located in Santa Clara since the District has the ability to secure additional supplies in conjunction with the District to adequately recharge the groundwater basin.

The City is in the process of upgrading the SCVWD turnout so that higher velocity water may be supplied to the City distribution system therefore maximizing supply take up to 4,839 acre-feet of water per year. This project is expected to be completed by the end of 2011. After 2025, in a multi-year drought, the worst case scenario for District water is a possible 20% reduction (see Appendix H). This would constitute a loss of 968 acre-feet and is further discussed in the water supply reliability and water shortage contingency planning.

The City's recycled water distribution system is currently being expanded. This phase of expansion, called SC-6, will be completed in September 2011. A total of 6.6 miles of distribution piping is being added to the system in Santa Clara, which will allow for a greater number of sites to have access to recycled water. Several large irrigation customers are located along the routes of the pipeline extensions. It is estimated that the expansion will allow for the potential connection of 44 customers and an estimated increase in recycled water annual sales of approximately 175 acre-ft.

The City is expecting to start another recycled water expansion project, called Santa Clara Industrial 3B, in 2011 with an estimated completion date of 2013. It will consist of approximately 5,800 linear feet of 12-inch diameter pipe and will provide up to 450 acre-feet per year of recycled water for industrial cooling.

Water Supply Reliability

General System Reliability

The City of Santa Clara is dependent on three sources of potable water and one of recycled water; all of these supplies have some possibility of interruption and differing degrees of reliability. According to engineering studies a major seismic (earthquake) event could interrupt the delivery of water from the San Francisco Hetch-Hetchy system for up to 2 months. A similar review of the District's potable and raw water delivery systems indicates a 2-week interruption of potable treated water deliveries to the City. Current proposals include major capital improvements to both regional water systems for increased reliability. The reliability of the District's imported supplies (State and Federal water projects) is also threatened by possible failure of the Sacramento delta's levee systems, with interruptions possible for several months. Regional power supplies could also be interrupted, however the City has sufficient back-up power generation capacity to provide the expected potable water demand from City-owned wells and water storage tanks. This groundwater source can sustain the entire City's water demand for a limited period of time: that is for months, but not years.

The recycled water system serves primarily irrigation and some industrial customers. In an emergency that may interrupt the recycled water service, industrial customers have back-up potable water services; landscaped areas can probably survive the time required for reinstatement of recycled water service.

The City's internal distribution system would also be compromised by a major seismic event. Since the majority of the City's growth has occurred over the past 40 to 50 years, and these distribution pipelines are networked throughout the City, the redundancy and reliability of the system should limit any interruptions of water service to those users that are nearest to any one pipeline break. An assessment of the vulnerability of the City's water system conducted in 2004 gave the water system fairly high marks for system security and reliability.

On all three counts, water supply, water quality and system reliability, the City has the ability to meet the needs of the community for the foreseeable future. The community must in turn be prepared to meet the fiscal requirements to support and fund the utility with retail water rates that are sufficient for these requirements.

Table 32 details water sources that may not be available at a consistent level of use given specific legal, environmental or water quality factors. Climate change may affect both SCWD and SFPUC supplies, but it is very hard to quantify this future concern.

Table 32: Factors Resulting in Inconsistency of Supply

Factors resulting in inconsistency of supply					
Water supply sources	Specific source name, if any	Limitation quantification	Legal	Environmental	Water quality
SCVWD	Surface water	15-30%		Delta Pumping Restrictions	
SFPUC	Hetch-Hetchy	0-5,040 acre-feet in 2018	Contract		
Groundwater	6 wells with nitrates	4,357 acre feet		Subsidence	Nitrates
Recycled water	SJ/SC Water Treatment Plant	None			

Delta Pumping Restrictions for SCVWD Supplies

Because the District imports over half of its current water supply from regions outside the Santa Clara Valley, issues related to regions such as the Sacramento River/San Joaquin Bay-Delta have enormous potential impact on water supply. The Delta is in peril, putting much of the Bay Area's water supply at risk, and threatening the ecosystem, recreation, energy supplies, transportation corridors and shipping routes. In dry years, SCVWD has estimated a potential 0%-20% reductions to their water supplies from the Delta. Treated surface water supplied from SCVWD only accounts for approximately 15% of the City's total water supply; this minimizes the overall effect of the potential decrease in supply. Table 45 b illustrates this worst-case scenario and is discussed more fully in the Drought subsection of Section 5.

Restrictions imposed by the biological opinions issued by the US Fish and Wildlife Service (December 2008) and the National Marine Fisheries Service (June 2009) to protect the Delta Smelt and other endangered fish affect the ability of the SWP (State Water Project) and CVP (Central Valley Project) to deliver imported water to multiple parts of the State, including Santa Clara Valley.[20]

Projected imported supplies have decreased since the analysis performed for the SCVWD UWMP 2005 as a result of actions to protect fisheries in the Delta and the consequences of climate change. In response to the trend of the Delta ecosystem decline and reduced water supply reliability, the District is working with the SWP and CVP, to develop a comprehensive Bay Delta Conservation Plan (BDCP). A final Plan is not currently available for public review. The BDCP's purpose is to provide for the conservation of at-risk species in the Delta and improve the reliability of the State's water supply system. The BDCP is being developed under the Federal Endangered Species Act (ESA) and the California Natural Community Conservation Planning Act (NCCPA) and will:

- Identify conservation strategies to improve the overall ecological health of the Delta;
- Identify ecologically friendly ways to move fresh water through and/or around the Delta;
- Address toxic pollutants, invasive species, and impairments to water quality;

[20] CA Dept. of Water Resources, Bay Delta Office Draft State Water Project Delivery Reliability Report 2009. Available at http://baydeltaoffice.water.ca.gov/swpreliability/

- Provide a framework and funding to implement the plan over time.

The DWR is the lead agency for an EIR/EIS that is being prepared to evaluate the potential effects of the BDCP. The BDCP is scheduled to be delivered early in 2011and draft EIR/EIS is expected to be ready for public review and comment by mid-2012. [21]

Impact of Fishery Flows on Dry Year Reliability of SFPUC Supplies

In adopting the Calaveras Dam Replacement Project and the Lower Crystal Springs Dam Improvements Project, the SFPUC committed to providing fishery flows below Calaveras Dam and Lower Crystal Springs Dam as well as bypass flows below Alameda Creek Diversion Dam. The fishery flow schedules for Alameda Creek and San Mateo Creek represent a potential decrease in available water supply of an average annual 3.9 mgd (million gallons per day) and 3.5 mgd, respectively with a total of 7.4 mgd average annually. These fishery flows could potentially create a shortfall in meeting the SFPUC delivery reliability goal of 265 mgd and slightly increase the SFPUC's dry-year water supply needs. If a shortfall occurs, it is anticipated at the completion of construction of both the Calaveras Dam Replacement Project and the Lower Crystal Springs Dam Improvements project in approximately 2015 and 2013, respectively when the SFPUC will be required to provide the fishery flows.

The adopted Water System Improvement Program (WSIP) water supply objectives include (1) meeting a target delivery of 265 mgd through 2018 and (2) rationing at no greater than 20 percent system-wide in any one year of a drought. As a result of the fishery flows, the SFPUC may not be able to meet these objectives between 2013 and 2018 without (1) a reduction in demand, (2) an increase in rationing, or (3) a supplemental supply. The following describes these actions.

Reduction in Demand

The current projections for purchase requests through 2018 remain at 265 mgd. However, in the last few years, SFPUC deliveries have been below this level, as illustrated below. If this trend continues, the SFPUC may not need 265 mgd from its watersheds to meet purchase requests through 2018. As a result, the need for supplemental supplies of 3.5 mgd starting in 2013 and increasing to 7.4 mgd in 2015 to offset the water supply loss associated with fish releases may be less than anticipated. Water Deliveries in SFPUC Service Area[22]

Table 33: Impact of Recent SFPUC Actions on Dry Year
(Reliability/Reduction in Demand Water Deliveries in SFPUC Service Area)

	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010
Total Deliveries (mgd)	247.5	257.0	254.1	243.4	225.2

[21] CA Dept. of Water Resources Bay-Delta Conservation Plan website,
ttp://baydeltaconservationplan.com/BDCPPages/aboutBDCP.aspx
22 SFPUC FY09-10 J-Table Line 9 "Total System Usage" plus 0.7 mgd for Lawrence Livermore National Laboratory use and 0.4 mgd for Groveland. No groundwater use is included in this number. Unaccounted-for-Water is included.

Increase in Rationing

The WSIP provides for a dry year water supply program that, when implemented, would result in system-wide rationing of no more than 20 percent. The Program Environmental Impact Report (PEIR) identified the following drought shortages during the design drought; 3.5 out of 8.5 years at 10 percent rationing and 3 out of 8.5 years at 20 percent. If the SFPUC did not develop a supplemental water supply in dry years to offset the effects of the fishery flows on water supply, rationing would increase during dry years. If the SFPUC experiences a drought between 2013 and 2018 in which rationing would need to be imposed, rationing would increase by approximately 1 percent in shortage years. Rationing during the design drought would increase by approximately 1 percent in rationing years.

Supplemental Supply

The SFPUC may be able to manage the water supply loss associated with the fishery flows through the following actions and considerations: Development of additional conservation and recycling, development of additional groundwater supply, water transfer from MID (Modesto Irrigation District) and/or TID (Turlock Irrigation District), Increase in Tuolumne River supply, revising the Upper Alameda Creek Filter Gallery Project capacity[23], and possible development of a desalination project.

The SFPUC has stated a commitment to meeting its contractual obligation to its wholesale customers of 184 mgd and its delivery reliability goal of 265 mgd with no greater than 20 percent rationing in any one year of a drought. In Resolution No. 10-0175 adopted by the Commission on October 15, 2010, the Commission directed staff to provide information to the Commission and the public by March 31, 2011 on how the SFPUC has the capability to attain its water supply levels of service and contractual obligations. This directive was in response to concerns expressed by the Commission and the Wholesale Customers regarding the effect on water supply of the instream flow releases required as a result of the Lower Crystal Springs Dam Improvement Project and the Calaveras Dam Replacement Project. In summary, the SFPUC has a projected shortfall of available water supply to meet its LOS goals and contractual obligations. The SFPUC has stated that current decreased levels of demand keep this from being an immediate problem, but that in the near future, the SFPUC must resolve these issues. Various activities are underway by the SFPUC to resolve the shortfall problem. SFPUC staff will report back to the Commission by August 31, 2011 to provide further information on actions to resolve the shortfall problem.

Effects of Climate Change on Water Supply Reliability

Global warming and climate change presents a significant long-term threat to water resources in Silicon Valley. Global warming may result in reduced water supplies, more critically dry years, degraded groundwater aquifers and wetlands and significant changes to precipitation patterns. Increased wildfires, prolonged heat waves and drought conditions could increase

[23] The adopted WSIP included the Alameda Creek Fishery Enhancement project, since renamed the Upper Alameda Creek Filter Gallery (UACFG) project, which had the stated purpose of recapturing downstream flows released under a 1997 California Department of Fish and Game MOU. Implementation of the UACFG project was intended to provide for no net loss of water supply as a result of the fishery flows bypassed from ACDD and/or released from Calaveras Dam. At the time the PEIR was prepared, the UACFG was described in the context of recapturing up to 6,300 AF per year. The UACFG will undergo a separate CEQA process in which all impacts associated with the project will be analyzed fully.

demand. Sea level rise threatens low-lying wastewater treatment facilities, potentially reducing sources of recycled water.

The most important parameter in determining runoff and therefore water supply is precipitation. Climate change can affect the amount, timing, and form of precipitation, whether rain or snow. [24] As a general rule, a warmer world would mean more evaporation, hence more precipitation overall. But where and when the precipitation falls is all important. Some researchers think that climate warming might push the winter storm track on the West Coast further north, which would mean a drier California. On the other hand, some of the new climate models forecast increased average California precipitation. Regional precipitation predictions in the atmospheric circulation models have not been reliable, and vary greatly among the different models, with significant uncertainty in projected California precipitation creating large uncertainty in surface water supply, ranging from a decrease of 26 percent to an increase of 14 percent in 2080-2099.[25] The information currently available on the potential effects of climate change indicates a potential increase in variability of supply that may require adaptation at the State level. However, the potential effects of climate change over the 25-year planning period covered by this UWMP are not quantified in the literature to a degree of specificity that allows for the adjustment of the water demand or supply calculations.[26] If warming occurs, one impact is considered relatively certain. On average, snow levels in the mountains will rise and the average amount of snow covered area and the snowpack will decrease. Less spring snowmelt could make it more difficult to refill winter reservoir flood control space during late spring and early summer of many years, thus potentially reducing the amount of surface water available during the dry season, which would translate to reduced deliveries.

The reports, models and studies share several common themes. The reports are generally making projections over a much longer period of 50 to 100 years, than is covered by this UWMP. Climatic Models also yield varying results based on the assumptions of the individual modelers. Some models predict more precipitation, others predict less. In general, the reports lack specific data that can be used to adjust or plan for supply reliability. The reports contain generalizations and most contain disclaimers such as:

> "It should be emphasized that these model results are not intended as specific predictions, but rather are scenarios based on potential climatic variability and change driven by both natural variability and human induced changes"[27]

Impacts of Increased Groundwater Pumping

The City of Santa Clara relies upon long-term water supply planning by the Santa Clara Water District, the public agency responsible for managing the groundwater basin, in considering its future water supply planning. The District's assumed Santa Clara Sub-Basin safe yield is approximately 200,000 acre-feet/year (afy). However, there is not a detailed

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[24] Maurice Roos, CA Dept. of Water Resources. *Accounting for Climate Change*, California Water Plan Update 2005, available at http://www.waterplan.water.ca.gov/previous/cwpu2005/index.cfm

[25] Schoups, G., E.P. Maurer, and J.W. Hopmans, 2010, Climate change impacts on water demand and salinity in California's irrigated agriculture. Available at http://www.engr.scu.edu/~emaurer/pub_pres.shtml

[26] City of Santa Clara Water Utility, Technical Memorandum "*Water Supply Forecast for General Plan Update 2035" April 27, 2010*

[27] *Pacific Institute, July 2003 Page 5*

groundwater budget for the Santa Clara Sub-Basin, nor have groundwater rights in the basin been adjudicated by a court.

The respective 2005 UWMPs prepared by the multiple water retailers that withdraw groundwater from the Santa Clara Sub-Basin forecast cumulative groundwater withdrawals out to 2030. As identified in Table 34 future cumulative demand is anticipated to be roughly 155,515 afy in 2030, approximately 22.25 percent or 44,500 afy below the basin safe yield of 200,000 afy. Like the City of Santa Clara, each water retailer will be updating its respective UWMP in 2011, including a projection for that retailer's groundwater usage in 2035. At this point, in the absence of retailer projections for 2035, a rough projection can be made using the average five-year incremental increase in cumulative groundwater demand, approximately 10,890 afy according to Table 34. Accordingly, using this basic methodology, cumulative groundwater basin demand would be expected to increase from 155,515 afy in 2030 to approximately 166,400 afy in 2035, still roughly 17 percent or 33,600 afy below the 200,000 afy safe yield.

A groundwater basin is a complex natural resource and can not be equated to a bathtub in which water drained from the bathtub affects all water levels equally. Given the large geographic scope of the Santa Clara Sub-Basin and the multiple users drawing from the aquifer, conditions vary across the sub-basin based on elevation, recharge conditions, and pumping activity. It should not be assumed that groundwater pumping from a specific location will necessarily have a uniform effect on groundwater conditions and levels throughout the sub-basin. Therefore, in such a large and complex groundwater basin, pumping at one end of the groundwater basin will not necessarily affect groundwater levels at the other end.

Table 34: Projected Annual Santa Clara Sub-Basin Groundwater Pumping

Retailer	City(s) Served by Retailer	Projected Ground Water Use AF/Year					
		2010	2015	2020	2025	2030	2035
City of Santa Clara	City of Santa Clara	23,048	23,048	23,048	23,048	23,048	23,048
San Jose Water Company	Campbell, Cupertino, San Jose, Saratoga, Los Gatos, Monte Sereno	60,911	64,433	67,956	71,478	75,000	78,522
		Surface Water					
		Surface Water					
San Jose Municipal Water System	San Jose	4,160	8,850	12,900	17,700	20,900	25,085
Great Oaks Water Company	San Jose	16,751	20,180	23,279	26,125	29,201	32,314
California Water Service Company (Los Altos District)	Cupertino, Los Altos, Los Altos Hills, Mountain View, Sunnyvale	4,138	4,197	4,258	4,320	4,385	4,447
City of Mountain View	Mountain View	134	202	157	112	69	45
City of Sunnyvale	Sunnyvale	2,800	2,800	2,800	2,800	2,912	2,940
Totals		111,942	123,710	134,398	145,583	155,515	166,400

If portions of the Santa Clara Sub-Basin were to go back into overdraft conditions, the likely environmental consequences, based on past observations, would be land subsidence, unproductive wells, water loss (negative balance) from rivers/creeks as the groundwater table drops, which in the worst-case would lead to de-watering, and associated riparian impacts as the vegetation loses access to sufficient water. However, as discussed previously, a primary responsibility of the Water District is to recharge groundwater basins to prevent overdraft, and as projected in Table 34, future cumulative demand on the Santa Clara Sub-Basin is expected to be well below the safe yield of 200,000 afy. Even when the City was at the historic peak for groundwater production in FY1986/87, the basin was not approaching overdraft. Therefore, the City's projected pumping falls within the range of historically sustainable pumping, given the Water District's reasonably foreseeable recharge and groundwater management programs.

There is an inherent level of uncertainty in predicting water supply availability decades into the future. Providing absolute supply certainty is only possible in the near-term and at a much later point in the land use planning and approval process. However, Santa Clara has a progressively phased 2010-2035 General Plan that will allow reconsideration of available water supplies concurrent with each phase of planned development, coordinated with each successive five-year City UWMP, which in turn would be based on the Water District's regional wholesale UWMP, updated every five years, including adjusted imported water quantities to account for pumping restrictions and climate change. Therefore, the City's land use planning processes will serve to prevent potential future overdraft conditions by specifically addressing Santa Clara's contribution to cumulative pumping demands on the aquifer.

Future pumping by the City of Santa Clara, in combination with the multiple other users of the Santa Clara Sub-Basin, would not be expected to contribute to cumulative groundwater pumping impacts, i.e. withdrawals above the basin's safe yield, given the Water District's reasonably foreseeable recharge and groundwater management programs. However, should the District's recharge program be affected by reduced availability of imported water, there is the potential for future cumulative groundwater basin demand to exceed the aquifer's safe yield.

Reliability and Vulnerability of Groundwater

In Santa Clara County, nearly half of all water used comes from groundwater. The county's groundwater basins have vast storage capacity, estimated to be three times the capacity of all the district's 10 surface reservoirs combined. However, groundwater is vulnerable to seasonal or climatic shortages due to droughts and/or shortages of water used for groundwater recharge. The Santa Clara Valley groundwater basin is managed by the SCVWD in order to maintain the reliability of the groundwater basin as a source of supply. The District uses both natural and managed groundwater recharge to replenish the basin. Other programmatic specifics are detailed in the SCVWD's 2001 Groundwater Management Plan.

As noted earlier in this UWMP the groundwater production wells are strategically located throughout the City. Locating the wells throughout the City increases the overall reliability of the system. The addition of portable emergency generators also increases the reliability of this water source. These generators are discussed in detail in the Shortage Contingency Plan subsection of this UWMP.

The City has well capacity that is not currently being used. The utilization factor for the City's wells is currently 23% with several wells being used at less than 10% of their rated capacity. Therefore additional capacity exists which could be used to replace the loss of either of the City's imported water supplies. The District has not determined a resource limit to the City's use of groundwater, rather they represent their ability to obtain sufficient quantities of water supply for the overall water requirements as stated in this Plan.

Nitrate levels have been tracked in the south bay for several decades, but levels in excess of the Maximum Contaminant Level (MCL) have never been found. However, if the six Santa Clara wells that have nitrate levels present below the MCL should someday test above the MCL, and need to be removed from service, this could potentially remove an estimated 4,357 acre-feet per year from future supplies. This will be discussed in more detail in the Water Quality subsection of this report.

Reliability and Vulnerability of Treated Surface Water Provided by Santa Clara Valley Water District

The Santa Clara Valley Water District has completed a reliability study to assess the vulnerability of their regional raw and treated water delivery systems to certain major disasters including earthquakes and flooding. The three major fault zones in the region, Calaveras, Hayward and San Andreas, each have an expected frequency and energy that has the potential for interrupting the delivery of potable treated water from the District's water treatment plants. The result of the combination of seismic probabilities for each one of these three fault zones indicates about a 1 in 100 chance each year for a major earthquake that could result in a 1 to 2 week interruption of the District treated water supply to the City of Santa Clara. Certain District facilities are also subject to flooding but this is much lesser concern to the City than a seismic event[28.]

Maintaining a diversified water supply portfolio is important to allow flexibility in storage and use options. The District currently gets its water from seven different sources, and stores water in surface reservoirs, local underground aquifers and a groundwater bank located in Kern County, California. As part of its annual operations planning, the district routinely opts to carry over a portion of its imported water supplies from one contract year to the next. Even though the amount is often limited by state or federal project operators, it provides cost-effective insurance against a subsequent dry year. Additionally, the district has invested in a water banking program at the Semitropic Water Storage District which provides 350,000 acre-feet of out-of-county water storage capacity. Together with water transfers and exchanges, this additional storage helps the district manage uncertainty and variability in supply as each water year develops.

It is important to further improve security of water supply facilities and to respond to water shortage or drought conditions in coordination with water retailers and other stakeholders. The District needs to regularly upgrade or replace aging infrastructure. In the years to come, aged pipelines, treatment plants, and other elements of the water supply infrastructure will need to be significantly improved. Getting public support to invest in upgrading and replace aged infrastructures remains a challenge.

Another identified vulnerability for the District is the reliability of the supplies of regional imported water from the Sacramento/San Joaquin Delta to the District. The Delta lies in close proximity to at least five major faults and it has been estimated that there is a two-in-three probability that the Bay Area will experience a large magnitude earthquake in the next 30 years. A recent state study predicts that a 6.5 magnitude earthquake near the Delta would cause 30 levee breaches resulting in the flooding of 16 islands. The influx of seawater would make the Delta an unusable drinking water supply for a prolonged period of time. It would likely be three to five years before a significant water supply could be delivered from the Delta. Failure of the Delta levees would lead to flooding and seawater intrusion. In addition the levees are vulnerable to washing away. The central Delta islands are up to 25 feet below sea level, subsiding at a rate of about two inches per year. The levees protecting these islands are old and weak, and are highly vulnerable to catastrophic events such as earthquakes and flooding, as well as daily ongoing threats such as animal burrows and wear and tear caused by age. Scientists estimate that global warming will increase the mean sea level between one and three feet over the next 100 years, placing greater pressure on the levee system and increasing the likelihood and impacts of levee failures. Regional climate changes may also result in an increase in the magnitude and frequency of extreme rainfall events, further stressing the stability of the Delta levee system.

Under certain conditions levee failure could interrupt the ability to pump treatable water to the State or Federal water projects for delivery to the District. The temporary loss of District imported supply could be replaced in the short term by a combination of increased well production of groundwater and an increase in SFPUC supply (within contract limits). The

[28] Santa Clara Valley Water District, Water Infrastructure Reliability Project, May 2005.

areas of the City served by this District connection could be served via the existing booster pumps at Serra Tanks that have back-up power supplied by a diesel-powered generator. Some additional optimization of Zone 2 and Zone 2A zone valves would be required to mitigate an extended loss of District supply.[29]

SCVWD water demand projections show that the current water supply will not be sufficient to meet future demand beyond 2020. The projected demand reductions would exceed 20% with the existing level of supplies and storage. This is outside the 0-20% target level called for in the projections provided to their wholesalers in Appendix H. Conservation measures currently planned for the next twenty to thirty years will only offset approximately half of the increased demand, resulting in significant water shortages. A 5% or greater water shortage in any given year could result in considerable economic loss to Santa Clara County. Other factors affecting water demand may include a substantial change in the type of water usage, wildfires, prolonged heat waves and drought, Bay-Delta issues, and other economic, demographic and environmental factors, including climate change. The district manages and addresses these risks and uncertainties by building and maintaining a diversified portfolio of water supply sources and programs. This portfolio of existing supplies and new water supply investments is intended to meet at least 95 percent of future water demands. This portfolio will be reviewed and updated in a Water Supply and Infrastructure Master Plan scheduled for completion in 2012.[30]

Reliability and Vulnerability of Treated Surface Water From San Francisco Public Utilities Commission

During the drought that occurred from 1986 to 1992, the reservoirs within the Hetch-Hetchy system became seriously depleted, indicating the system is less reliable during dry periods than previously thought. The San Francisco Public Utilities Commission (SFPUC) has also identified serious concerns about portions of the Hetch-Hetchy system that are aging and in need of repair or replacement. In addition, due to the age of the system, most facilities are not designed to current seismic standards and the system is vulnerable to earthquakes. An earthquake or similar catastrophic event could result in a prolonged disruption of the Hetch-Hetchy system with loss of service for 2 to 4 months. The SFPUC completed an evaluation of the Hetch-Hetchy water system that indicates more than $3.6 billion in infrastructure replacement and upgrades are necessary to insure the capacity and reliability of the water system for the suburban users[31].

The temporary loss of SFPUC Hetch-Hetchy supply would eliminate the single-source supply of water to Zone 1A industrial customers. Well water could be used to temporarily replace the loss of water from SPWD Hetch-Hetchy supply; long-term replacement of SFPUC supply would require a new connection and a new agreement with the District for additional treated water. The District connections would need to be modified and automated to allow a direct supply of District water into the transmission main to serve Zone 1. The two production wells north of Bayshore Highway (Wells 32 and 34) would also be critical in replacing the potential loss of SFPUC supply[29].

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[29] City of Santa Clara 2002 Water Master Plan
[30] Santa Clara Valley Water District Protection and Augmentation of Water Supplies 2010/2011
[31] San Francisco Public Utilities Commission, Bay Area Water Users Association: Water Supply Master Plan - A Water Resource Strategy for the SFPUC, April 2000

The Bay Area Water Supply and Conservation Agency (BAWSCA), Water Conservation Implementation Plan, Water System Improvement Plan, Long Term San Francisco Public Utilities Commission Reliable Water Supply Strategy, and 2009 Water Supply Agreement are all ways that water from the SFPUC, provided to their wholesale customers including the City of Santa Clara, can be better ensured.

San Francisco Public Utilities Commission Water System Improvement Plan

In order to enhance the ability of the SFPUC water supply system to meet identified service goals for water quality, seismic reliability, delivery reliability, and water supply, the SFPUC has undertaken the WSIP, approved October 31, 2008. The WSIP will deliver capital improvements aimed at enhancing the SFPUC's ability to meet its water service mission of providing high quality water to customers in a reliable, affordable and environmentally sustainable manner. Many of the water supply and reliability projects evaluated in the WSIP were originally put forth in the SFPUC's Water Supply Master Plan (2000).

A PEIR was prepared in accordance with the California Environmental Quality Act for the WSIP. The PEIR, certified in 2008, analyzed the broad environmental effects of the projects in the WSIP at a program level and the water supply impacts of various alternative supplies at a project level. Individual WSIP projects are also undergoing individual project specific environmental review as required.

In approving the WSIP, the Commission adopted a Phased WSIP Variant for water supply that was analyzed in the PEIR. This Phased WSIP Variant established a mid-term water supply planning milestone in 2018 when the Commission would reevaluate water demands through 2030. At the same meeting, the Commission also imposed the Interim Supply Limitation which limits the volume of water that the member agencies and San Francisco can collectively purchase to 265 mgd until at least 2018. Although the Phased WSIP Variant included a mid-term water supply planning milestone, it did include full implementation of all proposed WSIP facility improvement projects to insure that the public health, seismic safety, and delivery reliability goals were achieved as soon as possible.

As of July 1, 2010, the WSIP was 27% complete overall with the planning and design work over 90% complete. The WSIP is scheduled to be completed in December 2015 and respective projects are depicted in the Figure 16 below.

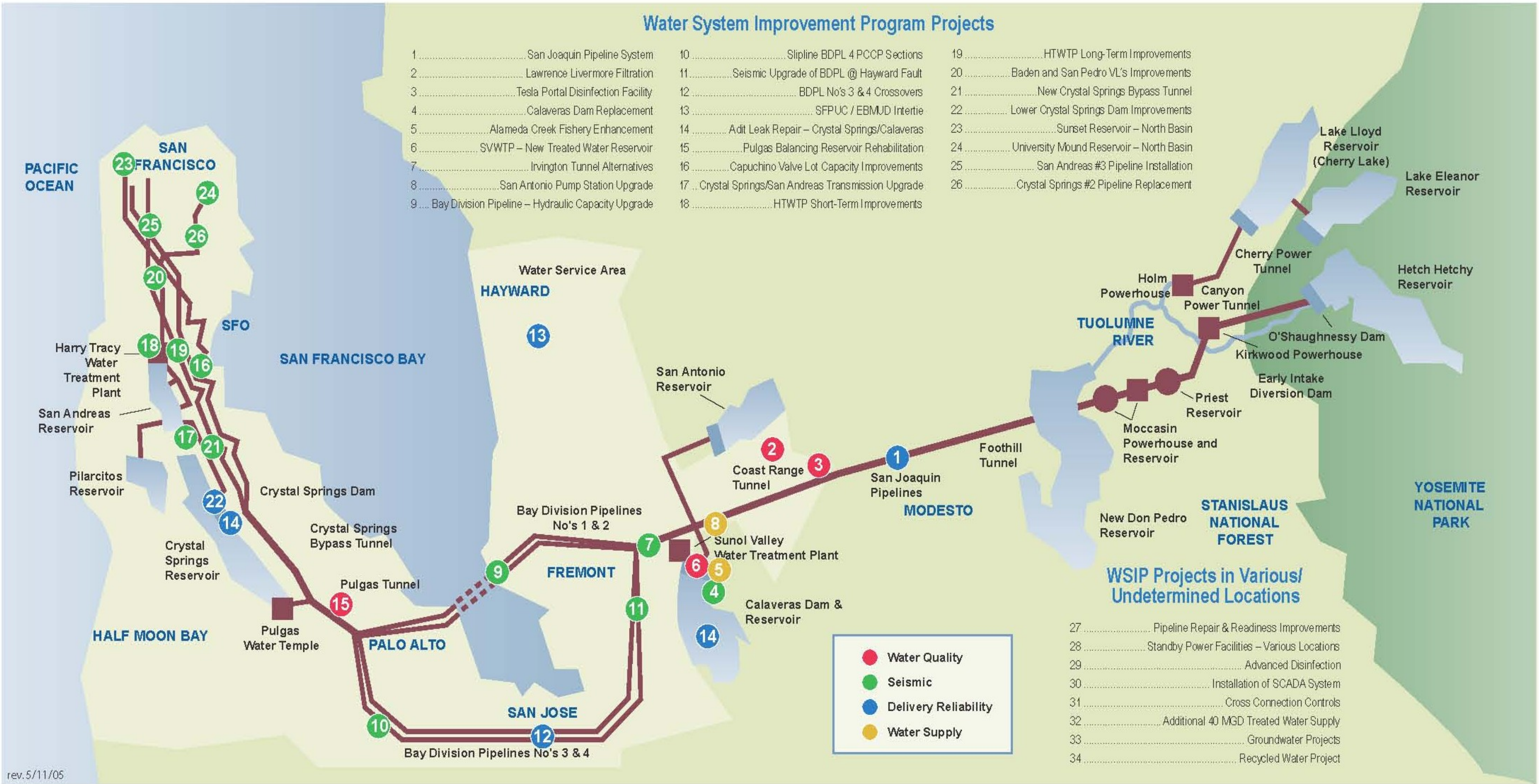

Figure 16: SFPUC Water System Improvement Program Projects

The SFPUC's Water System Improvement Program (WSIP) provides goals and objectives to improve the delivery reliability of the Regional Water System (RWS) including water supply reliability. The goals and objectives of the WSIP related to water supply are summarized in Table 35 below:

Table 35: SFPUC Water System Reliability: Program and Performance

Program Goal	System Performance Objectives
Water Supply – meet customer water needs in non-drought and drought periods	Meet average annual water demand of 265 million gallons per day (mgd) from the SFPUC watersheds for retail and wholesale customers during non-drought years for system demands through 2018.
	Meet dry-year delivery needs through 2018 while limiting rationing to a maximum 20 percent system-wide reduction in water service during extended droughts.
	Diversify water supply options during non-drought and drought periods.
	Improve use of new water sources and drought management, including groundwater, recycled water, conservation, and transfers.

The adopted WSIP had several water supply elements to address the WSIP water supply goals and objectives. The following provides the water supply elements for all year types and the dry-year projects of the adopted WSIP to augment all year type water supplies during drought.

Water Supply – All Year Types

The SFPUC historically has met demand in its service area in all year types from its watersheds. They are the: Tuolumne River watershed, Alameda Creek watershed and San Mateo County watersheds. In general, 85 percent of the supply comes from the Tuolumne River through Hetch-Hetchy Reservoir and the remaining 15 percent comes from the local watersheds through the San Antonio, Calaveras, Crystal Springs, Pilarcitos and San Andreas Reservoirs. The adopted WSIP retains this mix of water supply for all year types.

Water Supply – Dry-Year Types

The adopted WSIP includes the following water supply projects to meet dry-year demands with no greater than 20 percent system-wide rationing in any one year: Restoration of Calaveras Reservoir capacity, Restoration of Crystal Springs Reservoir capacity, Westside Basin Groundwater Conjunctive Use, Water Transfer with Modesto Irrigation District (MID) /Turlock Irrigation District (TID).

In order to achieve its target of meeting at least 80 percent of its customer demand during droughts, the SFPUC must successfully implement the dry-year water supply projects included in the WSIP.

Projected SFPUC System Supply Reliability

The SFPUC has provided a table, Table 3: Projected System Supply Reliability based on Historical Hydrologic Period from 2/22/10 letter from P. Kehoe, found in Appendix I presenting the projected Regional Water System (RWS) supply reliability. This table assumes that the wholesale customers purchase 184 mgd from the RWS through 2030 and the implementation of the dry-water water supply projects included in the WSIP. The numbers represent the wholesale share of available supply during historical year types per the Tier One Water Shortage Allocation Plan. This table does not reflect any potential impact to RWS yield from the additional fishery flows required as part of Calaveras Dam Replacement Project and the Lower Crystal Springs Dam Improvements.

Description of BAWSCA

The Bay Area Water Supply and Conservation Agency (BAWSCA) was created on May 27, 2003 to represent the interests of the 26 agencies that include cities, water districts, a water company, and a university, in Alameda, Santa Clara and San Mateo counties that purchase water on a wholesale basis from the San Francisco Regional Water System (RWS). Collectively, the BAWSCA agencies are referred to as the Wholesale Customers.

BAWSCA is the only entity that has the authority to directly represent the needs of the wholesale customers that depend on the RWS. Through BAWSCA, the wholesale customers can work with the San Francisco Public Utilities Commission (SFPUC) on an equal basis to ensure the RWS is rehabilitated and maintained and to collectively and efficiently meet local responsibilities.

BAWSCA has the authority to coordinate water conservation, supply and recycling activities for its agencies; acquire water and make it available to other agencies on a wholesale basis; finance projects, including improvements to the regional water system; and build facilities jointly with other local public agencies or on its own to carry out the agency’s purposes.

BAWSCA Water Conservation Implementation Plan

In September 2009, BAWSCA completed the Water Conservation Implementation Plan (WCIP). The goal of the WCIP is to develop an implementation plan for BAWSCA and its member agencies to attain the water efficiency goals that the agencies committed to in 2004 as part of the Program Environmental Impact Report (PEIR) for the Water System Improvement Program (WSIP) which is further described earlier in this Section. The WCIP’s goal was expanded to include identification of how BAWSCA member agencies could use water conservation as a way to continue to provide reliable water supplies to their customers through 2018 given the SFPUC’s 265 million gallons per day (MGD) Interim Supply Limitation. The SFPUC imposed the Interim Supply Limitation on October 31, 2008, to limit the volume of water that the BAWSCA member agencies and San Francisco can collectively purchase from the RWS to 265 MGD until at least 2018.

Based on the WCIP development and analysis process, BAWSCA and its member agencies identified five new water conservation measures, which, if implemented fully throughout the BAWSCA service area, could potentially save an additional 8.4 MGD by 2018 and 12.5 MGD by 2030. The demand projections for the BAWSCA member agencies, as transmitted to the SFPUC on June 30, 2010, indicate that collective purchases from the SFPUC will stay below 184 MGD through 2018 as a result of revised water demand projections, the identified water conservation savings, and other actions.

Long Term San Francisco Public Utilities Commission Reliable Water Supply Strategy

BAWSCA's water management objective is to ensure that a reliable, high quality supply of water is available where and when people within the BAWSCA service area need it. A reliable supply of water is required to support the health, safety, employment, and economic opportunities of the existing and expected future residents in the BAWSCA service area and to supply water to the agencies, businesses, and organizations that serve those communities. BAWSCA is developing the Long-Term Reliable Water Supply Strategy (Strategy) to meet the projected water needs of its member agencies and their customers through 2035 and to increase their water supply reliability under normal and drought conditions.

The Strategy is proceeding in three phases. Phase I was completed in 2010 and defined the magnitude of the water supply issue and the scope of work for the Strategy. Phase II of the Strategy is currently under development and will result in a refined estimate of when, where, and how much additional supply reliability and new water supplies are needed throughout the BAWSCA service area through 2035, as well as a detailed analysis of the water supply management projects, and the development of the Strategy implementation plan. Phase II will be complete by 2013. Phase III will include the implementation of specific water supply management projects. Depending on cost-effectiveness, as well as other considerations, the projects may be implemented by a single member agency, by a collection of the member agencies, or by BAWSCA in an appropriate timeframe to meet the identified needs. Project implementation may begin as early as 2013 and will continue throughout the Strategy planning horizon, in coordination with the timing and magnitude of the supply need.

The development and implementation of the Strategy will be coordinated with the BAWCSA member agencies and will be adaptively managed to ensure that the goals of the Strategy, i.e., increased normal and drought year reliability, are efficiently and cost-effectively being met.

2009 Water Supply Agreement

The business relationship between San Francisco and its wholesale customers is largely defined by the "Water Supply Agreement between the City and County of San Francisco and Wholesale Customers in Alameda County, San Mateo County and Santa Clara County" entered into in July 2009 (WSA). The new WSA replaced the Settlement Agreement and Master Water Sales Contract that expired June 2009. The WSA addresses the rate-making methodology used by the City in setting wholesale water rates for its wholesale customers in addition to addressing water supply and water shortages for the RWS. The WSA has a 25 year term.

In terms of water supply, the WSA provides for a 184 million gallon per day (MGD, expressed on an annual average basis) "Supply Assurance" to the SFPUC's wholesale customers, subject to reduction, to the extent and for the period made necessary by reason of water shortage, due to drought, emergencies, or by malfunctioning or rehabilitation of the regional water system. The WSA does not guarantee that San Francisco will meet peak daily or hourly customer demands when their annual usage exceeds the Supply Assurance. The SFPUC's wholesale customers have agreed to the allocation of the 184 MGD Supply Assurance among themselves, with each entity's share of the Supply Assurance as set forth in Attachment C of the WSA. The Supply Assurance survives termination or expiration of the WSA and this agency's Individual Water Sales Contract with San Francisco.

The Water Shortage Allocation Plan between the SFPUC and its wholesale customers, adopted as part of the WSA in July 2009, addresses shortages of up to 20% of system-wide use. The Tier 1 Shortage Plan allocates water from the RWS between San Francisco Retail and the wholesale customers during system-wide shortages of 20% or less. The WSA also anticipated a Tier 2 Shortage Plan adopted by the wholesale customers which would allocate the available water from the RWS among the wholesale customers. Further discussion of Tier 1 and 2 Shortage Plan is found in the Drought Planning section of this UWMP.

Reliability and Vulnerability of Recycled Water

Recycled water is not vulnerable to seasonal or climatic shortage. The volume of influent to the San Jose/ Santa Clara Water Pollution Control Plant far exceeds the recycled water system's delivery capability and there is not currently a requirement for a minimum discharge volume from the water pollution control plant. Even in the event of multiple dry years, the projected recycled water deliveries would still be a fraction of the influent volume. The San Jose/Santa Clara Water Pollution Control Plant currently produces 100 million gallons per day of water that meets recycled water standards, however system-wide recycled water sales are approximately 10 millions gallons per day. Therefore, recycled water is assumed to be a drought-proof water supply.

Imported Water Supply Constraints

As discussed previously, the City relies on imported water from the Water District and the SFPUC. The City's contract with the SFPUC is temporary and interruptible, and may be unavailable after 2018. The Water District's long-term ability to import water from the Delta will be affected by two primary constraints: 1) SWP (State Water Project) and CVP (Central Valley Project) pumping restrictions, and 2) altered hydrologic conditions due to climate change. A reduction in the Valley's imported water supply would, in turn, have implications for Santa Clara's surface water contract with the District and the District's groundwater recharge program for the Santa Clara Sub-Basin, of which the City is one of many users. (2010 General Plan EIR)

The District identified and analyzed risks to their ability to supply water as part of the Integrated Water Resources Planning (IWRP) Study in 2003. Risks evaluated included hazards and extreme events, climate change, increased water quality standards, fisheries protection measures, and demand growth greater than projected. The top two evaluated risks were the Delta levee failure possibility and climate change.

Future Imported Water Deliveries

The Department of Water Resources (DWR) has estimated potential SWP deliveries under future conditions in 2029 based on Delta pumping restrictions and climate change scenarios.[32] Future water deliveries are estimated using probabilities, i.e. the probability that deliveries will exceed a certain quantity of water in a given year. For instance, under current conditions, DWR estimates there is a 75 percent chance that SWP deliveries will be above 2,397,000 acre-feet/year (afy), or alternatively that there is a 25 percent chance that deliveries will be below this amount. Under future conditions accounting for pumping restrictions and

[32] CA Dept. of Water Resources, Bay-Delta Office Draft State Water Project Delivery Reliability Report, 2009. Available at http://baydeltaoffice.water.ca.gov/swpreliability/

climate change in 2029, DWR estimates there is a 75 percent chance that SWP deliveries will be above 2,137,000 afy, or 25 percent chance that deliveries will be below this amount. Comparing current and future (2029) conditions under the 75 percent probability scenario, DWR estimates a 260,000 afy reduction in SWP deliveries (i.e. the difference between 2,397,000 and 2,137,000 afy, or slightly more than 10 percent decrease in deliveries. Both the State and Federal systems' watersheds are expected to experience similar hydrological changes due to climate change, and both face similar Delta pumping restrictions, therefore it is reasonable to assume similar future reductions to CVP deliveries.

Efforts to Minimize Imported Water and Maximize Resources

The City of Santa Clara has adopted several management strategies to minimize imported water use and maximize local resources in order to be more self-reliant. The use of recycled water to offset water demand resulting from growth is one of the key management strategies used by the City of Santa Clara to reduce the reliance on imported water. Also, SCVWD states in their UWMP as well as in their Integrated Water Resource Plan so that the SCVWD manages their system to maximize the use of local supplies. This in turn reduces the reliance of the City on imported sources.

Recycled water has provided the City a drought proof water supply for customers who have acceptable uses. Recycled water has been used to offset growth in the potable water demand. Don Von Raesfeld (DVR) Power Plant is the single largest recycled water user in Santa Clara. If the DVR Power Plant had not been supplied with recycled water, the City's potable demand would have increase by 1.5 MGD or approximately 7% when DVR is at full production. Recycled water is also being used in the Rivermark development. Rivermark is the single largest development (mixed residential and commercial) in Santa Clara's history. Common areas, median strips, parks, commercial landscaping and residential front yards are all irrigated with recycled water. Recycled water has a secondary benefit of reducing the potable demand during the high demand summer months. This reduction in the overall demand reduces dependence on imported water sources and groundwater (and provides greater reliability from the existing potable storage volumes). Recycled water currently accounts for over approximately 11% of the City's overall water supply, or equivalent to approximately half the volume of water supplied by either Hetch-Hetchy or the District's treated water.

The City's use of imported treated water at a relatively constant rate per our contracts allows for a controlled and predictable use of imported water. The City's use of ground water to meet the variable demand (diurnal and seasonal) utilizes local supplies to the maximum extent practicable, although some imported water is used by the SCVWD to augment local supplies for groundwater recharge. While the District manages the county's water supplies to maximize the use of local supplies, it is imperative to augment local supplies so that the local supplies (mostly recharged to the groundwater basin) are not over used.

Proposed Policies to Ensure Future Water Supply

The City of Santa Clara's proposed 2010-2035 General Plan includes a range of policies to ensure a reliable, safe supply of potable water adequate to meet present and future needs through promotion of water conservation, expansion of the use of recycled water, and appropriate coordination with the Water District. Proposed Draft 2010-2035 General Plan

Policies that provide program-level mitigation to ensure adequate water supply within the City are identified below.

Table 36: Water Supply Reliability Policies to Ensure Future Water Supply

Water Policies	
5.10.4-P1	Promote water conservation through development standards, building requirements, landscape design guidelines, education, compliance with the State water conservation landscaping ordinance, and other applicable City-wide policies and programs.
5.10.4-P2	Expand water conservation and reuse efforts throughout the City.
5.10.4-P3	Promote water conservation, recycled water use and sufficient water importation to ensure an adequate water supply.
5.10.4-P4	Require an adequate water supply and water Quality for all new development.
5.10.4-P5	Prohibit new development that would reduce water quality below acceptable State and local standards.
5.10.4-P6	Maximize the use of recycled water for construction, maintenance, irrigation and other appropriate applications.
5.10.4-P7	Require installation of native and low-water consumption plant species when landscaping new development and public spaces to reduce water usage.
5.10.4-P8	Require all new development within a reasonable distance of existing or proposed recycled water distribution systems to connect to the system for landscape irrigation.
5.10.4-P9	Work with Santa Clara Valley Water District to improve the Santa Clara Distributary.
5.10.4-P10	Work with Santa Clara Valley Water District to minimize undesirable compaction of aquifers and subsidence of soils.

Water Shortage Contingency Plan

The City's water system benefits from flexibility due to multiple distributed sources. With 28 production wells currently in operation, two imported water suppliers and an extensive recycled water system the City's water system has been historically very reliable. The loss of a single supply, storage tank, well, or imported water connection can be offset, in most cases by relying on the other remaining sources. Back up power supplies (diesel generators) have been strategically located throughout the City for wells and booster pumps. In addition, 5 of these back up generators are portable and can be moved as necessary to other locations within a matter of hours.

Earthquake

Santa Clara County rests on three major fault lines. Seismologists estimate a 62% chance of a magnitude 6.7 or greater earthquake occurring on one of those fault lines within the next 25 years. Water resources and infrastructure where pipelines and levees cross active faults is highly vulnerable at these locations. (2011 SCVWD Website Comprehensive Water Resources Management Plan)

An earthquake could collapse or otherwise damage some well casings resulting in a significant reduction in production capacity or the complete loss of production from a well.

Historically the wells in Santa Clara have not suffered any damage in previous earthquakes such as the Loma Prieta earthquake in 1989. The Loma Preita earthquake, at 7.0 on the Richter scale with an epicenter in the nearby Santa Cruz Mountains, is the most recent significant seismic event. The City conducted a seismic vulnerability study in 2003. The study examined the vulnerability of the Santa Clara water system in the event of a magnitude 7.9 earthquake on the San Andreas fault and a magnitude 7.1 earthquake on the Hayward fault. The study found that Santa Clara would most probably be isolated from the Hetch-Hetchy and SCVWD imported water systems. The loss of both imported water supplies would result in a loss of approximately 32% of the water currently used to meet customer needs. However, the report found that the City's wells and storage were sufficient to meet average day demands even with the loss of both imported water sources.

Damage to the distribution system from either of the two earthquakes described would also result in 11% to 20% of the City's customers being isolated from piped water supplies. The report estimated it would take between 15 to 39 days to restore service to all effected customers.

The City completed a seismic capital improvement program that increased the reliability of the City system in the event of an earthquake. All the existing piping connections to the City's water storage systems were retrofitted to allow for greater flexibility for movement. One elevated storage tank (500,000 gallon) still needs to be removed from the system and replaced or alternative operations implemented.

The SFPUC acknowledges the possibly devastating effect of a local earthquake. Following San Francisco's experience with the 1989 Loma Prieta Earthquake, the SFPUC created a departmental *SFPUC Emergency Operations Plan (EOP).* The *SFPUC EOP*, originally released in 1992, and has been updated on average every two years. The latest plan update will be released in Spring, 2011. The *EOP* addresses a broad range of potential emergency situations that may affect the SFPUC and that supplements the City and County of San Francisco's *Emergency Operations Plan* prepared by the Department of Emergency Management and most recently updated in 2008. Specifically, the purpose of the *SFPUC EOP* is to describe the department's emergency management organization, roles and responsibilities and emergency policies and procedures.

In addition, SFPUC divisions and bureaus have their own EOPs that are in alignment with the SFPUC EOP and describe each division's/bureau's specific emergency management organization, roles and responsibilities and emergency policies and procedures. The SFPUC tests its emergency plans on a regular basis by conducting emergency exercises. Through these exercises the SFPUC learns how well the plans will or will not work in response to an emergency. Plan improvements are based on exercise and sometime real world event response and evaluation. Also, the SFPUC has an emergency response training plan that is based on federal, state and local standards and exercise and incident improvement plans. SFPUC employees have emergency training requirements that are based on their emergency response role.

With respect to emergency response for the SFPUC Regional Water System, the SFPUC has prepared the *SFPUC Regional Water System Emergency Response and Recovery Plan* (ERRP), completed in 2003 and updated in 2006. The purpose of this plan is to describe the SFPUC RWS emergency management organizations, roles and responsibilities within those organizations, and emergency management procedures. This contingency plan addresses how to respond to and to recover from a major RWS seismic event, or other major disaster. The ERRP complements the other SFPUC emergency operations plans at the Department, Division and Bureau levels for major system emergencies.

The SFPUC has also prepared in an *SFPUC-Suburban Customer Water Supply Emergency Operations and Notification Plan.* The plan was first prepared in 1996 and has been updated several times – most recently in July of 2010. The purpose of this plan is to provide contact information, procedures and guidelines to be implemented by the following entities when a potential or actual water supply problem arises: the SFPUC Water Supply and Treatment Division (WS&TD), Water Quality Bureau (WQB), and SFPUC wholesale customers, BAWSCA, and City Distribution Division (CDD – considered to be a customer for the purposes of this plan). For the purposes of this plan, water quality issues are treated as potential or actual supply problems.

As discussed previously the SFPUC is also undertaking a WSIP in order to enhance the ability of the SFPUC water supply system to meet identified service goals for water quality, seismic reliability, delivery reliability, and water supply.

WSIP projects include several projects located in San Francisco to improve the seismic reliability of the in-city distribution system, as well as many projects related to the SFPUC RWS to address both seismic reliability and overall system reliability. All WSIP projects are expected to be completed by 2016.

In addition to the improvements that will come from the WSIP, San Francisco has already constructed the following system interties for use during catastrophic emergencies, short-term facility maintenance and upgrade activities, and in times of water shortages:

- A 40 mgd system intertie between the SFPUC and the Santa Clara Valley Water District (Milpitas Intertie); and

- One permanent and one temporary intertie to the South Bay Aqueduct, which would enable the SFPUC to receive State Water Project water.

The WSIP includes intertie projects, such as the EBMUD-Hayward-SFPUC Intertie. The SFPUC and EBMUD have completed construction of this 30 mgd intertie between their two systems in the City of Hayward, as part of the WSIP.

Loss of Wells

The possibility of losing the production from a single or several wells is slight but could occur due to an earthquake (well collapse) or contamination. The City wells are all constructed to current standards in order to prevent possible contamination of the City's drinking water. The City has also completed a Source Water Assessment Program that examined potential sources of contamination. Currently six wells have shown a detectable level of nitrates. The potential exists that Nitrates could render several wells unusable if the level increased to a concentration in excess of the MCL. However, the recorded nitrate levels across the aquifer have not shown levels above the MCL, so the probability of the nitrate level increasing to that level is extremely remote.

Earthquakes have the potential to damage a well by collapsing the well casing or changing the yield of the aquifer from which the well draws. The wells are geographically distributed within the City such that the loss of one or two wells within a pressure zone will not affect the system's ability to meet the water demand by increasing production from other wells. As noted in Appendix J, the wells within the City have an average utilization factor of 23% with some wells utilized at less than 10% of their rated capacity. Therefore sufficient capacity exists for the City to maintain consistent water delivers even with the loss of multiple wells due to an earthquake or other factors.

Loss of Imported Water Supplies

The water system can offset the temporary loss of either (or both) imported water supplies by the expedient of increased pumping of groundwater. The long-term loss (for more than a year) of either or both imported supplies would, however, probably result in the eventual over-draft of the City's portion of the regional groundwater basin. The City water system can accommodate the increased use of groundwater through the increased operation of storage tanks and their associated booster pumps during periods of high water demand. This mode of operation would also place more demands on the pumping equipment while leaving the system more vulnerable to equipment failure.

The loss of SFPUC Hetch-Hetchy supply would eliminate the single-source supply of water to Zone 1A industrial customers. This loss can be only temporarily replaced with well water; long-term replacement would probably require a new connection and a new agreement with the District. The District connection would need to be modified and automated to allow a direct supply of District water into the transmission main to serve Zone 1. The two production wells (Wells 32 and 34) in the Rivermark area would also be critical in replacing the potential loss of SFPUC supply.

The temporary loss of District imported supply could be replaced in the short term by a combination of increased well production of groundwater and an increase in SFPUC supply (within contract limits). The areas of the City served by this District connection could be served via the existing booster pumps at Serra Tanks that have back-up power supplied by a diesel-powered generator. Some additional optimization of Zone 2 and Zone 2A zone valves would be required to mitigate an extended loss of District supply.

The City of Santa Clara water distribution system has been shown to be very robust in its ability to meet all demands for the peak day and peak hour, for now and for the future expected demands. Fire flow analyses for certain sections of the City indicate minor improvements in system piping would greatly improve pressures that would be available for fighting a major fire. The loss of SFPUC (Hetch-Hetchy) water can be accommodated with the existing system for short-term loss including a potential 3 to 4 month outage that is currently expected from a major earthquake.

The long-term replacement of SFPUC supply would require an additional connection to the District's distribution system and an agreement with the District to provide additional supplies of treated water to the City of Santa Clara. Currently a second District connection is expected to be completed by the end of 2011. This interconnection is part of the SCVWD turnout upgrade project at the City's Serra Tanks location as discussed earlier in this plan under the Future Water Projects section.

Loss of Electrical Power

The City of Santa Clara, like most water utilities is dependent on electrical power to pump water from wells, into and out of storage tanks, and at several points in the distribution system. The City of Santa Clara purchases electrical power from Silicon Valley Power (SVP), the City's municipal electric utility. SVP has taken steps to ensure the reliability of the local power supply including the completion of the Don Von Raesfeld Power plant, which is capable of generating one-third of the City's total electric demand. The Don Von Raesfeld Power Plant increases the reliability of the electrical power to the water utility since the power plant is located within the City limits.

Despite the reliability of SVP, the water utility has placed back up power supplies at 8 strategic water supply facilities around the city. Five of these back up power supplies are portable and can be moved as needed to other locations within the water utility. Electrical connections at the various well sites and booster pump stations are standardized to allow for quick connection of the portable generators at each location. These combined sources (wells with backup power) are sufficient to meet the low expected system demand during a regional or citywide power outage. The City also has sufficient supply of diesel fuel for several weeks of such operations.

SFPUC has also prepared for possible power supply issues. SFPUC's water transmission system is primarily gravity fed, from the Hetch-Hetchy Reservoir to the City and County of San Francisco. Within San Francisco's in-city distribution system, the key pump stations have generators in place and all others have connections in place that would allow portable generators to be used.

Although water conveyance throughout the RWS would not be greatly impacted by power outages because it is gravity fed, the SFPUC has prepared for potential regional power outages as follows:

- The Tesla disinfection facility, the Sunol Valley Water Treatment Plant, and the San Antonio Pump Station, have back-up power in place in the form of generators or diesel powered pumps. Additionally, both the Sunol Treatment Plant and the San Antonio Pump Station would not be impacted by a failure of the regional power grid because it runs off of the SFPUC hydro-power generated by the RWS.

- Both the Harry Tracy Water Treatment Plant and the Baden Pump Station have back-up generators in place.

The SFPUC's WSIP program also includes projects related to standby power facilities at various locations. These projects will provide for standby electrical power at six critical facilities to allow these facilities to remain in operation during power outages and other emergency situations. Permanent engine generators will be provided at four locations (San Pedro Valve Lot, Millbrae Facility, Alameda West, and Harry Tracy Water Treatment Plant), while hookups for portable engine generators will be provided at two locations (San Antonio Reservoir and Calaveras Reservoir).

Financial Impact Mitigation

In order to mitigate the financial impacts of reduced water sales during a drought, the City Council has the authority to impose a drought surcharge on water rates. This surcharge could be a flat fee per hundred cubic feet that is intended to provide the City's water utility with dependable revenues when water use reduction plans are in effect.

The City has traditionally used a "postage stamp" rate for all water sales. With reduction in sales, the fixed costs will remain, imposing a loss on the utility (expenses in excess of revenues). An advantage to the drought surcharge is that it is designed and set to allow sufficient revenue to meet all costs for the utility.

The water utility also has reserves that it has used in the past as a rate stabilization fund. These reserves are now being used in help reduce the rate impact from ever-increasing wholesale costs and the lower water sales due to the recent economic down-turn. Additionally, the Utility is currently developing a long range financial and rate stabilization plan. The 2005 UWMP predicted a steady increase in retail water sales of about 4% to 8% per year over the next 8 to 10 years. This has not occurred. In fact, water sales are at a 30 year low point. This loss of revenue has not allowed for the replacement of water utility reserves and for sufficient revenue for added capital projects for infrastructure replacement. The water utility's reserves are intended to be at the level that is sufficient to cover short-term loss of revenues due to a drought or other short-term catastrophic loss of sales. The 2010-11 Water, Sewer, and Recycled Water Operating Budget is $41.8 million, which represents a decrease of 4.7% over the prior year. [3] Most of this reduction is due to the decrease in projected water sales and sewer revenues due to the economic downturn. However, capital infrastructure replacement projects are needed in both the Water and Sewer Utilities. The cash reserves of the utilities have been drawn down over the past several years. Reserves will be utilized again this fiscal year. The Utility will continue to manage, plan and allocate resources to achieve City Council goals of; maintaining the lowest combined utility rates in the nine bay area counties, stabilizing rates and reducing the need for rate increases to the extent practical, ensuring the financial viability of the Water and Sewer Utilities, ensure the long term viability of and preserve the value of the utility infrastructure.

Draft Water Shortage Contingency Resolution

A draft shortage contingency resolution is included in Appendix K of this UWMP. The City Council has full authority to establish and adjust water rates because the City of Santa Clara operates a municipally owned water utility. Approval of the Public Utilities Commission is not required to raise or establish water rates, fees, or surcharges.

Water Waste Prohibitions

The City of Santa Clara has had water waste prohibitions in place since the 1989-1992 drought. Below is an excerpt from the City of Santa Clara Water Service and Use Rules and Regulations prohibiting water waste (City Municipal Code 13.15.080 section 1C).

WATER USE RESTRICTIONS AND PROHIBITIONS

The following list of Water Use Restrictions and Prohibitions are specific measures which prevent water waste and achieve reasonable, yet substantial, reductions in water use by all users in the City.

The following uses of water are prohibited by the City:

(a) Wasting water, which includes but is not limited to, the flooding or runoff on City sidewalks, gutters, and streets.

(b) Cleaning of sidewalks, driveways, patios, parking lots, or other paved or hard-surfaced areas, or washing cars, buses, boats, trailers, or any vehicle by use of a hose unless that hose is fitted with an operating automatic shut-off valve.

(c) Water waste due to broken or defective plumbing, fire system, irrigation system, or any appurtenance thereto; or to open or to leave open any stopcock or faucet so as to permit water waste.

(d) Service of water by any restaurant unless requested by a patron.

(e) Installation of a single-pass cooling system.

(f) Installation of a non-recirculating, decorative fountain.

(g) Construction of a non-recirculating conveyor car wash.

When water waste is reported and verified, a warning letter is sent to the party responsible for the water waste. If water waste continues the City can take further action including additional warning notices, administrative penalties of up to $5000, or termination of water service. The City has also terminated water service in the case of egregious water waste.

The following table concisely illustrates actions to be undertaken by the City to help prepare for, and implement water saving procedures during a drought or catastrophic interruption of water supplies. The measures specify mandatory prohibitions against certain water use practices in different restrictive stages and identify penalties for excessive use.

Table 37: Consumption Reduction Matrix

Plan	Plan 1	Plan 2	Plan 3	Plan 4
Drought Stage	Advisory	Voluntary	Mandatory	Emergency Curtailment
Reduction	Up to 10%	10% to 20%	21 to 49%	50% or greater
1. Water Use Reduction Target				
a) Single family	NA	80% - 90% of base year	50% -80% of base year	50% of base year
b) Master metered multi-family	NA	80% - 90% of base year	50% -80% of base year	50% of base year
c) Non-residential	NA	80% - 90% of base year	50% -80% of base year	50% of base year
2. Water Use Restrictions				
a) Water waste by irrigation	Prohibited	Prohibited	Prohibited	Prohibited
b) Cleaning sidewalks, hard surfaces, etc.	Prohibited	Prohibited	Prohibited	Prohibited
c) Washing vehicle w/o shut off valve on hose	Prohibited	Prohibited	Prohibited	Prohibited
d) Decorative fountains, operating maintaining	No restriction	Prohibited	Prohibited	Prohibited
e) Water for construction purposes	No restriction	Restricted (1)	Restricted (1)	Restricted (1)
f) Water waste due to effective plumbing / leaks	Prohibited	Prohibited	Prohibited	Prohibited
g) Landscape irrigation	No restriction	Prohibited from 9AM to 6PM	Prohibited from 9AM to 6PM	Prohibited
h) Restaurant water service unless patron requests	No restriction	Prohibited	Prohibited	Prohibited
i) New swimming pool or pond construction	No restriction	Restricted	Restricted	Prohibited
j) Filling or refilling swimming pools	No restriction	Restricted	Restricted	Prohibited
k) Hydrant flushing, except for health and safety	No restriction	Prohibited	Prohibited	Prohibited
l) New irrigation connections for new planting	No restriction	Restricted (2)	Restricted (2)	Prohibited (2)
m) Irrigation of golf courses except greens and tees	No restriction	No restriction	Restricted (1)	Restricted (1)
3. Enforcement				
a) First violation	Warning	Warning	Warning, Citation, up to $500 fine	Warning, Citation, up to $500 fine
b) Second violation	Warning	Warning	Warning, Citation, $100 to$1,000 fine	Warning, Citation, $100 to$1,000 fine
c) Subsequent violations	Warning, citation, $100 to$1,000 fine, flow restrictor	Warning, citation, $100 to $1,000 fine, flow restrictor	Warning, citation, $100 to $1,000 fine, flow restrictor, termination of service	Warning, citation, $100 to $1,000 fine, flow restrictor, termination of service
d) Restrictor removal charge	$50	$50	$50	$50
e) Second restrictor removal charge	$100	$100	$100	Remains for duration

(1) Recycled water only can be used

(2) New landscaping supplied by recycled water allowed without restriction.

Water Quality

All water provided by the City from the three potable and one non-potable sources continues to meet or better all applicable State and Federal water quality standards. The following sections highlight the current and possible future water quality challenges faced by the City of Santa Clara and its wholesale suppliers as illustrated in Table 38.

Table 38: Water Quality – Current and Projected Impacts

Water Quality — Current and Projected Water Supply Impacts (acre-feet/year)							
Water source	Description of condition	2010	2015	2020	2025	2030	2035
SCVWD	Possible 15-30% reduction for Delta Smelt	4,372	3,199-3,885	3,199-3,885	3,199-3,885	3,199-3,885	3,199 - 3,885
SFPUC	Possible system wide 8,292 acre-feet reduction due to fisheries	2,454	5,040	0-5,040	0-5,040	0-5,040	0-5,040
Groundwater	6 wells with Nitrates over MCL (4,357 acre-feet)	13,980	18,691	18,691	18,691	18,691	18,691
Recycled Water	None	2,409	4,000	4,300	4,500	4,500	4,500

Ground Water

The City's production wells consistently meet the applicable water quality criteria. Total dissolved solids are not a concern for the City, in contrast to other areas adjacent to San Francisco Bay where saltwater intrusion has been an issue. While the City's groundwater continues to provide excellent quality water, future State or Federal regulations could be imposed that would mandate additional treatment.

Per the Santa Clara Valley Water District's draft 2010 UWMP, groundwater quality in the South Bay region varies greatly. In general, quality is adequate for designated beneficial uses, including municipal and domestic supply, industrial process supply, and industrial service supply. The SCVWD monitors groundwater quality in the Santa Clara Subbasin in support of the District's Board Water Supply Objective 2.2.1: "Protect groundwater basins from contamination and the threat of contamination." Groundwater quality in Santa Clara County is generally very good. Public water supply wells throughout the County deliver high quality water to consumers, almost always without the need for treatment. Cleanup is ongoing at a number of contamination sites and elevated concentrations of nitrate and perchlorate have been observed in some areas. The 2009 Groundwater Quality Report is the most recent water quality monitoring completed by the SCVWD and includes a general evaluation of water quality conditions. The Santa Clara Subbasin has significant confining layers, so data for this subbasin is analyzed for both the principal and shallow aquifer zones. The 2009 median concentrations for common inorganic constituents are generally well below California Department of Public Health (CDPH) drinking water standards for each subbasin and aquifer zone.

Nitrate

The City of Santa Clara has historically relied on groundwater for the majority of the City's water supply. Therefore any contamination of those supplies poses a significant risk to the

City’s overall water supply. Nitrate in the environment comes from both natural and anthropogenic sources. Small amounts of nitrate in groundwater (less than 10 mg/L) are normal, but higher concentrations suggest an anthropogenic origin. Common anthropogenic sources of nitrate in groundwater are fertilizers, septic systems, and animal waste. The drinking water maximum contaminant level (MCL) for nitrate is 45 mg/L. Currently the City monitors its wells for nitrate concentration. Six wells show concentrations of nitrate at or slightly above ½ the Maximum Contaminant Level (MCL). A groundwater nitrate plume is apparently a result of historic agricultural practices and the past use of septic tanks in Santa Clara Valley.

Nitrate does not appear to currently pose a threat to the availability of ground water. Nitrate levels have been tracked in the south bay for several decades and levels in excess of the MCL have never been found. However, if the six Santa Clara wells that have existing nitrate levels below the MCL should someday test above the MCL, and need to be removed from service that could potentially remove 4,357 acre-feet per year of groundwater capacity.

Manganese

Manganese, a naturally occurring metal in groundwater, has been detected at one future well. The use of water with manganese is limited to a “secondary” maximum contaminant limit (MCL) of 50 ppb. Water with manganese concentrations above that will cause stains to plumbing fixtures and laundry and, although not a health problem, can only be delivered to a public water supply with the acceptance of the users. Since the 2005 UWMP, two new wells, Well 32 and 34, have been built. Both new wells have naturally occurring manganese present. Well 34, along with 4 other City wells, show levels of manganese anywhere from 2.9 to 31 ppb, under the MCL. Well 32, on the other hand, has a level over the MCL and the City is prepared to provide wellhead treatment for manganese removal to help assure a reliable supply of water to the Bayshore North neighborhoods. Well 32 is still in the permitting phase.

Manganese affects the availability of groundwater only as it relates to the cost to treat the groundwater to remove manganese down to an acceptable level. Initial calculations indicated an added cost of $30 to $40 per acre ft of water for chemical, equipment, and personnel costs.

Surface Water

The District’s source waters are susceptible to potential contamination from sea water intrusion and organic matter in the Delta and from a variety of land use practices, such as agricultural and urban runoff, recreational activities, livestock grazing, and residential and industrial development. Local sources are also vulnerable to potential contamination from commercial stables and historic mining practices. The District’s Water Quality Unit monitors surface water quality in District reservoirs. No contaminant associated with any of these activities has been detected in the District’s treated water. The water treatment plants provide multiple barriers for physical removal and disinfection of contaminants. The District is currently constructing improvements to the county’s three water treatment plants. These improvements are intended to meet new State and Federal standards and regulations for treated surface water supplies and to improve the taste and odor of the treated water.

The San Francisco Public Utilities Commission (SFPUC) provides its customers with safe, high quality drinking water. The majority of the water supply originates in the upper Tuolumne River Watershed high in the Sierra Nevada, remote from human development and pollution. This water is referred to as Hetch-Hetchy water and is protected in pipes and tunnels as it is conveyed to the Bay Area. It requires only primary disinfection and pH adjustment to control corrosion in the pipelines. The latest SFPUC State mandated Annual Water Quality Report (Consumer Confidence Report), summarizes the water quality analyses conducted on over 100,000 source and treated water samples over the past year. The analyses measure the level of various contaminants present in the water. Both source and treated water supplies continue to meet the maximum contaminant levels and treatment standards set by the Environmental Protection Agency and California Department of Health Services.

Recycled Water

To produce recycled water, wastewater is treated at the San Jose/Santa Clara Water Pollution Control Plant. California Department of Public Health (CDPH) establishes water quality standards and treatment reliability criteria for water recycling under Title 22 of the California Code of Regulations. Title 22 sets bacteriological water quality standards on the basis of the expected degree of public contact with recycled water. Recycled water produced by the Plant meets the "unrestricted use" standard as defined by Title 22. In fact, the recycled water frequently surpasses requirements for this standard. State standards have historically been growing ever more stringent. Future regulations and standards may require more extensive and expensive recycled water treatment.

Assessment of Other Threats to Groundwater Quality

In 2002 the City completed the State mandated Source Water Assessment Program that includes detailed review of all potential sources of contamination to each of the City's then 27 drinking water wells. The results of this work is on file with the CDPH as a part of their Drinking Water Source Assessment and Protection Program. Although the City's groundwater supply lays below a number of potential sources of contamination (industrial facilities, underground fuel tanks and the by-products of suburban living) the water quality testing has shown the City's groundwater supply meets or betters all State and Federal regulations for drinking water.

In the future, new understanding of the risks of constituents in drinking water could result in more stringent drinking water standards and more constraints on the use of groundwater. For example, currently there is no drinking water standard for hexavalent chromium or chromium -6. While trivalent chromium is an essential nutrient for the body, chromium-6 is being evaluated by federal and state regulatory agencies as a suspected carcinogen in water. In 2010, the Department of Public Health (DPH) established a draft public health goal (PHG) of 0.02 parts per billion for hexavalent chromium. While a PHG is not an enforceable regulatory standard, it marks the beginning of the process to develop the drinking water standard. While chromium-6 has been detected in wells throughout Santa Clara County, it is unclear what this represents for drinking water consumers until further state or federal regulatory guidance is provided.

Emerging contaminants also have the potential to constrain the use of groundwater. Emerging contaminants of concern include pharmaceuticals and personal care products, industrial chemicals, and endocrine disrupting compounds.

Drought Planning

As noted in the previous supply reliability and vulnerability section, the sources of water supply for the City are susceptible to seasonal or climatic shortages due to droughts. Based on the information provided by the City's water wholesalers regarding the availability of water supply during normal, single dry year, and multiple dry year scenarios, the City has projected shortages after 2020. Table details future water supply projects that are expected to provide between 5,000-6,000 acre-feet per year. This additional supply will help to cover most expected water shortages except after 2030 in the third year of a multi-year drought if the City loses the current SFPUC contracted Hetch-Hetchy water. How the City expects to handle such a situation is detailed at the end of this section.

The following section will attempt to analyze the vulnerability of both groundwater and treated surface water from the Santa Clara Valley Water District and San Francisco-PUC during a normal year, single dry year, and multiple dry year or range of years. The following two tables illustrate the baseline years used to determine consistent average, single-dry, and multiple dry years for subsequent discussion.

Table 39A: Basis of Water Year (SCVWD, Groundwater, Recycled)

Basis of water year data SCVWD, City of Santa Clara Groundwater/Recycled Water	
Water Year Type	Base Year(s)
Average Water Year	2002
Single-Dry Water Year	1977
Multiple-Dry Water Years	1987-1992

Table 39B: Basis of Water Year SFPUC

Basis of water year data SFPUC	
Water Year Type	Base Year(s)
Average Water Year	1985
Single-Dry Water Year	1987
Multiple-Dry Water Years	1987-1992

The actual water supplies for each year identified in Tables 39A and B can be found in Table 40. Recycled water did not become available in the City until 1989 as a response to the extended drought the region had been experiencing.

Table 40: Supply Reliability – Historic Conditions

Supply reliability — historic conditions (acre-feet/year)																
Water supply sources	Average / Normal Water Year	% of Avg Year	Single Dry Water Year	% of Avg Year	Multiple Dry Water Years											
					Yr. 1 1987	% of Avg Yr.	Yr. 2 1988	% of Avg Yr.	Yr. 3 1989	% of Avg Yr.	Yr 4 1990	% of Avg Yr.	Yr 5 1991	% of Avg Yr.	Yr 6 1992	
SCVWD	4,133	100.0	3,563	86.2	3,713	89.8	4,947	119.7	6,864	166.1	6,336	153.3	4,082	98.8	4,322	
SFPUC	4,082	100.0	6,002	147.0	6,002	147.0	5,267	129.0	5,175	126.8	4,986	122.1	4,289	105.1	4,604	
Ground-water	15,921	100.0	15,162	95.2	23,061	144.8	21,528	135.2	12,847	80.7	13,225	83.1	13,156	82.6	14,614	
Recycled Water	1,816	100.0	N/A	N/A	N/A	N/A	N/A	N/A	93	5.1	425	23.4	525	28.9	326	

Consumption Reduction Methods

If a 50% reduction in water demand were to become necessary due to a catastrophic event and/or severe drought, the City would achieve such a reduction through the use of water use restrictions and penalties. A draft water shortage contingency resolution is included in Appendix K of this UWMP.

During the previous drought, the City established water budgets based on historic usage for all customers and levied penalties when water use exceeded the established budget. Establishing water budgets for each customer required excessive work by City staff and was not well received by the public. The City processed a high number of appeals based on "special circumstances" and there was perceived inequities in the way water budgets were established. If a severe drought occurred again, the City would follow the water reduction targets, water use restrictions, and enforcement methods already described in Table 37 in the Water Shortage Contingency Planning section of this document. In addition, the City would implement an outdoor watering schedule as follows:

- Outdoor watering with sprinklers is restricted to three days a week with different watering days assigned to odd-numbered and even-numbered street addresses.
- Customers with odd-numbered street addresses – ending in 1, 3, 5, 7 or 9 – are allowed to use their sprinkler systems on Mondays, Wednesdays and Fridays.
- Customers with even-numbered street addresses – ending in 0, 2, 4, 6, or 8 – are allowed to use their sprinkler systems on Tuesdays, Thursdays and Sundays.
- Watering with sprinklers is limited to one cycle of up to 8 minutes per station per watering day for non-conserving nozzle sprinkler systems (typical residential system), or two 15-minute cycles per watering day for conserving nozzle sprinkler systems.
- All outdoor watering is restricted to hours before 9:00 a.m. and after 6:00 p.m., regardless of the watering day. First offenses are given verbal "warnings" in the form of water conservation tips, water saving devices where possible and printed educational materials in order to raise customer awareness. Subsequent violations, however, can result in fines. No monetary citation is given without prior warning. See Table 36 for further details.

Mechanism for Determining Actual Reductions

The utility currently uses a number of standardized reports to track water usage, production and revenues. The City utility billing system can generate custom reports that can be used for tracking water usage by users or by customer class. Custom reports can be requested and such reports are generally available within a day or two of the request being made. Reports are emailed to the requestor as a spreadsheet for ease of additional data analysis. In the event that the consumption reduction methods outlined above became necessary, these reports would be used to determine and track actual reductions in water consumption.

Tier One Drought Allocations

In July 2009, in connection with the WSA, the wholesale customers and San Francisco adopted a Water Shortage Allocation Plan (WSAP) to allocate water from the regional water system to retail and wholesale customers during system-wide shortages of 20% or less (the "Tier One Plan"). The Tier One Plan replaced the prior Interim Water Shortage Allocation Plan, adopted in 2000, which also allocated water for shortages up to 20%. The Tier One Plan also allows for voluntary transfers of shortage allocations between the SFPUC and any wholesale customer and between wholesale customers themselves. In addition, water "banked" by a wholesale customer, through reductions in usage greater than required, may also be transferred.

The Tier One Plan, which allocates water between San Francisco and the wholesale customers collectively, distributes water based on the level of shortage:

Table 41: Drought Planning, Tier 1 Drought Allocation

Level of System Wide Reduction in Water Use Required	Share of Available Water	
	SFPUC Share	Wholesale Customers Share
5% or less	35.5%	64.5%
6% through 10%	36.0%	64.0%
11% through 15%	37.0%	63.0%
16% through 20%	37.5%	62.5%

The Tier One Plan will expire at the end of the term of the Water Supply Agreement, unless extended by San Francisco and the wholesale customers.

Tier Two Drought Allocations

The wholesale customers have negotiated, and adopted the "Tier Two Plan," see Appendix L the second component of the WSAP which allocates the collective wholesale customer share among each of the 26 wholesale customers. This Tier Two allocation is based on a formula that takes multiple factors for each wholesale customer into account, including: Individual Supply Guarantee; seasonal use of all available water supplies; and residential per capita use.

The water made available to the wholesale customers collectively will be allocated among them in proportion to each wholesale customer's Allocation Basis, expressed in millions of gallons per day (mgd), which in turn is the weighted average of two components. The first component is the wholesale customer's Individual Supply Guarantee, as stated in the WSA, and is fixed. The second component, the Base/Seasonal Component, is variable and is calculated using the monthly water use for three consecutive years prior to the onset of the drought for each of the wholesale customers for all available water supplies. The second component is accorded twice the weight of the first, fixed component in calculating the Allocation Basis. Minor adjustments to the Allocation Basis are then made to ensure a minimum cutback level, a maximum cutback level, and a sufficient supply for certain wholesale customers.

The Allocation Basis is used in a fraction, as numerator, over the sum of all wholesale customers' Allocation Bases to determine each wholesale customer's Allocation Factor. The final shortage allocation for each wholesale customer is determined by multiplying the amount of water available to the wholesale customers' collectively under the Tier One Plan, by the wholesale customer's Allocation Factor.

The Tier Two Plan requires that the Allocation Factors be calculated by BAWSCA each year in preparation for a potential water shortage emergency. As the wholesale customers change their water use characteristics (e.g., increases or decreases in SFPUC purchases and use of other water sources, changes in monthly water use patterns, or changes in residential per capita water use), the Allocation Factor for each wholesale customer will also change. However, for long-term planning purposes, each wholesale customer shall use as its Allocation Factor, the value identified in the Tier Two Plan Table is 1.17% for the City of Santa Clara.

Santa Clara and San Jose are considered temporary, interruptible customers in the SFPUC Tier 2 plan, therefore the Tier 2 Plan has slight variations in the formula calculations for water allocations during drought for both Santa Clara and San Jose. These variations will cutback both agencies water allocation to be at least as much as the highest percentage reduction among any of the permanent Wholesale Customers.

While there is not direct fiscal impact of a Tier 2 plan for water shortages with San Francisco, it is anticipated that future water sales could decline in the event that the Tier 2 plan is implemented. Changes to anticipated water sales cannot be quantified for purposes of this Tier 2 plan, since the implementation of such a plan would be dependent on several factors, including but not limited to, the wholesale and City water rates applicable during the implementation of the Tier 2 plan, percentage reduction of water shortage, and other system water demand and supply factors within the City service area. The Tier Two Plan will expire in 2018 unless extended by the wholesale customers.

2018 Interim Supply Limitation

As part of its adoption of the Water System Improvement Program (WSIP) in October 2008, discussed separately herein, the Commission adopted a water supply element, the Interim Supply Limitation (ISL), to limit sales from San Francisco Regional Water System (RWS) watersheds to an average annual of 265 million gallons per day (mgd) through 2018. The wholesale customers' collective allocation under the ISL is 184 mgd and San Francisco's is 81 mgd. Although the wholesale customers did not agree to the ISL, the WSA provides a framework for administering the ISL.

BAWSCA has developed a strategy to address each of its member agencies' unmet needs flowing from the ISL through its Water Conservation Implementation Plan and the Long-term Reliable Water Supply Strategy, separately addressed herein.

Interim Supply Allocations

The Interim Supply Allocations (ISAs) refers to each individual wholesale customer's share of the Interim Supply Limitation (ISL). On December 14, 2010, the Commission established each agency's ISA through 2018. In general, the Commission based the allocations on the lesser of the projected fiscal year 2017-18 purchase projections or Individual Supply

Guarantees. The ISAs are effective only until December 31, 2018 and do not affect the Supply Assurance or the Individual Supply Guarantees, both discussed separately herein. San Francisco's Interim Supply Allocation is 81 million gallons per day (mgd). The City of Santa Clara's ISA is 4.5 mgd.

As stated in the Water Supply Agreement, the wholesale customers do not concede the legality of the Commission's establishment of the ISAs and Environmental Enhancement Surcharge, discussed below, and expressly retain the right to challenge either or both, if and when imposed, in a court of competent jurisdiction.

Environmental Enhancement Surcharge

The Commission plans to establish the Environmental Enhancement Surcharge concurrently with the budget-coordinated rate process. This surcharge will be unilaterally imposed by SFPUC on individual wholesale customers, and SFPUC retail customers, when each agency's use exceeds their Interim Supply Allocation and when sales of water to the wholesale customers and San Francisco retail customers, collectively, exceeds the Interim Supply Limitation of 265 mgd.

The SFPUC is in the process of developing the methodology and amount of this volume-based charge. The Environmental Enhancement Surcharge will become effective beginning fiscal year 2011-12.

Minimum Available Water Supply For Next Three Years

As described earlier, Santa Clara has four existing water sources (groundwater, SFPUC surface deliveries, SCVWD surface deliveries, and recycled water) and also relies on conservation to meet overall demand. The SCVWD provides water directly through a surface treated water contract, but also indirectly supplies a portion of the City's groundwater by recharging the large aquifer (of which the City is only one of multiple users) with imported Delta water. The City anticipates that future water demand associated with the proposed 2010-2035 General Plan growth would be met by the continued use of the four identified supply sources, with the assumption that groundwater and recycled water use and conservation would increase over time to meet future demand, as indicated in Table 19a and b.

Despite the drop in groundwater levels in the last three years because of the extended drought, overall groundwater conditions are healthy, due to SCVWD's water management programs. Based on current groundwater basin storage, planned recharge volumes, expected imported water supply deliveries, and current reservoir levels, the district expects to be able to meet projected demand over the next three years, even if a repeat of the historic driest 3-year sequence were to occur. In the 125-year record for San Jose, the driest 3-year sequence occurred from 1987 through 1989. The District has identified additional supplies in their IWRP to mitigate any further shortages and "to insure the water supply will be reliable to meet future countywide demands." The results of that analysis are shown in Table 42.

As noted earlier in this UWMP, SFPUC has assessed its water supply reliability capabilities during single dry year, multiple dry years beginning in 2010. The assessment of the capabilities of the Hetch-Hetchy system to provide water during single and multiple dry years was based on an analysis of actual historic hydrological period 1920 through 2002. The

SFPUC assumed that the historical hydrological period was indicative of potential future events. Water reduction amounts are based on the Tier 2 Drought Implementation Plan detailed earlier in this section. The results of that analysis are shown in Table 42.

Table 42: Supply Reliability – Current Water Sources (Multiple Dry Year)

Supply reliability — Current Water Sources (acre-feet/year)									
Water supply sources	Avg/ Normal Water Yr Supply	% of Normal Year	Multiple Dry Water Year Supply						
			Year 2011	% of Normal Yr	Year 2012	% of Normal Yr	Year 2013	% of Normal Yr
SCVWD	4,133	100%	4,166	101%	4,199	102%	4,232	102%
SFPUC	4,082	100%	2,001	49%	1,737	43%	1,737	43%
Ground-water	15,921	100%	17,432	109%	18,943	119%	20,454	128%
Recycled Water	1,816	100%	2,407	133%	2,407	133%	2,407	133%

Although the 43% to 49% reduction in the supplied water from Hetch-Hetchy appears at first glance to be significant, Hetch-Hetchy is less than 11% of the total water supply. The 43% to 49% reduction in water supplied from Hetch-Hetchy represents only an 8.3% to 9.6% reduction in the City's overall potable water supply. Therefore, the minimum available water supply for the next three years would be 90% to 92% of projected demand, if it were assumed that additional supplies are not available from the three other water sources in the City.

Additional water supplies may be available from the three other water supplies, however some physical and logistical limitations exist. For example, the recycled water system is capable of delivering recycled water far in excess of current demand. However, only customers that are located near the recycled water distribution system, that have a permitted use and have been connected to the system can use recycled water. In addition, as discussed earlier in this UWMP the treated water connection with the SCVWD is currently physically limited in the volume that can be delivered to the City. The plan to build a second district turnout is expected to be completed by the end of 2011.

During normal water years, water supplies should be adequate to meet projected demands in the 2015 to 2035 planning period as seen in Table 42A. This analysis assumes that water from SFPUC is available in 2018 and beyond. Table 42B assumes that water from SFPUC is not available in 2018 and beyond. This water supply loss would affect the City in 2020 and beyond. However, even in 2035 the 4,385 acre-feet difference in supply can be made-up through water provided by projected future water supply projects as seen in Table 31.

Table 43A: Supply and Demand Comparison – Normal Year
(assumes SFPUC supply exists beyond 2018)

Supply and demand comparison — normal year (acre-feet/year)					
	2015	2020	2025	2030	2035
Supply totals	37,352	37,753	38,032	38,088	38,088
Demand totals	31,259	33,053	34,605	36,071	37,433
Difference	6,093	4,700	3,427	2,017	655
Difference as % of Supply	16.3%	12.4%	9.0%	5.3%	1.7%
Difference as % of Demand	19.5%	14.2%	9.9%	5.6%	1.7%

Table 43B: Supply and Demand Comparison - Normal Year
(assumes SFPUC supply does not exist beyond 2018)

Supply and demand comparison — normal year (acre-feet/year)					
	2015	2020	2025	2030	2035
Supply totals	37,352	32,713	32,992	33,048	33,048
Demand totals	31,259	33,053	34,605	36,071	37,433
Difference	6,093	(340)	(1,613)	(3,023)	(4,385)
Difference as % of Supply	16.3%	-1.0%	-4.9%	-9.1%	-13.3%
Difference as % of Demand	19.5%	-1.0%	-4.7%	-8.4%	-11.7%

During a single dry year, the City projects no reduction in supplies from groundwater. Per a SCVWD handout dated March 16, 2011 SCVWD, Appendix H, treated surface water is not expected to be reduced in a single dry year event until 2030, when it could be reduced anywhere from 0-20%. For planning purposes, the 20% worst case scenario will be used in all projections. SFPUC has indicated that during a single critical dry year it will follow the Tier 2 reduction plan described earlier in this document. SFPUC will reduce their total water supply by 10% from 184 mgd to 152.6 mgd in a single dry year as shown in Table 1 of the letter from the SFPUC found in Appendix I. City of Santa Clara will receive 1.17% of the 152.6 mgd as shown in Table 3 of the letter from the SFPUC. Recycled water use and water conservation are projected to remain unchanged or potentially increase due to public awareness, during a critical dry year. The resulting analysis of available supplies is shown in Table 44A below. During a single critical dry year, there is no projected shortfall in total available water supplies if the City receives Hetch-Hetchy water until 2035. If the City does not receive Hetch-Hetchy water, after contract negotiations with SFPUC in 2018, there is a projected water supply shortfall after 2030. However, this can be made-up with water expected to be provided by future water supply projects as seen in Table 31.

Table 44A: Supply and Demand Comparison – Single Dry Year
(assumes SFPUC supply does exist exists beyond 2018)

Supply and demand comparison — single dry year (acre-feet/year)					
	2015	2020	2025	2030	2035
Supply totals	34,313	34,714	34,993	34,135	34,135
Demand totals	31,259	33,053	34,605	36,071	37,433
Difference	3,054	1,661	388	(1,936)	(3,298)
Difference as % of Supply	8.9%	4.8%	1.1%	-5.7%	-9.7%
Difference as % of Demand	9.8%	5.0%	1.1%	-5.4%	-8.8%

Table 44B: Supply and Demand Comparison – Single Dry Year
(assumes SFPUC supply does not exist exists beyond 2018)

Supply and demand comparison — single dry year (acre-feet/year)					
	2015	2020	2025	2030	2035
Supply totals	34,313	32,713	32,992	29,392	29,392
Demand totals	31,259	33,053	34,605	36,071	37,433
Difference	3,054	(340)	(1,613)	(6,679)	(8,041)
Difference as % of Supply	8.9%	-1.0%	-4.9%	-22.7%	-27.4%
Difference as % of Demand	9.8%	-1.0%	-4.7%	-18.5%	-21.5%

During a multiple dry year event, the City projects no reduction in supplies from groundwater. Per a SCVWD handout dated March 16, 2011 SCVWD, Appendix H, treated surface water is not expected to be reduced in a multiple dry year event until 2025, when it could be reduced anywhere from 0-20%. For planning purposes, the 20% worst case scenario will be used in all projections. SFPUC has indicated that during multiple critical dry years the City can expect a maximum reduction of SFPUC water supplies of 43% of normal, as shown in Table 42. This is based on Table 1 of the SFPUC letter found in Appendix I. SFPUC has indicated that in the second and third year of a drought, they will reduce their water supply by 20% from 184 mgd to 132.5 mgd. For SFPUC supplies, Table 45A assumes a worst-case scenario based on a replication of the 1987-1992 multiple dry year event. The City of Santa Clara will still receive 1.17% of the 132.5 mgd amount as shown in Table 3 of the Tier 2 plan in Appendix L. Table 45B assumes that SFPUC water is unavailable after 2018. Recycled water use and water conservation are projected to remain unchanged during a multiple dry year event. The resulting analysis of all available supplies is shown in Table 45A and 45B below. During a multiple critical dry year event, there is a projected shortfall in available water supplies independent of whether the City receives or does not receive Hetch-Hetchy water after contract negotiations with SFPUC in 2018. However, Table 31 details future water supply projects that are expected to provide between 5,000-6,000 acre-feet per year. This additional supply will help to cover any expected shortage until 2030 in the third year of a multi-year drought if the City loses the current SFPUC contracted Hetch-Hetchy water. Even in this worst case scenario, the projected shortfall in available water supply is only 96 acre-feet. This minimal amount is well within the margin of error related to the projections and is therefore negligible. These assumptions also yield a conservative estimate since during a critical multiple dry year event, mandatory conservation measures and increased recycled water usage would be expected to reduce potable water demand.

Table 45A: Supply and Demand Comparison – Multiple Dry-Year Events
(assumes SFPUC supply exists beyond 2018)

Supply and demand comparison — multiple dry-year events (acre-feet/year)						
		2015	2020	2025	2030	2035
Multiple-dry year *first* year supply	Supply totals	37,352	37,753	38,032	35,088	35,088
	Demand totals	31,259	33,053	34,605	36,071	37,433
	Difference	6,093	4,700	3,427	(983)	(2,345)
	Difference as % of Supply	16.3%	12.4%	9.0%	-2.8%	-6.7%
	Difference as % of Demand	19.5%	14.2%	9.9%	-2.7%	-6.3%
Multiple-dry year *second* year supply	Supply totals	37,352	37,753	38,032	35,088	35,088
	Demand totals	32,726	34,734	36,371	37,949	37,949
	Difference	4,626	3,019	1,661	(2,861)	(2,861)
	Difference as % of Supply	12.4%	8.0%	4.4%	-8.2%	-8.2%
	Difference as % of Demand	14.1%	8.7%	4.6%	-7.5%	-7.5%
Multiple-dry year *third* year supply	Supply totals	37,352	37,753	38,032	35,088	35,088
	Demand totals	33,163	35,064	36,674	38,210	38,210
	Difference	4,189	2,689	1,358	(3,122)	(3,122)
	Difference as % of Supply	11.2%	7.1%	3.6%	-8.9%	-8.9%
	Difference as % of Demand	12.6%	7.7%	3.7%	-8.2%	-8.2%

Table 45B: Supply and Demand Comparison – Multiple Dry-Year Events
(assumes SFPUC supply does not exist beyond 2018)

Supply and demand comparison — multiple dry-year events (acre-feet/year)						
		2015	2020	2025	2030	2035
Multiple-dry year *first* year supply	Supply totals	37,352	32,713	32,992	33,048	33,048
	Demand totals	31,259	33,053	34,605	36,071	37,433
	Difference	6,093	(340)	(1,613)	(3,023)	(4,385)
	Difference as % of Supply	16.3%	-1.0%	-4.9%	-9.1%	-13.3%
	Difference as % of Demand	19.5%	-1.0%	-4.7%	-8.4%	-11.7%
Multiple-dry year *second* year supply	Supply totals	37,352	32,713	32,992	33,048	33,048
	Demand totals	32,726	34,734	36,371	37,949	37,949
	Difference	4,626	(2,021)	(3,379)	(4,901)	(4,901)
	Difference as % of Supply	12.4%	-6.2%	-10.2%	-14.8%	-14.8%
	Difference as % of Demand	14.1%	-5.8%	-9.3%	-12.9%	-12.9%
Multiple-dry year *third* year supply	Supply totals	37,352	32,713	32,992	33,048	33,048
	Demand totals	33,163	35,064	36,674	38,210	38,210
	Difference	4,189	(2,351)	(3,682)	(5,162)	(5,162)
	Difference as % of Supply	11.2%	-7.2%	-11.2%	-15.6%	-15.6%
	Difference as % of Demand	12.6%	-6.7%	-10.0%	-13.5%	-13.5%

With the uncertainties inherent in future imported water supplies, the City plans to meet future demand growth by pumping additional groundwater, relying on more recycled water, and increased conservation. Given the potential for decreased SFPUC imported surface deliveries, CEQA requires disclosure of the environmental impacts, if any, of meeting future demand growth with increased supplies coming from pumping more groundwater. There are not anticipated to be any reasonably foreseeable impacts associated with increased use of recycled water and conservation, which is anticipated to occur through replacement of more water-efficient appliances, i.e. clothes washers, dishwashers, toilets, etc., and programs to encourage drought-tolerant landscaping on private property and on City properties. Mandatory conservation during a multiple year drought may also require prohibitions on outdoor use (irrigation, car washing, washing down pavement, etc.) and water rationing. As noted above, numerous conservative assumptions were made regarding both water supply and demand. Therefore, it is the conclusion of the Water Utility that adequate water supplies are available to meet the water demand projected until 2035.

The City of Santa Clara has a demonstrated commitment to water conservation and recycling. The Demand Management Measures offered by the City are programs implemented by the City directly, in conjunction with the District or run by the District on behalf of the City. The programs administered by the District are funded through the wholesale water rates paid by the City. Table 46 below lists each program discussed in this section and indicates whether the City or the District administers the program. The table also indicates programs that the district administers but the City augments through local efforts. Each demand management measure is discussed in detail below. An estimate of the amount of water conserved is included where a reasonable and generally accepted method of developing such an estimate exists.

Table 46: Demand Measurements Implementation Matrix

Demand Management Measure	City Program	District Program Augmented by the City	District Program
Water audits and incentives		X	
Residential plumbing retrofits		X	
Distribution system	X		
Metering and commodity rates	X		
Large landscapes	X	X	
Public information	X	X	
School education	X	X	
High efficiency clothes washer rebate			X
Commercial, industrial, and institutional accounts	X		X
Conservation pricing	X		
Conservation Staff	X		
Water waste prohibitions	X		
Ultra low flow toilets			X

Legal Authority to Implement Demand Management Measures

The City of Santa Clara Water Utility as a municipally owned water utility has the legal authority to implement demand management measures by ordinance or resolution approved by the City Council. This authority has exercised proven through past implementation of demand management measures, fees, and penalties.

Estimate of Further Ability to Reduce Demand by Conservation

A study was conducted as part of the SFPUC documentation in support of their proposed capital projects for improvement of the Hetch-Hetchy system: Wholesale Customer Water Conservation Potential[33.] This study began with the examination of 75 potential conservation

[33] Wholesale Customer Water Conservation Potential Technical Report, URS Corporation, Maddaus Water Management, Jordan Jones and Goulding, December 2004

measures. These 75 potential measures were screened down to 31 measures that met specific criteria. The list of 31 potential measures was eventually condensed down to 22 measures once duplicative or overlapping measures were combined. The 22 potential conservation measures include some measures that the City has already implemented such as residential water audits. However, some of the potential measures are over and above the programs required to satisfy the BMPs.

The study indicates that by 2030, additional conservation savings of 1,980 acre-ft/yr for the City of Santa Clara will be realized due to the natural replacement of toilets, showerheads and other water using fixtures with ones that meet current efficiency standards. The conservation savings from plumbing code requirements for water efficient fixtures is included in the demand projection contained the System Demands section of this UWMP.

Water Audits and Incentives

Residential Surveys

In the previous UWMP the City identified the goal of offering audits to the highest 20% of single and multi-family accounts for quantity of water used. These audits were offered though the SCVWD Water Wise House Call Program. By July 1, 2008, the District anticipates completing residential surveys for 15% of all single-family and multi-family residential customers. The District has targeted the top 20% of residential customers through a pilot program. Surveys were offered to residential customers through letters mailed to the highest 30% of water users. Each year this program is also promoted county wide through a summer media campaign, which typically includes television, radio and print advertisements.

The surveys include: educating the customer on how to read a water meter; checking flow rates of showerheads, faucet aerators and toilets; checking for leaks; installing low-flow showerheads, aerators and/or toilet flappers if necessary; checking irrigation system for efficiency (including checking for leaks); measuring landscaped area; developing an efficient irrigation schedule for the different seasons; and, providing customer with evaluation results, water savings recommendations, and other education materials.

Table 47: Water Wise House Calls

Water-Wise House Call Program						
Fiscal Year	FY 05-06	FY 06-07	FY 07-08	FY 08-09	FY 09-10	Total
Total	271	578	374	259	123	1605

Single-family landscapes

Single Family Landscape Audits are an integral part of the Water Wise House Call Program described under the Water Audit and Incentive Section of this UWMP. During the audit performed as part of the Water Wise House Call Program. The residential customer's irrigation system is evaluated for leaks, watering uniformity, and efficiency. The residents are also provided annual watering schedule and the auditor will even reprogram the residents sprinkler controller if requested.

The City of Santa Clara is also on the cutting edge of using recycled water for irrigation of common areas and the front yards in a planned community. Since September of 2004 the Rivermark development, a planned community of over 3000 residences, has been irrigating the common area landscaping and front yards of all the homes with recycled water.

The City offers residents and those that maintain single family landscapes various programs to promote water conservation. These programs are available through the SCVWD. The programs include:

> Nursery Program - The SCVWD created the nursery program in 1995 to provide educational materials through store displays
>
> Water Efficient Workshops - Water Efficient Landscape Workshops are offered by the SCVWD each spring. The series consists of 4 consecutive class sessions that cover garden design, plant selection, irrigation system design, installation and maintenance techniques, and gardening with native species
>
> Spanish Language Irrigation Workshops - These workshops, designed for landscape professionals, cover topics including irrigation controller programming, system scheduling, and irrigation troubleshooting.
>
> Landscape Water Management Seminar - These workshops are designed for landscape irrigations professionals and cover training in irrigation system evaluation, water budgeting, and water use tracking. The workshop is typically offered once per year
>
> Water Wise Gardening CD-Rom - In 2004/05 the SCVWD developed an interactive CD Rom that contains information on drought tolerant and water efficient plants. The CD features Garden tours and a Garden Gallery and allows the user to save and print lists of plants.

The programs described above are expected to continue as a means of insuring that single-family dwellings are irrigating in an efficient manner.

Residential Water Leak Check

The City also offers free leak checks to residential customers. A trained technician is sent to the residence to assist in determining if a leak exists at the property. Although the City has offered free leak checks for it's residents for many years, the City only began tracking the number of Leak Checks performed in 2003. In 2009 the City performed 131 leak checks and in 2010 the City performed 142 leak checks.

The City of Santa Clara Finance department monitors customer accounts for higher than typical water usage. Accounts that are found to have a higher than average water usage are referred to the Water Utility for follow up. The Water Meter Readers also report accounts with obvious signs of leakage, or if the water meter appears to be running when the residence does not appear to be occupied. Follow up typically consists of one or more of the following: the water meter is re-read to confirm the high usage, a phone call to the resident to advise them of the higher than typical usage, and/or the resident is offered a free leak check.

Residential Plumbing Retrofits

In the previous UWMP, the City identified a past rebate program for ULFT's and a proposed program for distributing water conservation devices through public events, water audit participation, and upon request. The rebate program was modified over the course of the past five years, however the distribution of free low flow showerheads and aerators continues.

The City has distributed free low flow showerheads, faucet aerators, dye tablets for detecting toilet leaks, and automatic shut-off hose nozzles through public events, field technicians, the Water Wise House Call program, and at the front counter of the Utility offices in City Hall. From 2000 to 2004 the City has distributed 2,920 water conservation kits through direct distribution. Additional water conservation devices were distributed through the Water Wise House Call program detailed above. Additionally, the City plans to continue the distribution of free water conservation devices to residents that request them.

Based upon a study recently completed by the District, Santa Clara County Residential Water Use Baseline Study (August 2004), the county is nearing the 75% saturation threshold and completion of this BMP. The study found countywide saturation rates of 59% for pre-1992 constructed single-family homes and 51% of pre-1992 constructed multi-family units. A CUWCC report estimates the average lifespan of a showerhead to be 3-7 years, and the average lifespan of an aerator to be 1-3 years[34].

Distribution System

The City of Santa Clara tracks the difference between water produced or purchased and the amount of water sold to its customers. The difference, expressed as a percentage of total water produced, is referred to as unaccounted for water. The generally accepted industry standard for unaccounted for water is from 7% to 15% [35].

Unaccounted for water is attributable to flushing, leaks, fire fighting, street cleaning, and reservoir overflow. The City has an aggressive response to reports of leaks within the distribution system. Leaks are repaired upon discovery and repairs are generally completed in less than 8 hours.

In addition, the City has an aggressive program for potable water main rehabilitation. Areas where leaks and main breaks occur at a higher frequency are put on a list and prioritized for replacement. The City plans to replace 45,900 feet of water mains between 2011 and 2016 as part of the Utility's Capital Improvement Program. These improvements will continue to ensure a low unaccounted for water percent system wide and a safe potable drinking water supply.

These programs have resulted in an unaccounted for water rate of 4 % or less. The percentage of unaccounted for water is shown below in Table 50 and Figure 17.

[34] BMP Cost & Savings Study; Guide to Data and Methods for Cost-Effectiveness Analysis of Urban Water Conservation Best Management Practices, California Urban Water Conservation Council, December 2003
[35] Water Resources Planning Manual of Water Supply Practices M50, American Water Works Association, First Edition 2001 pp 33-34

Table 48: Unaccounted for Water By Year

Unaccounted for Water by Year (percentage)						
Year	2005	2006	2007	2008	2009	2010
Percentage unaccounted for water	4.2%	5.1%	2.9%	3.1%	4.1%	5.2%

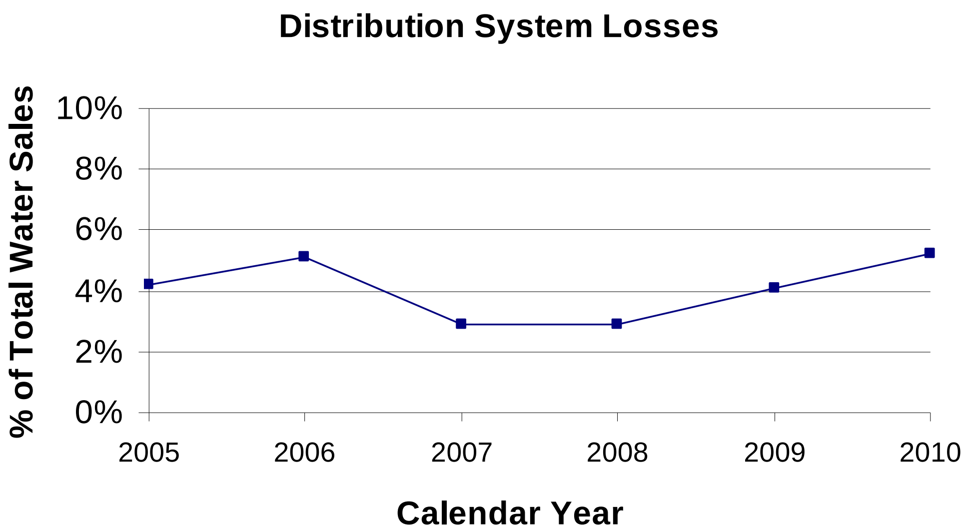

Figure 17: Unaccounted for Water

Metering and Commodity Rates

The City of Santa Clara requires meters on all connection to both the potable and recycled water distribution systems. Currently, there are no known unmetered connections to the water distribution systems.

All new commercial, industrial, and multi-family developments are required to have dedicated water meters and separate accounts and meters for landscape irrigation. Retrofit assistance has been offered for those facilities that wish to convert mixed use water services to separate landscape and internal use water services. The retrofit assistance includes a rebate for the cost of the water meter and is offered through the Santa Clara Valley Water District.

Large Landscapes

Since 1995, the City has offered a free Landscape Survey Program (formerly known as Irrigation Technical Assistance Program, ITAP) through the Santa Clara Valley Water District to sites with 5,000 square feet or more of landscaping. The surveys are provided through the Santa Clara Valley Water District that oversees and runs the program. Landscape managers are provided with water-use analyses, scheduling information, in-depth irrigation evaluation, and recommendations for affordable irrigation upgrades. Each site surveyed receives a detailed report upon completion of the audit. The District also generates an annual report that recaps the previous year's efforts. A specialized database is used to track water use history, meter numbers, account numbers, and site contacts and addresses are captured for each site where audits have been conducted. The database allows for several reporting and monitoring options.

The Landscape Survey Program consist of 5 components:

1. A System Check – which includes an evaluation of the entire landscape irrigation system where precipitation is verified uniformity and to provide distribution scheduling strategies.

2. Irrigation Budgets – Auditors classify plant groups into hydro zones to estimate each areas actual water need. This results in an optimum water budget, along with recommendations on updated hardware.

3. Scheduling and Tracking – Auditors provide a suggested yearly watering schedule and set up a system to log meter readings, calculate weekly water use and graphically compare current use to the proposed water budget.

4. Site Report – The site's property manager receives a report that evaluates the existing irrigation system and landscape water management. The report also includes a plan detailing how the site's water use efficiency can be improved.

5. Follow Up Services – Auditors are available for follow up visits and consultations free of charge.

98 landscape surveys have been completed in the City of Santa Clara since the program started. 42 of the landscape surveys were conducted between 2006 and 2010.

In addition, the City evaluates large area landscapes for conversion to recycled water. Large landscapes are typically the most economical to convert to recycled water. The routes of recycled water mains were determined in part by the concentration of potential customers along the pipeline routes. To date the City has converted 5 parks, 3 schools, a golf course, the City's cemetery, Santa Clara University, Mission College and numerous commercial and industrial facilities to recycled water for irrigation of turf areas.

The City also has Water Service and Use Rules and Regulations regulating conservation in landscaping. This ordinance applies to all new and rehabilitated landscaping for public agency projects and private development projects that require a permit; and developer-installed landscaping in single-family and multi-family projects. A copy of this ordinance is included in Appendix M.

The City plans to continue to offer both the District's Landscaping Survey Program and recycled water to customers with large landscape areas.

<u>High Efficiency Clothes Washer Rebate</u>

The City offers rebates on high efficiency clothes washing machines through the SCVWD. Promotion of this program occurs through point of sale information and education of appliance retailers. A breakdown of the rebates issued per year is shown below in Table 49. The CUWCC estimates that the average water savings for high efficiency clothes washers is approximately 5,100 gal/yr. Therefore, the 5,089 rebates issued to date equate to approximate savings of 25,953,900 gallons/year or 79.6 acre-ft/yr. The City plans to continue to offer rebates for high efficiency clothes washers.

Table 49: High Efficiency Clothes Washer Rebates

High efficiency clothes washer rebates											
Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Totals
Washer Rebates	320	422	576	364	455	257	493	533	1,267	402	5,089

Public Information

The City of Santa Clara has an active public education and information program to promote water conservation, which augments the district's very active public information program. This program takes the form of bill inserts, information on the customer bill, educational displays, special events, articles and information posted on the Utility web site and educational materials. The City includes informational and educational articles in the City Publication Mission City Scenes. These articles cover a variety of topics including water conservation.

All utility bills include a water usage comparison to previous years usage. In addition, each bill contains a chart shows the water usage over the previous 13 months. In 2004 the utility bills were redesigned to make the information more concise and customer friendly.

The Utility participates in an average of 5 public events per year including Arbor Day/Earth Day Events, elementary school events, and private company events. The Utility has a number of educational displays that are used in conjunction with educational handouts, games and interactions with staff to raise the water conservation awareness of event participants. The Utility also uses public events as an opportunity to distribute conservation devices.

Educational displays are also featured in a display case in the East Wing of City hall, typically during the month of May to coincide with Water Awareness Month. Educational displays make residents and businesses aware of the conservation programs and materials that are available. The display case is located in a high traffic area of City Hall and only a short distance from the Utility Offices. Permanent displays of free conservation literature and information are located in three areas of City Hall, near human resources, just outside the permit counter, and in the Water Utility offices. These literature displays are prominently located in highly visible areas and are maintained on a daily basis.

City staff writes water conservation articles for publication in the Santa Clara newspaper, Inside Santa Clara. These articles cover a number of conservation topics and typically four to six articles are published each year. The City plans to continue the existing public information program.

School Education Programs

The District operates an extensive public information and education program directed at school age children. This includes developing school programs, contracting with the Youth

Science Institute for additional instructors, and supervising university student interns as classroom assistants.

The District has been continuously active in this area by providing free classroom presentations, puppet plays, and tours of district facilities to schools within the county. The objective is to teach students about water conservation, water supply, watershed stewardship and flood protection. The District also provides school curricula to area educators, including workbooks and videos, as well as hands-on training for teachers.

Materials distributed through the District's school program included "Water Colors" to students in grades Kindergarten and 1st grade, "Water Junction & Journal" to students in grades 2 and 3, "Rain to Drain" to students in grades 4 through 6, and "Project Water Science" to students in grades 7 through 12. All programs meet state education framework requirements and are grade-level appropriate. All students who participated in the programs received educational materials.

Table 50: Classroom Presentations by Fiscal Year

Classroom Presentations					
Fiscal Year	06/07	07/08	08/09	09/10	Total
Number of Classroom Presentations	37	19	18	22	96
Number of Students	910	459	417	532	2,318

In addition to the program run by the District, the City staff has outreach events that target school age children including an annual Earth Day/ Arbor Day event, which draws between 750 and 1000 children and their teachers from Santa Clara elementary schools and the Briarwood Elementary School Science and Community Faire which draws 100 to 150 children and their parents. These events allow for distribution of age appropriate educational materials to encourage water conservation and wise water use.

Commercial, Industrial, and Institutional Accounts

Pre-rinse Spray Valve Retrofit Program

In FY 2002/03 The Santa Clara Valley Water District, with funding from the CUWCC and the California Public Utilities Commission, began a program to provide free water efficient pre-rinse sprayer valves and installation to restaurants and food service establishments. These spray valves save an average of 200 gallons of water per unit per day. From 2006-2010, 2097 of pre-rinse spray nozzles have been installed in facilities in Santa Clara. This retrofitting program is estimated to have resulted in water of 153,081,000 gallons per year or 463.4 acre ft/yr.

Audits

During FY 1996/97, the Santa Clara Valley Water District implemented a pilot program the provided 25 water use surveys to large water using businesses and industries. The District has offered comprehensive Commercial and Industrial water use surveys. The comprehensive audits include a thorough review of water use on site, including landscaping, suggestions for potential water saving technology changes, and cost benefit analysis for each water conserving measure. The City continues to offer industrial and commercial audits through a program administered by the Santa Clara Valley Water District.

Financial incentives

The City currently offers rebates of up to $50,000 through the Water Efficient Technology (WET) program. The maximum rebate is $50,000 per project or 50% of the project cost whichever is less. The minimum rebate is $400 per project. All commercial and industrial users within the City are eligible for the rebate. The rebate amount is $4.00 for each hundred cubic feet or 748 gallons of water saved per year, directly related to projects using purchased equipment.

Table 51 below shows the associated demand reductions and rebates. Over the past 6 years the WET program has resulted in demand reductions totaling 420,013 gpd or approximately 470.5 acre-ft/year. Prior to 2000, which are not shown in the table below projects that decreased demand by an additional 592,532 gpd or approximately an additional 664 acre-ft/yr.

Table 51: Water Efficiency Technology Program Rebates

Date	Demand Reduction (gpd)
May 1999	13,855
June 1999	103,792
December 1999	1,699
March 2000	26,465
October 2000	244
January 2001	77,812
April 2001	570
May 2001	45,317
June 2002	16,194
May 2004	16,890
June 2005	93,488
September 2005	7,336
June 2006	9,141
April 2006	2,569
November 2006	1,125
September 2007	3,516

Conservation Pricing

The City of Santa Clara Water Utility charges a set price per unit of potable water, referred to as a uniform volume charge. Residential, multi-family, commercial, institutional, and industrial currently all pay $2.74 per hundred cubic feet (ccf) of potable water. A monthly minimum charge varies based on meter size. The currently minimum charges for each meter size are listed below.

Table 52: Minimum Charges - Potable Water 2011

Water Meter Size	Minimum Charge
5/8 x 3/4 inch	$8.40
1 inch	$13.40
1½ inch	$24.20
2 inch	$34.10
3 inch	$94.60
4 inch	$134.20
6 inch	$263.90
8 inch	$403.70
10 inch	$498.30
12 inch	$640.20

The City of Santa Clara Water Utility also charges a set per unit price for recycled water. Recycled water is priced cheaper than potable water to encourage its use. The current price per hundred cubic feet (ccf) of recycled water is $1.64. The City further discounts the price of recycled water in the following special cases.

1. Landscape Irrigation Otherwise Served By A Private Well: Customers who receive recycled water from the City for landscape irrigation purposes and upon application and presenting evidence to the City that such water would otherwise be provided by a well which qualifies pump taxes levied by the Santa Clara Valley Water District, receive a credit of $0.69 per HCF for the quantities of water used.

2. Industrial Process Water: Customers who receive recycled water from the City for use in an industrial process, receive a credit of $0.35 per HCF for the quantities of water used.

3. Industrial Process Water Otherwise Served By A Private Well: Customers who receive recycled water from the City for use in an industrial process and upon application and presenting evidence to the City that such water would be otherwise provided by a well which qualifies for the pump taxes levied by the Santa Clara Valley Water District, receive a credit of $1.15 per HCF for the quantities of water used, plus a fixed rate of $50.00 per month.

A monthly minimum charge varies based on recycled meter size. The currently minimum charges for each recycled meter size are listed below.

Table 53: Minimum Charges - Recycled Water 2011

Water Meter Size	Minimum Charge
5/8 x 3/4 inch	$8.40
1 inch	$13.40
1½ inch	$24.20
2 inch	$34.10
3 inch	$94.60
4 inch	$134.20
6 inch	$263.90
8 inch	$403.70
10 inch	$498.30
12 inch	$640.20

This existing rate structure facilitates conservation since customer bills vary directly with the level of water usage[36]. The Uniform Volume Charge also provides a clear and easy to understand price signal to the customer. To date the utility has avoided an inverted rate block structure in order to preserve this option for use during a prolonged drought.

Conservation Coordinator

The water resource planner position was created by reclassifying the City's previous water conservation coordinator's position. A Water Resource Planner was hired in January of 2001.

The water resource planner was responsible for control and administration of existing water supply programs, recycled water distribution, drought contingency planning, supervision and promotion of conservation programs directed to private and commercial customers as well as financing and budgeting for the water conservation programs.

In 2005, the City created the position of water and sewer compliance manager to replace the water resource planner's position. There are several distinct differences between the former and latter positions. The water resource planner was an hourly employee whereas the compliance manager is a management level position.

The compliance program manager's position is responsible for managing; demand side management programs for the water utility, water quality program, and environmental, health, and safety programs. Management of the demand side management programs is expected to comprise 25% of the compliance manager's time. The compliance manager was hired on September 11, 2005.

In addition to the compliance manager, there are two full-time City staff members who report directly to the compliance manager, known as Code Enforcement Technicians. The Code Enforcement Technicians primary responsibility is to promote recycled water, including program outreach, marketing, permitting sites for recycled water use and code enforcement. These staff members are also responsible for conservation program administration at the City.

[36] Principles of Water Rates, Fees and Charges, AWWA M1 Manual, Fifth Ed., p. 87

Water Waste Prohibitions

The City of Santa Clara has had water waste prohibitions in place since the 1989-1992 drought. Below is an excerpt from the City of Santa Clara Water Service and Use Rules and Regulations prohibiting water waste.

> "1.C WATER USE RESTRICTIONS AND PROHIBITIONS
>
> The following list of Water Use Restrictions and Prohibitions are specific measures which prevent water waste and achieve reasonable, yet substantial, reductions in water use by all users in the City.
>
> The following uses of water are prohibited by the City:
>
> (a) Wasting water, which includes but is not limited to, the flooding or runoff on City sidewalks, gutters, and streets.
>
> (b) Cleaning of sidewalks, driveways, patios, parking lots, or other paved or hard-surfaced areas, or washing cars, buses, boats, trailers, or any vehicle by use of a hose unless that hose is fitted with an operating automatic shut-off valve.
>
> (c) Water waste due to broken or defective plumbing, fire system, irrigation system, or any appurtenance thereto; or to open or to leave open any stopcock or faucet so as to permit water waste.
>
> (d) Service of water by any restaurant unless requested by a patron.
>
> (e) Installation of a single-pass cooling system.
>
> (f) Installation of a non-recirculating, decorative fountain.
>
> (g) Construction of a non-recirculating conveyor car wash."

When water waste is reported and verified, a warning letter is sent to the party responsible for the water waste. If water waste continues the City can take further action including additional warning notices, administrative penalties of up to $5000, or termination of water service. The City has also terminated water service in the case of egregious water waste.

High Efficiency Toilet Rebate Program

The District administers the High Efficiency Toilet (HET) Rebate Program where residents can replace old toilets with 3.5 gallons per flush (gpf) or more, with an approved high efficiency toilet. High-efficiency toilets use a minimum of 20% less water than standard 1.6 gpf toilets, essentially any toilet that flushes at 1.28 gpf or less is considered high efficiency. The resident is eligible to receive a rebate amount up to $125 per toilet for replacing old, high water use toilet. A list of approved high efficiency toilets is provided by the District to aid in program administration. Listed below is the total number of high efficiency or ultra low flush toilets (ULFT's) for the City in the past five years:

Table 54: High Efficiency Toilet Rebate Program

Fiscal Year	Commercial Industrial ULFTs	Single Family ULFTs Multi-Family ULFTs	Total
05/06	494	3	497
06/07	407	26	433
07/08	9	39	48
08/09	192	91	283
09/10	164	120	284
Total	1266	279	1545

The amount of water conserved by installation of high efficiency toilet (e.g. ULFT's) in residential settings can be made assuming an average of 4 flushes per day and an average savings of 3.9 gallons per flush[37], that translates to an annual water savings of 5,694 gallons per toilet per year. Therefore the 558 residential rebates/installations to date equates to approximate savings of 3,177,252 gal/year or 9.75 acre-ft/yr.

The amount of water conserved by installation of high efficiency toilets in commercial/ Industrial settings can be estimated assuming a savings of 37 gallons per day per toilet[38] based on an average of industry types. The 2,532 toilets installed would equate to water savings totaling 34,194,660 gallons per year or 104.9 acre-ft/yr

[37] BMP Cost & Savings Study; Guide to Data and Methods for Cost-Effectiveness Analysis of Urban Water Conservation Best Management Practices, California Urban Water Conservation Council, December 2003

[38] BMP Cost & Savings Study; Guide to Data and Methods for Cost-Effectiveness Analysis of Urban Water Conservation Best Management Practices, California Urban Water Conservation Council, December 2003

CLIMATE CHANGE

Effects of climate change on future water supplies, was not included in the demand and supply analysis of this Urban Water Management Plan update. However, several reports have been reviewed in detail on the potential effects of climate change on water supply[39,40,41,42] share common recurring themes with regards to water supply reliability:

- Climate change may result in changes in patterns of precipitation. The majority of reports note potentially reduced snowpack, earlier spring runoff, and more rainfall.
- Warmer temperatures could lead to longer growing seasons and increased need for irrigation, and changes in evapotranspiration rates.
- Rising sea levels could influence groundwater and San Francisco Delta operations due to saltwater intrusion.
- The reservoir system within California may not be adequate to handle the change in precipitation patterns.
- Prior to 1980, historic data was a good predictor of rainfall amounts. Since 1980 historic data is not as reliable a predictor.
- Droughts may occur more frequently.
- Climatic Models yield inconsistent results. Some models indicate precipitation will increase, others that it will decrease.[43]
- Operational adaptation may be necessary if precipitation patterns change. For example if spring runoff occurs earlier, additional groundwater recharge or reservoir storage may be needed.

However, these reports also share several other common themes. The report are generally making projections over a much longer period of 50 to 100 years, than is covered by this technical memorandum. Climatic Models also yield varying results based on the assumptions of the individual modelers. Some models predict more precipitation, others predict less. In general, the reports lack specific data that can be used to adjust or plan for supply reliability. The reports contain generalizations and most contain disclaimers such as:

---

[39] Climate Change and California Water Resources: A Survey and Summary of Literature, Pacific Institute, July 2003

[40] Draft The State Water Project Delivery Reliability Report 2009, State of California Department of Water Resources, December 2009

[41] Using Future Climate Projections to Support Water Resources Decision Making in California, California Climate Action Center, May 2009

[42] Managing an Uncertain Future Climate Change Adaptation for California's Water, State of California Department of Water Resources Oct. 2008

[43] Pacific Institute, July 2003, Page 5

"It should be emphasized that these model results are not intended as specific predictions, but rather are scenarios based on potential climatic variability and change driven by both natural variability and human induced changes"[44]

Climate Change - SFPUC

As described by the SFPUC in its Final Water Supply Availability Study for the City and County of San Francisco, dated October 2009, there is evidence that increasing concentrations of greenhouse gasses have caused and will continue to cause a rise in temperatures around the world, which will result in a wide range of changes in climate patterns. Moreover, there is evidence that a warming trend occurred during the latter part of the 20th century and will likely continue through the 21st century. These changes will have a direct effect on water resources in California, and numerous studies have been conducted to determine the potential impacts to water resources.

According to the SFPUC, other than the general trends listed above, there is no clear scientific consensus on exactly how climate change will quantitatively affect the state's water supplies, and current models of water systems in California generally do not reflect the potential effects of climate change.

Initial climate change modeling completed by the SFPUC indicates that about seven percent of runoff currently draining into Hetch-Hetchy Reservoir will shift from the spring and summer seasons to the fall and winter seasons in the Hetch-Hetchy basin by 2025. This percentage is within the current interannual variation in runoff and is within the range accounted for during normal runoff forecasting and existing reservoir management practices. The predicted shift in runoff timing is similar to the results found by other researchers modeling water resource impacts in the Sierra Nevada due to warming trends associated with climate change.

The SFPUC has stated that based on this preliminary analysis, the potential impacts of climate change are not expected to affect the water supply available from the San Francisco Regional Water System (RWS) or the or the overall operation of the RWS through 2030.

The SFPUC views assessment of the effects of climate change as an ongoing project requiring regular updating to reflect improvements in climate science, atmospheric/ocean modeling, and human response to the threat of greenhouse gas emissions. To refine its climate change analysis and expand the range of climate parameters being evaluated, as well as expand the timeframes being considered, the SFPUC is currently undertaking two additional studies. The first utilizes a newly calibrated hydrologic model of the Hetch-Hetchy watershed to explore sensitivities of inflow to different climate change scenarios involving changes in air temperature and precipitation. The second study will seek to utilize state-of-the-art climate modeling techniques in conjunction with water system modeling tools to more fully explore potential effects of climate change on the SFPUC water system as a whole. Both analyses will consider potential effects through the year 2100.

Water resource planning requires accepting and planning for a certain amount of variability both in water supply and water demand projections. As an example, this UWMP analyzes the potential impacts of single and multiple dry year scenarios. Conservative supply and

[44] Pacific Institute, July 2003 Page 5

demand assumptions have historically been used in order to increase the probability of an adequate supply. This UWMP is based on a number of noted conservative assumptions. The information currently available on the potential effects of climate change indicates a potential increase in variability of supply that may require adaptation at the State level. However, the potential effects of climate change over the 25-year planning period covered by this Memorandum are not quantified in the literature to a degree of specificity that allows for the adjustment of the water demand or supply calculations.

Table 55: Urban Water Management Plan checklist, organized by subject

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location
PLAN PREPARATION				
4	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.	10620(d)(2)		Pages 2-3 Appendix A
6	Notify, at least 60 days prior to the public hearing on the plan required by Section 10642, 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. Any city or county receiving the notice may be consulted and provide comments.	10621(b)		Pages 2-3 Appendix A
7	Provide supporting documentation that the UWMP or any amendments to, or changes in, have been adopted as described in Section 10640 et seq.	10621(c)		Page 2 Appendix B
54	Provide supporting documentation that the urban water management plan has been or will be provided to any city or county within which it provides water, no later than 60 days after the submission of this urban water management plan.	10635(b)		Page 3
55	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.	10642		Page 3
56	Provide supporting documentation that the urban water supplier made the plan available for public inspection and held a public hearing about the plan. For public agencies, the hearing notice is to be provided pursuant to Section 6066 of the Government Code. The water supplier is to provide the time and place of the hearing to any city or county within which the supplier provides water. Privately-owned water suppliers shall provide an equivalent notice within its service area.	10642		Page 2
57	Provide supporting documentation that the plan has been adopted as prepared or modified.	10642		Page 2
58	Provide supporting documentation as to how the water supplier plans to implement its plan.	10643		Page 2

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location
59	Provide supporting documentation that, in addition to submittal to DWR, the urban water supplier has submitted this UWMP to the California State Library and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption. This also includes amendments or changes.	10644(a)		Page 2
60	Provide supporting documentation that, not later than 30 days after filing a copy of its plan with the department, the urban water supplier has or will make the plan available for public review during normal business hours	10645		Page 2
SYSTEM DESCRIPTION				
8	Describe the water supplier service area.	10631(a)		Page 4
9	Describe the climate and other demographic factors of the service area of the supplier	10631(a)		Page-67
10	Indicate the current population of the service area	10631(a)	Provide the most recent population data possible. Use the method described in "Baseline Daily Per Capita Water Use." See Section M.	Page 7
11	Provide population projections for 2015, 2020, 2025, and 2030, based on data from State, regional, or local service area population projections.	10631(a)	2035 and 2040 can also be provided to support consistency with Water Supply Assessments and Written Verification of Water Supply documents.	Page 8
12	Describe other demographic factors affecting the supplier's water management planning.	10631(a)		Page 7
SYSTEM DEMANDS				
1	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.	10608.20(e)		Page 13-19 Appendix B
2	*Wholesalers:* Include an assessment of present and proposed future measures, programs, and policies to help achieve the water use reductions. *Retailers:* Conduct at least one public hearing that includes general discussion of the urban retail water supplier's implementation plan for complying with the Water Conservation Bill of 2009.	10608.36 10608.26(a)	Retailers and wholesalers have slightly different requirements	Appendix B

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location
3	Report progress in meeting urban water use targets using the standardized form.	10608.40	Note: City will meet or exceed the water use targets/goals for 2015 and 2020.	See Page 22
25	Quantify past, current, and projected water use, identifying the uses among water use sectors, for the following: (A) single-family residential, (B) multifamily, (C) commercial, (D) industrial, (E) institutional and governmental, (F) landscape, (G) sales to other agencies, (H) saline water intrusion barriers, groundwater recharge, conjunctive use, and (I) agriculture.	10631(e)(1)	Consider 'past' to be 2005, present to be 2010, and projected to be 2015, 2020, 2025, and 2030. Provide numbers for each category for each of these years.	Page 10, 20-21
33	Provide documentation that either the retail agency provided the wholesale agency with water use projections for at least 20 years, if the UWMP agency is a retail agency, OR, if a wholesale agency, it provided its urban retail customers with future planned and existing water source available to it from the wholesale agency during the required water-year types	10631(k)	Average year, single dry year, multiple dry years for 2015, 2020, 2025, and 2030.	Page 23
34	Include projected water use for single-family and multifamily residential housing needed for lower income households, as identified in the housing element of any city, county, or city and county in the service area of the supplier.	10631.1(a)		Page 23
SYSTEM SUPPLIES				
13	Identify and quantify the existing and planned sources of water available for 2015, 2020, 2025, and 2030.	10631(b)	The 'existing' water sources should be for the same year as the "current population" in line 10. 2035 and 2040 can also be provided.	Page 21
14	Indicate whether groundwater is an existing or planned source of water available to the supplier. If yes, then complete 15 through 21 of the UWMP Checklist. If no, then indicate "not applicable" in lines 15 through 21 under the UWMP location column.	10631(b)	Source classifications are: surface water, groundwater, recycled water, storm water, desalinated sea water, desalinated brackish groundwater, and other.	Yes, Page 26
15	Indicate whether a groundwater management plan 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.	10631(b)(1)		Page 30
16	Describe the groundwater basin.	10631(b)(2)		Page 29-30

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location
17	Indicate whether the groundwater basin is adjudicated? Include a copy of the court order or decree.	10631(b)(2)		Page 29
18	Describe the amount of groundwater the urban water supplier has the legal right to pump under the order or decree. If the basin is not adjudicated, indicate “not applicable” in the UWMP location column.	10631(b)(2)		N/A
19	For groundwater basins that are not adjudicated, provide information as to whether DWR has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to eliminate the long-term overdraft condition. If the basin is adjudicated, indicate “not applicable” in the UWMP location column.	10631(b)(2)		Page 28
20	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	10631(b)(3)		Page 31
21	Provide a detailed description and analysis of the amount and location of groundwater that is projected to be pumped.	10631(b)(4)	Provide projections for 2015, 2020, 2025, and 2030.	Page 31
24	Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.	10631(d)		Page 45
30	Include a detailed description of all water supply projects and programs that may be undertaken by the water supplier to address water supply reliability in average, single-dry, and multiple-dry years, excluding demand management programs addressed in (f)(1). Include specific projects, describe water supply impacts, and provide a timeline for each project.	10631(h)		Page 46
31	Describe desalinated water project opportunities for long-term supply, including, but not limited to, ocean water, brackish water, and groundwater.	10631(i)		Page 45
44	Provide information on recycled water and its potential for use as a water source in the service area of the urban water supplier. Coordinate with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area.	10633		Page 33
45	Describe the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.	10633(a)		Page 35, 36

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location
46	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.	10633(b)		Page 35-36
47	Describe the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.	10633(c)		Page 36
48	Describe and quantify the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, indirect potable reuse, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.	10633(d)		Page 41
49	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.	10633(e)		Page 42
50	Describe the actions, including financial incentives, 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.	10633(f)		Page 43
51	Provide a plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.	10633(g)		Page 44
WATER SHORTAGE RELIABILITY AND WATER SHORTAGE CONTINGENCY PLANNING [b]				
5	Describe water management tools and options to maximize resources and minimize the need to import water from other regions.	10620(f)		Page 48
22	Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage and provide data for (A) an average water year, (B) a single dry water year, and (C) multiple dry water years.	10631(c)(1)		Page 48, 54-56
23	For any water source that may not be available at a consistent level of use - given specific legal, environmental, water quality, or climatic factors - describe plans to supplement or replace that source with alternative sources or water demand management measures, to the extent practicable.	10631(c)(2)		Page 49
35	Provide an urban water shortage contingency analysis that specifies stages of action, including up to a 50-percent water supply reduction, and an outline of specific water supply conditions at each stage	10632(a)		Page 65, 70

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location
36	Provide an estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply.	10632(b)		Page 82
37	Identify actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster.	10632(c)		Page 65
38	Identify additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.	10632(d)		Page 71
39	Specify consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.	10632(e)		Page 72, 78
40	Indicated penalties or charges for excessive use, where applicable.	10632(f)		Page 78, Appendix K
41	Provide an analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments.	10632(g)		Page 70
42	Provide a draft water shortage contingency resolution or ordinance.	10632(h)		Appendix K
43	Indicate a mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.	10632(i)		Page 78
52	Provide information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments, and the manner in which water quality affects water management strategies and supply reliability	10634	For years 2010, 2015, 2020, 2025, and 2030	Page 73

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location
53	Assess the water supply reliability during normal, dry, and multiple dry 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, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. Base the assessment on the information compiled under Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.	10635(a)		Page 83-85
DEMAND MANAGEMENT MEASURES				
26	Describe how each water demand management measures is being implemented or scheduled for implementation. Use the list provided.	10631(f)(1)	Discuss each DMM, even if it is not currently or planned for implementation. Provide any appropriate schedules.	Page 86-98
27	Describe the methods the supplier uses to evaluate the effectiveness of DMMs implemented or described in the UWMP.	10631(f)(3)		Page 86-98
28	Provide an estimate, if available, of existing conservation savings on water use within the supplier's service area, and the effect of the savings on the ability to further reduce demand.	10631(f)(4)		Page 86-98
29	Evaluate each water demand management measure that is not currently being implemented or scheduled for implementation. The evaluation should include economic and non-economic factors, cost-benefit analysis, available funding, and the water suppliers' legal authority to implement the work.	10631(g)	See 10631(g) for additional wording.	Page 86-98
32	Include the annual reports submitted to meet the Section 6.2 requirements, if a member of the CUWCC and signer of the December 10, 2008 MOU.	10631(j)	Signers of the MOU that submit the annual reports are deemed compliant with Items 28 and 29.	N/A

a The UWMP Requirement descriptions are general summaries of what is provided in the legislation. Urban water suppliers should review the exact legislative wording prior to submitting its UWMP.

b The Subject classification is provided for clarification only. It is aligned with the organization presented in Part I of this guidebook. A water supplier is free to address the UWMP Requirement anywhere with its UWMP, but is urged to provide clarification to DWR to facilitate review.

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33) Van Keuren, Neal. Projection for Influent Hydraulic Flow to the WPCP. September 2005.

Appendix A

Letter Notifying Cities and Counties of UWMP Revision

February 1, 2011

Mr. Alan Kurotori
City of Santa Clara
1500 Warburton Avenue
Santa Clara, CA

NOTICE OF PREPARATION OF URBAN WATER MANAGEMENT PLAN

The Urban Water Management Plan Act (Water Code Section 10610 - 10657) requires the City of Santa Clara to update its Urban Water Management Plan. We are reviewing our current Plan, which was last updated in 2005, and will be considering revisions to it. We invite your agency's participation in this process.

We will make any proposed revisions to our Plan available for public review and will hold a public hearing later this year. In the meantime, if you have any questions about our Plan, or the process for updating it, please contact:

Ms. Nina Hawk
Compliance Manager
City of Santa Clara
1500 Warburton Ave.
Santa Clara, CA 95050
Tel: (408) 615-2018
Fax: (408) 247-0784
nhawk@santaclaraca.gov

Sincerely,

Alan Kurotori
Director of Water and Sewer Utilities

cc: Chron File

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Appendix B

Resolution Adopting the 2010 Urban Water Management Plan for the City of Santa Clara

RESOLUTION NO. 11-7855

A RESOLUTION OF THE CITY OF SANTA CLARA, CALIFORNIA, APPROVING THE 2010 URBAN WATER MANAGEMENT PLAN AND WATER USE GOALS

BE IT RESOLVED BY THE CITY OF SANTA CLARA AS FOLLOWS:

WHEREAS, The California Urban Water Management Planning Act, requires that every urban water supplier annually providing water for municipal purposes to more than 3000 customers or supplying more than 3,000 acre feet of water adopt and periodically update an Urban Water Management Plan to assess the reliability of its water sources over a 20-year planning horizon;

WHEREAS, the City of Santa Clara last prepared an Urban Water Management Plan ("Plan") in December 2005, at which the City filed the Plan with the California Department of Water Resources;

WHEREAS, although typically the City must review and update its Plan at least once every five years, in 2009 the Legislature passed Senate Bill 7 (7^{th} Extraordinary Session), known as the Water Conservation Act of 2009, which allowed water suppliers an extension for adoption of the Plan due in 2010 to July 1, 2011;

WHEREAS, Senate Bill x7-7 imposed an additional requirement that the City of Santa Clara develop Water Use Goals and adopt applicable methodology for meeting those Water Use Goals by July 1, 2011;

WHEREAS, on May 4, 2011 and May 10, 2011, the City published notice of a public hearing to consider a proposed 2010 plan in the Santa Clara weekly, a newspaper of general circulation;

WHEREAS, by letter dated February 1, 2011, the City notified the County of Santa Clara, the Cities of Brisbane, Burlingame, Daly City, Foster City, Hayward, Menlo Park, Millbrae, Milpitas, Mountain View, Palo Alto, Redwood City, San Bruno, Sunnyvale, the Alameda County Water District, California Water Service Company, Coastside County Water District, East Palo

Alto Water District, Los Trancos County Water District, Mid-Pennisula Water District, North Coast County Water District, Purissima Hills Water District, San Jose Municipal Water System, San Jose Water Company, Santa Clara Valley Water District, Standford University, Town of Hillsborough, Westborough Water District, and the Bay Area Water Supply and Conservation Agency, about the public hearing; and,

WHEREAS, on May 24, 2011, the City Council conducted a public hearing on the proposed 2010 Plan of its regularly scheduled meeting, at which time all interested person were given an opportunity to present verbal and written testimony and evidence.

NOW THEREFORE, BE IT FURTHER RESOLVED BY THE CITY OF SANTA CLARA AS FOLLOWS:

1. Approval of Plan. The Council has reviewed the Plan and Water Use Goals at a regular public meeting conducted on May 24, 2011. Based upon the data and conclusions set forth therein, and the evidence and testimony presented at the public meeting, the Council hereby finds that there is adequate water to supply without creating a negative impact on the groundwater basin and that the City has an adequate supply to provide water for the City during single or multiple dry years for at least a 20-year projection.

2. The Council hereby approves and adopts the 2010 Urban Water Management Plan, which contains the City's Water Use Goals.

3. The City's Water Utility is hereby directed to file a copy of the Plan with the California Department of Water Resources within 30 days.

4. Constitutionality, severability. If any section, subsection, sentence, clause, phrase, or word of this resolution is for any reason held by a court of competent jurisdiction to be unconstitutional or invalid for any reason, such decision shall not affect the validity of the

remaining portions of the resolution. The City of Santa Clara, California, hereby declares that it would have passed this resolution and each section, subsection, sentence, clause, phrase, and word thereof, irrespective of the fact that any one or more section(s), subsection(s), sentence(s), clause(s), phrase(s), or word(s) be declared invalid.

5. Effective date. This resolution shall become effective immediately.

I HEREBY CERTIFY THE FOREGOING TO BE A TRUE COPY OF A RESOLUTION PASSED AND ADOPTED BY THE CITY OF SANTA CLARA, CALIFORNIA, AT A REGULAR MEETING THEREOF HELD ON THE 24th DAY OF MAY, 2011, BY THE FOLLOWING VOTE:

AYES:	COUNCILORS:	Gillmor, Kennedy, Kolstad, Mahan, McLeod and Moore and Mayor Matthews
NOES:	COUNCILORS:	None
ABSENT:	COUNCILORS:	None
ABSTAINED:	COUNCILORS:	None

ATTEST: [signature]

ROD DIRIDON, JR.
CITY CLERK
CITY OF SANTA CLARA

Attachments Incorporated by Reference:
1. Exhibit A: 2010 Urban Water Management Plan

Appendix C

Public Participation, Inside Santa Clara, Advertisement of Public Meeting

CITY OF SANTA CLARA

Notice Of Public Hearing
Regarding Proposed
2010 Urban Water Management Plan
and the City's Water Use Goals

Notice is hereby given that the City Council of the City of Santa Clara has determined and fixed its regularly scheduled meeting of May 24th, 2011 at 7:00 p.m., or as soon thereafter as the matter may be heard, in the City Hall Council Chambers, 1500 Warburton Avenue, Santa Clara, California as the location, date and time to conduct a public hearing to receive comment on the proposed 2010 Urban Water Management Plan, which includes the water use goals required under the Water Conservation Act of 2009, for the City of Santa Clara. If adopted, the 2010 Urban Water Management Plan will remain in effect until the next update in 2015.

Copies of the proposed Plan are available in the City Clerk's Office, City Website and in the City Water Utility offices in City Hall. Questions should be addressed to Christopher de Groot, Acting Director of Water and Sewer Utilities, 1500 Warburton Avenue, Santa Clara, California 95050; telephone (408) 615-2000.

____

Rod Diridon, Jr.
City Clerk
City of Santa Clara

PROOF OF PUBLICATION

Santa Clara Weekly

P.O. Box 580, Santa Clara, California 95052

IN THE
City of Santa Clara,
State of California,
County of Santa Clara

CITY OF SANTA CLARA

NOTICE OF PUBLIC HEARING REGARDING PROPOSED 2010 ...

State of California, } SS.
County of Santa Clara }

The undersigned, being first duly sworn, deposes and says: That at all times hereinafter mentioned affiant was and still is a citizen of the United States, over the age of eighteen years, and not a party to nor interested in the above entitled proceeding; and was at and during all said times and still is publisher of the Santa Clara Weekly, a newspaper of general circulation printed and published weekly in the County of Santa Clara, State of California, and said Santa Clara Weekly is and was at all times hereinmentioned a newspaper of general circulation as that term is defined by sections 6000 and following, of the government code of the State of California, and, as provided by said sections, is published for the dissemination of local or telegraphic news and intelligence of a general character, having a bonafide subscription list of paying subscribers, and is not devoted to the interest or published for the entertainment or instruction of a particular class, profession, trade, calling, race or denomination, or for the entertainment and instruction of any number of such classes, professions, trades, callings, races or denominations; that at all times said newspaper has been established, printed and published in the said County of Santa Clara and State of California at regular intervals for more than one year proceeding the first publication of the notice herein mentioned; that said notice was set in type not smaller than non-parell, describing and expessing in general terms the purport and character of the notice intended to be given; that the clipping of which the annexed is a true printed copy, was published and printed in said newspaper on the following dates to wit:

Pub: 5/4, 5/11/2011

Dated at Santa Clara, California

This ______12TH______ day of ________MAY______________, 2011

I declared under penalty of perjury that the foregoing is true and correct.

Signed: ____
(Assoc.) Publisher of the Santa Clara Weekly

The Santa Clara Weekly was adjudicated a newspaper of general circulation in and for the County of Santa Clara on September 3, 1974 (Case No. 314617). The Santa Clara Weekly was adjudicated a newspaper of general circulation within the City of Santa Clara on April 2, 1976 (Case No. 347776).

DATED: 01/08/2010 RECONTRUST COMPANY, N.A. 1800 Tapo Canyon Rd., CA6-914-01-94 SIMI VALLEY, CA 93063 Phone: (800) 281 8219, Sale Information (626) 927-4399 By: Trustee's Sale Officer RECONTRUST COMPANY, N.A. is a debt collector attempting to collect a debt. Any information obtained will be used for that purpose. ASAP# 3977707 05/04/2011, 05/11/2011, 05/18/2011
Pub.: 5/4, 5/11, 5/18/2011

CITY OF SANTA CLARA

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Rod Diridon, Jr.
City Clerk
City of Santa Clara
Pub.: 5/4, 5/11/2011

Appendix D

SBx7-7 Baseline Calculations

Year ID	Year Ending	Service Area Population	Annual Recycled Water Use	Recycled Water Use Percent	Annual Gross Water Use	Per Capita Water Use	GPCD 10-year Period Ending						
				(%)	(gallons)	(gpcd)	Dec-04	Dec-05	Dec-06	Dec-07	Dec-08	Dec-09	Dec-10
1	1990	93,613	138	2%	7,989	234							
2	1991	93,433	171	2%	7,006	205							
3	1992	94,583	106	1%	7,661	222							
4	1993	95,697	133	2%	8,044	230							
5	1994	96,259	114	1%	8,365	238							
6	1995	96,915	125	1%	8,954	253	253						
7	1996	97,774	63	1%	9,477	266	266	266					
8	1997	99,201	235	2%	9,711	268	268	268	268				
9	1998	100,602	164	2%	9,191	250	250	250	250	250			
10	1999	101,307	292	3%	8,747	237	237	237	237	237	237		
11	2000	101,605	415	5%	8,928	241	241	241	241	241	241	241	
12	2001	103,386	560	7%	8,364	222	222	222	222	222	222	222	222
13	2002	104,031	592	7%	7,986	210	210	210	210	210	210	210	210
14	2003	105,581	672	9%	7,718	200	200	200	200	200	200	200	200
15	2004	107,616	771	10%	7,949	202	202	202	202	202	202	202	202
16	2005	108,717	918	12%	7,672	193		193	193	193	193	193	193
17	2006	110,682	895	11%	7,809	193			193	193	193	193	193
18	2007	113,575	1001	13%	7,881	190				190	190	190	190
19	2008	114,988	909	12%	7,640	182					182	182	182
20	2009	117,237	794	11%	7,074	165						165	165
21	2010	118,830	785	12%	6,540	151							151
Calculated Baseline/Current Water Use (Period Average)							**235**	**229**	**222**	**214**	**207**	**200**	**191**

Year ID	Year Ending	Service Area Population	Annual Recycled Water Use	Recycled Water Use Percent	Annual Gross Water Use	Per Capita Water Use	GPCD 5-year Period Ending			
				(%)	(gallons)	(gpcd)	Dec-07	Dec-08	Dec-09	Dec-10
1	1990	93,613	138	2%	7,989	234				
2	1991	93,433	171	2%	7,006	205				
3	1992	94,583	106	1%	7,661	222				
4	1993	95,697	133	2%	8,044	230				
5	1994	96,259	114	1%	8,365	238				
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18	2007	113,575	1001	13%	7,881	190	190	190	190	190
19	2008	114,988	909	12%	7,640	182		182	182	182
20	2009	117,237	794	11%	7,074	165			165	165
21	2010	118,830	785	12%	6,540	151				151
Calculated Baseline/Current Water Use (Period Average)							**196**	**192**	**185**	**176**

Appendix E

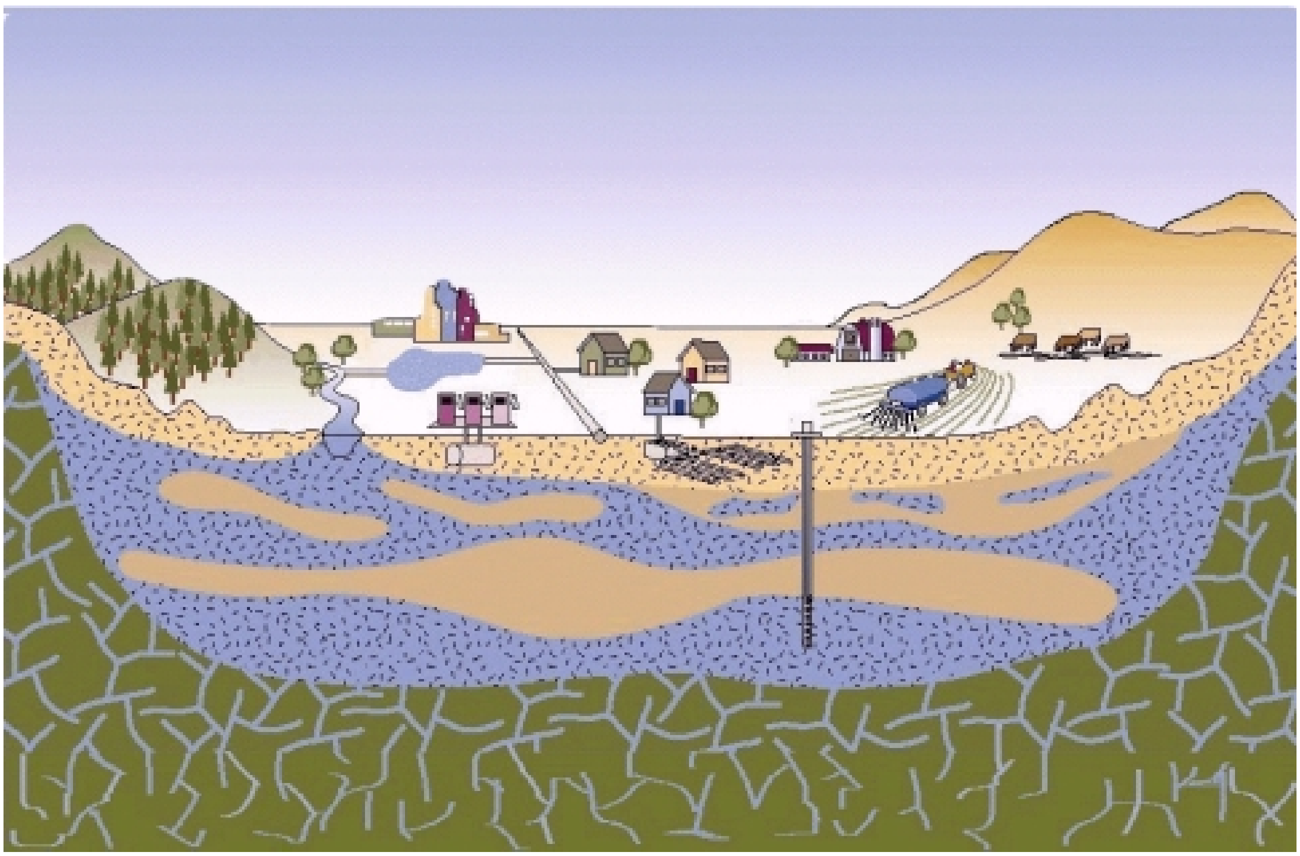
Planning Projects

Project	Location	Description	Anticipated year built
Kohl/Santa Clara Square	3610-3700 El Camino Real	Existing shopping center redeveloped to 490 housing units and 171,000 sf of retail use and 12,300 sqft. of office.	2013
Medhi Shahmirza Commercial Building	1480 El Camino Real	PD rezone for the construction of a 5,600 s.f. commercial building	2010-2013
David Tymn for Mozart Dev.	3051 Homestead Road	Pre-Application Review of proposal to rezone from A to PD for the demolition of an existing s.f. residence, and replacement with 8 detached homes	2012-2015
LHL Partners and Barry Swenson Builders	3499 The Alameda	Rezoning to PD from ML to facilitate development of five four bedroom attached three story townhomes with an attached garage and four three bedroom attached three story townhomes with an attached garage	2012-2013
Trumark/Extreme Networks	3515-3585 Monroe St	Phased mixed use project with 593 residential units, including later phasing of retail/commercial and apartments	2030
QTS Offices and Data Center	2805 Mission College Boulevard	Architectural Review to allow use of the existing industrial building as a data center in conjunction with offices	2011
Clear Channel Outdoor	1130 Duane Avenue	Use Permit and Sign Relocation Agreement to allow new double-sided LED sign.	2013-2014
Carden Academy	2499 Homestead Rd.	Use Permit (2 year only) to allow private grade school K-8 grades for two years only at existing church property	2012
SCU Graham Residential Living Community	500 El Camino Real	Architectural review of (4) four-story residential halls w/378 beds, classrooms and common areas & demo of (4) two-story residential buildings w/ 250 beds (net increase 128 beds)	2012
Alex Byer	2000 El Camino Real	Proposed Large Scale Retail Store in former Mervyns Plaza vacant tenant space & façade change & parking lot & landscape improvements to shopping center	2012
Indoor Volleyball and Basketball	2925 Mead Avenue	Indoor volleyball and Basketball- applicant Ramin Khayat	2012
Speno Brothers	1575 Pomeroy	6 unit apartment project/PD rezone	2012-2013
Former Neto's Site - conversion to new housing development	1313 Franklin Street	Multifamily Residential project proposed at 9 dwelling units	2012-2013
Swim Center at Central Park	909 Kiely Boulevard	2 Olympic-sized pools, special event venue. Replacement and possible enhancement of current facilities.	2015-2021

Appendix F

Santa Clara Valley Water District,
2001 Groundwater Management Plan

Santa Clara Valley Water District Groundwater Management Plan



July 2001

Santa Clara Valley Water District

SANTA CLARA VALLEY WATER DISTRICT

Santa Clara Valley Water District Groundwater Management Plan

Prepared by

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Tracy Hemmeter	Program Administrator

Under the direction of

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The authors would like to extend a special thanks to William G. Molnar for his support, assistance, and guidance on this project.

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TABLE OF CONTENTS

ACRONYMS USED

af – acre-feet
BMP – Best Management Practices
CEQA – California Environmental Quality Act
CIMIS – California Irrigation Management Information System
CVP – Central Valley Project
DEIR – Draft Environmental Impact Report
DRASTIC – Depth to water table, net Recharge, Aquifer media, Soil media, Topography, Impact of the vadose zone, and hydraulic Conductivity
DWR – Department of Water Resources
DWSAP – Drinking Water Source Assessment and Protection
EIR – Environmental Impact Report
EPA – Environmental Protection Agency
GIS – Geographic Information Systems
InSAR – Interferometric Synthetic Aperture Radar
IWRP – Integrated Water Resources Plan
LUSTOP – Leaking Underground Storage Tank Oversight Program
MCL – Maximum Contaminant Level
MOU – Memorandum of Understanding
MTBE – Methyl Tert Butyl Ether
NPDES – National Pollution Discharge Elimination System
NTU – Nephelometric Turbidity Unit
PCB - Polychlorinated biphenyl
RWQCB – Regional Water Quality Control Board
SBA – South Bay Aqueduct
SBWRP – South Bay Water Recycling Program
SCRWA – South County Regional Wastewater Authority
SCVWCD – Santa Clara Valley Water Conservation District
SCVWD – Santa Clara Valley Water District
SWRCB – State Water Resources Control Board
USGS – United States Geological Survey
UST – Underground Storage Tank
VOC – Volatile Organic Compound
WHP – Wellhead Protection Program
WMI – Watershed Management Initiative
WTP – Water Treatment Plant

EXECUTIVE SUMMARY

The Santa Clara Valley Water District (District) has managed the groundwater basin in Santa Clara County (County) since the early 1930s and is nationally recognized as a leader in groundwater management. The District works in conjunction with local retailers, the Regional Water Quality Control Board, and other agencies to ensure a safe and healthy supply of groundwater. In 2000, the groundwater basin supplied nearly half of the 390,000 acre-feet used in the County.

The District is the groundwater management agency in Santa Clara County as authorized by the California legislature under the Santa Clara Valley Water District Act (District Act), California Water Code Appendix, Chapter 60. Since its creation, the District has worked to minimize subsidence and protect the groundwater resources of the County under the direction of the District Act. As stated in the District Act, the District's objectives related to groundwater management are to recharge the groundwater basin, conserve water, increase water supply, and to prevent waste or diminution of the District's water supply.

The mission of the District is a healthy, safe, and enhanced quality of living in Santa Clara County through the comprehensive management of water resources in a practical, cost-effective, and environmentally-sensitive manner. In the Global Governance Commitment adopted by the District Board of Directors, it is stated that the conjunctive management of the groundwater basins is an integral part of the District's comprehensive water supply management program.

The District has always effectively managed the groundwater basin to fulfill the objectives of the District Act and its mission. The goal of these groundwater management efforts has been, and continues to be, ***to ensure that groundwater resources are sustained and protected***.

The Groundwater Management Plan formally documents the District's groundwater management goal and describes programs in place that are designed to meet that goal. The following programs are documented in the plan:

- Groundwater supply management programs that replenish the groundwater basin, sustain the basin's water supplies, help to mitigate groundwater overdraft, and sustain storage reserves for use during dry periods.

- Groundwater monitoring programs that provide data to assist the District in evaluating and managing the groundwater basin.

- Groundwater quality management programs that identify and evaluate threats to groundwater quality and prevent or mitigate contamination associated with those threats.

This plan serves as the first step toward a more formal and integrated approach to the management of groundwater programs, and to the management of the basin overall. The various groundwater management programs and activities described in this document demonstrate that the District is proactive and effective in protecting the County's groundwater resources.

Recommendations

The groundwater management programs described in the Groundwater Management Plan were developed and implemented before the Board of Directors adopted the Ends Policies in 1999, and were therefore not driven by these formally documented ends. As the District is now guided by these policies, we need to ensure that the outcomes of our groundwater management programs match those of the Ends Policies. In addition, we need to ensure that existing programs are integrated and effective in terms of achieving the District's groundwater management goal.

Although the District manages the basin effectively, there is room for improvement of the groundwater management programs in terms of meeting these outcomes. Specific areas where further analysis is recommended include:

1. **Coordination between the Groundwater Management Plan and the Integrated Water Resources Plan (IWRP) –** As the District's water supply planning document through year 2040, the IWRP has identified the operation of the groundwater basin as a critical component to help the District respond to changing water supply and demand conditions. Planning and analysis efforts for future updates of the Groundwater Management Plan and the IWRP need to be integrated in order to provide a coordinated and comprehensive water supply plan for Santa Clara County.

2. **Integration of groundwater management programs and activities –** Individual groundwater management programs tend to be implemented almost independently of other programs. A more integrated approach to the management of these programs, and to the management of the basin overall needs to be developed. Integration of these programs and improved conjunctive use strategies will result in more effective basin management.

3. **Optimization of recharge operations –** As artificial recharge is critical to sustaining groundwater resources, an analysis of the most effective amount, location, and timing of recharge should be conducted.

4. **Improved understanding of the groundwater basin –** In general, the existing groundwater management programs seem to focus on managing the basin to meet demands and protecting the basin from contamination and the threat of contamination. However, improving the District's understanding of the complexity of the groundwater basin is critical to improved groundwater management. The more we know about the basin, the better we can analyze the impact of different groundwater scenarios and management alternatives.

5. **Effective coordination and communication with internal and external agencies –** Improved communication and coordination will lead to improved groundwater

management programs. Increased sharing of ideas, knowledge, and technical expertise among people involved with groundwater at the District will result in increased knowledge, well-coordinated and efficient work, and well-informed analyses and conclusions. Improved coordination with external agencies, such as retailers and state and federal organizations, will result in improved knowledge of customer needs and increased awareness of District activities.

A detailed analysis of these areas and of all groundwater programs as they relate to the Ends Policies and the groundwater management goal is recommended. District staff have already begun to address some of these issues, which will be fully discussed in the first update to the Groundwater Management Plan. The update, which is scheduled for 2002, will fully address the issues above and the overall management of the basin by presenting a formal groundwater management strategy. The update will evaluate each groundwater program's contribution and effectiveness in terms of the groundwater management goal and outcomes directed by the Ends Policies. If there is no direct connection between the Ends Policies and a specific program, that program's contribution to other linked programs will be analyzed. The update will include recommendations for changes to existing programs or for the development of new programs, standards, or ordinances. The update will also develop an integrated approach for the management of groundwater programs, and for the management of the groundwater basin in general.

Groundwater is critical to the water supply needs of Santa Clara County. Therefore, it is of the utmost importance that the District continues the progress begun with this Groundwater Management Plan. Increased demands and the possibility of reduced imported water in the future make effective and efficient management of the groundwater basin essential. The Groundwater Management Plan and future updates will identify how the management of the groundwater basin can be improved, thereby ensuring that groundwater resources will continue to be sustained and protected.

Chapter 1
INTRODUCTION

The Santa Clara Valley Water District (District) has managed the groundwater basin in Santa Clara County (County) since the early 1930s and is nationally recognized as a leader in groundwater management. Effective management of the groundwater basin is essential, as the groundwater basin provides nearly half of the County's overall water supply. Since its creation, the District has implemented numerous groundwater management programs and activities to manage the basin and to ensure a safe and healthy supply of groundwater.

Purpose

The purpose of this Groundwater Management Plan is to describe existing groundwater management programs and to formally document the District's groundwater management goal of ensuring that groundwater resources are sustained and protected. The following groundwater management programs are documented in this plan:

- Groundwater supply management programs that replenish the groundwater basin, sustain the basin's water supplies, help to mitigate groundwater overdraft, and sustain storage reserves for use during dry periods.

- Groundwater monitoring programs that provide data to assist the District in evaluating and managing the groundwater basin.

- Groundwater quality management programs that identify and evaluate threats to groundwater quality and prevent or mitigate contamination associated with those threats.

Background

The District is the groundwater management agency in Santa Clara County as authorized by the California legislature under the Santa Clara Valley Water District Act (District Act), California Water Code Appendix, Chapter 60. Since its creation, the District has worked to minimize subsidence and protect the groundwater resources of the County under the direction of the District Act. As stated in the District Act, the District's objectives related to groundwater management are to recharge the groundwater basin, conserve water, increase water supply, and to prevent waste or diminution of the District's water supply. The District Act also provides the District with the authority to levy groundwater user fees and to use those revenues to manage the County's groundwater resources.

The mission of the District is a healthy, safe, and enhanced quality of living in Santa Clara County through the comprehensive management of water resources in a practical, cost-effective, and environmentally-sensitive manner. As part of the District's Global Governance Commitment adopted by the Board of Directors, "the District will provide a healthy, clean, reliable, and affordable water supply that meets or exceeds all applicable water quality regulatory standards in a cost-effective manner. Utilizing a variety of water supply sources and strategies, the District will pursue a comprehensive water management program both within the county and statewide that reflects its commitment to public health and environmental stewardship." The policy also states that the conjunctive management of the groundwater basins to be an integral part of the District's comprehensive water supply management program.

The District has always effectively managed the groundwater basin to fulfill the objectives of the District Act and its mission. The goal of these efforts has been, and continues to be, to sustain and protect groundwater resources.

This Groundwater Management Plan is the District's first step toward a more formal and integrated approach to groundwater management. This Groundwater Management Plan describes existing groundwater management programs and formally documents the District's groundwater management goal, which is ***to ensure that groundwater resources are sustained and protected***.

Report Contents

The structure of the Groundwater Management Plan is outlined below. Chapters 3 through 5, which pertain to specific groundwater management programs, are organized to provide program objectives, related background information, the current status of the program, and information on the future direction of each program.

- Chapter 1 (this Introduction)

- Chapter 2 describes the geography and geology of the County as well as the history of local groundwater use. The chapter also describes the development of District facilities, and explains the various components of the existing water conservation and distribution system. A brief discussion on current groundwater conditions is also presented.

- Chapter 3 describes District groundwater supply management programs that replenish the groundwater basin, sustain the basin's supplies, and/or help in mitigating groundwater overdraft. In addition, the chapter summarizes the role of groundwater in the District's overall water supply outlook, and describes water use efficiency programs for groundwater users.

- Chapter 4 describes groundwater monitoring programs that provide data to assist the District in evaluating groundwater basin management.

- Chapter 5 describes groundwater quality management programs that evaluate groundwater quality and protect the groundwater from contamination and the threat of contamination.

- Chapter 6 summarizes existing groundwater management programs and activities designed to sustain and protect groundwater resources and provides recommendations for future work.

Chapter 2
BACKGROUND

This chapter describes the study area as well as the history of local groundwater use and the development of District facilities. Various components of the District's existing water conservation and distribution system are also described. A brief discussion on current groundwater conditions is also presented.

Geography

Santa Clara County is located at the southern tip of the San Francisco Bay. It encompasses approximately 1,300 square miles, making it the largest of the nine Bay Area counties. The County contributes about one fourth of the Bay Area's total population and more than a quarter of all Bay Area jobs.

Figure 2-1
Location of Santa Clara County

The County boasts a combination of physical attractiveness, economic diversity, and numerous natural amenities. Major topographical features include the Santa Clara Valley, the Diablo Range to the east, and Santa Cruz Mountains to the west. The Baylands lie in the northwestern part of the County, adjacent to the waters of the southern San Francisco Bay.

History of the County's Groundwater

Water has played an important part in the development of Santa Clara County since the arrival of the Spaniards in 1776. Unlike the indigenous peoples, who for thousands of years 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 the demand for these crops, which forced the use of the groundwater basin. Groundwater was drawn to the surface by windmill pumps or flowed up under artesian conditions. The first well was drilled in the early 1850s in San Jose.

By 1865, there were close to 500 artesian wells in the valley and already signs of potential misuse of groundwater supplies. 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 a water shortage and erosion damage to the lowlands.

As a result of several dry years in the late 1890s, more and more wells were sunk. Dry winters in the early 1900s were accompanied by a growing demand for the County's fruits and vegetables, which were irrigated with groundwater. This trend of increased irrigation and well drilling continued until 1915. During this period, less water replenished the groundwater basin than was taken out, causing groundwater levels to drop rapidly.

In 1913 a group of farmers asked the federal government for relief from the increased cost of pumping that resulted from 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 ft had occurred in San Jose. Between 1912 and 1932 subsidence ranged from 0.35 ft in Palo Alto to 3.66 ft 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 from the ground than nature could replace. The committee planned to form a water district that differed from others in the state by having a provision for groundwater recharge. Their effort to form the water district failed, but they were able to implement several water recharge and conservation programs. It was not until 1929 that the County's voters approved the Santa Clara Valley Water Conservation District (SCVWCD), with the initial mission of stopping groundwater overdraft and ground surface subsidence.

District History

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. By 1935, the District had completed the construction of Almaden, Calero, Guadalupe, Stevens Creek, and Vasona dams to impound winter waters for recharge into percolation facilities during the summer. 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.

The late 1930s to 1947 marked a period of recovery in groundwater levels that reduced 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 extracted from the groundwater basin. This resulted in an all-time low water level in the northern subbasin.

In 1952, the first imported water was delivered by the water retailers in northern Santa Clara County through the Hetch-Hetchy southern aqueduct. 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. 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 contracted with the state to receive an entitlement of 100,000 acre-feet (af) per year through the South Bay Aqueduct (SBA).

The SBA supply could not be fully utilized for recharge in the groundwater basin. Hence, to supplement the basin, the District constructed its first water treatment plant (WTP), Rinconada. In 1967, the District started delivering treated surface water to North County residents (North County refers to the Santa Clara Valley Subbasin), thus reducing the need for pumping. This led to a recovery of groundwater levels and reduced the rate of subsidence as well.

From 1960 to 1970 the County's population nearly doubled yet again. The semiconductor and computer manufacturing industries contributed to almost 34 percent of the job growth between 1960 and 1970. Population growth and economic diversity seemed especially important to Santa Clara County, which had been predominantly agricultural. This transformation was not without its problems. In the early 1980s a major underground tank storing a solvent for a manufacturing process in south San Jose was discovered to be leaking and the District's attention focused on water quality of the groundwater basin.

The growth and prosperity of the County continued, and jobs grew 39 percent between 1970 and 1980. In 1974, Penitencia (the District's second WTP) started delivering treated water. Groundwater pumping accounted for about half of the total water use by the mid-1980s. The rate of subsidence was reduced to about 0.01 ft/year compared to 1 ft/year in 1961. To provide a reliable source of supply the District contracted with the federal government for the delivery of an entitlement of 152,500 af per year of imported water from the Central Valley Project (CVP) through the San Felipe Project. The first delivery of San Felipe water took place in 1987, but it was not until 1989 that the District's Santa Teresa WTP was began operating to fully utilize this additional source of imported supply. Since the 1980s, the population of Santa Clara County has continued to increase, and the change in land use toward urbanization has continued.

District Board of Directors

The District is governed by a seven-member Board of Directors. Five of the members are elected, one from each of the five County supervisorial districts, and the remaining two directors are appointed by the Santa Clara County Board of Supervisors to represent the County at large. The directors serve overlapping four-year terms.

The Board establishes policy on the District's mission, goals, and operations and represents the general public in deciding issues related to water supply and flood control. The Board also has the authority to adopt ordinances that have the force of law within the District. The Board reviews staff recommendations and decides which policies should be implemented in light of the District's mission and goals. The Board also monitors the implementation of its policies, and supervises management to see that work is accomplished on time and efficiently.

The Board of Directors holds biweekly public meetings, at which the public is given the opportunity to express opinions or voice concerns. In addition, the public can participate in the annual process of groundwater rate setting through public hearings.

The Board of Directors identifies the conjunctive management of the groundwater basins to maximize water supply reliability as an integral part of the District's commitment to a comprehensive water management program.

District System

As a water resource management agency for the entire County, the District provides a reliable supply of high-quality water to 13 private and public water retailers serving more than 1.7 million residents, and to private well owners who rely on groundwater.

The District operates and maintains a Countywide conservation and distribution system to convey raw water for groundwater recharge and treated water for wholesale to private and public retailers. The components of this distribution system are described in detail below.

Reservoirs

Local runoff is captured in reservoirs within the County with a combined capacity of about 169,000 af. The stored water is released for beneficial use at a later time. The District's reservoirs are described in Table 2-1 and are shown in Figure 2-2.

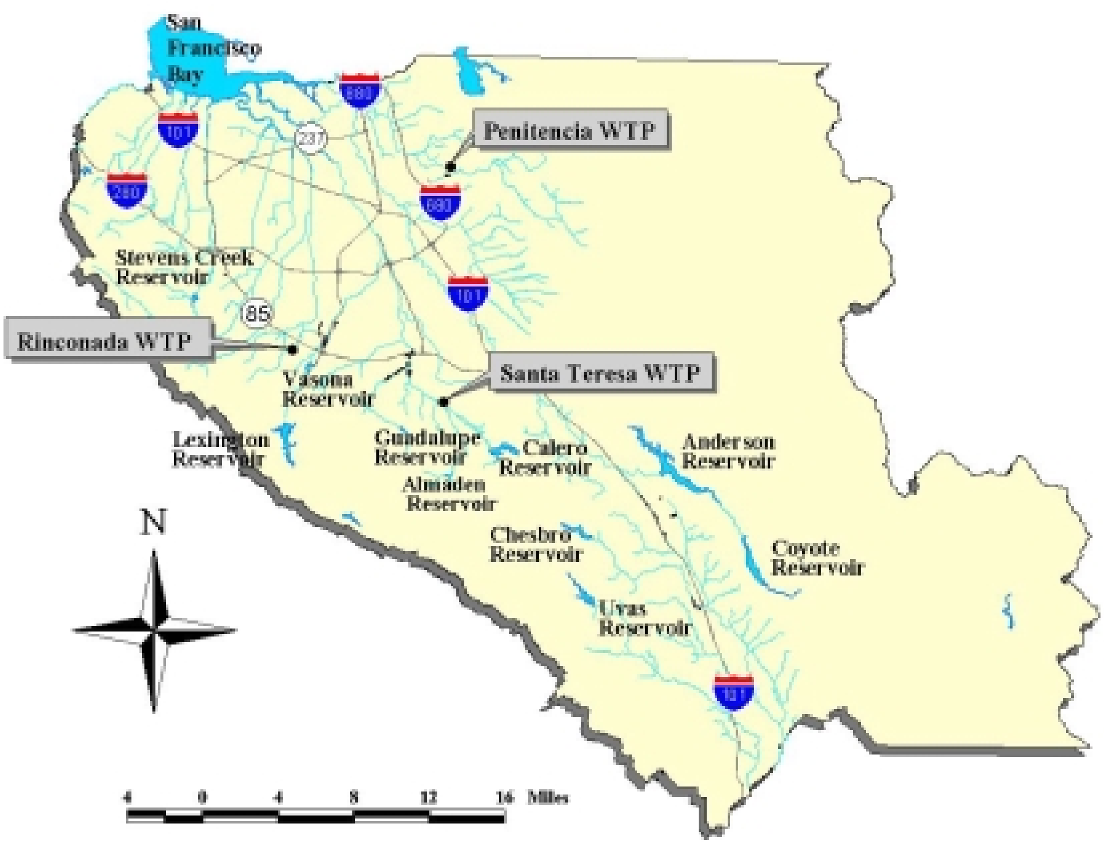
Treatment Plants

The District also operates three water treatment plants (WTPs): Rinconada, Penitencia, and Santa Teresa. These facilities are all connected by five major raw water conduits, which also connect the two imported raw water sources from the State Water Project (SWP) and the CVP. Two pumping plants (Coyote and Vasona) provide the lifts required for conveyance during peak usage.

Table 2-1
District Reservoirs

Reservoir	***Capacity(af)***	***Year Completed***	***Surface Area (ac)***	***Dam Height (ft)***
Almaden	*1,586*	*1935*	*59*	*108*
Anderson	*89,073*	*1950*	*1,245*	*240*
Calero	*10,050*	*1935*	*347*	*98*
Chesbro	*8,952*	*1955*	*265*	*95*
Coyote	*22,925*	*1936*	*648*	*138*
Guadalupe	*3,228*	*1935*	*79*	*129*
Lexington	*19,834*	*1952*	*475*	*195*
Stevens Creek	*3,465*	*1935*	*91*	*129*
Uvas	*9,935*	*1957*	*286*	*105*
Vasona	*400*	*1935*	*57*	*30*

Figure 2-2
District Reservoir Locations



Recharge Facilities
The Districts operates and maintains 18 major recharge systems, which consist of a combination of off-stream and in-stream facilities. These systems have a combined pond surface recharge area of more than 390 acres, and contain over 30 local creeks for artificial in-stream recharge to replenish the groundwater basin. The total annual average recharge capacity of these systems is 157,200 af.

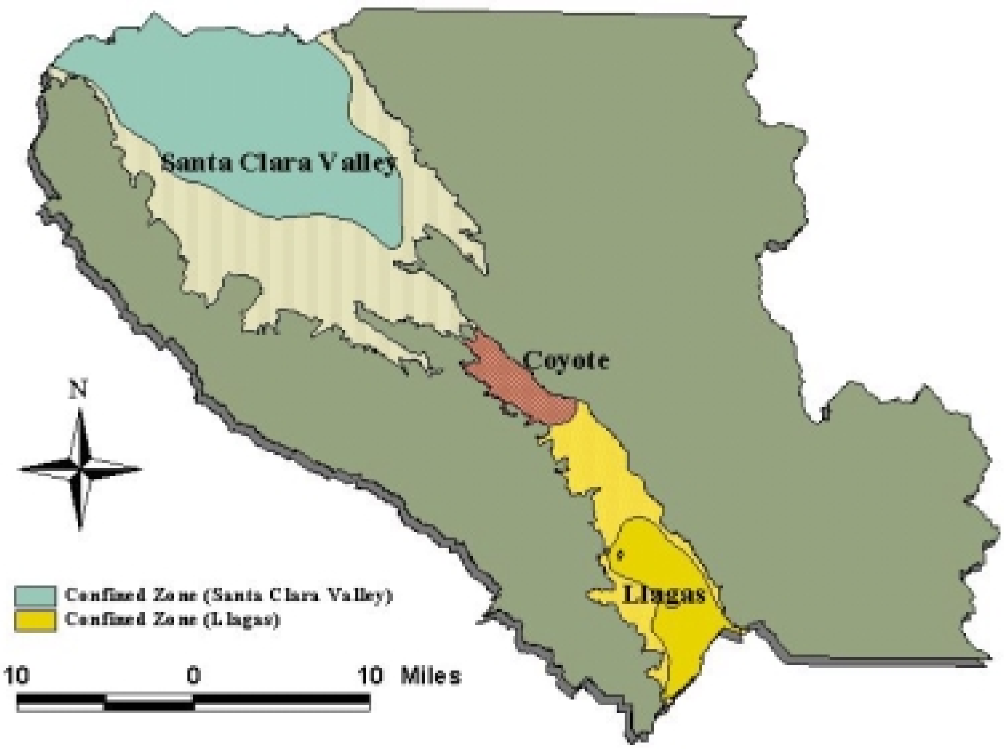
Groundwater Basins
The groundwater basin is divided into three interconnected subbasins that transmit, filter, and store water. These subbasins are portrayed in Figure 2-3. The Santa Clara Valley Subbasin in the northern part of the County extends from Coyote Narrows at Metcalf road to the County's northern boundary. The Diablo Range bounds it on the east and the Santa Cruz Mountains on the west. These two ranges converge at the Coyote Narrows to form the southern limits of the subbasin. The Santa Clara Valley Subbasin is approximately 22 miles long and 15 miles wide, with a surface area of 225 square miles. A confined zone within the northern areas of the subbasin is overlaid with a series of clay layers resulting in a low permeability zone. The southern area is the unconfined zone, or forebay, where the clay layer does not restrict recharge.

The Coyote Subbasin extends from Metcalf Road south to Cochran Road, where it joins the Llagas Subbasin at a groundwater divide. The Coyote Subbasin is approximately 7 miles long and 2 miles wide and has a surface area of approximately 15 square miles. The subbasin is generally unconfined and has no thick clay layers. This subbasin generally drains into the Santa Clara Valley Subbasin.

The Llagas Subbasin extends from Cochran Road, near Morgan Hill, south to the County's southern boundary. It is connected to the Bolsa Subbasin of the Hollister Basin and bounded on the south by the Pajaro River (the Santa Clara - San Benito County line). The Llagas Subbasin is approximately 15 miles long, 3 miles wide along its northern boundary, and 6 miles wide along the Pajaro River. A series of interbedded clay layers, which extends north from the Pajaro River, divides this subbasin into confined and forebay zones.

The three subbasins serve multiple functions. They transmit water through the gravelly alluvial fans of streams into the deeper confined aquifer of the central part of the valley. They filter water, making it suitable for drinking and for municipal, industrial, and agricultural uses. They also have vast storage capacity, together supplying as much as half of the annual water needs of the County. In 2000, the groundwater basin supplied 165,000 acre-feet of the total water use of 390,000 acre-feet.

Figure 2-3
Santa Clara County Groundwater Subbasins



Current Groundwater Conditions

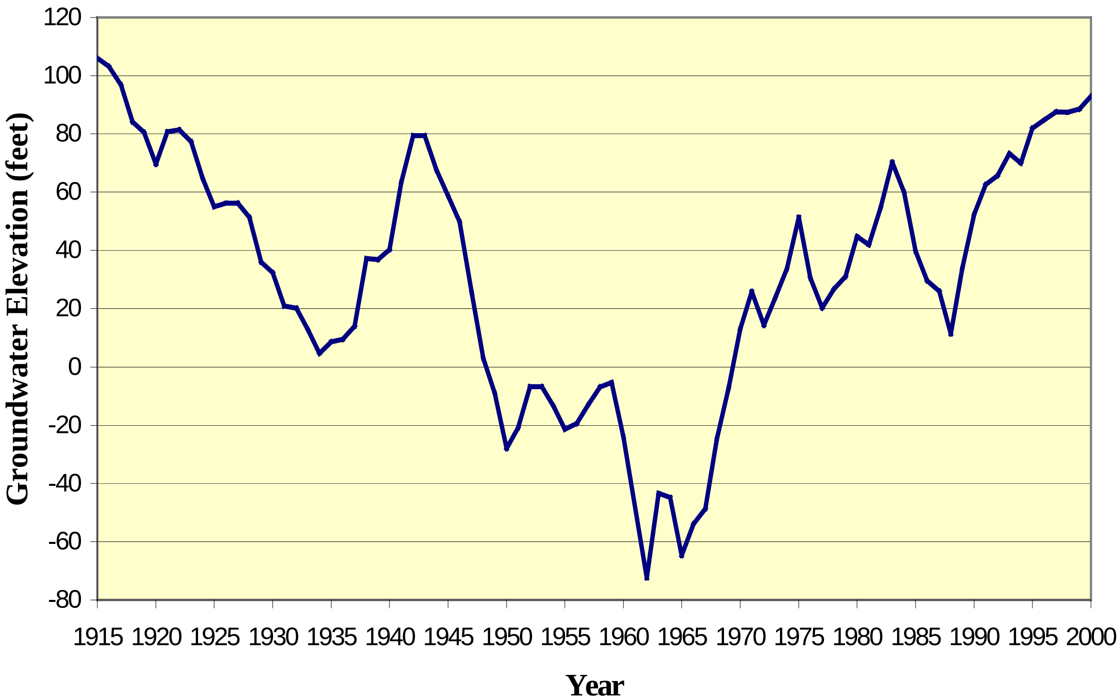
Groundwater conditions throughout the County are generally very good, as District efforts to prevent groundwater basin overdraft, curb land subsidence, and protect water quality have been largely successful. Groundwater elevations are generally recovered from overdraft conditions throughout the basin, inelastic land subsidence has been curtailed, and groundwater quality supports beneficial uses. The District evaluates current groundwater conditions based on the results of its groundwater monitoring programs, which are described in Chapter 4 of this plan.

Groundwater Elevations

Groundwater elevations are affected by natural and artificial recharge and groundwater extraction, and are an indicator of how much groundwater is in storage at a particular time. Both low and high elevations can cause severe, adverse conditions. Low groundwater levels can lead to land subsidence and high water levels can lead to nuisance conditions for below ground structures.

Figure 2-4 shows groundwater elevations in the San Jose Index Well in the Santa Clara Valley Subbasin. While groundwater elevations in the well are not indicative of actual groundwater elevations throughout the County, they demonstrate relative changes in groundwater levels.

Figure 2-4
Groundwater Elevations in San Jose Index Well



Land Subsidence
Land subsidence occurs in the Santa Clara Valley when the fluid pressure in the pores of aquifer systems is reduced significantly by overpumping, resulting in the compression of clay materials and the sinking of the land surface. Historically, the Santa Clara Valley Subbasin has experienced as much as 13 feet of inelastic, or nonrecoverable, land subsidence that necessitated the construction of additional dikes, levees, and flood control facilities to protect properties from flooding. The costs associated with inelastic land subsidence are high, as it can lead to saltwater intrusion that degrades groundwater quality and flooding that damages buildings and infrastructure. However, imported water from the State Water Project and Central Valley Project has increased District water supplies, reducing the demand on the groundwater basin, and providing water for the recharge of the basin. As a result, the rate of inelastic land subsidence has been curtailed to less than 0.01 feet per year.

Groundwater Quality
Natural interactions between water, the atmosphere, rock minerals, and surface water control groundwater quality. Anthropogenic (man-made) compounds released into the environment, such as nitrogen-based fertilizer, solvents, and fuel products, can also affect groundwater quality. Groundwater quality in the Santa Clara Valley Subbasin is generally high. Drinking water standards are met at public water supply wells without the use of treatment methods.

A few water quality problems have been detected. High mineral salt concentrations have been identified in the upper aquifer zone along San Francisco Bay, the lower aquifer zone underlying Palo Alto, and the southeastern portion of the forebay area of the Santa Clara Valley Subbasin. Nitrate concentrations in the South County (Coyote and Llagas Subbasins) are elevated and high nitrate concentrations are sporadically observed in the Santa Clara Valley Subbasin. Lastly, even though Santa Clara County is home to a large number of Superfund sites, there are few groundwater supply impacts from the chemicals from these sites; volatile organic compounds VOCs) are intermittently detected at trace concentrations in public water supply wells. In four wells, such contamination has been severe enough to cause the wells to be destroyed. Overall, the District's groundwater protection programs, including its well permitting, well destruction, and leaking underground storage tank programs, have been effective in protecting the groundwater basin from contamination.

Water quality data for common inorganic compounds during the period from 1997 through 2000 are summarized in Table 2-2. The typical concentration ranges were computed using standard statistical methods. Organic compounds were nondetectable in almost all wells and below drinking water standards in all wells. Data for organic compounds, including MTBE, solvents, and pesticides is not shown in Table 2-2 due to the large number of compounds.

Table 2-2
Summary of Santa Clara County Groundwater Data (1997-2000) and Water Quality Objectives[a]

Constituents	Santa Clara Valley Subbasin		Coyote Subbasin	Llagas Subbasin	Drinking Water Standard	Ag. Objective[f]
	Principal Aquifer Zone[d]	Upper Aquifer Zone[d]				
Chloride (mg/l)	40 – 45	92 – 117	16 – 27	24 -52	500[c,e]	355
Sulfate (mg/l)	37 – 41	106 – 237	32 - 65	32 -65	500[c,e]	-
Nitrate (mg/l)	15 – 18	0.002 – 4	12 -38	44 -47	45[b]	30
Total Dissolved Solids (mg/l)	366 – 396	733 – 1210	250 - 490	320 -540	1000[c,e]	10,000
Sodium Adsorption Ratio	0.89 - 1.26	1.23 - 3.84	NA	NA	-	9
Electrical Conductance (uS/cm at 25 C)	596 - 650	1090 – 1590	375 - 391	500 - 715	1600[c,e]	3000
Aluminum (ug/l)	6 - 18	23 – 97	<5 - 86	5 -51	1000[b]	20,000
Arsenic (ug/l)	0.7- 1.2	1.2 – 3.7	<2	<2	50[b]	500
Barium (ug/l)	141 - 161	60 – 220	71 - 130	99 - 180	1000[b]	-
Boron (ug/l)	115 - 150	200 – 523	81 - 119	82 -159	-	500
Cadmium (ug/l)	<1	<0.5	< 0.5	<0.5	5[b]	500
Chromium (ug/l)	6 – 8	0.5 – 1.8	0.5 - 10	2 - 10	50[b]	1000
Copper (ug/l)	1.9 – 4.4	0.3 – 1	<1 - 50	0.75 – 3.90	1000[c]	-
Fluoride (mg/l)	0.13 – 0.16	0.15 – 0.3	0.12 – 0.21	0.12 – 0.17	1.8[b]	15
Iron (ug/l)	10 – 38	40 – 160	19 - 100	14 - 170	300[c]	20,000
Lead (ug/l)	0.2 – 1.1	<0.5	<2	<2	50[b]	10,000
Manganese (ug/l)	.15 – 1.5	120 – 769	<0.5 - 29	0.86 - 21	50[c]	10,000
Mercury (ug/l)	<1	<0.2	<0.2	<0.2	2[b]	-
Nickel (ug/l)	1.8 – 3.4	4 – 10	<2- 10	<2 - 10	100[b]	2000
Selenium (ug/l)	2.5 – 3.8	0.4 – 2	<2	<2	50[b]	20
Silver (ug/l)	<5	<0.5	<0.5	<0.5	100[b]	-
Zinc (ug/l)	3 – 8	3 - 13	<50	10 - 32	500[c]	10,000

[a] For common inorganic water quality constituents
[b] Maximum Contaminant Level as specified in Table 64431-A of Section 64431, Title 22 of the California Code of Regulations
[c] Secondary Maximum Contaminant Level as specified in Table 64449-B of Section 64449, Title 22 of the California Code of Regulations
[d] Typical range = approximate 95% Confidence Interval estimate of the true population median
[e] Upper limit of secondary drinking water standard
[f] Taken from the Water Quality Control Plan for the San Francisco Bay Basin, 1995 Regional Water Quality Control Boards

Chapter 3
GROUNDWATER SUPPLY MANAGEMENT

This chapter covers the District programs that relate to groundwater supply management. It describes the District's groundwater recharge, treated groundwater recharge/reinjection, and water use efficiency programs. It also summarizes the role of the groundwater basin in terms of the District's overall water supply plan, the Integrated Water Resources Plan (IWRP). Groundwater supply management programs support the District's groundwater management goal by sustaining the basin's groundwater supplies, mitigating groundwater overdraft, minimizing land subsidence, protecting recharge and pumping capabilities, and sustaining storage reserves for use during dry periods.

Future efforts in groundwater supply management will include strengthening the District's groundwater recharge program so that the District makes the most effective use of its resources with regard to the amount, location, and timing of groundwater recharge.

GROUNDWATER RECHARGE

Program Objective

The objective of the Groundwater Recharge Program is to sustain groundwater supplies through the effective operation and maintenance of District recharge facilities.

Background

Groundwater recharge is categorized as either natural recharge or facility recharge. The District defines "natural" groundwater recharge to be any type of recharge not controlled by the District. Sources may include rainfall, net leakage from pipelines, seepage from surrounding hills, seepage into and out of the groundwater basin, and net irrigation return flows to the basin. Facility recharge consists of controlled and uncontrolled recharge through District facilities, which include about 90 miles of stream channel and 71 off-stream recharge ponds. Controlled recharge refers to the active and intentional recharge of the basin by releases from reservoirs or the distribution system. Uncontrolled recharge occurs through District facilities, such as creeks, but refers to recharge that would occur without any action on the part of the District. This includes natural recharge through streams as a result of rainfall and runoff. This section focuses exclusively on controlled and uncontrolled facility recharge.

Current Status

The District's current recharge program is accomplished by releasing locally conserved water and imported water to District in-stream and off-stream recharge facilities.

In-stream Recharge

The controlled in-stream recharge accounts for approximately 45 percent of groundwater recharge through District facilities. In-stream recharge occurs along stream channels in the alluvial plain, upstream of the confined zone that eventually reaches the drinking water aquifer. The District can release flow for recharge into 80 of the 90 miles of streams. Uncontrolled in-stream recharge accounts for approximately 20 percent of groundwater recharge.

Spreader dams have been a key component of the in-stream recharge program. These temporary or permanent dams are constructed within streambeds to impound water in the channels and increase recharge rates via percolation through stream banks. The use of spreader dams increases in-stream recharge capacity by about 15,000 af, or approximately ten percent. Spreader dams have been constructed at 60 or more sites since they were first employed in the 1920s.

Off-stream Recharge
The off-stream recharge accounts for approximately 35 percent of groundwater recharge through District facilities. The off-stream facilities include abandoned gravel pits and areas excavated specifically as recharge ponds. Ponds range in size from less than 1 acre to more than 20 acres. The District operates 71 off-stream ponds in 18 major recharge systems with a cumulative area of about 393 acres. Locally conserved and imported water is delivered to these ponds by the raw water distribution system.

Off-stream recharge facilities are generally operated in one of two modes: constant head mode or wet/dry cycle mode. The District most often uses the constant head mode, which involves filling the pond and maintaining inflow at a rate equal to the recharge rate of the pond. This operation is continued until the recharge rate of the pond has decreased to an unacceptable rate. In order to maintain high recharge rates, ponds are cleaned periodically. Pond cleaning is generally considered when the recharge rate has decreased by about 75 percent. The pond is then emptied and any sediment cleaned out. In some cases, the pond is emptied and allowed to dry out and the recharge operation is restarted without cleaning. However, this typically results in a slightly reduced recharge rate. The recharge rates of the District's ponds generally range from 1 af/acre/day to about 2 af/acre/day, although some ponds have rates up to 5 af/acre/day.

In the constant head mode, algae and weed growth generally occurs. The algae growth varies according to sunlight, water temperature, nutrients and other factors. As the algae dies, it falls to the pond bottom, also contributing to a reduced recharge rate. The algae are generally controlled using chemical additives. Using deeper ponds can also reduce algae growth, as ponds in the range of 13 to 15 feet deep do not support algae growth as rapidly as shallower ponds.

Water Quality
High turbidity of incoming water results in a rapid decrease of recharge rates. In order to increase recharge pond efficiency, the District works to reduce turbidity levels with coagulants, simple mixing procedures, settling basins and skimming weirs. At most facilities, water with turbidity levels up to about 100 Nephelometric Turbidity Unit (NTU) can be treated effectively. Water with turbidity levels of less than 10 NTU is usually not treated. Each NTU represents

several pounds of fine-grained material per acre-foot of water. Allowable influent turbidity levels may depend on the availability of water.

Monitoring

Recharge facilities are monitored around the clock by operations center personnel using a computerized control system, and in the field by technicians. The raw water control system provides for remote operation of water distribution facilities and real-time system performance data. Operations technicians perform daily inspection of recharge facilities and record flows and water levels.

A periodic water balance is performed to reconcile all measured imported water, inflows, releases and changes in surface water storage. 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 basin water budget.

Future Direction

Although spreader dams have traditionally been a key component of the in-stream recharge program, their use has been limited significantly because of more stringent permitting due to fish and wildlife concerns.

The District has completed the feasibility testing of a direct injection facility to increase recharge and has completed construction of a full-scale well. The injection well has a capacity of 750 af/year and will be supplied with water treated at the Rinconada WTP. The potential for additional direct injection facilities may be evaluated in the future.

TREATED GROUNDWATER RECHARGE/REINJECTION PROGRAM

Program Objective

The objective of the Treated Groundwater Recharge/Reinjection Program is to encourage the reuse or recharge of treated groundwater from contamination cleanup sites in order to enhance cleanup activities and protect the County's groundwater resources.

Background

District Resolution 94-84 encourages the reuse or recharge of treated groundwater from groundwater contamination cleanup projects and provides a financial incentive program to qualifying cleanup project sponsors. Sponsors must document that all non-potable demands are satisfied to the maximum extent possible prior to injecting any water into the aquifer. All injected water must be recovered by the pump-and-treat cleanup activities at the site.

Each application is processed within 45 working days. Once an applicant has met the qualifying conditions and is accepted, a legal contract is prepared and signed by the District and the clean-up project sponsor. This contract details how the sponsor will receive a financial incentive from the District. The sponsor is responsible for providing periodic updates on the amount and quality of water reinjected/recharged.

Current Status
The amount of this financial incentive is equivalent to the basic groundwater user rate. IBM (San Jose) is currently recharging between 900 and 1,000 af per year, and is the only approved sponsor currently injecting/recharging groundwater and receiving this financial incentive.

Future Direction
Any future applications will be evaluated rigorously with respect to overall groundwater basin management to ensure that the groundwater basin will not be adversely impacted.

WATER USE EFFICIENCY PROGRAMS

The District's Water Use Efficiency Programs are designed to promote more effective use of the County's water supplies. The District's demand management measures are described in the Water Conservation and Agricultural Water Efficiency sections that follow the discussion of Recycled Water. The District's commitment to increasing the use of recycled water within the County will also help the District to more effectively use the County's water.

Recycled Water

Program Objective
The objective of the Recycled Water Program is to increase the use of recycled water, thereby promoting more effective use of the County's water supplies. To meet this objective, the District is forming partnerships with the four sewage treatment plant operators in the County and is taking every opportunity to expand the distribution and use of tertiary treated recycled water for non-potable uses. Present efforts focus on planning for future uses in agriculture, industry, commercial irrigation, and indirect potable reuse. To meet the objective of increasing the use of recycled water, the District is:

- Partnering with and providing rebates to the South Bay Water Recycling Program (SBWRP) which includes the cities of San Jose, Santa Clara and Milpitas.

- Operating and expanding the South County Recycled Water System as the recycled water wholesaler in the area. Formal agreements with the recycled water producer, the South County Regional Wastewater Authority (SCRWA), and the recycled water retailer, the City of Gilroy, are in place.

- Providing the City of Sunnyvale a rebate on the recycled water delivered each year.

- Meeting with the City of Palo Alto and their stakeholder group to help plan for expanded future use of recycled water in the North County.

- Contracting a consultant to perform a feasibility study on Advanced Treated Recycled Water.

Background

The District has been involved in water recycling since the 1970s when it supported research in Palo Alto and partnered in the establishment of the South County distribution system in Gilroy. Since the early 1990s, the District has become involved in an ever-increasing role. Recycled water use in the County has grown from about 1,000 af in 1990 to over 6,000 af in the year 2000. To encourage the use of recycled water, in 1993 the District started providing rebates to agencies delivering recycled water.

The largest system for recycled water distribution is the South Bay Water Recycling Program, which has over 60 miles of distribution pipelines and serves over 300 customers. The District continues a partnership with the SBWRP in its planning effort for expansion. In 1999, the District formalized its partnership with the South County Regional Wastewater Authority and the cities of Gilroy and Morgan Hill to plan and operate the recycled water distribution system in South County. Since then, the District has begun construction on major pumping and reservoir facilities to modernize the system.

Current Status

The District is expanding its planning efforts and is continuing discussions with the SBWRP for expanding the use of recycled water. This will involve transporting recycled water south from the existing pipeline in south San Jose in order to supply agricultural and industrial customers that now use groundwater or untreated surface water. The City of San Jose, who administers the SBWRP, has installed several groundwater monitoring wells at the District's request in order to monitor potential changes in groundwater quality as a result of the application of recycled water for irrigation.

The District continues to modernize and expand the South County Recycled Water System. Besides serving golf courses and parks, expansion of this system will involve delivering water to industrial and agricultural users. District staff has inventoried the volume of use and location of the largest groundwater and surface water users in the area and is beginning a marketing study for expansion of the system. The District is also working with the City of Gilroy to plan for the connection of new large water use developments to the system.

A project has been initiated to study the feasibility of installing a pilot plant for the advanced treatment of recycled water for use in agriculture, commercial irrigation, industry, and possibly for future streamflow augmentation and groundwater replenishment.

Future Direction

The future direction of the recycled water program is driven by District Board policy, which directs staff to increase recycled water use to 5% of total water use in the County by the year 2010 and to 10% of total use by the year 2020. To meet this goal, it is assumed that a countywide network of recycled water distribution systems will be developed. The initial stage will provide for a major transmission main from the area of south San Jose in the SBWRP service area to the major commercial and agricultural customers in South County. Developing advanced treatment methods and facilities to provide recycled water of a higher quality standard than the present tertiary treatment will be required in order to meet the needs of some potential customers. Methods and facilities to blend recycled water with untreated surface water and with groundwater will also need to be developed in order to provide for peaking factors and the quality requirements of some customers. Additional research on the most effective method of advanced treatment and ways to develop more industrial use and onsite treatment of recycled water will be performed.

District efforts to expand recycled water use within Santa Clara County will be coordinated with the District's Integrated Water Resources Plan which will evaluate the various options for obtaining the additional water the County will require in future years. This effort will evaluate the comparative costs and benefits of recycled water, water conservation, water banking, and water transfers. District staff will work with partnering agencies to ensure that any potential uses of recycled water will not adversely impact the groundwater basin or recharge and extraction capabilities.

Water Conservation Programs

Program Objective

The objective of the Water Conservation Program is to promote more efficient use of the County's water resources and to reduce the demands placed on the District's water supplies. To meet this objective, the District has implemented a variety of programs designed to increase water use efficiency in the residential, commercial, industrial, and agricultural sectors, which all rely, in part, on extraction from the groundwater basin.

Background

The District's Water Conservation Program has been developed in large part to comply with the Best Management Practices (BMPs) commitments, defined in the 1991 Memorandum of Understanding (MOU) Regarding Urban Water Conservation in California. The program targets residential, commercial/industrial/institutional, and agricultural water use.

The District has promoted conservation of the County's water supplies since its creation. However, a series of drought years between 1987 and 1992 prompted the District and local water retailers to significantly increase conservation efforts. The District enjoys a special cooperative partnership with the water retailers in regional implementation of the BMPs; several program elements were developed in partnership with the local water retailers. Water retailers have partnered with the District in marketing efforts for cooperative programs and in the distribution of water-saving devices such as showerheads and aerators.

Current Status
The Water Conservation Program has designed programs aimed specifically at residential, commercial, and agricultural users. Residential programs include:

- Water-Wise House Call Program designed to measure residential water use and provide recommendations for improved efficiency.

- Showerhead/Aerator Retrofit Distribution Program, which provides free showerheads and aerators to replace less efficient devices.

- Clothes Washer Rebate Program for the installation of high-efficiency washing machines.

- Landscape workshops focused on water efficient landscape and irrigation design.

- Ultra-Low-Flush Toilet (ULFT) Program (free or low-cost).

- Multi-Family Submeter Pilot Program aimed at reducing water use in multi-family dwellings.

- Education programs in English and Spanish, including the distribution of literature, promotion of water conservation at organized events, and the survey program.

District programs targeting water conservation in the commercial sector include:

- Irrigation Technical Assistance Program (ITAP) designed to help large landscape managers improve irrigation efficiency through free site evaluations.

- Commercial Clothes Washer Rebate Program, in conjunction with PG&E, San Jose/Santa Clara Water Pollution Control Plant, and the City of Santa Clara.

- Project WET (Water Efficient Technologies), which offers rebates to commercial and industrial customers for the reduction of water use and wastewater discharges (in conjunction with the City of San Jose).

- Ultra-Low-Flush Toilet Retrofit Program in conjunction with the San Jose/Santa Clara Water Pollution Control Plant.

- Irrigation Submeter Program to encourage better water management at large commercial sites.

The District has also implemented several programs to promote water use efficiency in the agricultural sector, which relies mainly on the groundwater basin for its water needs. These programs are discussed in the following section of this report.

In fiscal year 1999/2000, the District's water conservation programs achieved an estimated water savings of over 24,000 af, which includes 10,000 af through water retailer participation.

Future Direction

Water conservation efforts are anticipated to reduce County water demands by approximately 30,000 af in 2001, and by almost 32,000 af in 2002. Future programs and projects being developed include:

- Water Use Efficiency Baseline Survey to provide specific information needed to tailor the District's water use efficiency program to result in effective long-term water use efficiency, to evaluate the impacts of water efficiency measures, and further promote and implement Best Management Practices (BMPs).

- Expansion of the Water Efficient Technologies (WET) Program to the entire county.

- Landscape and Agricultural Area Measurement and Water Use Budgets.

Agricultural Water Efficiency

Program Objective

The objective of the Agricultural Water Efficiency Program is to promote, demonstrate and achieve water use efficiency in the agricultural sector, which relies on groundwater supplies for most of its water needs. To meet this objective the District has implemented the following program elements:

- Mobile Lab Program

- California Irrigation Management Information System (CIMIS) Program

- Outreach Program

Background

As required by the Central Valley Project Improvement Act, in 1994 the District adopted a Water Conservation Plan to comply with U.S. Bureau of Reclamation criteria. This plan commits the District to support various agricultural water management activities and to implement the urban BMPs discussed in the Water Conservation Programs section.

Among the agricultural water management activities outlined in the plan is a Mobile Irrigation Lab program. This program provides local farmers with on-site irrigation system evaluations and recommendations for efficiency improvement. The mobile lab is designed to help increase water distribution uniformity and on-farm irrigation and energy efficiencies for all types of irrigation systems. Proper distribution uniformity can result in lower water and energy bills and decreased fertilizer application. Managing nitrogen and irrigation input to more closely match actual crop needs can also reduce water and energy bills; this approach reduces the potential for nitrate to leach into groundwater while maintaining or improving agricultural productivity.

California Irrigation Management Information System (CIMIS) is a related program that helps large-scale water users to develop water budgets for determining when to irrigate and how much water to apply. Created in 1982 through a joint effort of UC Davis and the Department of Water Resources (DWR), CIMIS is a network of more than 100 computerized weather stations across the state that collects, measures and analyzes all the climatological factors that influence irrigation. This information provides major irrigators daily data on the amount of water that evaporates from the soil and the amount used by grasses.

The District owns and supervises two CIMIS weather stations, one at the UC field station in downtown San Jose, and the other at Live Oak High School in Morgan Hill. Both of these stations, as well as others around the state, are connected to a central computer run by the DWR in Sacramento. The updated information from the District's two stations is automatically downloaded and then provided to the public via a telephone hotline recording or the Internet.

An Outreach Program is an essential component of the agricultural efficiency programs. Outreach to the agricultural community includes public information dissemination, seminars or workshops, public presentations, newsletter articles and specific program materials.

Current Status

The District continues to implement the Mobile Lab Program, which provides on-farm irrigation evaluations, pump efficiency tests, nitrate field test demonstrations, and recommendations for efficient irrigation improvements. Approximately 30 sites participate in the program each year.

The District is currently assessing the potential need for an additional CIMIS station in the North County.

As part of the Outreach Program, significant work has been channeled into developing educational materials on the use of CIMIS in efficient irrigation scheduling. Presentations on the various program elements have been made to the District's Agriculture Advisory Committee, Farm Bureau and grower associations. Articles and brochures have been developed for CIMIS and the mobile lab program. In addition, the staff from the District's Water Use Efficiency and Groundwater Management Units have worked together to hold various workshops and seminars in the South County on irrigation and nutrient and pesticide management. All seminars have been well attended.

Future Direction

The future direction of the agricultural water efficiency programs includes the continuation and further development of the Mobile Lab Program. District staff will recommend continuation of the program as long as it demonstrates its cost-effectiveness.

The District is currently evaluating the feasibility of implementing a financial incentives program to complement the mobile lab.

A Monitoring and Evaluation Program is necessary to determine and assess the effectiveness of the various programs. The focus of the current monitoring effort has been the tracking of activity levels and program costs. To ensure that future water saving goals are achieved and urban and agricultural programs are successful, the District will need to enhance its existing monitoring program to more rigorously quantify actual water savings.

INTEGRATED WATER RESOURCES PLAN

Program Objective
The objective of the Integrated Water Resources Plan (IWRP) is to develop a long-term, flexible, comprehensive water supply plan for the County through year 2040 that incorporates community input and can respond to changing water supply and demand conditions.

Background
The District's 1975 water supply master plan identified the Federal San Felipe Project as the best solution to meet future water demands. However, recent severe droughts, changing state and federal environmental and water quality regulations, and the variability and reliability of both local and imported supplies underscored the need for an updated, more flexible water supply planning process. In the early 1990s, District staff developed a water supply overview study and began to outline a process to update the 1975 master plan.

The overview study described the District's water system and identified drinking water quality issues, the County's water needs, existing water supplies, projected water supplies, potential water shortages, and other components for managing water supplies. The overview study also evaluated water supply alternatives and recommended a stakeholder process to help the District select the preferred alternative.

As a result of the recommendations from the water supply overview process and several workshops involving the Board and overview study project team, the District Board of Directors authorized staff to undertake the IWRP.

In March of 1996, the project team introduced the Board's planning objectives for the IWRP evaluation of water supply strategies. These objectives were refined by stakeholders, including: the general public, representatives of business, community, environmental and agricultural groups, District technical staff, and officials of local municipalities and other water agencies. Stakeholders used these objectives to evaluate various water supply strategies and agree upon an IWRP Preferred Strategy.

The IWRP Preferred Strategy aims to maximize the District's flexibility to meet actual water demands, whether they exceed or fall short of projections. It relies on water banking, recycled water, demand management, and water transfers, plus “core elements” designed to ensure the validity of baseline planning assumptions, monitor or evaluate resource options, and help meet planning objectives. The Board approved the preferred strategy in December of 1996**.**

The groundwater basin is a critical component in the management of the County’s water supply. The basin treats, transmits, and stores water for the County. The management objective of the 1996 IWRP is to maintain the highest storage possible in the three interconnected subbasins (or to bank groundwater) without creating high groundwater problems. During dry periods when local and imported water supplies do not meet the County’s water needs, stored groundwater is used to make up the difference. However, the use of this storage has to be balanced with the potential occurrence of land subsidence.

Land subsidence has been a great concern in the valley. As much as thirteen feet of subsidence occurred in parts of the basin before subsidence was minimized through recharge activities and imported water deliveries. If subsidence were to recommence, the damage to infrastructure would be significant, as many levees, pipelines, and wells would need to be rebuilt. Therefore, the IWRP must balance the use of the groundwater basin with the avoidance of adverse impacts.

Current Status

The preferred strategy from the 1996 IWRP is being implemented. Action on several elements of the plan that has already taken place includes the following:

> *Water Banking*
>
> The District reached an agreement with Semitropic Storage District to bank up to 350,000 af in their storage facilities. The District currently has stored about 140,000 af in the water banking program.
>
> *Recycled Water*
>
> The District is working closely with the city of San Jose and Sunnyvale to develop and market recycled water in lieu of groundwater pumping for irrigation. Planning with South County Regional Wastewater Agency is also occurring (see section on Water Use Efficiency).
>
> *Demand Management*
>
> The Water Use Efficiency Unit has developed an aggressive program to minimize water use and provide assistance to irrigators to improve the efficiencies in their irrigation systems (see section on Water Use Efficiency).
>
> *Water Transfers*
>
> In 1999, the District entered into a multi-party water transfer agreement for an agricultural supply from a Central Valley Project (CVP) contractor. This transfer will make a small amount of dry year water available to the District during the next 20 years.

Core Elements

- In 1997, the District entered into a Reallocation Agreement that provides a reliability "floor" of 75 percent of contract quantity for the District's Municipal and Industrial CVP supply, except for extreme years when CVP allocations are made on the basis of public health and safety.

- A study was recently conducted to determine the frequency of critical dry periods using a statistical approach that showed the preferred strategies are very robust although not perfect.

- The Operational Storage Capacity of the Santa Clara Valley Subbasin was evaluated and refined in 1999 (SCVWD, 1999) – see section on operational storage capacity.

Future Direction

An ongoing process of monitoring the baseline conditions and contingency action levels is being developed. Updates to the IWRP are scheduled for every 3 to 5 years. The District is currently developing the 2002 IWRP Update.

As the District's water supply planning document through year 2040, the IWRP has identified the operation of the groundwater basin as a critical component to help the District respond to changing water supply and demand conditions. Planning and analysis efforts for future updates of the Groundwater Management Plan and the IWRP need to be integrated in order to provide a coordinated and comprehensive water supply plan for Santa Clara County.

Additional Groundwater Supply Management Activities

Groundwater Modeling

The District uses a three-dimensional groundwater flow model to estimate the short-and long-term yield of the Santa Clara Valley Subbasin and to evaluate groundwater management alternatives. Six layers are used to represent the subbasin, and changes in rainfall, recharge, and pumping are simulated. The model is used to simulate and predict groundwater levels under various scenarios, such as drought conditions, reduced imported water availability, or increased demand. The groundwater model also allows the District to evaluate the operational storage capacity (discussed below) in the Santa Clara Valley Subbasin.

In the future, a three-dimensional flow model similar to the one used in the Santa Clara Valley Subbasin will be developed for the Coyote and Llagas Subbasins, enabling the District to simulate groundwater conditions throughout the County.

Operational Storage Capacity Analysis

The operational storage capacity is an estimate of the storage capacity of the groundwater basin as a result of District operation. Operational storage capacity is generally less than the total storage capacity of the basin, as it accounts for operational constraints such as available pumping capacity and the avoidance of land subsidence or high groundwater levels. Identifying a reasonable range for the amount of groundwater that can be safely stored in wet years and withdrawn in drier years is critical to proper management of the groundwater basin.

The operational storage capacity of the Santa Clara Valley Subbasin was evaluated (SCVWD, 1999) using the groundwater flow model and historical hydrology, which included two periods of severe drought. The key findings of the analysis were that:

- The operational storage capacity of the Santa Clara Valley Subbasin is estimated to be 350,000 af.
- The rate of withdrawal from the basin is a controlling function and pumping should not exceed 200,000 af in any one year.
- The western portion of the subbasin is operationally sensitive which requires the Rinconada Water Treatment Plant to receive the highest priority when supplies become limited.

In 2001, an analysis of the operational storage capacity for the Coyote and Llagas Subbasins was conducted (SCVWD, 2001). As the District does not currently have a groundwater model for these two subbasins, a static analysis was used. Unlike a groundwater model, a static analysis cannot simulate changes in recharge, pumping, or demand. Instead, the operational storage capacity was estimated as the volume between high and low groundwater surfaces, chosen to maximize storage while accounting for operational constraints such as high groundwater conditions. The draft estimate for the combined operational storage capacity of the Coyote and Llagas Subbasins ranges from 175,000 to 198,000 af. The District is working to narrow the range of estimates for operational storage capacity through further analysis.

Having an estimate of the amount of water that can be stored within the basin during wet years and withdrawn during drier times will continue to be critical in terms of long-term water supply planning. As hydrology, water demands, recharge, and pumping patterns change, the estimate of operational storage capacity will need to be updated.

Subsidence Modeling

Due to substantial land subsidence that has occurred within the Santa Clara Valley Subbasin, the District uses numerical modeling to simulate current conditions and predict future subsidence under various groundwater conditions. PRESS (Predictions Relating Effective Stress and Subsidence) is a two-dimensional model that relates the stress associated with groundwater extraction to the resulting strain in fine-grained materials such as clays. The District has calibrated the model at ten index wells within the subbasin, and has established subsidence thresholds equal to the current acceptable rate of 0.01 feet per year.

Chapter 4
GROUNDWATER MONITORING PROGRAMS

This chapter describes District programs that monitor the water quality, water levels and extraction from the groundwater basin. It also describes the District's land subsidence monitoring program. These programs provide data to assist the District in evaluating and managing the groundwater basin. Specifically, the groundwater and subsidence monitoring programs provide the data necessary for evaluating whether the program outcomes result in achievement of the groundwater management goal.

Future efforts in groundwater monitoring will include the annual development of a groundwater conditions report, which will contain information regarding groundwater quality, groundwater elevation, and land subsidence.

GROUNDWATER QUALITY MONITORING

Program Objective

The objective of the General Groundwater Quality Monitoring Program is to determine the water quality conditions of the County's groundwater resources. By monitoring the quality of the groundwater basin, the District can discover adverse water quality trends before conditions become severe and intractable, so that timely remedial action to prevent or correct costly damage can be implemented. In general, the District monitors groundwater quality to ensure that it meets water quality objectives for all designated beneficial uses, including municipal and domestic, agricultural, industrial service, and industrial process water supply uses.

Background

Groundwater quality samples have been collected in the County since the 1940s by the District and by others. In 1980, District staff reviewed the existing general groundwater quality monitoring program and recommended changes and enhancements. The recommended changes and enhancements included revising the monitoring well network, revising the list of water quality parameters to be measured, and collecting groundwater samples biennially (every other year). Groundwater samples were analyzed for general mineral and physical water quality parameters.

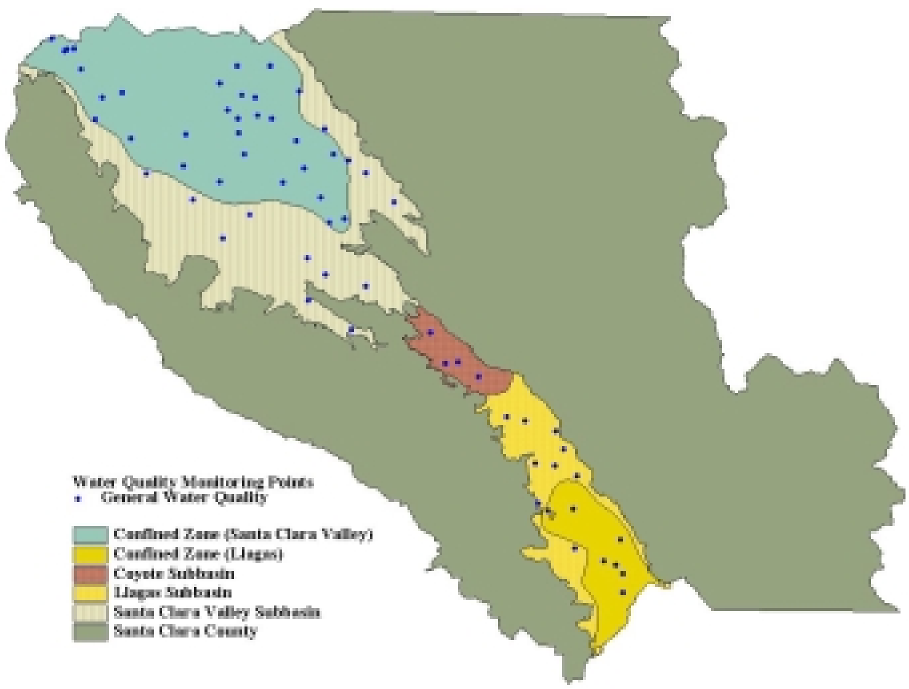
Current Status

The general groundwater quality monitoring program is designed to provide specific water quality data for each of the three subbasins (Figure 2-3). The monitoring well network includes one or more wells in each hydrographic unit yielding significant amounts of water. Groundwater samples collected from the monitoring network are intended to reflect the general areal and vertical groundwater quality conditions. Currently, the following program activities occur biennially:

- Water quality samples are collected from a monitoring network of approximately 60 wells (Figure 4-1).

- Samples are analyzed for general minerals, trace metals, and physical characteristics.
- Analytical results are evaluated, the database is updated, and routine water quality computations are performed.
- A summary report describing the water quality of the groundwater resources in the County is prepared.

Figure 4-1
Water Quality Monitoring Wells



In addition to the 60 wells monitored by the District for general groundwater quality analysis, the District monitors additional wells for special studies. There are currently approximately 100 wells monitored for MTBE, 60 wells monitored for nitrate, and 30 wells monitored for saltwater intrusion. The District also receives groundwater quality data for approximately 300 water retailer wells from the California Department of Health Services.

Monitoring results suggest that water quality is excellent to good for all major zones of the groundwater basin. This is based on comparing groundwater quality monitoring results to water quality objectives. Regional Water Quality Control Boards designed water quality objectives based on beneficial uses. Water quality objectives for municipal and domestic, industrial service, and industrial process water supply beneficial uses are equivalent to the drinking water standards established by the California Department of

Health Services. Water quality objectives for agricultural beneficial uses are defined specifically in the Regional Water Quality Control Boards' Water Quality Control Plans. Drinking water standards, agricultural water quality objectives, and monitoring results for common groundwater constituents are summarized in Table 2-2.

The more common trace constituents, which are considered unwanted impurities when present in high concentrations, are generally not observed in concentrations that adversely affect beneficial uses. Areas with somewhat degraded waters in terms of total mineral salt content have been identified in the Santa Clara Valley Subbasin and elevated nitrate concentrations have been observed in the Coyote and Llagas Subbasins. In addition, volatile organic compounds and other anthropogenic compounds have affected shallow aquifers in localized areas. Special groundwater monitoring programs have been developed to define the extent and severity of these problems and are discussed in Chapter 5.

Radon analysis was performed as a one-time special survey of current conditions and provided data for analyzing the potential impacts of upcoming drinking water standards for radon. The results of the 1999 sampling are presented in the 2000 General Groundwater Quality Monitoring report.

Future Direction

The General Groundwater Quality Monitoring Program utilizes relatively few, widely spaced monitoring points to assess large areas. Certain hydrographic units of the basin are only sparsely monitored at present. Staff is continuing to review the monitoring network to ensure that groundwater samples collected from the monitoring well network reflect areal and vertical groundwater quality conditions within each hydrographic unit. If it is determined that additional monitoring points are needed in some areas where there are no existing wells, District staff will recommend the installation of additional monitoring wells.

The District is also planning to increase the frequency of monitoring and the number of water quality parameters that are measured. Historically, the most frequent sampling frequency has been biennially. However, in order to parallel District efforts to better monitor performance in achieving desired results, the sampling frequency for the General Groundwater Quality Monitoring Program will be increased to annually. The number of water quality parameters that are measured will also be increased, so that samples are analyzed for volatile organic compounds, a significant concern in Santa Clara County. Samples will continue to be analyzed for general minerals, trace constituents, and physical characteristics.

The District will continue to assess and provide recommendations to address any adverse water quality trends that are observed through the General Groundwater Quality Monitoring Program. In addition, the District will continue to conduct special studies for specific contaminants as the need arises. As part of groundwater management planning, action levels and triggers will be developed for the constituents monitored.

The District will also begin developing annual groundwater conditions reports, which will summarize information regarding groundwater quality, groundwater elevation, and land subsidence.

GROUNDWATER ELEVATION MONITORING

Program Objective

The objective of the Groundwater Elevation Monitoring Program is to provide accurate and dependable depth-to-water field measurements for the County's major groundwater subbasins. By monitoring the groundwater elevations, the District can evaluate the groundwater supply conditions and formulate strategies to ensure adequate water supplies, prioritize recharge activities, and minimize any adverse impacts.

Background

Collecting depth-to-water information has been one of the District's functions since it was first formed as a water conservation district in 1929. Depth-to-water information is used to create groundwater elevation contour maps, which depict the conditions of the groundwater basin in the fall and spring of each year. Depth-to-water data are also used for subsidence modeling, to generate hydrographs needed to analyze groundwater model simulations, and to provide information to District customers on current and historical groundwater elevations.

Current Status

The District continues to collect depth-to-water field measurements, obtain depth-to-water measurements from other agencies and record that information for approximately 275 wells. Most wells in the current program are privately owned and their locations are fairly evenly distributed among the three subbasins (Figure 4-2). Current groundwater elevation monitoring includes the following:

- Collection of monthly depth-to-water field measurements from approximately 168 wells, including approximately 150 wells owned by other agencies (Figure 4-2).

- Collection of quarterly depth-to-water field measurements from approximately 108 wells (Figure 4-2).

- Maintenance of a groundwater elevation database.

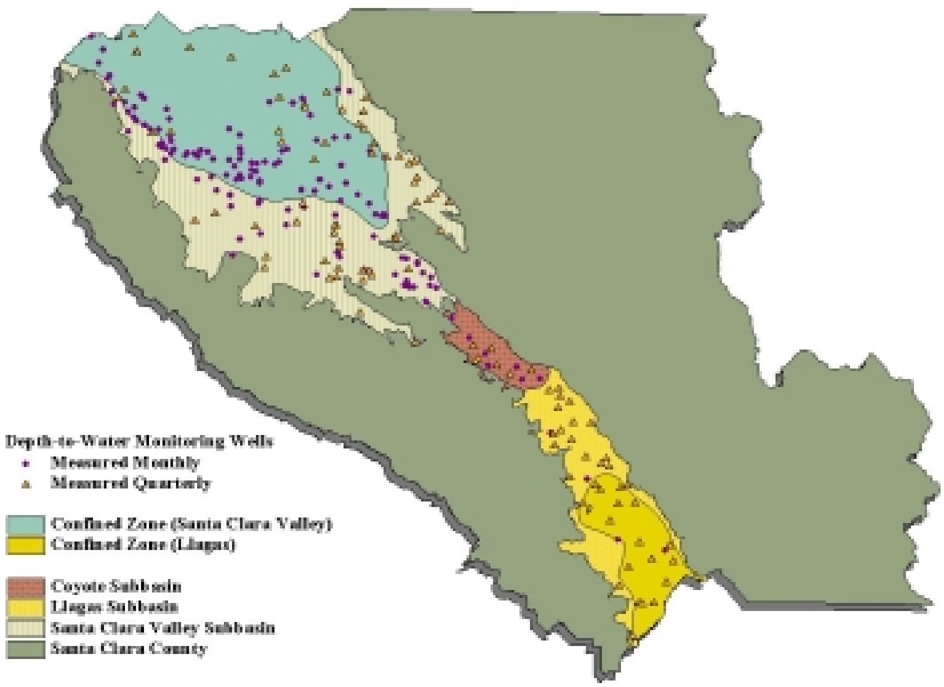
- Preparation of semi-annual groundwater level elevation contour maps.

The information in the District depth-to-water database is used regularly by District staff. Each year the District answers several hundred requests for depth-to-water information from other public agencies, consultants, and the public.

Future Direction

Although the District collects depth-to-water data from many wells throughout the County, most wells were designed as production wells, with perforations at multiple intervals to increase groundwater extraction. There are relatively few wells that measure groundwater elevations in a single depth zone. The existing Groundwater Elevation Monitoring Program is currently being updated to target monitoring wells where discrete, depth-specific groundwater elevations can be obtained, which will enable better characterization of the three-dimensional groundwater system. A new groundwater elevation monitoring network has already been designed for the Santa Clara Valley Subbasin, and another project will be undertaken to develop a monitoring network for the Coyote and Llagas Subbasins by 2003.

Figure 4-2
Groundwater Elevation Monitoring Wells



The proposed network for the Santa Clara Valley Subbasin will include monitoring the individual piezometric pressures at the following 79 wells, which are geographically distributed among the hydrographic units in the subbasin. Specific recommendations include the:

- Continued monitoring of 31 depth-specific wells monitored in the existing depth-to-water program.
- Acquisition of 16 aquifer-specific wells from other organizations.
- Addition of 25 wells that are not part of the existing depth-to-water program.
- Installation of 7 new multiple-well monitoring sites to be constructed by 2003.

Monitoring these 79 wells will provide invaluable information to aid in characterizing depth-specific groundwater conditions. However, in addition to these 79 wells, monitoring of the wells in the current groundwater elevation network will continue indefinitely, as the water level data can be useful even though it cannot be attributed to specific depth zones. Monitoring is recommended on a quarterly basis during the months of January, April, July, and October, although some wells will be monitored monthly. A quarterly monitoring frequency is consistent with the historical groundwater level data in the basin, and is currently adequate in terms of current groundwater elevation monitoring needs. A change in monitoring frequency will be assessed if necessary.

The proposed monitoring network for the Santa Clara Valley Subbasin will be re-evaluated in 2003 to ensure that monitoring needs can be met with the wells proposed. A monitoring network for the Coyote and Llagas Subbasins will be developed by 2003.

Since groundwater information is continually utilized both within and outside the District, an online database that is easily accessible through the District's web site is being evaluated as it would significantly reduce District staff time spent in database maintenance and fulfilling depth- to-water data requests.

GROUNDWATER EXTRACTION MONITORING

Program Objective

The amount of groundwater extracted from the groundwater basin is recorded through the Water Revenue Program. Data produced by this program are used primarily to: 1) determine the amount of water used by each water-producing facility and collect the revenue for this usage, and 2) fulfill the provisions of Section 26.5 of the District Act which requires the District to annually investigate and report on groundwater conditions.

Background

The Water Revenue Program tracks groundwater, surface water, treated water and recycled water production within the District. The first collection of groundwater extraction data began shortly after the State Legislature authorized amendments to the Santa Clara County Flood Control and Water District Act in June 1965. As part of implementation of the District Act, wells within the District were registered. The District has been collecting groundwater extraction data from wells in the Santa Clara Valley Subbasin (also known as the North Zone or Zone W-2) since the early 1960s. After the merger with Gavilan Water Conservation District in 1987, this program expanded to the Coyote and Llagas Subbasins (the South Zone, or Zone W-5).

Current Status

To determine the amount of all water produced in the District, including groundwater, the Water Revenue Program:

- Develops and distributes water extraction statements to well owners within the two water extraction zones on a monthly, semi-annual, and annual basis.

- Audits incoming water extraction statements and completes field surveillance to ensure that water extraction information is accurate.
- Audits and invoices surface, treated and recycled water accounts.
- Assists the public in completing and filing water extraction statements.
- Maintains files for surface, ground, treated and recycled water accounts.
- Administers and maintains a database containing all water extraction information.
- Initiates and approves the installation of water measurement devices (meters) on water-producing wells.
- Registers (assigns state well numbers) and maps all water extraction wells.

Water extraction data is stored in an electronic database (Water Revenue Information System) and on paper. Program staff maintain accounts and records for more than 6,000 water extraction wells and approximately 27,000 monitoring wells. Staff provide information on these accounts to other District programs and outside customers, and provide other customer support as necessary.

Although approximately half of the wells within the County are not metered, metered wells extract the vast majority of groundwater used within the County. Where meters are not feasible, crop factors are used to determine agricultural water usage and average values adjusted for residences. Water meter testing and maintenance are performed on a regular basis. Maintenance is done to ensure meters are performing properly and accurately. When problems are discovered, meters are repaired or replaced. Meters are also replaced on a regular basis for testing and rebuilding.

The following table shows type of usage for wells in Zone W-2 (Santa Clara Valley Subbasin) and Zone W-5 (Coyote and Llagas Subbasins) and the number of meters recording usage.

Table 4-1
1998 Statistics on Extraction Wells

	North Zone (W-2)	**South Zone (W-5)**
Agricultural Wells	81	570
Municipal & Industrial Wells	1,875	350
Domestic Wells	567	2,569
Ag & M&I Wells	77	511
Total Number of Wells	2,600	4,000
Number of Metered Wells	1,017	395
Percentage of Metered Wells	40%	10%

In accordance with Section 26.5 of the District Act, the District prepares an annual Water Utility Enterprise Report, which contains the following information: present and future water requirements of the County; available water supply; future capital improvement, maintenance and operating requirements; financing methods; and the water charges by zone for agricultural and nonagricultural water. Recommended water rates are based on multi-year projections of capital and operating costs. Water charges can be used as a groundwater supply management tool, as the surcharge for treated water can be adjusted to encourage or discourage extraction from the groundwater basin.

Future Direction

Groundwater extraction monitoring data will continue to be important as a basis of groundwater management decisions and for groundwater revenue receipts. Program staff are currently evaluating the existing database and hope to convert the database into a relational database and link it to the newly developed Geographic Information System (GIS) based well mapping system. This will enable staff to evaluate groundwater use data geographically and to provide this data to groundwater management decision-makers in a meaningful and easy to use format.

LAND SUBSIDENCE MONITORING

Program Objective

The objective of the Land Subsidence Monitoring Program is to maintain a comprehensive system to measure existing land subsidence and to predict the potential for further subsidence.

Background

Land subsidence was first noticed in 1919 after an initial level survey conducted in 1912 by the National Geodetic Survey. At that time, 0.4 feet of subsidence was measured in downtown San Jose. Between 1912 and 1932, over 3 feet of subsidence were measured at the same location. As a result of this drastic increase in subsidence, an intensive leveling network was installed for periodic re-leveling to evaluate the magnitude and geographical extent of subsidence. From 1912 to 1970, cumulative subsidence measured at the same San Jose location totaled approximately 13 feet.

A cross-valley differential leveling survey circuit was run in the 1960s and continues to be conducted. The level circuit was conducted almost annually from 1960 through 1976, once in 1983, and annually from 1988 to the present.

In 1960, the United States Geologic Survey (USGS) installed extensometers, or compaction recorders, in the two 1,000-foot boreholes drilled in the centers of recorded subsidence sites in Sunnyvale and San Jose. The purpose for installing these wells was to measure the rate and magnitude of compaction that occurs between the land surface and the bottom of the well.

In the mid-1960s, imported water from San Francisco’s Hetch-Hetchy reservoir and the State Water Project’s South Bay Aqueduct played a major role in restoring groundwater levels and curbing land subsidence. A combination of factors including imported water, natural recharge, decreased pumping and increased artificial recharge has reduced land subsidence to an average 0.01 feet per year.

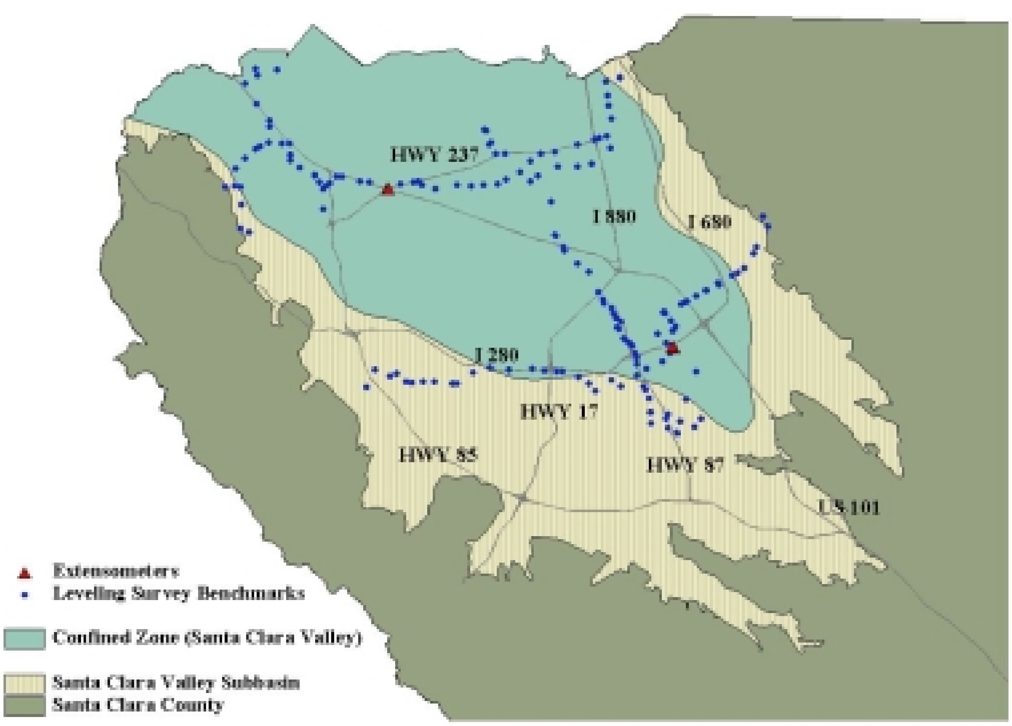
The District developed subsidence thresholds that relate the expected rate of land subsidence from various groundwater elevations. The Predictions Relating Effective Stress and Subsidence (PRESS) computer code was utilized for this model, and 10 index wells located throughout the Santa Clara Valley Subbasin were used as control points for the subsidence calibration and prediction.

Current Status

The existing land subsidence monitoring program includes the following:

- Monitoring land subsidence at two extensometer sites in San Jose and Sunnyvale (Figure 4-3).
- Conducting an annual leveling survey across three different directions in the valley to measure any land subsidence that may be occurring away from the extensometers (Figure 4-3).
- Analyzing data to evaluate the potential of re-initiating land subsidence.

Figure 4-3
Location of Extensometers and Leveling Survey Benchmarks



The extensometer in the San Jose site has recently been upgraded and equipped with monitoring and storage instrumentation to execute the data acquisition process electronically. Data collected from this site continues to be analyzed to determine any changes in the rate of land subsidence.

In 1998, the District entered into a cooperative agreement with the USGS to use Interferometric Synthetic Aperture Radar (InSAR) technology to measure any subsidence that may have not been captured in the existing monitoring program. This new technology compares satellite images taken at different times and reveals any changes in ground surface elevations with an accuracy of a few millimeters. INSAR covers the entire County, unlike traditional monitoring which is site-specific. Under the cooperative agreement, InSAR images were analyzed both seasonally and over a five-year period. Data from this study reasonably replicated and supported the data obtained from the District's extensometers.

The leveling survey continues to be conducted annually. A new leveling line was added to the leveling survey in 1998 as InSAR images indicated that additional information was needed along the Silver Creek Fault in San Jose.

Future Direction
Monitoring and data storage equipment have been installed at the San Jose extensometer site. Plans to enhance the land subsidence monitoring network program include the installation of new equipment to facilitate the monitoring and storage of data from the extensometer site in Sunnyvale, and the evaluation of datum stability at this site.

Through the 1998 study with the USGS, InSAR technology was proven able to reasonably replicate historical subsidence data from extensometers and the cross-valley leveling surveys. District staff will investigate the benefits of incorporating InSAR technology into the current land subsidence monitoring program.

The District will continue to utilize groundwater flow and subsidence models to simulate land subsidence as a result of different groundwater scenarios and groundwater management alternatives.

Chapter 5
GROUNDWATER QUALITY MANAGEMENT PROGRAMS

This chapter describes District programs that address nitrate management, saltwater intrusion, well construction and destruction, wellhead protection, leaking underground storage tanks, toxic cleanup, land use and land development review, and other groundwater protection issues. These programs help protect groundwater quality by identifying existing and potential groundwater quality problems, assessing the extent and severity of such problems, and preventing and mitigating groundwater contamination.

NITRATE MANAGEMENT

Program Objective

The objective of the Nitrate Management Program is to delineate, track and manage nitrate contamination in the groundwater basin in order to ensure the basin's viability as a long-term potable water supply. More specifically, the objectives are as follows:

- Reduce the public's exposure to high nitrate concentrations.
- Reduce further loading of nitrate.
- Monitor the occurrence of nitrate.

Background

The conversion of nitrogen to nitrate is a natural progression in the nitrogen cycle. In the form of nitrate, nitrogen is highly soluble and mobile. Due to its solubility and mobility, nitrate is one of the most widespread contaminants in groundwater. Unlike other compounds, nitrate is not filtered out by soil particles. It travels readily with rain and irrigation water into surface and groundwater supplies.

The amount of nitrate reaching the groundwater depends on the amount of water infiltrating the soil, the concentration of nitrate in the infiltrating water and soil, the soil type, the depth to groundwater, plant uptake rates, and other processes. Nitrate concentrations now observed in the groundwater basin might be a result of land use practices from several decades ago.

High concentrations of nitrate in drinking water supplies are a particular concern for infants. Nitrate concentrations above the federal and state maximum contaminant level (MCL) of 45 milligrams per liter (45 mg/L NO_3) have been linked to cases of methemoglobinemia ("Blue Baby Syndrome") in infants less than 6 months of age. In addition, public health agencies, including the California Department of Health Services, are conducting research to determine whether excess nitrate in food and drinking water might also have long term carcinogenic (tendency to cause cancer) or teratogenic (tendency to cause fetal malformations) effects on exposed populations.

Communities in the South County rely solely on groundwater for their drinking water supply. The District created the Nitrate Management Program in October 1991 to manage increasing nitrate concentrations in the Llagas Subbasin.

In June of 1992, an extensive study was initiated to review historical nitrate concentrations, identify potential sources, collect and analyze groundwater samples for nitrate, and develop a set of recommendations for the prevention and control of nitrate loading in South County. The results of the study, completed in February 1996, indicated that nitrate concentrations in the Llagas Subbasin are generally increasing over time and that elevated concentrations still exist throughout the subbasin.

In addition, the study found that there are many sources of nitrate loading in Llagas Subbasin. The major sources of nitrate are fertilizer applications, and animal and human waste generation. The southern portion of Santa Clara County has historically been an agricultural area. Only in recent years has agricultural acreage declined due to residential growth. However, due to the slow movement of surface water to the water table, residual nitrate concentrations in the soil from past practices may continue to contribute to increasing nitrate concentrations in the groundwater for several years or decades to come.

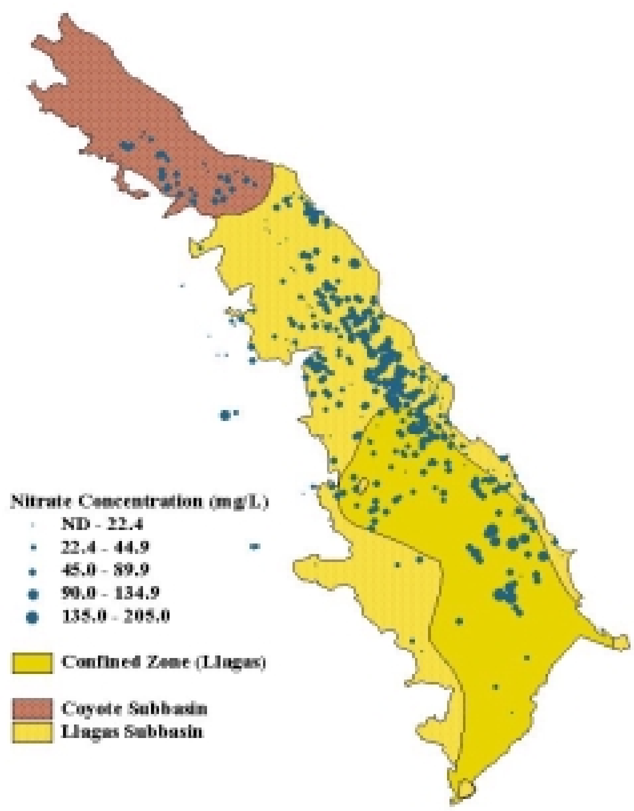
The specific recommendations of the study were the following: increase public education to reduce loading and exposure; blend water to reduce exposure; review and possibly revise the well standards; increase the level of regional wastewater treatment in order to reduce reliance on septic systems; increase point source regulation; conduct recharge feasibility studies; increase monitoring of the groundwater basin; and to consider alternative water supplies, treated surface water, water recycling and enhanced sewage treatment technologies for on-site systems.

In 1997, the District began implementing the public education portion of the study recommendations. A large agricultural outreach effort was initiated. As part of that outreach, the District entered into a contract with a Mobile Irrigation Lab to offer free irrigation evaluations to farmers in order to improve the efficiency of their irrigation systems and scheduling. By improving the irrigation efficiency and distribution uniformity, the irrigators can reduce the amount of water and nitrate leached beyond the active root zone of the crop and into the groundwater. Over 250 people have attended seminars to increase their awareness of the mobile lab and to learn nitrate-sampling and nitrogen management techniques. Approximately 150 free soil nitrate test kits have been prepared and distributed. A series of 5 fact sheets on Nitrogen and Water Management in Agriculture was produced in cooperation with Monterey County Water Resources Agency and the Pajaro Valley Water Management Agency. English and Spanish versions have been distributed to the agricultural community through a series of seminars, mobile lab operators, other agricultural agencies and the on the District's new Agricultural web page.

To reduce exposure, reduce loading and monitor occurrence, a large-scale public outreach effort was launched offering a free nitrate analysis to all well water users in the Llagas and Coyote Subbasins. Approximately 2,500 residents were notified through direct mailings about the program and the issues surrounding nitrate in drinking water. An unknown number were notified through newspaper, radio and television coverage. More than 600 private wells shown in Figure 5-1 have been tested for nitrate. Along with the results of the testing, residents were mailed a fact sheet describing what nitrate is, where it comes from, what the health effects are, how to prevent further loading and where to find more information.

Of the 600 private wells tested, more than half exceed the federal safe drinking water standard for nitrate. Of those that exceed the standard, half of the residents use an alternate water source or point-of-use treatment for their drinking water. The data also indicated that nitrate concentrations in the Llagas Subbasin continue to increase, that nitrate concentrations in the Coyote Subbasin have remained steady, and that high concentrations of nitrate are sporadically located throughout both subbasins. A report on the findings was produced in December 1998 and was distributed to several local and state agencies. These elevated nitrate levels were detected only in private wells; it should be noted again that public water supply wells within the County meet drinking water standards.

Figure 5-1
South County Nitrate Concentration

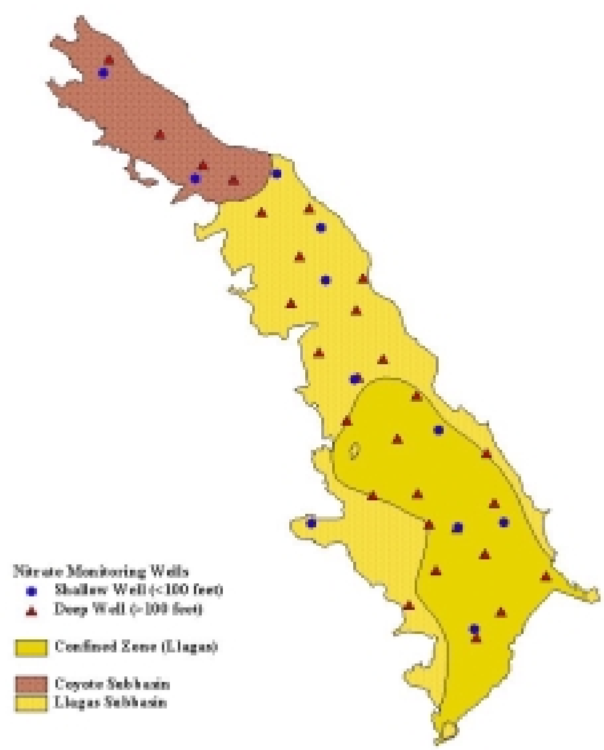


Current Status

To reduce nitrate loading, the District continues to schedule mobile lab evaluations and agricultural seminars. These seminars focus on how to apply irrigation water more efficiently and how to conduct soil testing for nitrate. In addition, the District is a cooperator on a grant with a soil scientist to establish field trials demonstrating and evaluating the effectiveness of in-field nitrate testing in drip and sprinkler irrigated vegetables.

To monitor nitrate occurrence, the District is conducting a comprehensive monitoring effort to track seasonal, areal, vertical and long-term trends in nitrate concentrations. The current monitoring program shown in Figure 5-2 consists of 42 deep groundwater wells (greater than 100 feet deep) and 15 shallow monitoring wells (less than 100 feet deep).The shallow monitoring wells will allow us to track what we might expect to see in the deeper wells in the future. Network wells are being monitored on a quarterly basis to track seasonal variations.

Figure 5-2
Current South County Nitrate Monitoring Network



To reduce nitrate exposure, the District is working with the Santa Clara County Department of Environmental Health to produce a well owner's guide. Among other things, the guide will contain information on recommended sampling, testing and disinfecting practices, as well as measures to protect against contamination.

Future Direction
Continued public education and outreach will remain the focus of the nitrate management program to reduce further loading and prevent possible exposure. If nitrate concentrations continue to increase at all depths, more extensive action may be required. The District may need to investigate alternate water supplies for the many private well water users in the area. Alternate water supplies could include a water treatment plant to remove the nitrate from the existing groundwater supply or the treatment of water from the San Felipe pipeline.

More research is needed to determine how much nitrate is contributed through the various manure management practices currently used. Best Management Practices (BMPs) for manure management need to be determined, and they need to be communicated to the public in a manner that will encourage adoption. More research is also needed regarding reduction of nitrate loading from septic systems; specifically, regarding whether the benefit of removing or reducing septic system loading justifies the economic and political cost of increasing sewer line connections.

To achieve the objective of monitoring nitrate occurrence, the District will continue to sample the existing monitoring network in the Llagas and Coyote Subbasins on a quarterly basis. Two years of quarterly data has been collected so far and staff are in the process of analyzing the data for seasonal, areal, and long-term trends. Staff is beginning a thorough evaluation of the extent and severity of nitrate contamination in the Santa Clara Subbasin, based on water quality data from the District's groundwater monitoring program and the water retailers.

The District may also investigate the feasibility of remediating nitrate contamination. There is some indication that nitrate concentrations around recharge facilities are lower than elsewhere. This finding would need to be confirmed as part of an investigation into reducing nitrate concentrations by additional recharge. Similarly, the District may be able to remediate nitrate contamination by setting up several pump and treat operations. High nitrate water would be pumped out of the basin, treated and injected back into the basin. Phytoremediation, which uses deep-rooted plants to draw the nitrate out of the vadose zone before it can reach groundwater, may be employed in some areas. A fourth possibility is reactive zone remediation where a reagent is injected into the system to intercept and immobilize or degrade the nitrate into a harmless end product. A thorough investigation of any remediation technology would need to occur before prior to its adoption.

SALTWATER INTRUSION PREVENTION

Program Objective
The objective of the Saltwater Intrusion Prevention Program is to monitor and to protect the groundwater basin from seawater intrusion.

Background

The movement of saline water into a freshwater aquifer constitutes saltwater intrusion. This potential exists in groundwater basins adjacent to the sea or other bodies of saline water. Intrusion of saltwater into a freshwater aquifer degrades the water for most beneficial uses and, when severe, can render it virtually unusable. Salty water can corrode holes in well casings and travel vertically to other aquifers not previously impacted. Once freshwater aquifers are rendered useless by a severe case of saltwater contamination or intrusion, it is extremely difficult and costly to reclaim them.

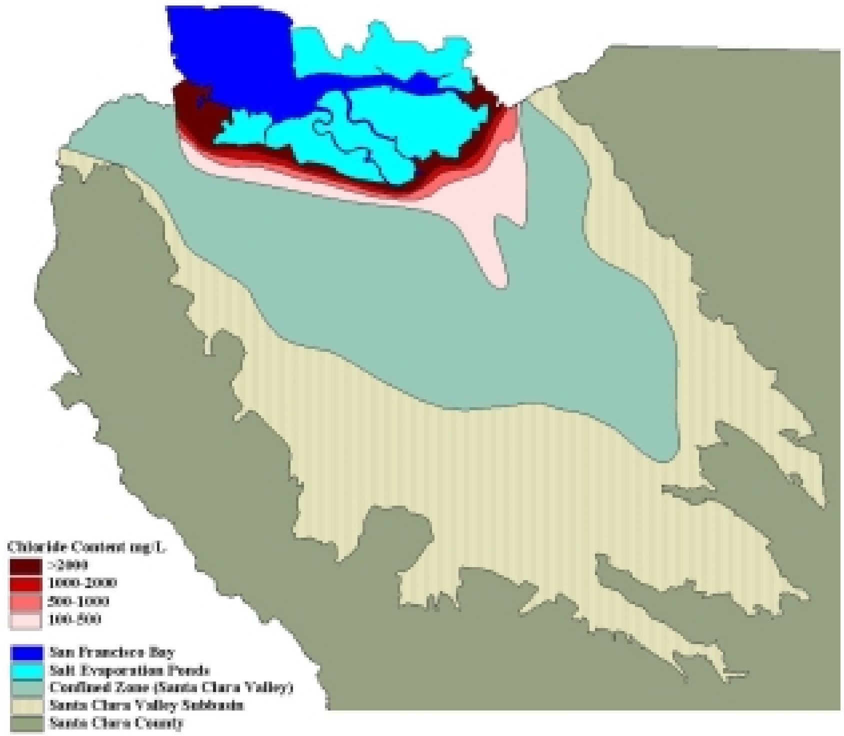
Comparison of older mineral analyses of groundwater from wells in the San Francisco bayfront area in Santa Clara and Alameda counties, some dating back to 1907, with more recent data shows that saltwater intrusion has occurred in the upper aquifer. With much higher water demands after World War II and the occurrence of land subsidence, saltwater intrusion conditions became aggravated and encompassed a portion of the baylands (the area adjacent to the southern San Francisco Bay). Bayshore Freeway (U.S. Route 101) and the Nimitz Freeway (Interstate 880) delineate the southern limits of this area.

The alluvial fill deposits of the Santa Clara Valley Subbasin in the flat baylands area consist of thin aquifers amongst abundant clays. The aquifers are broadly grouped into two water-bearing zones referred to as the “upper aquifer zone,” which usually occurs at depths less than 100 feet, and the “lower aquifer zone,” which usually occurs at depths greater than 150 to 250 feet, and which constitutes the potable aquifer system. Previous studies indicate the upper aquifer zone fringing San Francisco Bay is widely intruded by saltwater. The lower aquifer zone has pockets of small areas of elevated salinity associated with migration through abandoned wells.

Within the upper aquifer zone, the “classical case” of intrusion which occurs by displacement of freshwater by seawater and is indicated by total dissolved salt content over 5,000 mg/L, has progressed only a short distance inland from the bayfront, estuaries or salt evaporator ponds as shown in Figure 5-3. This intrusion had been induced when pumping of the upper aquifer and land subsidence reversed the hydraulic gradients, which had originally been toward the Bay. A large mixed transition zone precedes this intruding front with its outer limit arbitrarily defined by the 100 mg/L chloride line.

The greatest inland intrusion of the mixed transition water occurs along Guadalupe River and Coyote Creek. The large mixed transition zone is caused by saltwater moving upstream during the high tides and leaking through the clay cap into the upper aquifer zone when this zone is pumped. Land surface subsidence has aggravated the condition of intrusion by allowing farther inland incursion of saltwater up the stream channels from the Bay and by changing the gradient directions.

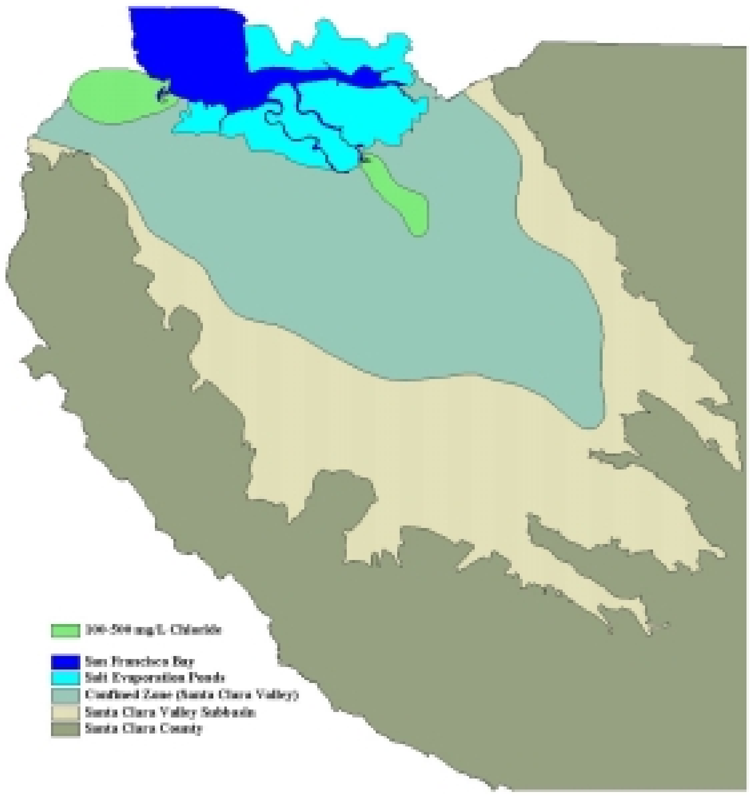
Figure 5-3
Upper Zone Saltwater Intrusion



Data has revealed a local area of high salt concentration in the upper aquifer zone in the Palo Alto bayfront area. This locally concentrated groundwater has moved inland historically and has the potential to continue farther inland. It is in this area that the District constructed a 2-mile-long hydraulic barrier in order to prevent further intrusion and to reclaim portions of the intruded aquifers.

The lower aquifer zone is only mildly affected; the area of elevated salinity encompasses a much smaller area than that of the upper aquifer zone (Figure 5-4). The contaminated lower aquifers lie beneath the intruded portion of the upper aquifer zone. The areal distribution and the variable concentration of the saltwater contamination with time imply that the intrusion into the lower aquifer occurred as seasonal slugs of contaminated water were induced from either the surface or the upper aquifer. As the clay aquitard between the upper and lower aquifer zones is essentially impermeable, the salinity in the lower aquifer zone is thought to have occurred through improperly constructed, maintained or abandoned wells. As a result of this finding, the operation of the hydraulic barrier was discontinued.

Figure 5-4
Lower Zone Saltwater Intrusion



The resumption of land surface subsidence is the greatest potential threat to aggravating the intrusion condition, as it would further depress the land surface fronting South San Francisco Bay. This would increase the inland hydraulic gradient relative to the classical intrusion front and expose a larger area of the upper aquifer zone to intrusion as a consequence of the greater inland incursion of tidal waters. A lowering of the piezometric level in the lower aquifers, which is related to the cause of subsidence, will also increase the potential for intrusion into the lower zone.

Current Status

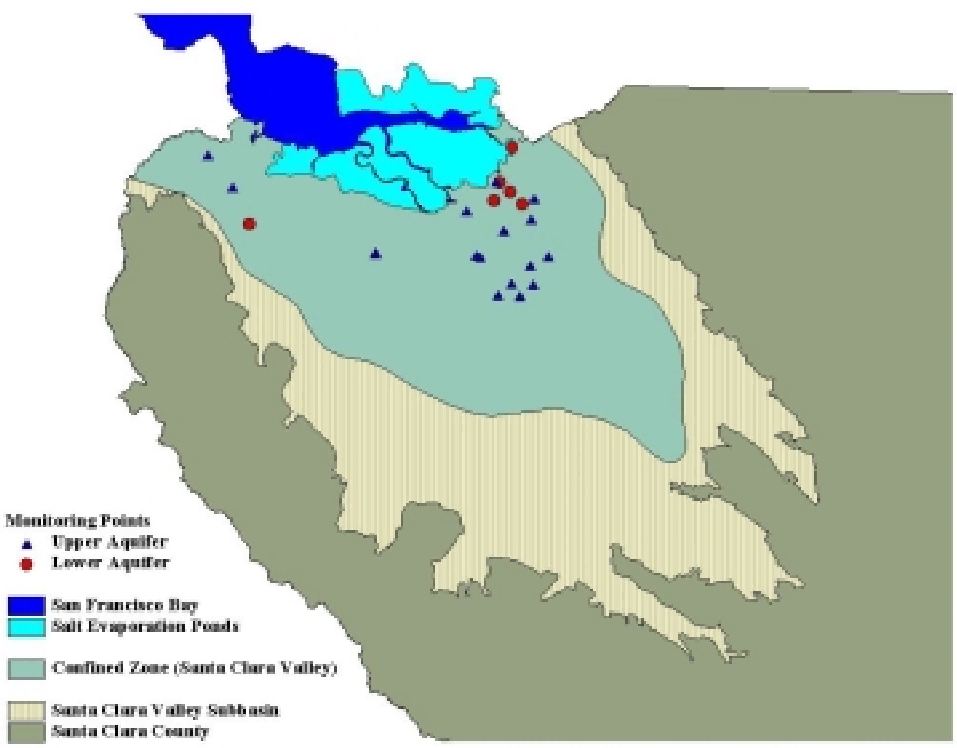
As part of the Saltwater Intrusion Prevention Program, the defective wells in the northern Santa Clara Valley Subbasin along San Francisco Bay were to be located and destroyed. The District conducted an extensive program of locating and properly destroying these contaminant conduit wells. After these defective wells were located, the owners were required to properly destroy them under District ordinance, or by litigation if necessary. From District records, a list of 45 defective wells to be destroyed was generated.

Since the inception of this program, the Board has authorized a more comprehensive well destruction program, through which abandoned wells near areas of known chemical contamination can be destroyed with District funds. This program began in October 1984, and was in part a result of general concerns about contamination of useable aquifers by saltwater as well as by industrial chemicals throughout the County. Several wells in the area were included in this parallel program, many of which were not identified as defective or potential conduit wells.

Of the 45 potential conduit wells, six were removed from the list as they do not appear to be acting as conduits. In 1985, the District's Groundwater Protection Section pursued destroying the remaining 39 wells through District Ordinance No. 85-1. This ordinance gives the District authority to require owners of wells determined to be "public nuisances" to destroy the wells or to upgrade them to active or inactive status. Of the 39 potential conduit wells identified, 10 were not located and were presumed destroyed without a permit. The remaining wells were all properly destroyed.

The District continues to monitor the extent and severity of saltwater intrusion. The current Saltwater Intrusion Monitoring Program consists of 21 monitoring wells that are sampled quarterly as shown in Figure 5-5. Five of these wells monitor the status of saltwater intrusion in the lower aquifer zone, while the remaining 16 wells monitor the upper aquifer zone. Originally, the program consisted of 25 wells. Eight of these wells could not be located during recent field investigations and presumably were destroyed by the owners. However, work is commencing to replace the lost wells with District-owned wells and restore the monitoring program to its original form.

Figure 5-5
Saltwater Intrusion Monitoring Locations



Future Direction
The present status of the Saltwater Intrusion Prevention Program is subject to change, depending upon the future basin operation and groundwater demand in the area. The two economically practical ways to prevent or minimize any further intrusion are through management of the groundwater basin and strict enforcement of ordinances on well construction and destruction standards. These approaches have been adopted by the District and should continue to be implemented.

Saltwater intrusion continues to be monitored. Monitoring data are stored by electronic and conventional means. Electronic storage consists of a geographically referenced database of monitoring wells and a related database of water quality information. Conventional storage consists of filing hard copies of laboratory analytical reports in the appropriate well folders and providing data to DWR. Biennial evaluations of the data are documented in the General Groundwater Quality Monitoring Program reports. The monitoring program, including well location and sampling frequency, will be evaluated with respect to long-term groundwater quality protection strategies and overall basin management.

WELL CONSTRUCTION/DESTRUCTION PROGRAMS

Well Ordinance

Program Objective
The objective of the Well Ordinance Program is to protect the County's groundwater resources by ensuring that wells and other deep excavations are constructed, maintained and destroyed such that they will not cause groundwater contamination. To meet this goal, the Well Ordinance Program:

- Develops standards for the proper construction, maintenance, and destruction of wells and other deep excavations.
- Educates 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.
- Maintains a database and well mapping system to document information about well construction and destruction details, a well's location, and well permit and well violation status.

The scope of the Well Ordinance Program includes all activities relating to the construction, modification, maintenance, or destruction of wells and other deep excavations in the County.

Background
In the late 1960s, following post-war industrialization and development of Santa Clara County, it became apparent that abandoned or improperly constructed wells and other deep excavations (e.g. elevator shaft pits) are potential conduits through which contaminants can travel from shallow, potentially contaminated aquifers, to deeper drinking water aquifers. Recognizing this, in 1971, a District advisory committee consisting of representatives from local agencies, the District, and the Association of Drilling Contractors, was established.

The committee was charged with the development of well construction standards and standards for the proper destruction of abandoned wells. The Board adopted standards for well destruction and construction in October 1972 and January 1975, respectively. In 1975, the District Board of Directors passed the first District Well Ordinance.

Both the Standards and the Well Ordinance have undergone numerous revisions. The most recent version of the well standards, the *Standards for the Construction and Destruction of Wells and Other Deep Excavations in Santa Clara County*, was adopted by the Board in July 1989. The Board passed district Well Ordinance 90-1 in April 1990. These documents address the permitting and proper construction and destruction of wells and other deep excavations, including water supply wells, monitoring wells, remedial extraction wells, vadose wells, cathodic protection wells, injection wells, storm water infiltration wells and elevator shaft pits.

Beginning in 1975, well construction and destruction permits were required by the District and the District began inspecting every well that was constructed. Well destruction activities were first inspected by the District in 1984.

Since the inception of well permitting, the annual number of permits issued has greatly increased. The District issued approximately 400 well permits in 1976, the first full year of permitting, to a maximum of approximately 2,544 permits in 1994.

The District is in compliance with Sections 13803 and 13804 of the State Water Code and thereby has the authority to assume the lead role in the enforcement of the State Well Standards, the assignment of State Well Numbers, and the collection of State Drillers Reports for all wells constructed or destroyed in Santa Clara County.

Current Status
To date, the District has permitted and inspected the construction of approximately 3,000 water supply wells, 22,000 monitoring wells, 4,000 exploratory borings, and the destruction of 9,500 wells under the Well Ordinance Program.

The District has recently completed converting the paper-based well maps to a GIS based well mapping system.

Future Direction

In order to continue protecting the District's groundwater resource, the District will continue implementation of the program and will continue to regulate the construction and destruction of wells in the County. District staff will re-write District's well standards and ordinance to address recent changes in well construction and destruction techniques. District staff is also currently evaluating District's existing well information database and would like to convert the database into a relational database format and link it to the newly developed GIS based Well Mapping System.

Dry Well Program

Program Objective

The objective of the Dry Well Program is to minimize the impacts of dry wells on groundwater quality. The main objectives of this program are to:

- Control installation of new dry wells.
- Destroy existing dry wells that have contaminated or may contaminate groundwater.
- Educate planning agencies and the public about the threat that dry wells pose to groundwater quality.

Background

Dry wells, also known as storm water infiltration devices, are designed to direct storm water runoff into the ground. Storm water runoff can carry pollution from surface activities. Because dry wells introduce runoff directly into the ground, they circumvent the natural processes of pollution breakdown and thereby increase the chance of groundwater contamination. Additionally, dry wells have been sites of illegal dumping of pollutants.

In Santa Clara County, at least 8 serious contamination sites were caused or aggravated by the presence of dry wells introducing contamination into the groundwater. One dry well site has a solvent plume more than 2,000 feet long and more than 200 feet deep in a recharge area of South County where the only source of drinking water is groundwater.

In 1974, the Environmental Protection Agency (EPA) developed the Underground Injection Control Program under the Safe Drinking Water Act. The program requires the owners and operators of all shallow drainage wells to submit information regarding the status of each well to the EPA. The Regional Board adopted the "Shallow Drainage Wells" amendment to the Basin Plan in 1992. The Basin Plan amendment requires the local agency to develop a shallow drainage well control program that would locate existing shallow wells and establish a permitting program for existing and new wells.

In 1991, the District and municipal agencies began development of a Storm Water Infiltration Policy to satisfy Regional Board requirements. In August 1993, the District adopted Resolution 93-59 regarding Storm Water Infiltration Devices.

Current Status
Since 1993, owners of dry wells deeper than 10 feet have been required to register their wells by filing a "Notice to Continue Use" with the District. Dry well owners can continue using their wells as long as the well is not an immediate threat to groundwater quality. Local cities, businesses, contractors and private citizens regularly call for District guidance on dry wells.

The District continues to issue permits for dry wells greater than 10 feet deep and for the destruction of dry wells. District staff advise the public and planning agencies about the appropriate use of dry wells to mediate storm water problems generally and on a case-by-case basis. District staff continue to work with local programs to clarify the District dry well policy. Local inspecting agencies continue to work with the District to locate and register dry wells.

Future Direction
The Dry Well Program is being incorporated into the Well Ordinance Program. Specific standards for dry wells will be incorporated into the next revision to the Well Standards. These standards include prohibiting the construction of dry wells greater than 10 feet deep and defining dry wells to include all shallow drainage wells, not just shallow drainage wells receiving storm water. The purpose of revising the program to incorporate it into the Well Ordinance Program is to clarify permitting and construction standards for dry wells, to expand the definition of devices covered by the Well Standards so that all wells that bypass natural protection processes are subject to standards for protecting groundwater, and to simplify the process by which dry wells are permitted.

Abandoned Water Well Destruction Assistance

Program Objective
The objective of the Abandoned Well Destruction Assistance Program is to protect the County's groundwater resources by helping property owners properly destroy old, abandoned water supply wells that they have discovered.

To meet the program's objective, the District:

- Passed a Board Resolution (94-87) allowing District assistance to property owners who discover abandoned wells.
- Enters into annual contracts with well drillers to complete work associated with the project.
- Destroys abandoned wells for property owners.

Background
Due to the agricultural history of the County and to subsequent post-World War II development, many former water supply wells were abandoned and buried and remain

potential vertical conduits that may transport contaminants into the District's deep, water supply aquifers.

Some estimates indicate that there may be as many as 10,000 abandoned water supply wells within the boundaries of the Santa Clara Subbasin. Since there are no official records for these wells, the District has no knowledge of their existence or their locations.

In the mid-1980s, the District took a proactive stance on active and abandoned water supply wells found within known contamination plumes. At that time, with assistance from the Regional Board, the District actively searched for and destroyed known active wells and abandoned wells.

However, when abandoned water wells were discovered in areas not threatened by known groundwater contamination, they were not included in the District's well destruction efforts, but instead were treated as well violations under the Well Ordinance Program. As well violations, the District proceeded with enforcement action to force the property owner to properly destroy the well.

Unfortunately, this enforcement action often took months to complete. Property owners often didn't have the $3,000 to $15,000 dollars needed to destroy the well and had to secure loans to complete the destruction. Many property owners had negative feelings about the District after the enforcement action, especially considering that most property owners had no previous knowledge of the well and when they had discovered the well, they had been the first to inform the District of its existence.

District staff believed that while a well was found on an owner's property (and according to the Well Ordinance, that the property owner is responsible for destroying it), the owner wasn't actually responsible for the well's current status (abandoned and buried) and because the destruction of the well was in the best interest of the District, that the District should destroy it.

Therefore, in 1994, the District initiated the Abandoned Well Destruction Assistance Program to aid property owners who happen to discover an abandoned water supply well on their property. Under the Abandoned Well Destruction Program, the District destroys abandoned water wells if: 1) the property owner had no previous knowledge of the well, 2) the well was not registered with the District, 3) the well has no surface features that would have obviously indicated its presence, and, 4) the property owner enters into a Right of Entry Agreement with the District.

Current Status

Since the program's inception in 1994, the District has destroyed 108 abandoned wells under the Abandoned Well Destruction Program. Most of these wells were first discovered and reported to the District because they were flowing under artesian pressure.

Future Direction

Staff will continue to implement the program. Annually, staff receives reports of approximately 20 wells that meet program criteria and staff expect that this trend to continue.

WELLHEAD PROTECTION

Program Objective

The Wellhead Protection Program (WHP) represents the groundwater portion of the District's Source Water Assessment Program. The objective of the Wellhead Protection Program is to identify areas of the groundwater basin that are particularly vulnerable to contamination. The District uses this knowledge to focus groundwater protection, monitoring, and cleanup efforts.

Background

Groundwater vulnerability is based on groundwater sensitivity to contamination and the presence of potentially contaminating activities. Groundwater sensitivity is evaluated based on hydrogeology and groundwater use patterns. Areas with shallow groundwater, high recharge, high conductivity aquifers, permeable soils and subsurface materials, mild slopes, and high groundwater pumping rates are most sensitive to contamination. The District compiles data on hydrogeologic conditions, pumping patterns, and contamination sources, and uses GIS technology to identify areas of the groundwater basin that are particularly vulnerable to contamination.

The District first began compiling groundwater protection data in the late 1980's. In 1989, the District, in collaboration with the U.S. Environmental Protection Agency (EPA), conducted a pilot project in the Campbell area to evaluate the usefulness of GIS for groundwater protection. Data on roads, city boundaries, hazardous material storage sites, groundwater recharge facilities, wells and hydrogeology were collected and used to create GIS coverages for the Campbell study area. The project team used GIS to evaluate groundwater sensitivity and draw areas to be protected around production wells. The study concluded that GIS is a feasible tool to use for WHP programs.

After the Campbell pilot study, the District expanded its groundwater protection data collection effort to encompass the entire County. Staff developed Countywide GIS coverages of active wells, abandoned and destroyed wells, geology, soil types, depth to groundwater, leaking underground storage tank sites, and petroleum storage facilities. This data, along with water quality data, is used to identify and evaluate threats to groundwater quality.

Current Status

The District created a groundwater sensitivity map to evaluate land use development proposals and make recommendations for appropriate groundwater protection strategies. In 1996, the District built upon the pilot GIS project to assess groundwater sensitivity throughout the groundwater basin using EPA's DRASTIC method. DRASTIC stands for depth to water table, net recharge, aquifer media, soil media, topography, impact of the vadose zone, and hydraulic conductivity of the aquifer. The DRASTIC method is a quantitative evaluation of these hydrogeologic factors to assess relative groundwater sensitivity. The results of this effort were several GIS coverages and a groundwater sensitivity map (Figure 5-6), which the District uses to review land development proposals. In sensitive groundwater areas, the District requests that planning agencies require, and that property owners implement, best management practices and other protection activities beyond those required by minimum standards.

Figure 5-6
Groundwater Sensitivity Map

Staff uses information on land use and the location of contaminated sites to help identify and evaluate the sources of contamination that are detected in wells. Although groundwater quality is generally good throughout the basin, contamination is occasionally detected in individual wells. By quickly locating contamination sources, we can work with the regulatory agencies to ensure prompt and adequate cleanup.

The District also uses information on well construction, well location, well pumping, leaking Underground Storage Tank (UST) site locations and conditions, land use, and hydrogeology to prioritize leaking UST sites and identify vulnerable water supply wells. Sites that pose the greatest threat to groundwater supplies are the first to receive detailed regulatory oversight. Staff also uses this information to select wells for groundwater monitoring and special studies.

District staff is working with local water retailers on the state's Drinking Water Source Assessment and Protection (DWSAP) Program. The state's DWSAP Program is required by the 1996 reauthorization of the federal Safe Drinking Water Act. California has until May 2003 to assess all of its drinking water sources for vulnerability to contamination. The District developed a GIS-based wellhead assessment and protection area delineation tool, which delineates protection areas according to state guidelines. Once the vulnerability assessments are completed in Santa Clara County, the District will work with the water retailers to ensure that the greatest threats to their drinking water supply wells are being addressed.

Future Direction

District staff continues to create GIS coverages that help assess groundwater vulnerability. Some coverages that are in development include solvent contamination sites and plumes, dry cleaners, hazardous materials storage facilities, septic system locations, and sewer lines. The District has found great utility in these GIS coverages, and is beginning to work with other agencies and organizations to determine how we can share GIS information and increase its use for groundwater protection. We will continue to use this information to identify areas vulnerable to groundwater contamination, and focus our monitoring, protection, and cleanup efforts.

LEAKING UNDERGROUND STORAGE TANK OVERSIGHT

Program Objective

The objective of the Leaking Underground Storage Tank Oversight Program (LUSTOP) is to protect the groundwater basin from water quality degradation as a result of releases of contaminants from underground storage tanks. The District provides regulatory oversight of the investigation and cleanup of fuel releases from USTs for most of Santa Clara County.

Background

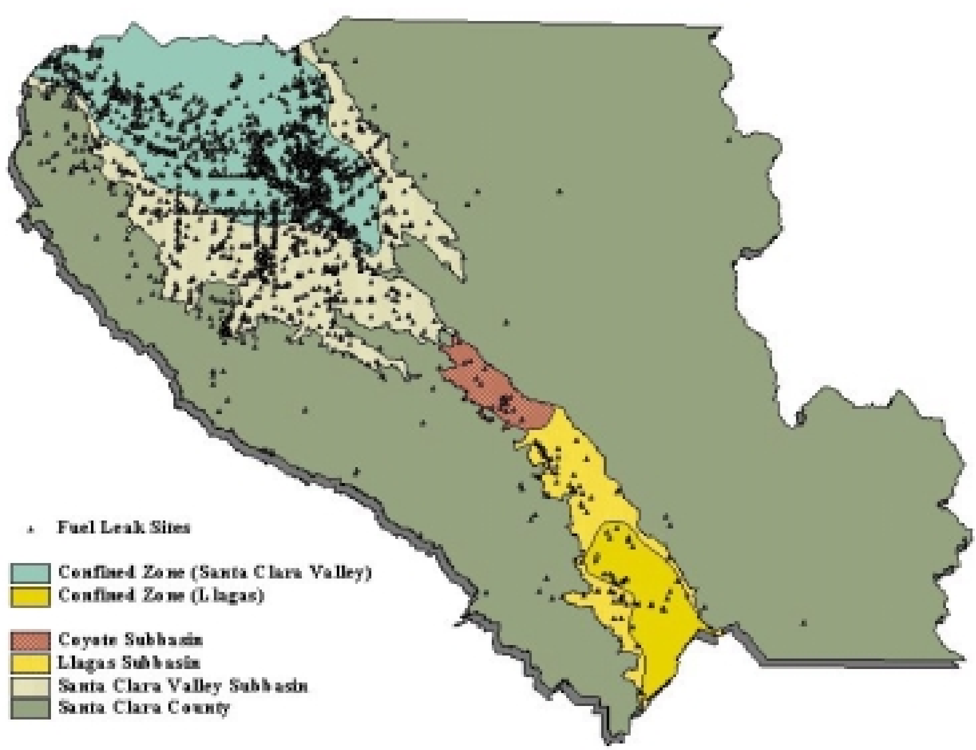
In 1983, the State Legislature enacted the UST Law [Chapter 6.7 of the Health and Safety Code] authorizing local agencies to regulate the design, construction, monitoring, repair, leak reporting and response, and closure of USTs. In the early 1980s, several drinking water wells in the County were shut down as a result of contamination by chlorinated solvents. In 1986, the Board decided to implement a leaking UST oversight program for petroleum fuels in coordination with the San Francisco Bay Regional Water Quality Control Board (RWQCB). The District Board recognized that releases from USTs affect groundwater quality and that effective protection of the County's groundwater basin demanded a proactive approach. They committed financial and technical resources in-house to quickly initiate the program.

In 1987, the District entered into an informal agreement with the San Francisco RWQCB to create a pilot oversight program. At that time more than 1,000 fuel leaks had been reported within the County. The District developed an in-house technical group of employees capable of providing regulatory oversight of the investigation and cleanup of releases from USTs. In 1988, the District and the County of Santa Clara entered into a contract with the State Water Resources Control Board to implement one of the State's first Local Oversight Programs. This allowed the District to get reimbursed by state and federal funds for costs associated with operation of the program.

The State Water Resources Control Board (SWRCB) amends its Local Oversight Program contract with the District and the County annually. Over the years, many changes have occurred in the UST regulatory process as new laws were passed, scientific knowledge improved, and new investigation and cleanup strategies became available. The District's program actively participates in ensuring that new laws and regulations continue to protect groundwater quality into the future. The District has been at the forefront of several initiatives for improving the effectiveness and efficiency of our regulatory oversight efforts and the cost-effectiveness of corrective action while protecting human health, safety, the environment and water resources.

Every leaking petroleum UST case is currently assigned to a District caseworker who provides technical and regulatory guidance to responsible parties and their consultants (Figure 5-7).

Figure 5-7
Fuel Leak Cases in Santa Clara County



The District only provides regulatory oversight on investigation and cleanup at UST sites where a release has occurred. Tank removals, leak prevention, and UST release detection activities are overseen by one of 10 other agencies, usually the local fire department. Each agency has jurisdiction over a designated geographical area in the County. If there is evidence of a leak or if contamination is detected, an agency inspector or UST owner/operator notifies the District and/or the Regional Board. The District reviews the data to confirm the release, lists the site on the Leaking Underground Storage Tank Oversight Program database, and notifies the responsible party and the SWRCB. The District then determines if the unauthorized release poses a threat to human health and safety, the environment, or water resources and, if necessary, a caseworker requests additional investigation and cleanup.

To get case closure for the release, the responsible party must provide evidence that the release does not pose a significant threat to human health and safety, the environment or water resources; or, that the release has been adequately investigated and cleaned up. Fuel leak investigation and cleanup is closely monitored by a caseworker, and the case is promptly closed when the unauthorized release no longer poses a threat to human health, safety, the environment or water resources.

Current Status

As of January 2000, a total of 2,315 fuel leak cases have been reported in the County, the majority of which have affected groundwater. Approximately 1,650 (71 percent) of reported leak cases have been closed. About 575 cases are currently within the District's UST program, while about 75 cases receive Regional Board oversight. As a local oversight program, the District has made significant progress in closing low-risk sites and sites that have performed appropriate corrective action to reduce contamination to below levels of regulatory concern.

The presence of Methyl tert-Butyl Ether (MTBE) in gasoline has precipitated additional changes in the UST regulatory process and the manner in which sites are investigated and cleaned up. Since 1995, MTBE and other oxygenates have emerged as significant contaminants at fuel leak sites within the County, causing increased concern for the protection of groundwater resources. MTBE has been blended into gasoline in high percentages (up to 15 percent by volume) beginning in the winter of 1992 with the intent to significantly improve air quality. However, MTBE is a recalcitrant chemical in groundwater, as it does not undergo significant breakdown (bio-degradation) in groundwater. As a result, MTBE contamination can migrate considerable distances in groundwater and may impact wells miles downgradient. MTBE has been detected at more than 375 current fuel leak cases in the County, with concentrations at these sites ranging from 5 parts per billion to more than 1 million parts per billion. The District has taken a progressive and vigilant approach to protecting groundwater resources from MTBE contamination through the use of GIS to manage and analyze both UST site and regional information and in demanding a more intense and detailed level of work be performed at MTBE release sites.

The District is also very concerned regarding the increasing occurrence of MTBE at operating gasoline stations, which poses a significant threat to municipal drinking water wells within the County. In response to this threat, the District completed two studies of operating gasoline stations that were in compliance with the 1998 UST upgrade requirements. The first study, completed by Levine-Fricke in 1999, involved soil and groundwater sampling at 28 facilities to determine if releases were occurring from upgraded UST systems. MTBE was detected in groundwater at 13 of the 27 sites where groundwater was encountered. The second study, completed in 2000 (SCVWD, 2000), was a case study of 16 sites with operating USTs and high levels of MTBE in groundwater to evaluate whether undetected releases are occurring and to assess weaknesses in fuel storage, management, and delivery operation. Of the 16 sites studied, undetected releases were suspected at 13 sites.

Despite the fact that gasoline stations have been upgraded to meet stringent requirements, it is clear that faulty installations, poor maintenance and poor facility operation practices are resulting in leaks, and that improvements in the management of USTs are needed to prevent widespread contamination of groundwater.

Future Direction

The District continues to provide technical guidance and regulatory oversight to cases using improved scientific knowledge and latest investigation and cleanup strategies. The District will continue to work closely with local universities, research organizations, the water community, major oil companies, local, state and federal agencies, and the state and federal legislature to ensure that problems in the UST program are identified and that prompt effective solutions are implemented to protect groundwater quality.

An effective UST leak prevention and monitoring program is essential. There are several studies underway regarding the effectiveness of leak prevention and monitoring systems at sites. The District will continue to monitor all developments in this area and propose ongoing studies and/or regulatory changes. To ensure water resources are protected, the District actively participates in the legislative process to ensure that recalcitrant chemicals like MTBE that can cause significant groundwater degradation are not used in fuels.

One of the biggest concerns for the District regarding MTBE is the significance of both short-term and long-term threats to groundwater quality. The District is committing additional resources to gain a more extensive understanding of the groundwater basin, groundwater flow patterns, and groundwater pumping trends. This improved understanding allows for better decisions regarding: the level of oversight necessary at sites; how much investigation is required to properly understand the nature and extent of contamination at sites; the level of cleanup necessary to protect groundwater resources; and the effectiveness of the program in preventing significant short-term and long-term water quality degradation.

The District will continue responding to the public regarding USTs and groundwater contamination and will ensure that files and information are available for public review.

District staff plan to have all fuel leak files scanned and electronically accessible over the Internet in the near future. Program guidance, site information, and news of the latest developments in the program are available on the District's web site.

TOXICS CLEANUP

Program Objective

The objective of the Toxics Cleanup Program is to ensure the protection of the groundwater basins from water quality degradation as a result of toxics and solvent contamination and spills of other non-fuel chemicals. The District performs peer review of these cases and makes water use and geologic information available to the public and environmental consultants. District staff also provide expert technical assistance to the regulatory agencies (County of Santa Clara, San Francisco and Central Coast Regional Boards, Department of Toxics Substances Control, and the Federal Environmental Protection Agency) responsible for the oversight of investigation and cleanup at non-fuel contaminated sites within Santa Clara County.

Background

Since the late 1970s, the District has provided expert technical and hydrogeologic assistance to agencies having the legal responsibility for the protection of the water resources serving the needs of Santa Clara County. The discovery of groundwater contamination at Fairchild Semiconductor in 1981 resulted in heightening the awareness for the protection of groundwater quality and the need for the District to be actively involved in ensuring that appropriate investigation and cleanup of sites was undertaken in a timely manner. District staff were actively involved with the review and analysis of early laws governing the regulation of underground storage tanks and hazardous materials and in laws, regulations, and policies to ensure groundwater resource protection. District staff have documented the migration of contamination down abandoned wells and conduits and fashioned a well installation and destruction ordinance to ensure that wells were properly installed and potential conduits properly destroyed.

Current Status

The District has records of over 700 releases of non-fuel related cases involving the release of solvents, metals, pesticides, Polychlorinated Biphenyls (PCBs), and a variety of other chemicals in Santa Clara County. The San Francisco Bay RWQCB provides regulatory oversight on over 600 cases in the Santa Clara Valley and Coyote Subbasins. The Central Coast RWQCB provides oversight on an estimated 35 cases in the Llagas Subbasin. The California Department of Toxics Substances Control provides oversight of 17 cases and the Federal EPA provides oversight of 11 sites.

The District maintains an elaborate filing system for these cases that is heavily used by the environmental consultants and the public researching contaminated sites. District staff actively track and peer review the most serious of these cases (primarily the Superfund sites). Staff provide review and comment on Site Cleanup Requirements and Cleanup and Abatement Orders prepared by the Regional Boards and investigation and cleanup reports prepared for these sites. The District provides geologic and technical expertise to responsible parties (site owners and operators) and their consultants and staff, and regularly participate in various committees and public meetings to ensure groundwater protection issues are properly addressed.

Future Direction

The District plans to continue these efforts in addition to conducting a review of all the recorded cases to ensure that all have been properly addressed by the various regulatory agencies. Many cases have remained "inactive" and may not have performed appropriate investigation and cleanup. The District plans to inform the regional boards and other agencies of these reviews and assist them to ensure appropriate work is performed. The District also plans to make more information available regarding geologic conditions and the status of solvent and toxics cases in GIS and over the Internet.

LAND USE AND DEVELOPMENT REVIEW

Program Objective

The objective of the Land Use and Development Review Program is to evaluate the land use and developments occurring within the County for adverse impacts to watercourses under District jurisdiction and to other District facilities, including the pollution of groundwater.

Background

Land development decisions made by the cities and the County influence a variety of issues related to water quality and quantity. The District reviews land development proposals, identifies any potential adverse impacts to District facilities and provides comments to the lead agency charged with making the final decision for the proposals. The District also reviews Draft Environmental Impact Reports (DEIRs) and/or EIRs and provides comments to the lead agency.

Current Status

The District reviews and comments on proposed land development, environmental documents and city and County General plans. Review of land development proposals includes a determination of direct and indirect impacts to District facilities. Indirect impacts could result from increased runoff and flooding due to new impervious surface or introduction of pollutants to a watercourse from construction activities or urban runoff. Direct impacts to watercourses under District jurisdiction are addressed through the District's permitting program as defined by Ordinance 83-2.

This ordinance allows the District to investigate whether a proposed project or activity will:

a. Impede, restrict, retard, pollute or change the direction of the flow of water.

b. Catch or collect debris carried by such water.

c. Be located where natural flow of the storm and flood waters will damage or carry any structure or any part thereof downstream.

d. Damage, weaken, erode, or reduce the effectiveness of the banks to withhold storm and flood waters.

e. Resist erosion and siltation and prevent entry of pollutants and contaminants into water supply.

f. Interfere with maintenance responsibility or with structures placed or erected for flood protection, water conservation, or distribution.

If a project appears likely to do any of the above, the District may deny or conditionally approve the permit application for the proposed project.

Future Direction
The California Environmental Quality Act (CEQA) provides the District an opportunity to comment in areas relevant to the issues listed above; however, cities need to make certain these issues are adequately addressed and treated. The use of Ordinance 83-2 and CEQA have generally not effected adequate attention to these issues.

In years past the District has relied on local agencies to place conditions on development projects and to include provisions that address District water supply and flood protection measures. The recent increase in development and land use coupled with more stringent environmental concerns and requirements imposed by other regulatory agencies has made it necessary for the District to shift to a more proactive approach and to undertake greater participation in development planning activities. District land use and development review staff plan to participate on interagency project teams, conduct general plan review and revision, and development of relevant policies (such as riparian corridor and building setback policies). The program will also seek revisions to Ordinance 83-2, and greater education of land development planning staff and officials.

Additional Groundwater Quality Management Activities

Groundwater Guardian Affiliate
The District was designated as Groundwater Guardian Affiliate for the year 2000. Groundwater Guardian is an annually earned designation for communities and affiliates that take voluntary, proactive steps toward groundwater protection. The district earned the designation in 2000 based on activities such as conducting irrigation, nutrient, and pesticides management seminars, sponsoring a mobile irrigation management laboratory, and creating a prototype zone of contribution delineation tool for delineating wellhead protection areas. The Groundwater Guardian Program is sponsored by The Groundwater Foundation, a private, international, not-for-profit education organization that educates and motivates people to care about and for groundwater. The District will continue to participate in the program by submitting annual work plans and reports documenting our groundwater protection efforts.

Comprehensive Reservoir Watershed Management

The District has initiated a Comprehensive Reservoir Watershed Management Project to protect the water quality and supply reliability of the District's reservoirs. 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 drinking water quality delivered to the District treatment plants and recharged into the groundwater basins.

Watershed Management Initiative

The District is an active participant in the San Francisco Bay Regional Water Quality Control Board's Santa Clara Basin Watershed Management Initiative (WMI). The purpose of the WMI is to develop and implement a comprehensive watershed management program. The goals of the WMI include balancing the objectives of water supply management, habitat protection, flood management, and land use to protect and enhance water quality, including the quality of water used for groundwater recharge and water in the groundwater basins. The WMI will develop a watershed management plan that will set out agreed upon actions to meet stakeholder goals, including water quality protection and enhancement.

Non-Point Source Pollution Control

The District along with other agencies is the co-permittee for National Pollution Discharge Elimination System (NPDES) permit number CAS029718. The co-permittees formed the Santa Clara Valley Urban Runoff Management Program in 1990 to develop and implement efficient and uniform approaches to control non-point source pollution in storm water runoff that flows to the South San Francisco Bay, in compliance with NPDES permit responsibilities.

Chapter 6
SUMMARY

The many groundwater management programs and activities described in this document demonstrate that the District is proactive and effective in terms of ensuring that groundwater resources are sustained and protected. A summary of existing District groundwater programs is presented here, organized by report section.

Groundwater Supply Management
The objective of the District's groundwater supply management programs is to sustain groundwater resources by replenishing the groundwater basin, increasing basin supplies, and mitigating groundwater overdraft. This is currently achieved through:

- In-stream recharge, including controlled and uncontrolled recharge through District facilities.
- Off-stream recharge through District percolation ponds and abandoned gravel pits, including activities to reduce turbidity of incoming water.
- Periodic water balance to reconcile water imports, inflows, releases, and changes in surface water storage.
- Direct injection recharge facilities.
- Water use efficiency programs.
- Estimation of operational storage capacity.
- Subsidence and groundwater flow modeling to evaluate potential impacts to the groundwater basin.
- Public outreach and education for water use efficiency programs.

Groundwater Monitoring
The District's groundwater monitoring programs provide basic data to assist in the evaluation of groundwater conditions. Programs include:

- Groundwater quality monitoring, including sampling for general minerals, trace metals, and physical characteristics.
- Groundwater elevation monitoring, including depth-to-water measurements and the development of groundwater contour maps.
- Groundwater extraction monitoring, which tracks groundwater use throughout the County.

- Land subsidence monitoring, which measures existing subsidence.

Groundwater Quality Management

Existing programs designed to protect the groundwater from contamination and the threat of contamination include the following:

- Nitrate management program designed to delineate, track, and manage nitrate contamination by monitoring nitrate occurrence, and by reducing further loading and the public's exposure to nitrate.

- Saltwater intrusion prevention program to prevent freshwater aquifers from degradation through monitoring and the sealing of contaminant conduit wells.

- Well construction and destruction programs to protect groundwater resources by ensuring that wells will not allow the vertical transport of contaminants.

- Wellhead protection program to identify areas of the basin that are particularly vulnerable to contamination to focus groundwater protection, monitoring, and cleanup efforts.

- Leaking underground storage tank oversight program to protect the groundwater from water quality degradation and provide regulatory oversight of investigation and cleanup of fuel releases from underground tanks.

- Toxics cleanup program to protect the basin from contamination by non-fuel chemicals.

- Land use and development review to evaluate land use proposals in terms of potential adverse impacts to District facilities.

- Public outreach and education for groundwater quality management programs.

Recommendations

In 1999, the District Board of Directors established Ends Policies that direct the Chief Executive Officer/General Manager to achieve specific results or benefits. The following Ends Policies are related to groundwater:

E.1.1.2. The water supply is reliable to meet current demands.
E.1.1.3. The water supply is reliable to meet future demands as identified in the District's Integrated Water Resource Plan (IWRP) process.
E.1.1.4. There are a variety of water supply sources.
E.1.1.5. The groundwater basins are aggressively protected from contamination and the threat of contamination.
E.1.1.6. Water recycling is expanded consistent with the District's Integrated Water Resource Plan (IWRP) within Santa Clara County.
E.1.2.2.3. Groundwater supplies are sustained.

Two of the Ends Policies directly relate to the management of groundwater resources: 1.1.5 - The groundwater basins are aggressively protected from contamination and the threat of contamination, and 1.2.2.3 - Groundwater supplies are sustained. As the District is now formally guided by these policies, we need to ensure that program outcomes match these ends.

Although the District manages the basin effectively, there is room for improvement of the groundwater programs in terms of meeting the Ends Policies and in the coordination and integration of the programs. Specific areas where further analysis is recommended include:

1. **Coordination between the Groundwater Management Plan and the Integrated Water Resources Plan (IWRP) –** As the District's water supply planning document through 2040, the IWRP has identified the operation of the groundwater basin as a critical component to help the District respond to changing water supply and demand conditions. Planning and analysis efforts for future updates of the Groundwater Management Plan and the IWRP need to be integrated in order to provide a coordinated and comprehensive water supply plan for Santa Clara County.

2. **Integration of groundwater management programs and activities –** Individual groundwater management programs tend to be implemented almost independently of other programs. A more integrated approach to the management of these programs, and to the management of the basin overall needs to be developed. Integration of these programs and improved conjunctive use strategies will result in more effective basin management.

3. **Optimization of recharge operations –** As artificial recharge is critical to sustaining groundwater resources, an analysis of the most effective amount, location, and timing of recharge should be conducted.

4. **Improved understanding of the groundwater basin –** In general, the existing groundwater management programs seem to focus on managing the basin to meet demands and protecting the basin from contamination and the threat of contamination. However, improving the District's understanding of the complexity of the groundwater basin is critical to improved groundwater management. The more we know about the basin, the better we can analyze the impact of different groundwater scenarios and management alternatives.

5. **Effective coordination and communication with internal and external agencies –** Improved communication and coordination will lead to improved groundwater management programs. Increased sharing of ideas, knowledge, and technical expertise among people involved with groundwater at the District will result in increased knowledge, well-coordinated and efficient work, and well-informed analyses and conclusions. Improved coordination with external agencies, such as retailers and state and federal organizations, will result in improved knowledge of customer needs and increased awareness of District activities.

A detailed analysis of the areas above and of all groundwater programs as they relate to Ends Policies and the groundwater management goal is recommended.

The next update of the Groundwater Management Plan, scheduled for 2002, will address the issues above and the overall management of the basin by presenting a formal groundwater management strategy for achieving the groundwater management goal in a practical, cost-effective, and environmentally-sensitive manner. The update will evaluate each groundwater program's contribution and effectiveness in terms of the groundwater management goal and Ends Policies. Measurement criteria will be developed, and if there is no direct connection between the Ends Policies and a specific program, that program's contribution to other linked programs will be analyzed. The update will include recommendations for changes to existing programs or for the development of new programs, standards, or ordinances. The update will also develop an integrated approach for the management of groundwater programs, and for the management of the groundwater basin in general.

Groundwater is critical to the water supply needs of Santa Clara County. Therefore, it is of the utmost importance that the District continues the progress begun with this Groundwater Management Plan. Increased demands and the possibility of reduced imported water in the future make effective and efficient management of the groundwater basin essential. The Groundwater Management Plan and future updates will identify how the management of the groundwater basin can be improved, thereby ensuring that groundwater resources will continue to be sustained and protected.

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Appendix G

Annual Well Production and Depth to Water

Annual well production and depth to water

Fiscal Year	05/06		06/07		07/08		08/09		09/10	
	Production AF	Depth to water in ft.	Production AF	Depth to water in ft.	Production AF	Depth to water in ft.	Production AF	Depth to water in ft.	Production AF	Depth to water in ft.
ZONE I										
Well 2-02	250	41	424	80	337	90	704	102	430	60
Well 3-02	149	29	157	62	161	70	311	65	134	44
Well 4	1,211	45	1,154	70	1,373	93	800	90	850	80
Well 5-02	195	23	183	65	77	60	207	53	207	24
Well 7	952	50	824	30	769	98	984	60	645	61
Well 12	780	28	781	45	385	50	152	85	967	45
Well 13-02	907	50	825	60	941	70	1,158	120	1,068	60
Well 14	181	49	177	70	279	74	505	85	238	52
Well 16-02	746	30	1,083	45	176	47	239	34	301	20
Well 18-02	356	35	478	23	831	60	769	109	869	50
Well 21	1,461	20	1,408	10	1,570	44	1,301	52	1,335	36
Well 22-02	99	69	414	40	312	90	459	95	229	76
Well 25	167	49	184	40	146	85	138	68	131	60
Well 26	420	14	1,076	16	758	15	385	17	684	20
Well 28	194	50	269	84	256	50	213	84	543	65
Well 30	136	29	197	57	146	62	279	64	142	43
Well 34	NA	NA	0	15	828	15	1,053	155	453	146
Well 36	NA	NA	1	35	1	26	0	30	1	14
ZONE II										
Well 6	1,529	132	1,456	65	1,087	116	0	110	0	60
Well 8	924	85	962	110	788	30	643	112	264	110
Well 9-02	389	105	507	105	363	120	531	135	570	120
Well 10	878	80	742	110	1,401	152	1,749	140	1,550	105
Well 11	263	51	145	84	81	89	181	79	469	100
Well 17-02	432	75	356	115	449	113	427	105	340	94
Well 23	589	71	168	105	1,204	110	812	108	0	89
Well 24	787	72	996	110	811	110	732	137	590	85
Well 29	208	120	196	165	397	180	328	170	267	148
ZONE IA										
Well 15	291	90	203	108	127	114	81	125	48	113

Appendix H

Santa Clara Valley Water District
Water Supply Planning

Santa Clara Valley Water District

Meeting Date: March 16, 20111
Agenda Item No.: 5.C.
Staff: James O'Brien
Extension: 2443

Status of Urban Water Management Planning

This item provides an update on the development of the District's 2010 Urban Water Management Plan (UWMP). Each urban water supplier is required to coordinate the preparation of its plan with other appropriate agencies in the area. The 13 water retailers are the primary stakeholders involved in the District's UWMP. Coordination with water retailers is primarily through the Retailer Water Supply Subcommittee. In addition, District staff has met with several of the retailers on an individual basis.

Portions of the preliminary draft 2010 UWMP were shared with the retailers upon request. The draft of the UWMP will be made available and discussed with the retailers at the next Water Supply Subcommittee meeting to be held in March (the exact date was unknown at the time of this writing). By the second week of April 2011, the draft of the 2010 UWMP will be made available to the public on the District's external website and hard copies will be made available at the District office for public review.

The public hearing on the draft 2010 Urban Water Management Plan will be opened on April 12th, 2011. Staff is requesting that the public hearing be continued since the *current version of the District's 2010 UWMP is draft and will be revised before the close of the public hearing.* Following the close of the public hearing, staff will address any comments received and revise the UWMP, as appropriate. Staff will then request that the Board adopt the final 2010 UWMP for submittal to DWR by the regulatory deadline of July 1, 2011 and/or within 30 days of adoption.

The UWMP is being prepared consistent with the California Urban Water Management Planning Act (Act), Water Code Division 6, Part 2.6, Sections 10610 through 10656. The Act requires publicly and privately-owned urban water suppliers with greater than 3,000 customers or greater than 3,000 acre-feet per year for municipal purposes to prepare and adopt an UWMP every five years. The 2010 UWMPs are due to the California Department of Water Resources (DWR) by July 1, 2011. Note that an urban water supplier would be ineligible for state grant funding or receive drought assistance from the state until the urban water management plan is prepared, adopted and submitted to DWR.

SBX7 7 requires a statewide 20% reduction in urban per capita water use by 2020 and requires urban retail water suppliers to adopt year 2015 and 2020 water use targets. Water wholesalers, such as the District, are only required to include an assessment of current and future actions to help retail water suppliers achieve their water use targets.

The District's UWMP includes a general discussion on the history of Santa Clara Valley Water District as well as information on climate, climate change, demographics, and the economy of Santa Clara County. Water supply sources including groundwater, local surface water, imported water, water recycling and efforts related to desalination are also described. In addition, the

UWMP includes information on historical water use, water conservation programs, demand projections, water shortage contingency and supply interruption planning, water quality, reliability and threats to reliability. The plan examines the water supply outlook in the County through the year 2035 under different hydrologic conditions (normal year, single dry year and multiple dry years) in accordance with DWR guidelines.

The basis for water demands included in the District's UWMP, is retailer provided water demand projections by source as required by the Urban Water Management Planning Act (§ 10631(k)). The District performed a separate water demand forecast to gain insight into the projected growth dynamics of the county and to better understand the demands provided by water retailers. This forecast is based on ABAG Projections 2009 and is reasonably close to the water demand projections provided by the retailers to date.

The supply and demand comparison performed as part of the development of the 2010 UWMP, indicates that annual supplies, which exclude carryover storage, begin to fall below projected demands under normal water year conditions between the years 2025 and 2030. The comparison also shows that carryover storage between the years 2020 and 2025 begins to be depleted which would require increases in both the magnitude and frequency of calls for water shortage contingency actions with time, unless a combination of new supplies, infrastructure, increased long term conservation, and changes in operational strategies are implemented. The required demand reductions after the year 2020 would exceed 20% for the multiple dry year period with the existing level of supplies and storage. This is outside the 0 - 20% target level identified as a planning constraint for the Water Supply and Infrastructure Master Plan (Water Master Plan). The appropriate target level of projected demand reductions within the 0-20% range will be evaluated as part of the Water Master Plan benefit cost analysis work.

Note, that the analysis performed for the UWMP is focused on supplies and demands at the countywide level and any localized issues such as conveyance limitation and potential local groundwater pumping issues are not addressed. These will be addressed in the Water Master Plan scheduled to be completed by August 2012.

Projected Demand Reductions Summary

Projected Demand Reductions[1]

Demand Year	Single Dry Year (1977)	Multiple Dry Years (1987 - 1992)					
		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
2015	0%	0%	0%	0%	0%	**10%**	**10%**
2020	0%	0%	0%	0%	0%	**20%**	**20%**
2025[2]	0%	**0 - 20%**	**0 - 20%**	**0 - 20%**	**0 - 20%**	**0 - 20%**	**0 - 20%**
2030[2]	**0 - 20%**	**0 - 20%**	**0 - 20%**	**0 - 20%**	**0 - 20%**	**0 - 20%**	**0 - 20%**
2035[2]	**0 - 20%**	**0 - 20%**	**0 - 20%**	**0 - 20%**	**0 - 20%**	**0 - 20%**	**0 - 20%**

Notes:

(1) Projected demand reductions are based on the modeling analysis performed for the 2010 UWMP with the implementation of water shortage contingency planning stages as summarized in Chapter 6 of the Draft 2010 UWMP. Water shortage contingency plan actions were developed for existing conditions including existing levels of supplies and storage.

(2) Projected demand reductions after the year 2020 would exceed 20% with the existing level of supplies and storage. This is outside the 0 - 20% target level identified as a planning constraint for the Water Supply and Infrastructure Master Plan (Water Master Plan). The appropriate target level of projected demand reductions within the 0-20% range will be evaluated as part of the Water Master Plan benefit cost analysis work.

Santa Clara Valley Water District

Appendix I

Letter from Paula Kehoe, San Francisco Public Utilities Commission

SFPUC
WATER
WASTEWATER
POWER

SAN FRANCISCO PUBLIC UTILITIES COMMISSION
1145 Market St., 4th Floor, San Francisco, CA 94103 • Tel. (415) 554-3271 • Fax (415) 554-3161 • TTY (415) 934-5770

March 31, 2011

Nicole Sandkulla
Senior Water Resources Engineer
Bay Area Water Supply and Conservation Agency
155 Bovet Road, Suite 302
San Mateo, CA 94402

Dear Nicole,

Attached please find additional information through 2035 on the Regional Water System's supply reliability for use in the Wholesale Customer's 2010 Urban Water Management Plan updates. The SFPUC has assessed the water supply reliability under the following planning scenarios:

- Projected Single dry-year supply for 2010
- Projected Multiple dry-year supply beginning 2010; and
- Projected supply reliability for years 2010-2035.

Table 1 summarizes deliveries to the Wholesale Customers for projected single dry-year supply for 2010 and projected multiple dry-year supply beginning 2010.

With regards to future demands, the SFPUC proposes to expand their water supply portfolio by increasing the types of water supply resources. Table 2 summarizes the water supply resources assumed to be available by 2035.

Concerning allocation of supply during dry years, the Water Shortage Allocation Plan ("Plan") was utilized to allocate shortages between the SFPUC and the Wholesale Customers collectively. The Plan implements a method for allocating water among the individual Wholesale Customers which has been adopted by the Wholesale Customers. The Plan was adopted pursuant to Section 7.03(a) of the 1984 Settlement Agreement and Master Water Sales Contract and has been updated to correspond to the terminology used in the June 2009 Water Supply Agreement between the City and County of San Francisco and Wholesale Customers in Alameda County, San Mateo County and Santa Clara County.

Finally, the SFPUC estimated the frequency and severity of anticipated shortages for the period 2010 though 2035. For this analysis, we assumed that the historical hydrologic period is indicative of future events and evaluated the supply reliability assuming a repeat of the actual historic hydrologic period 1920 through 2002. The results of this analysis are summarized in Table 3.

It is our understanding that you will pass this information on to the Wholesale Customers. If you have any questions or need additional information, please do not hesitate to contact me at (415) 554-0792.

Sincerely,

Paula Kehoe
Director of Water Resources

Table 1
Projected Deliveries for Three Multiple Dry Years

	2010	One Critical Dry Year	Deliveries during Multiple Dry Years in mgd		
			Year 1	Year 2	Year 3
System-Wide Shortage in Percent	0%	10%	10%	20%	20%
Wholesale Allocation (mgd)	184.0	152.6	152.6	132.5	132.5

Table 2

UWMP Studies: Water Supply Reliability Water Supply Options for Years 2010 through 2030						
	2010	2015	2020	2025	2030	2035
Crystal Springs Reservoir (20.28bg)		x	x	x	x	x
Westside Basin Groundwater afa		8,100	8,100	8,100	8,100	8,100
Calaveras Reservoir Recovery (31.5 bg)		x	x	x	x	x
Districts' Transfer afa		2240	2240	2240	2240	2240

Table 3: Projected System Supply Reliability Based on Historical Hydrologic Period

Allocation by Year	Wholesale Demand in mgd					
	184.0	184.0	184.0	184.0	184.0	184.0
	Projected Wholesale Allocation in mgd					
Delivery for Fiscal Year	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**
1920	184.0	184.0	184.0	184.0	184.0	184.0
1921	184.0	184.0	184.0	184.0	184.0	184.0
1922	184.0	184.0	184.0	184.0	184.0	184.0
1923	184.0	184.0	184.0	184.0	184.0	184.0
1924	184.0	184.0	184.0	184.0	184.0	184.0
1925	154.6	184.0	184.0	184.0	184.0	184.0
1926	184.0	184.0	184.0	184.0	184.0	184.0
1927	184.0	184.0	184.0	184.0	184.0	184.0
1928	184.0	184.0	184.0	184.0	184.0	184.0
1929	184.0	184.0	184.0	184.0	184.0	184.0
1930	184.0	184.0	184.0	184.0	184.0	184.0
1931	184.0	184.0	184.0	184.0	184.0	184.0
1932	132.5	152.6	152.6	152.6	152.6	152.6
1933	184.0	184.0	184.0	184.0	184.0	184.0
1934	184.0	184.0	184.0	184.0	184.0	184.0
1935	154.6	184.0	184.0	184.0	184.0	184.0
1936	184.0	184.0	184.0	184.0	184.0	184.0
1937	184.0	184.0	184.0	184.0	184.0	184.0
1938	184.0	184.0	184.0	184.0	184.0	184.0
1939	184.0	184.0	184.0	184.0	184.0	184.0
1940	184.0	184.0	184.0	184.0	184.0	184.0
1941	184.0	184.0	184.0	184.0	184.0	184.0
1942	184.0	184.0	184.0	184.0	184.0	184.0
1943	184.0	184.0	184.0	184.0	184.0	184.0
1944	184.0	184.0	184.0	184.0	184.0	184.0
1945	184.0	184.0	184.0	184.0	184.0	184.0
1946	184.0	184.0	184.0	184.0	184.0	184.0
1947	184.0	184.0	184.0	184.0	184.0	184.0
1948	184.0	184.0	184.0	184.0	184.0	184.0
1949	184.0	184.0	184.0	184.0	184.0	184.0
1950	184.0	184.0	184.0	184.0	184.0	184.0
1951	184.0	184.0	184.0	184.0	184.0	184.0
1952	184.0	184.0	184.0	184.0	184.0	184.0
1953	184.0	184.0	184.0	184.0	184.0	184.0
1954	184.0	184.0	184.0	184.0	184.0	184.0
1955	184.0	184.0	184.0	184.0	184.0	184.0
1956	184.0	184.0	184.0	184.0	184.0	184.0
1957	184.0	184.0	184.0	184.0	184.0	184.0
1958	184.0	184.0	184.0	184.0	184.0	184.0
1959	184.0	184.0	184.0	184.0	184.0	184.0

Delivery for Fiscal Year	2010	2015	2020	2025	2030	2035
1960	184.0	184.0	184.0	184.0	184.0	184.0
1961	152.6	184.0	184.0	184.0	184.0	184.0
1962	132.5	152.6	152.6	152.6	152.6	152.6
1963	184.0	184.0	184.0	184.0	184.0	184.0
1964	184.0	184.0	184.0	184.0	184.0	184.0
1965	184.0	184.0	184.0	184.0	184.0	184.0
1966	184.0	184.0	184.0	184.0	184.0	184.0
1967	184.0	184.0	184.0	184.0	184.0	184.0
1968	184.0	184.0	184.0	184.0	184.0	184.0
1969	184.0	184.0	184.0	184.0	184.0	184.0
1970	184.0	184.0	184.0	184.0	184.0	184.0
1971	184.0	184.0	184.0	184.0	184.0	184.0
1972	184.0	184.0	184.0	184.0	184.0	184.0
1973	184.0	184.0	184.0	184.0	184.0	184.0
1974	184.0	184.0	184.0	184.0	184.0	184.0
1975	184.0	184.0	184.0	184.0	184.0	184.0
1976	184.0	184.0	184.0	184.0	184.0	184.0
1977	152.6	184.0	184.0	184.0	184.0	184.0
1978	136.2	152.6	152.6	152.6	152.6	152.6
1979	184.0	184.0	184.0	184.0	184.0	184.0
1980	184.0	184.0	184.0	184.0	184.0	184.0
1981	184.0	184.0	184.0	184.0	184.0	184.0
1982	184.0	184.0	184.0	184.0	184.0	184.0
1983	184.0	184.0	184.0	184.0	184.0	184.0
1984	184.0	184.0	184.0	184.0	184.0	184.0
1985	184.0	184.0	184.0	184.0	184.0	184.0
1986	184.0	184.0	184.0	184.0	184.0	184.0
1987	184.0	184.0	184.0	184.0	184.0	184.0
1988	152.6	184.0	184.0	184.0	184.0	184.0
1989	132.5	152.6	152.6	152.6	152.6	152.6
1990	132.5	152.6	152.6	152.6	152.6	152.6
1991	132.5	132.5	132.5	132.5	132.5	132.5
1992	132.5	152.6	152.6	152.6	152.6	152.6
1993	136.2	132.5	132.5	132.5	132.5	132.5
1994	184.0	184.0	184.0	184.0	184.0	184.0
1995	154.6	184.0	184.0	184.0	184.0	184.0
1996	184.0	184.0	184.0	184.0	184.0	184.0
1997	184.0	184.0	184.0	184.0	184.0	184.0
1998	184.0	184.0	184.0	184.0	184.0	184.0
1999	184.0	184.0	184.0	184.0	184.0	184.0
2000	184.0	184.0	184.0	184.0	184.0	184.0
2001	184.0	184.0	184.0	184.0	184.0	184.0
2002	184.0	184.0	184.0	184.0	184.0	184.0

Appendix J

Utilization Factors for Individual Wells

ZONE I

Well No.	Capacity (gpm)	Production AF/Y FY04/05	Production AF/Y FY05/06	Production AF/Y FY06/07	Production AF/Y FY07/08	Production AF/Y FY08/09	Production AF/Y FY09/10	Utilization Factor
1-02	0	0	0	0	0	0	0	Inactive
2-02	2,017	503	250	424	303	704	430	13%
3-02*	1,778	211	149	157	149	311	134	6%
4	1,010	1,440	1,211	1,154	1,333	800	850	69%
5-02	1,719	213	195	183	70	207	207	6%
7	1,398	145	952	824	752	984	645	32%
12	1,454	625	780	781	385	152	967	26%
13-02	1,650	784	907	825	876	1,158	1,068	35%
14	1,095	252	181	177	257	505	238	15%
16-02	1,134	1,681	746	1,083	176	239	301	39%
18-02	1,288	329	356	478	793	769	869	29%
19	0	0	0	0	0	0	0	Inactive
20-02	0	0	0	0	0	0	0	Inactive
21*	1,580	1,280	1,461	1,408	1,502	1,301	1,335	54%
22-02	1,209	252	99	414	291	459	229	15%
25	929	163	167	184	136	138	590	15%
26	878	201	420	1,076	713	385	131	34%
28*	2,021	314	194	269	228	213	684	10%
30	1,445	198	136	197	132	279	543	11%
32	0	0	0	0	0	0	0	0%
34	944	0	0	0	767	1,053	453	25%

ZONE II

Well No.								
6	1,623	1418	1,529	1,456	1,087	0	0	35%
8	1,111	698	911	962	770	643	264	40%
9-02	1,143	246	389	507	314	531	570	23%
10	1,674	884	878	742	1,296	1,749	1,550	44%
11**	1,820	219	263	145	81	181	469	8%
17-02*	2,126	365	432	356	449	427	340	12%
23	1,802	1,076	589	168	1,117	812	0	22%
24	1,435	549	787	996	735	732	590	32%
29	1,936	279	208	196	373	328	267	9%

ZONE IIa

Well No.								
15	1,096	305	291	203	123	81	48	10%

Totals	39,315	14,630	14,479	15,362	15,209	15,141	13,773	23%

Appendix K

Draft Water Shortage Contingency Resolution

RESOLUTION NO. __________

A RESOLUTION OF THE CITY OF SANTA CLARA, CALIFORNIA, AUTHORIZING THE IMPLEMETNATION OF THE WATER UTILITY WATER SHORTAGE CONTINGENCY PLAN.

BE IT RESOLVED BY THE CITY OF SANTA CLARA AS FOLLOWS:

WHEREAS, all water furnished to consumers by the City of Santa Clara shall be charged, paid for and supplied only in accordance with such applicable schedules, rules and regulations as the City Council shall adopt pursuant to the provisions of Section 13.15.010 [entitled "Purpose and Intent"] (formerly § 31-1) of "The Code of the City of Santa Clara, California" [City Code] and the Rules and Regulations for Water Service of the City of Santa Clara; and

WHEREAS, the City of Santa Clara ("Santa Clara") has determined that water demand within the City must be reduced by ____ % due to _____________(prolonged drought/ loss of imported supply, loss of well production); and,

WHEREAS, the City Council of the City of Santa Clara (the "Council") hereby determines that it is in the public interest and the best interests of Santa Clara to authorize the implementation of water use restrictions in order to reduce water demand within the City,

WHEREAS, the City Council of the City of Santa Clara (the "Council") hereby determines that it is in the public interest and the best interests of Santa Clara to authorize the implementation of water use restrictions and a modified water rate schedule in order to reduce water demand within the City,

NOW THEREFORE, BE IT FURTHER RESOLVED BY THE CITY OF SANTA CLARA AS FOLLOWS:

1. That ...

   A.

Plan	Plan 1	Plan 2	Plan 3	Plan 4
Drought Stage	Advisory	Voluntary	Mandatory	Emergency Curtailment
Reduction	Up to 10%	10% to 20%	21 to 49%	50% or greater
1. Water Use Reduction Target				
a) Single family	NA	80% - 90% of base year	50% -80% of base year	50% of base year
b) Master metered multi-family	NA	80% - 90% of base year	50% -80% of base year	50% of base year
c) Non-residential	NA	80% - 90% of base year	50% -80% of base year	50% of base year
2. Water Use Restrictions				
a) Water waste by irrigation	Prohibited	Prohibited	Prohibited	Prohibited
b) Cleaning sidewalks, hard surfaces, etc.	Prohibited	Prohibited	Prohibited	Prohibited
c) Washing vehicle w/o shut off valve on hose	Prohibited	Prohibited	Prohibited	Prohibited
d) Decorative fountains, operating maintaining	No restriction	Prohibited	Prohibited	Prohibited
e) Water for construction purposes	No restriction	Restricted (1)	Restricted (1)	Restricted (1)
f) Water waste due to effective plumbing / leaks	Prohibited	Prohibited	Prohibited	Prohibited
g) Landscape irrigation	No restriction	Prohibited from 9AM to 6PM	Prohibited from 9AM to 6PM	Prohibited
h) Restaurant water service unless patron requests	No restriction	Prohibited	Prohibited	Prohibited
i) New swimming pool or pond construction	No restriction	Restricted	Restricted	Prohibited
j) Filling or refilling swimming pools	No restriction	Restricted	Restricted	Prohibited
k) Hydrant flushing, except for health and safety	No restriction	Prohibited	Prohibited	Prohibited
l) New irrigation connections for new planting	No restriction	Restricted (2)	Restricted (2)	Prohibited (2)
m) Irrigation of golf courses except greens and tees	No restriction	No restriction	Restricted (1)	Restricted (1)
3. Enforcement				
a) First violation	Warning	Warning	Warning, Citation, up to $500 fine	Warning, Citation, up to $500 fine
b) Second violation	Warning	Warning	Warning, Citation, $100 to$1,000 fine	Warning, Citation, $100 to$1,000 fine
c) Subsequent violations	Warning, citation, $100 to$1,000 fine, flow restrictor	Warning, citation, $100 to $1,000 fine, flow restrictor	Warning, citation, $100 to $1,000 fine, flow restrictor, termination of service	Warning, citation, $100 to $1,000 fine, flow restrictor, termination of service
d) Restrictor removal charge	$50	$50	$50	$50
e) Second restrictor removal charge	$100	$100	$100	Remains for duration

(1) Recycled water only can be used; (2) New landscaping supplied by recycled water allowed without restriction.

2. Constitutionality, severability. If any section, subsection, sentence, clause, phrase, or word of this resolution is for any reason held by a court of competent jurisdiction to be unconstitutional or invalid for any reason, such decision shall not affect the validity of the remaining portions of the resolution. The City of Santa Clara, California, hereby declares that it would have passed this resolution and each section, subsection, sentence, clause, phrase, and word thereof, irrespective of the fact that any one or more section(s), subsection(s), sentence(s), clause(s), phrase(s), or word(s) be declared invalid.

4. Effective date. This resolution shall become effective immediately.

I HEREBY CERTIFY THE FOREGOING TO BE A TRUE COPY OF A RESOLUTION PASSED AND ADOPTED BY THE CITY OF SANTA CLARA, CALIFORNIA, AT A REGULAR MEETING THEREOF HELD ON THE ___ DAY OF _________, 2011, BY THE FOLLOWING VOTE:

AYES: COUNCILORS:

NOES: COUNCILORS:

ABSENT: COUNCILORS:

ABSTAINED: COUNCILORS:

ATTEST: ___________________________

ROD DIRIDON, JR.
CITY CLERK
CITY OF SANTA CLARA

Attachments incorporated by reference:
None

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Appendix L

Cutback and Allocation for Tier 2 Drought Implementation Plan

TABLE 3 - CALCULATION OF FINAL PURCHASE CUTBACK AND ALLOCATION FACTOR FOR TIER 2 DROUGHT IMPLEMENTATION PLAN (DRIP)

Overall Average Wholesale
Customer Reduction: 26.84%
Reduction from purchases in: FY 08-09

Base = 10.00%
Seasonal = 65.00%

Weighted average for Column 10:
0.33 =ISG component (Col. 2)
0.67 =Base/Seas component (Col. 9)

Variable component - Base/Seasonal Allocation (with ISG cap)
Minimum (Column 19) = 10.00%
Ceiling (Col. 21) = avg. cutback + 20.00%

Minimum residential per capita use threshold (Column 29) =
55.00 gpcpd

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	Agency Information		Initial Allocations Based on Weighted Fixed (ISG) and Variable (Base/Seasonal) Components Adjusting for SJ/SC												
			Base/Seasonal Allocations				1st SJ/SC Adjustment		Weighted Allocation				2nd SJ/SC Adjustment		
Wholesale Customers	**FY 08-09 SFPUC Purchases**	**Fixed Comp.**	**Lesser of Purchase or ISG**	**Base/ Seasonal Allocation Cutback**	**Base/ Seasonal Allocation**	**Base/ Seasonal Purchase Cutback**	**Subtotal Allocation Factors**	**Adjusted Base/Seasonal Allocation**	**Weighted ISG-Base/ Seasonal Avg**	**Allocation Factors**	**Weighted Shortage Allocation**	**Weighted Purchase Cutback**	**Subtotal Allocation Factors**	**Adjusted Weighted Shortage Allocation**	**Adjusted Weighted Purchase Cutback**
ACWD	11.24	13.76	11.24	-26.83%	8.22	-26.83%	7.19%	8.35	10.14	7.00%	8.37	-25.55%	7.26%	8.43	-24.99%
Brisbane/GVMID	0.62	0.98	0.62	-28.53%	0.44	-28.53%	0.39%	0.45	0.62	0.43%	0.52	-16.72%	0.45%	0.52	-16.10%
Burlingame	4.28	5.23	4.28	-25.29%	3.20	-25.29%	2.79%	3.25	3.90	2.70%	3.22	-24.70%	2.80%	3.24	-24.13%
Coastside	1.97	2.18	1.97	-25.29%	1.47	-25.29%	1.28%	1.49	1.72	1.19%	1.42	-27.83%	1.23%	1.43	-27.29%
CWS Total	35.84	35.68	35.68	-29.00%	25.33	-29.31%	22.15%	25.73	29.01	20.05%	23.95	-33.17%	20.79%	24.13	-32.67%
Daly City	4.10	4.29	4.10	-13.44%	3.55	-13.44%	3.11%	3.61	3.83	2.65%	3.16	-22.90%	2.75%	3.19	-22.32%
East Palo Alto	1.92	1.96	1.92	-22.38%	1.49	-22.38%	1.30%	1.51	1.66	1.15%	1.37	-28.55%	1.19%	1.38	-28.02%
Estero	5.14	5.90	5.14	-31.61%	3.52	-31.61%	3.08%	3.57	4.34	3.00%	3.58	-30.34%	3.11%	3.61	-29.82%
Hayward	18.97	25.11	18.97	-17.31%	15.69	-17.31%	13.72%	15.93	18.96	13.10%	15.65	-17.50%	13.59%	15.77	-16.88%
Hillsborough	3.68	4.09	3.68	-42.62%	2.11	-42.62%	1.85%	2.14	2.79	1.93%	2.30	-37.47%	2.00%	2.32	-37.01%
Menlo Park	3.34	4.46	3.34	-33.40%	2.23	-33.40%	1.95%	2.26	2.99	2.06%	2.47	-26.25%	2.14%	2.48	-25.69%
Mid Pen WD	3.16	3.89	3.16	-27.30%	2.30	-27.30%	2.01%	2.33	2.85	1.97%	2.35	-25.64%	2.04%	2.37	-25.08%
Millbrae	2.39	3.15	2.39	-24.36%	1.81	-24.36%	1.58%	1.84	2.27	1.57%	1.88	-21.65%	1.63%	1.89	-21.06%
Milpitas	6.91	9.23	6.91	-20.83%	5.47	-20.83%	4.79%	5.56	6.77	4.68%	5.59	-19.16%	4.85%	5.63	-18.56%
Mountain View	9.81	13.46	9.81	-27.98%	7.07	-27.98%	6.18%	7.18	9.25	6.39%	7.64	-22.19%	6.63%	7.69	-21.61%
North Coast	3.05	3.84	3.05	-21.34%	2.40	-21.34%	2.10%	2.43	2.90	2.00%	2.39	-21.50%	2.08%	2.41	-20.91%
Palo Alto	11.63	17.07	11.63	-34.49%	7.62	-34.49%	6.66%	7.74	10.82	7.48%	8.93	-23.23%	7.75%	9.00	-22.65%
Purissima Hills	2.01	1.62	1.62	-42.43%	0.94	-53.47%	0.82%	0.95	1.17	0.81%	0.97	-51.85%	0.84%	0.98	-51.49%
Redwood City	10.35	10.93	10.35	-28.65%	7.38	-28.65%	6.45%	7.50	8.63	5.96%	7.12	-31.15%	6.18%	7.18	-30.63%
San Bruno	1.94	3.25	1.94	-18.01%	1.59	-18.01%	1.39%	1.62	2.15	1.49%	1.78	-8.42%	1.54%	1.79	-7.74%
Stanford	2.27	3.03	2.27	-21.33%	1.78	-21.33%	1.56%	1.81	2.22	1.53%	1.83	-19.39%	1.59%	1.84	-18.79%
Sunnyvale	10.62	12.58	10.62	-25.20%	7.94	-25.20%	6.95%	8.07	9.56	6.60%	7.89	-25.72%	6.85%	7.95	-25.16%
Westborough	0.95	1.32	0.95	-13.97%	0.82	-13.97%	0.72%	0.83	0.99	0.69%	0.82	-13.86%	0.71%	0.82	-13.21%
Subtotal	156.19		156.19	-26.18%	114.37	-26.78%	100.00%	116.16	139.55		115.18	-26.26%	100.00%	116.05	-25.70%
San José	4.46	4.50	4.46	-30.84%	3.08	-30.84%		2.07	2.87	1.99%	2.37	-46.78%		2.15	-51.85%
Santa Clara	2.64	4.50	2.64	-23.65%	2.01	-23.65%		1.23	2.31	1.59%	1.90	-27.78%		1.27	-51.85%
Total	163.29		163.29	-26.33%	119.46	-26.84%		119.46	144.73	100.00%	119.46	-26.84%		119.46	-26.84%

	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)
	Adjustment for Minimum and Maximum Cutbacks														
	Minimum Cutback Adj.		Maximum Cutback Adjustment						Adjustment for East Palo Alto						
Wholesale Customers	**Adjusted for 10.00% Minimum Cutback**	**Add'l Cutback for Hardship Bank**	**Adjusted for 46.84% Maximum Cutback**	**Cutback Over Cap**	**Allocations Adjusted For Cap**	**Agencies To Which Cutback Over Cap Is Redistributed**	**Min/Max Adjusted Allocation**	**Adj. Min/Max Purchase Cutbacks**	**FY 08-09 Residential Per Capita**	**Agencies To Which EPA Adjustment Applies**	**Share of EPA Adjustment**	**Allocations With EPA Adjustments**	**Final Purchase Cutback**		**Final Allocation Factor**
ACWD	-24.99%		-24.99%		8.43	8.43	8.40	-25.29%	91.40	8.40	-0.019	8.376	-2.860	-25.45%	7.01%
Brisbane/GVMID	-16.10%		-16.10%		0.52	0.52	0.52	-16.43%	62.89	0.52	-0.001	0.516	-0.103	-16.62%	0.43%
Burlingame	-24.13%		-24.13%		3.24	3.24	3.23	-24.43%	89.50	3.23	-0.007	3.224	-1.052	-24.60%	2.70%
Coastside	-27.29%		-27.29%		1.43	1.43	1.42	-27.58%	68.30	1.42	-0.003	1.421	-0.545	-27.74%	1.19%
CWS Total	-32.67%		-32.67%		24.13	24.13	24.03	-32.94%	107.12	24.03	-0.054	23.977	-11.858	-33.09%	20.07%
Daly City	-22.32%		-22.32%		3.19	3.19	3.18	-22.63%	50.00			3.176	-0.929	-22.63%	2.66%
East Palo Alto	-28.02%		-28.02%		1.38	1.38	1.375	-28.30%	45.30		0.241	1.660	-0.257	-13.42%	1.39%
Estero	-29.82%		-29.82%		3.61	3.61	3.60	-30.10%	85.40	3.60	-0.008	3.588	-1.556	-30.26%	3.00%
Hayward	-16.88%		-16.88%		15.77	15.77	15.71	-17.21%	64.00	15.71	-0.035	15.670	-3.301	-17.40%	13.12%
Hillsborough	-37.01%		-37.01%		2.32	2.32	2.31	-37.26%	289.50	2.31	-0.005	2.303	-1.375	-37.40%	1.93%
Menlo Park	-25.69%		-25.69%		2.48	2.48	2.47	-25.99%	104.60	2.47	-0.006	2.468	-0.874	-26.16%	2.07%
Mid Pen WD	-25.08%		-25.08%		2.37	2.37	2.36	-25.38%	83.90	2.36	-0.005	2.354	-0.808	-25.55%	1.97%
Millbrae	-21.06%		-21.06%		1.89	1.89	1.88	-21.38%	75.70	1.88	-0.004	1.878	-0.516	-21.55%	1.57%
Milpitas	-18.56%		-18.56%		5.63	5.63	5.61	-18.88%	65.10	5.61	-0.013	5.595	-1.318	-19.06%	4.68%
Mountain View	-21.61%		-21.61%		7.69	7.69	7.66	-21.92%	78.80	7.66	-0.017	7.646	-2.169	-22.10%	6.40%
North Coast	-20.91%		-20.91%		2.41	2.41	2.40	-21.23%	57.10	2.40	-0.005	2.395	-0.652	-21.40%	2.00%
Palo Alto	-22.65%		-22.65%		9.00	9.00	8.96	-22.96%	107.00	8.96	-0.020	8.943	-2.691	-23.13%	7.49%
Purissima Hills	-51.49%		-46.84%	-0.094	1.07		1.07	-46.84%	302.70			1.069	-0.942	-46.84%	0.89%
Redwood City	-30.63%		-30.63%		7.18	7.18	7.15	-30.91%	85.40	7.15	-0.016	7.132	-3.214	-31.06%	5.97%
San Bruno	-10.00%	-0.044	-10.00%		1.75		1.75	-10.00%	66.20			1.748	-0.194	-10.00%	1.46%
Stanford	-18.79%		-18.79%		1.84	1.84	1.83	-19.11%	N/A	1.83	-0.004	1.831	-0.438	-19.29%	1.53%
Sunnyvale	-25.16%		-25.16%		7.95	7.95	7.92	-25.46%	89.20	7.92	-0.018	7.898	-2.721	-25.62%	6.61%
Westborough	-13.21%		-13.21%		0.82	0.82	0.82	-13.56%	48.50			0.822	-0.129	-13.56%	0.69%
Subtotal	-25.70%		-25.70%		116.09	113.28	115.65	-25.96%		107.46		115.689	-40.503	-25.93%	
San José	-51.85%		-46.84%	-0.223	2.37		2.37	-46.84%	63.20			2.370	-2.088	-46.84%	1.98%
Santa Clara	-51.85%		-46.84%	-0.132	1.40		1.40	-46.84%	85.80			1.401	-1.235	-46.84%	1.17%
Total	-26.84%	-0.044	-26.84%	-0.449	119.87	113.28	119.42	-26.87%		107.46	0.000	119.461	-43.826	-26.84%	100.00%

First SJ/SC Adjustment

1. Largest permanent customer cutba -53.47%
2a. Adjusted SC allocation: 1.23 (Applying largest permanent customer cutback)
2b. Santa Clara adjustment: -0.79 (Difference between initial and adjusted alloc.)
3a. Adjusted SJ allocation: 2.07 (Applying largest permanent customer cutback)
3b. San José adjustment: -1.01 (Difference between initial and adjusted alloc.)
4. Total Adjustment: -1.80 (2b + 3b)

Second SJ/SC Adjustment

1. Largest permanent customer cut -51.85%
2a. Adjusted SC allocation: 1.27
2b. Santa Clara adjustment: -0.63
3a. Adjusted SJ allocation: 2.15
3b. San José adjustment: -0.23
4. Total Adjustment: -0.86

****All values in MGD unless noted otherwise***

Column Notes

Agency Information
(1) SFPUC Purchases: From Tab 1.
(2) Fixed Component: Individual Supply Guarantees for most agencies from Tab 1; 4.5 mgd for SJ & SC; projected 2018 demand before conservation used as surrogate for Hayward

Base/Seasonal Allocations
(3) Lesser of Purchase or ISG: The lesser of column (1) or column (2).
(4) Base/Seasonal Allocation Cutback: From Tab 3, column (17).
(5) Base/Seasonal Allocation: column (3) reduced by the Base/Seasonal cutback in column (4).
(6) Base/Seasonal Purchase Cutback: The change between column (5) and column (1) shown as a percentage.

First San Jose/Santa Clara Adjustment: This adjustment is made so that Santa Clara's and San José's cutbacks are at least as great as the highest cutback by the permanent customers.
(7) Subtotal Allocation Factors: The ratio of each permanent agency's column (5) allocation to the column (5) subtotal.
(8) Adjusted Base/Seasonal Allocation: Redistributes "First SJ/SC Adjustment" line 4 value among the permanent customers based on the proportionate shares in column (8).

Allocations Based on Weighted ISG/Base Seasonal Average
(9) Weighted ISG/Base-Seasonal Avg: 33% of column (2) plus 67% of column (8).
(10) Allocation Factors: Each agency's proportionate share of column (9).
(11) Weighted Shortage Allocation: Column (9) times the available water supply (column (5) total).
(12) Weighted Purchase Cutback: The change between column (11) and column (1) shown as a percentage.

Second San Jose/Santa Clara Adjustment: This adjustment is made so that Santa Clara's and San José's cutbacks are at least as great as the highest cutback by the permanent customers.
(13) Subtotal Allocation Factors: The ratio of each permanent agency's column (11) allocation to the column (11) subtotal.
(14) Adjusted Weighted Shortage Allocation: Redistributes "Second SJ/SC Adjustment" line 4 value among the permanent customers based on the proportionate shares in column (13).
(15) Adjusted Weighted Purchase Cutback: The change between column (14) and column (1).

Column Notes

Adjustment for Minimum Cutback: This adjustment forces a 10% minimum cutback with the reallocated water being placed in a hardship bank for later application to East Palo Alto.
(16) Adjusted for 10% Minimum Cutback: Decreases any percentage cutback in column (15) that is less than the minimum 10% floor to equal the 10% floor.
(17) Additional Cutback for Hardship Bank: The difference between column (15) and column (16) times column (1).

Adjustment for Maximum Cutback: This adjustment is made so that the maximum cutback applied to any agency is equal to the Overall Average BAWSCA Reduction + 20%.
(18) Adjusted for Maximun Cutback: Caps the cutbacks in column (18) to no more than 20% more than the average cutback.
(19) Cutback Over Cap: The difference between column (18) and column (15) times column (1).
(20) Allocations Adjusted for Cap: Purchases in column (1) reduced by the cutbacks in column (18).
(21) Agencies to Which Cutback Over Cap is Redistributed: Agencies that are not subject to the minimum or maximum adjustments in columns (17) and (19).
(22) Minimum/Maximum Adjusted Allocation: Redistributes the excess cutback in column (19) by the proportions in column (21) to agencies shown in column (21).
(23) Adjusted Minm/Max Purchase Cutbacks: The change between column (22) and column (1) shown as a percentage.

Adjustment for East Palo Alto (Low Residential Gallons per Capita per Day Adjustment)
(24) Residential Per Capita Usage: From Tab 1.
(25) Agencies To Which EPA Adjustment Applies: Column (22) agency allocations, except those whose GPCD is less than 55 GPCD & those who are impacted by the min./max. cutback .
(26) Share of EPA Adjustment: EPA value equal to difference 50% of the Overall Average Wholesale Customer Reduction and the sum of column (17) total (Hardship Bank value) and EPA allocation in column (22). Indivdiual agency proportionate shares of EPA's adjustment based on column (25).
(27) Allocation with EPA Adjustment: Column (22) plus column (26).

Final Allocations
(28) Final Purchase Cutback: Column (27) minus column (1) expressed as MGD
(29) Final Purchase Cutback: The change between column (31) and column (1) shown as a percentage.
(30) Final Allocation Factor: Each agency's allocation from Column (27) divided by the total water allocated to the wholesale agencies (total in Column (27)), shown as a percentage

Appendix M

Water Service and Use Rules and Regulations for Water Conservation in Landscaping

WATER CONSERVATION IN LANDSCAPING

EXCERPT FROM
WATER SERVICE AND USE
RULES AND REGULATIONS

PASSED AND ADOPTED BY CITY COUNCIL
DATE OF ADOPTION: JANUARY 11, 2011
ORDINANCE NO. 1871

TABLE OF CONTENTS

24. WATER CONSERVATION IN LANDSCAPING

24.A **PURPOSE**

The purpose of these Rules and Regulations is to promote efficient water use in landscaping by promoting use of region-appropriate plants that require minimal supplemental irrigation, and by establishing standards for irrigation efficiency. Irrigation efficiencies are accomplished through proper landscape design, installation and management techniques appropriate to Santa Clara's growing conditions. These Rules and Regulations implement the California Water Conservation in Landscaping Act, Government Code Section 65591 et. seq.

24.B **APPLICABILITY**

24.B.1 Except as provided in Subsection 24.B.2. below, these Rules and Regulations shall apply to:

- 24.B.1.(a) Projects that are subject to architecture and site approval, building site approval (for new dwellings), grading permit or use permit.
- 24.B.1.(b) New single-family or two-family dwellings for which a building permit is required.
- 24.B.1.(c) New and rehabilitated cemeteries, are limited to sections 24.I, 24.L, and 24.O of these Rules and Regulations

24.B.2 These Rules and Regulations shall not apply to:

- 24.B.2.(a) Any project with a landscaped area less than 2,500 square feet.
- 24.B.2.(b) Registered local, state or federal historical sites;
- 24.B.2.(c) Mine reclamation projects that do not require a permanent irrigation system;
- 24.B.2.(d) Any ecological restoration project that does not require a permanent irrigation system;
- 24.B.2.(e) Community gardens or plant collections, as part of botanical gardens and arboretums open to the public;
- 24.B.2.(f) Any commercial cultivation or agricultural products, including by not limited to products of farms, orchards, production nurseries and forests;
- 24.B.2.(g) Any project that uses, primarily, Recycled Water for irrigation purposes;

24.C **DEFINITIONS**

The terms used in this Section of these Rules and Regulations have the meaning set forth below:

Antidrain Valve or **Check Valve**: A valve located under a sprinkler head to hold water in the system so it minimizes drainage from the lower elevation sprinkler heads.

Application Rate: The depth of water applied to a given area, usually measured in inches per hour.

Applied Water: The portion of water supplied by the irrigation system to the landscape.

Automatic (Irrigation) Controller: An automatic mechanical or solid-state timing device, capable of remotely controlling valve stations that operate an irrigation system. Automatic irrigation controllers schedule irrigation events using evapotranspirtion or soil moisture data to set days and length of time of irrigation.

Backflow Prevention Device: A City-approved device that prevents pollution or contamination of the water supply due to the reserve flow of water into the City's water distribution system.

Certified Irrigation Designer: A person certified to design irrigation systems by an accredited academic institution, a professional trade organization, or other program such as the U.S. Environmental Protection Agency's WaterSense irrigation designer certification program, or the Irrigation Association's Certified Irrigation Designer program.

Certified Professional: A certified irrigation designer, certified landscape irrigation auditor, licensed landscape architect, licensed landscape contractor, licensed professional engineer, or any other person authorized by the State of California to design a landscape, an irrigation system or authorized to complete a water budget.

Conversion Factor (0.62): A number that converts the maximum applied water allowance from acre-inches per acre per year to gallons per square foot per year. The conversion factor is calculated as follows:

(325,829 gallons/43,560 sq. ft./12 inches = 0.62)
325,829 gallons = 1 acre-foot
43,560 square feet = 1 acre
12 inches = 1 foot

To convert gallons per year to 100 cubic feet per year, the City's billing unit for water, divide gallons per year by 748 (748 gallons = 100 cubic feet).

Ecological Restoration Project: A project where the site is intentionally altered to establish a defined, indigenous, historic ecosystem.

Effective Precipitation (Eppt) or Usable Rainfall: The portion of total precipitation that is available for plants. Precipitation is not a reliable source of water but can contribute to some degree toward the water needs of the landscape. For the purpose of this document, "effective precipitation" is twenty-five percent (25%) of local annual mean precipitation.

Emitters: Drip irrigation fittings that deliver water slowly from the system to the soil.

Established Landscape: The point at which plants in the landscape have developed roots into the soil adjacent to the root ball.

Establishment Period: The first year after installing the plant in the landscape.

Estimated Applied Water Use: The portion of the Estimated Total Water Use that is derived from applied water. The Estimated Applied Water Use shall not exceed the Maximum Applied Water allowance. The Estimated Applied Water Use may be the sum of the water recommended through the irrigation schedule as referenced herein.

Estimated Total Water Use (ETWU): The annual total amount of water estimated to be needed to keep the plants in the landscaped area healthy. It is based upon such factors as the local evapotranspiration (ET) rate, the size of the landscaped area, the types of plants, and the efficiency of the irrigation system, as described herein.

Evapotranspiration Adjustment Factor (ETAF): A factor of 0.7 that, when applied to reference Evapotranspiration, adjusts for plant factors and irrigation efficiency, two major influences upon the amount of water that needs to be applied to the landscape. ETAF for a Special Landscape Area shall not exceed 1.0. ETAF for existing non-rehabilitated landscapes shall not exceed 0.8.

A combined plant mix with a site-wide average of 0.5 is the basis of the plant factor portion of this calculation. The irrigation efficiency for the purpose of the ET Adjustment Factor is 0.71.

Evapotranspiration Rate: A quantity of water evaporated from adjacent soil and other surfaces and transpired by plants during a specific time.

Flow Rate: The rate at which water flows through the pipes, valves and emission devices. (gallons per minute, cubic feet per second, gallon per hour).

Hardscape: Any constructed feature in a landscape built of concrete, stone, wood, or other such pervious or non-pervious durable material. Includes, but is not limited to, patios, walkways, and retaining walls.

Hydrozone: A portion of the landscaped area having plants with similar water needs that are served by a valve or set of valves with the same schedule. A Hydrozone may be irrigated or non-irrigated. For example, a naturalized area planted with native vegetation that will not need supplemental irrigation once established is a non-irrigated Hydrozone.

Infiltration Rate: The rate of water entry into the soil expressed as a depth of water per unit of time (e.g. inches per hour).

Invasive Plant Species: Species of plants not historically found in California that spread outside cultivated areas and can damage environmental or economic resources. Invasive species may be regulated by agricultural agencies as noxious species. “Noxious weeds” means any weed designated by the Weed Control Regulations in the Weed Control Act and identified on a Regional District noxious weed control list. List of invasive plants are maintained at the California Invasive Plant Inventory and USDA invasive and noxious weeds database.

Irrigation Efficiency (IE): The measurement of the amount of water beneficially used divided by the amount of water applied. Irrigation efficiency is derived from measurements and estimates of irrigation system characteristics and management practices. The minimum irrigation efficiency for purposes of this ordinance is 0.71. Greater Irrigation Efficiency can be expected from well-designed and well-maintained systems.

Irrigation Survey: An evaluation of an irrigation system that is less detailed than an irrigation audit. An irrigation survey includes, but is not limited to: inspection, system test, and written recommendations to improve performance of the irrigation system.

Landscape Architect: A person who holds a license to practice landscape architecture in California as defined by the California Business and Professions Code, Section 5615.

Landscape Area: The entire parcel less the building footprint, driveways, sidewalks, gravel or stone walks, non-irrigated portions of the parking lot, hardscape such as decks and patios, and other pervious or nonpervious hardscapes. Water features are included in the calculation of the landscaped area. Areas dedicated to edible plants such as orchards or vegetable gardens are not included. Landscape area does not include other non-irrigated areas designated for non-development (e.g., open spaces and existing wildland vegetation).

Landscape Contractor: A person licensed by the State of California to construct, maintain, repair, install, or subcontract the development of landscape systems.

Landscape Irrigation Audit: A process to perform site inspection, evaluate irrigation systems, and develop efficient irrigation schedules.

Landscape Installation Report: The report, per section 24.K of these rules and regulations, documenting the landscape installation assessment for new and rehabilitated landscape and irrigation system(s) have been installed.

Landscape Project: An undertaking of landscape design and installation on a particular area of land. A landscape project may be associated with an individual lot, a building project, or a multi-phased development. It may also be a larger, comprehensive landscape scheme that is not coupled with an individual building project.

Lateral Line: The water delivery pipeline that supplies water from the water source to the valve or outlet.

Local Mean Precipitation: The State Department of Water Resources' 20-year historical rainfall data.

Low-volume Irrigation: The application of irrigation water through a system of tubing or lateral lines and low-volume emitters such as drip and bubblers. Certain rotary emitters designed for highly efficient water distribution, and situated to irrigate low water use plants, may also be included in this definition at the discretion of the City.

Low Water Use Plant: A plant species whose demonstrated water needs are compatible with local climate and soil conditions such that regular supplemental irrigation is not required to sustain the plant after it has become established. Any species classified as "very low water use" and "low water use" by WUCOLS, having a regionally adjusted plant factor of 0.0 through 0.3, shall be categorically deemed a low water use plant.

Main Line: The pressurized pipeline that delivers water from the water source to the valve or outlet.

Maximum Applied Water Allowance (MAWA): For design purposes, the upper limit of annual applied water for the established landscaped area as specified in Section 24I., Water Budget Calculation. It is based upon the area's reference Evapotranspiration rate, the ET Adjustment Factor, and the size of the landscaped area. The Estimated Applied Water Use shall not exceed the Maximum Applied Water allowance (gallons per year).

Mined Reclamation Projects: Any surface mining operation with a reclamation plan approved in accordance with the Surface Mining and Reclamation Act of 1975.

Mulch: Any material such as leaves, bark, straw, or other materials left loose and applied to the soil surface to reduce evaporation, suppressing weeds, moderating soil temperature and preventing soil erosion.

Native Plant: A plant indigenous to a specific area of consideration. For the purposes of these Rules and Regulations division, the term will refer to plants indigenous to the costal ranges of Centeral and Northern California, and more specifically to such plants that are suited to the ecology of the present or historic natural community of the project's vicinity.

Operating Pressure: The pressure at which a system of sprinklers is designed to operate, usually indicated at base of sprinkler.

Overhead sprinkler irrigation system: A system that delivers water through the air (e.g., spray heads and rotors).

Overspray: The water which is delivered beyond the landscape area, wetting pavements, walks, structures, or other non-landscaped areas.

Pervious: Any surface or material that allows the passage of water through the material and into the underlying soil.

Plant Factor: A factor that, when multiplied by reference Evapotranspiration, estimates the amount of water used by plants. For purposes of these Rules and Regulations, the average plant factor of low water-using plants ranges from 0 to 0.3; for average water-using plants the range is 0.4 to 0.6, and for high water-using plants the range is 0.7 to 1.0. Plant Factors are based on the Department of Water Resources 2000 publication "Water Use Classification of Landscape Species" (WUCOLS).

Precipitation Rate: means the rate of application of water measured in inches per hour.

Rain Sensing Device: A system which automatically shuts off the irrigation system when it rains.

Recreational Areas: Areas of active play or recreation, such as sports fields, school yards, picnic grounds, or other areas with intense foot traffic.

Recycled Water or Reclaimed Water: Treated or recycled wastewater of a quality suitable for non-potable uses, such as landscape irrigation and water features; not intended for human consumption.

Reference Evapotranspiration or **ETo**: A standard measurement of environmental parameters, which affect the water use of plants. ETo is given in inches per day, month, or year (as represented in Section 24.I Water Budget Calculation) and is an estimate of the Evapotranspiration of a large field of four to seven inch tall, cool-season grass that is well watered. Reference Evapotranspiration is the Maximum Applied Water Allowance so that regional differences in climate can be accommodated.

Rehabilitated Landscape: Any re-landscaping project that requires a permit.

Runoff: Water that is not absorbed by the soil or landscape to which it is applied and flows from the landscape area. For example, runoff may result from water that is applied at too great a rate (application rate exceeds infiltration rate) or when there is a severe slope.

Soil Moisture Sensing Device: A device that measures the amount of water in the soil. The device may also initiate or suspend irrigation.

Soil Texture: The classification of soil based on the percentage of sand, silt, and clay in the soil.

Special Landscape Area (SLA): An area of the landscape dedicated solely to edible plants, areas irrigated with recycled water, water features using recycled water and areas dedicated to active play or high-volume foot traffic such as parks, cemeteries, sports fields, golf courses, and where turf provides a playing surface.

Static Water Pressure: The pipeline or municipal water supply pressure when water is not flowing.

Station: An area served by one valve or by a set of valves that operate simultaneously.

Turf: A ground cover surface of mowed grass. Some examples of turf include annual bluegrass, Kentucky bluegrass, Perennial ryegrass, Red fescue, and Tall fescue are cool-season grasses. Bermudagrass, kikuyugrass, Seashore Paspalum, St. Augustinegrass, Zoysiagrass, and Buffalo grass are warm-season grasses.

Valve: A device used to control the flow of water in the irrigation system.

Water Feature: A landscape design element where open water performs an aesthetic or recreational function. Water features include ponds, fountains, waterfalls and artificial streams. Also includes spas and swimming pools that are ancillary to single-family, two-family and multi-family residential uses.

Wet Surface Area: The surface area of that portion of a water feature that functions to contain water, such as the water surface of a swimming pool, spa or garden pond. For a fountain or other feature with flowing water, wet surface area shall be measured as a two dimensional plane bounded by the perimeter of the area where water has been designed to flow.

WUCOLS: The published "Water Use Classification of Landscape Species" published by the University of California Cooperative Extension, the Department of Water Resources and the Bureau of Reclamation, 2000.

24.D **WATER-EFFICIENT DESIGN CHECKLIST**

24.D.1 A water-efficient design checklist shall serve as a preliminary summation of select landscape components to determine whether a proposed landscape is generally consistent with the water efficiency goals of these rules and regulations.

24.D.1.(a) All Landscape Projects identified in Santa Clara City Code Section ---, Landscaping Permit, shall include a completed water efficient design checklist. Building permits for new dwellings shall also include a completed water efficient design checklist.

24.D.1.(b) The checklist shall be completed by a property owner or certified landscape professional, and shall be submitted to the Planning Division along with the associated Planning Application.

24.E **<u>COMPONENTS OF A LANDSCAPE PROJECT SUBMITTAL</u>**

24.E.1 Landscape project submittal consists of the following items.

24.E.1.(a) Water-Efficient Design Checklist (section 24.D).

24.E.1.(b) Landscape and Irrigation Design Plans which are required for landscape projects greater than 2,500 square feet (see section 24.H).

24.E.1.(c) Landscape and Irrigation Maintenance Schedule (section 24.L).

24.E.1.(d) Landscape Installation Report (section 24.K). Shall be submitted following installation of landscaping materials and irrigation hardware.

24.E.1.(e) Water Budget Calculations (Section 24.I). Not required if plant type restriction option (section 24.F.1.(a)) is utilized.

24.E.1.(f) Soil Analysis Report (section 24.J). Only required when requested by City as a condition of permit approval.

24.E.1.(g) Landscape Permit Fee is required when submitting a Landscape Permit.

24.F **<u>DEMONSTRATION OF LANDSCAPE WATER EFFICIENCY</u>**

24.F.1 Applicants of projects subject to these rules and regulations may choose one of the following two options to demonstrate that a landscape proposal meets water-efficiency goals.

24.F.1.(a) Plant Type restriction option: The plan, checklist and any accompanying documentation must demonstrate all of the following as a means of achieving water efficiency.

24.F.1.(a)(i) The total turf area shall not exceed 25% of the landscape area, or 1,250 square feet, whichever is lesser in area.

24.F.1.(a)(ii) Within non-turf areas, at least 80% of the plants shall be native or low water-use.

24.F.1.(a)(iii) All other applicable design criteria of Section 24.G, Water-Efficient Design Elements, shall be met.

24.F.1.(b) Water Budget option: Project applicants may elect to prepare a water budget calculation, per the provisions of Section 24.I, Water Efficient Design Checklist, as a means of demonstrating water efficiency.

24.G **<u>WATER EFFICIENT DESIGN ELEMENTS</u>**

24.G.1 The elements of a landscape project shall be designed to achieve water efficiency consistent with the intent of these Rules and Regulations.

24.G.1.(a) Plant Material:

24.G.1.(a)(i) Plants shall be chosen and arranged appropriately based upon the site's climate, soil characteristics, sun exposure, wildfire susceptibility, topographical conditions and other factors. Plants with similar water needs shall be grouped within hydrozones.

24.G.1.(a)(ii) The turf area shall not be more than 25% of the landscape area, or 1,250 square feet, whichever is lesser in area, unless the project applicant develops a water budget per Section 24.I Water Budget Calculation.

24.G.1.(a)(iii) Turf shall not be planted on slopes greater than 25%.

24.G.1.(a)(iv) No portions of turf areas shall be less than eight feet wide.

24.G.1.(a)(v) At least 80% of the plants in non-turf landscape areas shall be native plants, or low water using plants, unless the project applicant develops a water budget and the ETWU of the landscaped area does not exceed the MAWA.

24.G.1.(a)(vi) The horticultural attributes of plant species (e.g., mature plant size, invasive roots, structural attributes) shall be considered, in order to minimize the potential for damage to property or infrastructure (e.g., buildings, septic systems, sidewalks, power lines).

24.G.1.(a)(vii) Fire-prone plant materials and highly flammable mulches are strongly discouraged. In designated wildland urban interface areas, plants shall be selected, arranged and maintained to provide defensible space for wildfire protection, in conformance with Public Resources Code Section 4291.

24.G.1.(a)(viii) Installation of invasive plant species shall be prohibited.

24.G.1.(a)(ix) Existing invasive plants and noxious weeds within or adjacent to the proposed landscape area shall be removed prior to installation, to minimize potential for spread into installation area.

24.G.1.(a)(x) The architectural guidelines, conditions, covenants or restrictions of a common interest development shall not supersede this division. For example, a common interest development may not prohibit low water use plants, or include conditions that have the effect of restricting the use of low water use plants.

24.G.1.(b) Irrigation System: An irrigation system shall meet all of the requirements listed in this section and the manufacturers' recommendations. The irrigation system and its related components shall be planned and designed to allow for proper installation, management and maintenance. In addition:

24.G.1.(b)(i) The irrigation system shall be designed to prevent runoff, low head drainage, overspray, or other similar conditions.

24.G.1.(b)(ii) Irrigation systems shall be designed, maintained and managed to meet or exceed an average landscape irrigation efficiency of 70%.

24.G.1.(b)(iii) Low-volume irrigation shall be required in mulched areas, in areas with slope greater than 25%, or in any narrow or irregularly shaped areas that are less than eight (8) feet in width in any direction. Irrigation emitters within 24 inches of a non-permeable surface shall be either low-volume, or designed to preclude wasteful overspray and runoff.

24.G.1.(b)(iv) The irrigation hardware for each hydrozone shall include a separate valve. Where feasible, trees shall be placed on separate valves from shrubs, groundcovers, and other plant types.

24.G.1.(b)(v) Automatic irrigation controllers utilizing either evapotranspiration or soil moisture sensor data for irrigation scheduling are required.

24.G.1.(b)(vi) Sensors (rain, freeze, wind, etc.), either integral or auxiliary, that suspend or alter irrigation operation during unfavorable weather conditions shall be required on all irrigation systems.

24.G.1.(b)(vii) Whenever possible, landscape irrigation shall occur between the hours of 6:00 p.m. and 10:00 a.m., unless climatic conditions or unfavorable weather (e.g. high wind, extreme temperature) prevents it or otherwise renders irrigation unnecessary. Operation of the irrigation system outside the normal watering window is allowed for auditing and system maintenance.

24.G.1.(c) Soil, conditioning, and mulching:

24.G.1.(c)(i) At the time of installation, a minimum of eight (8) inches of non-compacted topsoil shall be available for water absorption and root growth in planted areas. The City may waive this requirement where a landscape professional has determined that practical limitations (e.g., slope, other geotechnical factors) necessitate a lesser soil depth that is viable for the chosen plant materials.

24.G.1.(c)(ii) Soil amendments, such as compost or fertilizer, shall be appropriately added according to the soil conditions at the project site and based on what is appropriate for the selected plants.

24.G.1.(c)(iii) A minimum two (2)-inch layer of mulch shall be applied on all exposed soil surfaces of planting areas, except in areas of direct seeding application (e.g. hydro-seed).

24.G.1.(c)(iv) Stabilizing mulching products shall be used on slopes.

24.G.1.(d) Hydrozones:

24.G.1.(d)(i) Hydrozones shall group plant materials of similar water use, and shall generally demarcate areas of similar slope, sun exposure, soil, and other site conditions appropriate for the selected plants.

24.G.1.(d)(ii) The flow of water to each hydrozone shall be controlled by a separate valve.

24.G.1.(d)(iii) Sprinkler heads and other emission devices shall be selected based on what is appropriate for the plant type within that hydrozone.

24.G.1.(d)(iv) Within a hydrozone, low and moderate water use plants may be mixed, but all plants within that hydrozone shall be classified as moderate water use for MAWA calculations. High water use plants shall not be mixed with low or moderate water use plants.

24.G.1.(e) Water Features:

24.G.1.(d)(i) Recirculating water systems shall be used for water features.

24.G.1.(d)(ii) The wet surface area of a water feature shall be counted as an area of high water use plants for purposes of a water budget calculation, except as provided in 24.G.1.(d)(iii), below.

24.G.1.(d)(iii) The wet surface area of a pool or spa with a cover shall be counted as an area of medium water use plants for purposes of a water budget calculation.

24.H **LANDSCAPE AND IRRIGATION DESIGN PLANS**

24.H.1 Landscape and irrigation design plans are required of landscape projects larger than 2,500 square feet when associated with applications for [major project permit types, e.g., design review, grading permit, or use permit], and building permits for new dwellings. The landscape and irrigation design plan shall be prepared as follows:

24.H.1.(a) The landscape and irrigation design plans shall incorporate all applicable elements of Section 24.G Water-Efficient Design Elements.

24.H.1.(b) The landscape design portion shall be prepared by, and bear the signature of, a licensed landscape architect, licensed landscape contractor, or any other person authorized by the State of California to design a landscape.

24.H.1.(c) The irrigation design portion shall be prepared by, and bear the signature of, a licensed landscape architect, certified irrigation designer, licensed landscape contractor, or any other person authorized by the State of California to design an irrigation system.

24.H.1.(d) The landscape design portion of the landscape and irrigation design plan, at a minimum, shall:

24.H.1.(d)(i) Provide basic project information, such as applicant name, site address, total landscape area and turf area (square feet), irrigation water source (e.g. municipal, well, recycled), and project contacts.

24.H.1.(d)(ii) Identify, in tabular form, all plants to be installed as part of the project. The table shall include the following:

(1) Symbol (representing the plant on the plan).

(2) Common name.

(3) Botanical name.

(4) Container size.

(5) Quantity.

(6) Type (e.g. grass, forb, succulent, vine, shrub, tree).

(7) Water-efficient species identification. All "Native" and "Low Water Use" plant species (defined in section 24.C Definitions) shall be so labeled.

(8) Unique physical specifications of plants (e.g., bare-root, field-potted, multi-trunk), if applicable.

24.H.1.(d)(iii) The landscape and irrigation design plan shall include the following:

(1) General notes, planting notes, plant layout based on size at maturity, species, and symbol legend.

(2) Spacing of proposed plantings.

(3) Topography

(4) Trunk diameter of all existing trees whose trunk circumference is greater than 18.5 inches, measured 54 inches above grade.

(5) Existing features to remain, such as trees,

fencing, hardscape, etc.

(6) Existing features to be removed.

(7) Identification of pertinent site factors such as sun exposure, microclimate, property lines, buildings, underground/above-ground utilities, existing drainage features, etc.

(8) Proposed grading. For earthwork exceeding 150 cubic yards, or for cuts or fills exceeding five vertical feet, a grading permit will be required.

(9) Seed mix, if applicable.

24.H.1.(d)(iv) Delineate and label each hydrozone;

24.H.1.(d)(v) Identify each hydrozone as low water, moderate water, high water, or mixed (low/moderate) water use, as defined by WUCOLS;

24.H.1.(d)(vi) Identify special landscape areas;

24.H.1.(d)(vii) Identify type of mulch and application depth;

24.H.1.(d)(viii) Identify type and wet surface area of water features;

24.H.1.(d)(ix) Identify hardscapes (pervious and non-pervious); and

24.H.1.(d)(x) Contain the following statement: "I have complied with the criteria of the Water Service and Use Rules and Regulations for Water Conservation in Landscaping and applied them for the efficient use of water in the landscape design plan."

24.H.1.(e) The irrigation design portion of the landscape and irrigation design plan, at a minimum, shall contain:

24.H.1.(e)(i) Location, type and size of all components of the irrigation system, including controllers, main and lateral lines, valves, sprinkler heads, moisture sensing devices, rain switches, quick couplers, pressure regulators, and backflow prevention devices;

24.H.1.(e)(ii) Static water pressure at the point of connection to the public water supply;

24.H.1.(e)(iii) Flow rate (gallons per minute), application rate (inches per hour), and design operating pressure (pressure per square inch) for each station;

24.H.1.(e)(iv) Irrigation schedule;

24.H.1.(e)(v) Location and size of separate water meters for landscape (if applicable); and,

24.H.1.(e)(vi) The following statement: "I have complied with the criteria of the Water Service and Use Rules and Regulations for Water Conservation in Landscaping and applied them accordingly for the efficient use of water in the irrigation design plan."

24.H.1.(f) Grading. If the landscape project area will be graded, then, at a minimum, grading contours and quantities shall be shown on the landscape design plan. Grading shall meet all applicable requirements of the City. A geotechnical engineer should be consulted prior to the installation of landscaping materials and irrigation hardware on slopes greater than 50%, or in any areas where slope stability may be compromised.

24.H.1.(g) Storm Water Management. Storm water best management practices shall be incorporated as appropriate into the landscape installation, the details of which shall be shown on the landscape design plan. Practices that increase rainwater capture and retention are encouraged. Installation shall be subject to the City's National Pollutant Discharge Elimination System (NPDES) storm water discharge permit requirements.

24.I **WATER BUDGET CALCULATION**

24.I.1. A Project applicant shall complete a water budget calculation for the landscape project as required per section 24.F Demonstration of Landscape Efficiency A water budget must be completed by a certified professional who is authorized by the State of California to complete a water budget. Water budget calculations shall adhere to the following requirements:

24.I.1.(a) The plant factor used shall be from WUCOLS. The plant factor ranges from 0.0 to 0.3 for low water use plants, from 0.4 to 0.6 for moderate water use plants, and from 0.7 to 1.0 for high water use plants.

24.I.1.(b) The wet surface area of a water feature shall be counted as an area of high water using plants for purposes of a water budget calculation, except as provided in section 24.I.1(c), below.

24.I.1.(c) The wet surface area of a pool or spa with a cover shall be counted as an area of medium water using plants for purposes of a water budget calculation.

24.I.1.(d) Where low and moderate water use plants are be mixed within a single hydrozone, the entire hydrozone area shall be classified as moderate water use for purposes of a water budget calculation. High water use plants shall not be mixed with low or moderate water use plants.

24.I.1.(e) All special landscape areas shall be identified and their water use included in the water budget calculations.

24.I.1.(f) The reference evapotranspiration adjustment factor (ETAF) for special landscape areas shall not exceed 1.0. The ETAF for the remaining landscaped area shall not exceed 0.7.

24.I.1.(g) Irrigation system efficiency shall be greater than or equal to 70%.

24.I.1.(h) Maximum Applied Water Allowance (MAWA) shall be calculated using the equation below:

MAWA = (ETo) (0.62) [(0.7 x LA) + (0.3 x SLA)]

Where:

MAWA = Maximum Applied Water Allowance (gallons per year)

ETo = Reference Evapotranspiration (inches per year)

0.62 = Conversion Factor (acre-inches to gallons)

0.7 = Reference Evapotranspiration Adjustment Factor

LA = Landscape Area including SLA (square feet)

0.3 = Additional Water Allowance for SLA

SLA = Special Landscape Area (square feet)

24.I.1.(i) A project applicant may consider effective precipitation (25% of annual precipitation) in tracking water use and may use the following equation to calculate the MAWA:
MAWA= (ETo - Eppt) (0.62) [(0.7 x LA) + (0.3 x SLA)]

24.I.1.(j) Estimated Total Water Use (ETWU) shall be calculated for each hydrozone using the equation below. The sum of the ETWU calculated for all hydrozones shall not exceed the MAWA.

$$ETWU = (ETo)(0.62)\left(\frac{PF\ x\ HA}{IE} + SLA\right)$$

Where:
ETWU = Estimated Total Water Use per year (gallons)
ETo = Reference Evapotranspiration (inches)
PF = Plant Factor from WUCOLS
HA = Hydrozone Area
[high, medium, and low water use areas] (square feet)
SLA = Special Landscape Area (square feet)
0.62 = Conversion Factor
IE = Irrigation Efficiency (minimum 0.70)

24.J **SOIL ANALYSIS**

24.J.1. The City shall have discretion to require soil analysis as a condition of approval for any [major project permit types, e.g., grading permit, or use permit], where a landscape project submittal is required.

24.J.2 A soil analysis report shall document the various characteristics of the soil (e.g. texture, infiltration rate, pH, soluble salt content, percent organic matter, etc), and provide recommendations for amendments as appropriate to optimize the productivity and water-efficiency of the soil. The soil analysis report shall be made available to the professionals preparing the landscape and irrigation design plans in a timely manner either before or during the design process. A copy of the soils analysis report shall be submitted to the City as part of the landscape documentation package.

24.K. **LANDSCAPE INSTALLATION REPORT**

24.K.1. A Landscape installation assessment for new or rehabilitated landscapes shall be conducted by a certified landscape professional after the landscaping and irrigation system have been installed. The findings of the assessment shall be consolidated into a Landscape Installation Report.

24.K.1.(a) The Landscape Installation Report shall include, but is not limited to: inspection to confirm that the landscaping and irrigation system were installed as specified in the landscape and irrigation design plan, system tune-up, system test with distribution uniformity, reporting overspray or run off that causes overland flow, and preparation of an irrigation schedule.

24.K.1.(b) The Landscape Installation Report shall include the following statement: "The landscape and irrigation system has been installed as specified in the landscape and irrigation design plan and complies with the criteria of the Water Service Rules and Regulations for Water Conservation in Landscaping."

24.K.1.(c) The City of Santa Clara shall administer ongoing programs that may include, but not be limited to, post-installation landscape inspection, irrigation water use analysis, irrigation audits, irrigation surveys and water budget calculations to evaluate compliance with the MAWA.

24.L **LANDSCAPE AND IRRIGATION MAINTENANCE**

24.L.1. Landscapes shall be maintained to ensure successful establishment following installation, and to ensure water use efficiency consistent with these Rules and Regulations. A maintenance schedule shall be established and submitted to the City either with the landscape application package, with the Landscape Installation Report, or any time before the landscape installation report is submitted. Maintenance contract documentation shall be provided to the City if so requested.

24.L.1.(a) Maintenance shall include, but not be limited to the following: routine inspection; pressure testing, adjustment and repair of the irrigation system; aerating and de-thatching turf areas; replenishing mulch; fertilizing; pruning; replanting of failed plants; weeding; pest control; and removing obstructions to emission devices.

24.L.1.(b) Failed plants shall be replaced with the same or functionally equivalent plants that may be size-adjusted as appropriate for the stage of growth of the overall installation. Failing plants shall either be replaced, or be revived through appropriate adjustments in water, nutrients, pest control or other factors as recommended by a landscaping professional.

24.M **LANDSCAPE PROJECT REFERRAL**

24.M.1. The City shall refer the landscape project documents to any City department or outside agency whose interests or area of expertise warrants their participation in the review process. Referral agencies may include, but are not limited to, Santa Clara Valley Water District and Santa Clara Fire Department.

24.N **LANDSCAPE PROJECT REVIEW FEE**

24.N. A landscape project review fee shall be required by the schedule of fees established by resolution of the City Council.

24.O **AUDIT OF EXISTING LANDSCAPES**

24.O.1. The City shall be authorized to require audits to evaluate water use on established landscapes larger than one acre. Such audit may be also be initiated as a coordinated effort between the City and a water purveyor (e.g., Santa Clara Valley Water District, as part of the Water District's established outdoor water conservation programs). When such audit is required, it must be completed by a certified landscape irrigation auditor.

24.O.2. Following the findings and recommendations of the certified landscape irrigation auditor, the City may require adjustments to irrigation usage, irrigation hardware, and/or landscape materials to reduce irrigation water use. Landscape renovation or rehabilitation resulting from such audit activity shall be considered a Landscape Project, and shall be subject to applicable document submittal requirements of Section 24.E Components of Landscape Project Submittal.

24.O.3. For established landscapes that have dedicated irrigation meters, the maximum applied water allowance (MAWA) shall be calculated as follows: MAWA= (ETo) (0.62) (LA) (0.8)

Where:
MAWA = Maximum Applied Water Allowance (gallons per year)
ETo = Reference Evapotranspiration (inches per year)
0.62 = Conversion Factor (acre-inches to gallons)
LA = Landscape Area (square feet)
0.7 = Reference Evapotranspiration Adjustment Factor (ETAF)

24.P **PUBLIC EDUCATION**

24.P.1. The City shall provide information to all applicants regarding the design, installation, management and maintenance of water-efficient landscapes and irrigation systems. This shall include, and is not limited to, promoting the use of recycled water and the efficient use of water through water conservation incentive programs offered by the City or the Santa Clara Valley Water District.

24.P.2. All model homes that are landscaped shall have signs installed that provide information on the principles of water-efficient landscaping.

24.Q **PENALTIES**

24.Q.1 Non-compliance with any applicable provision of the Water Service and Use Rules and Regulations shall constitute a violation of the City Code shall be subject to enforcement action and/or permit revocation.

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