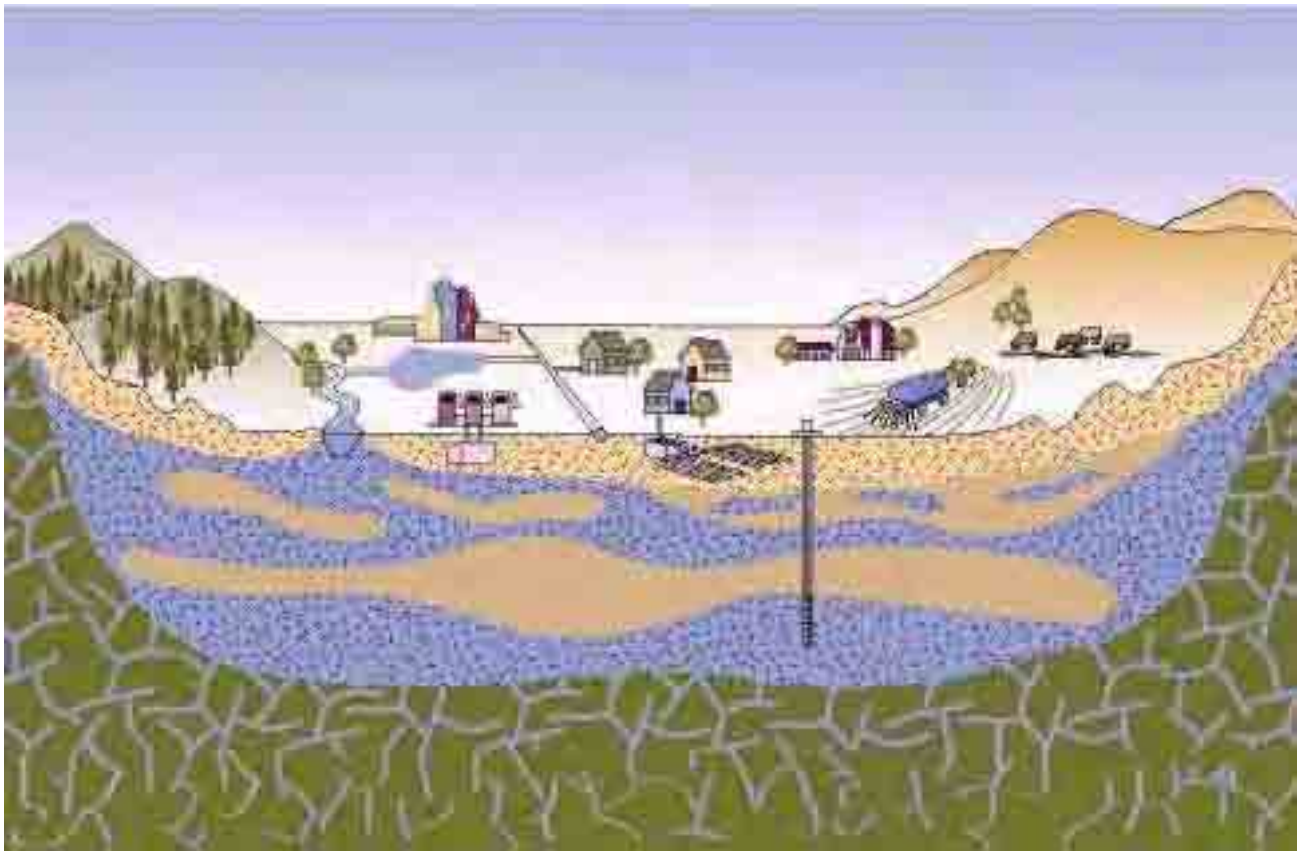
Appendix E

City of Sunnyvale
2010 Urban Water Management Plan
SCVWD 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

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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

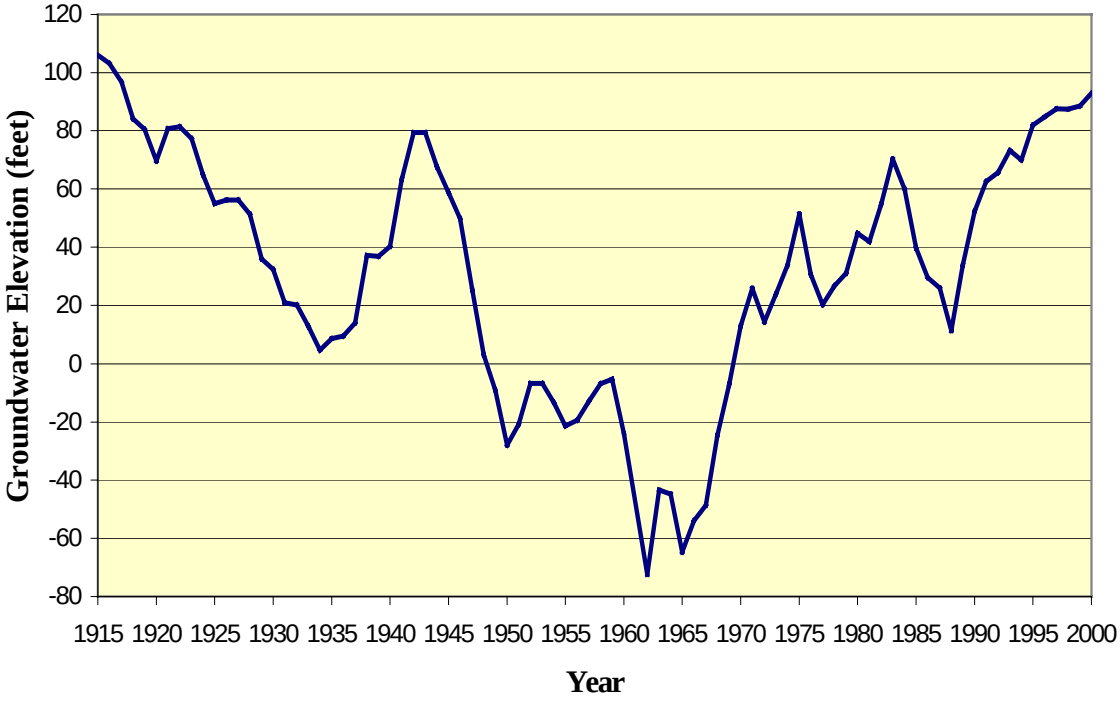
Groundwater conditions throughout the County are generally very good, as District efforts to prevent groundwater basin overdraft, curb land subsidence, and protect water quality have been largely successful. Groundwater elevations are generally recovered from overdraft conditions throughout the basin, 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:

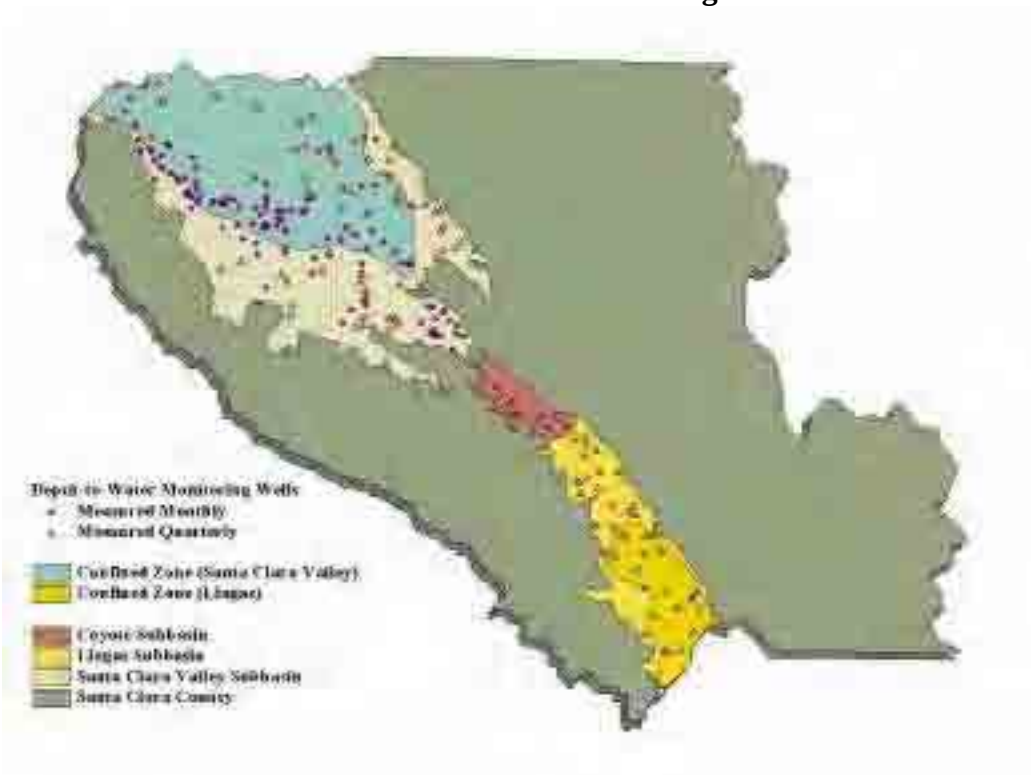
- Collection of monthly depth-to-water field measurements from approximately 168 wells, including approximately 150 wells owned by other agencies (Figure 4-2).
- Collection of quarterly depth-to-water field measurements from approximately 108 wells (Figure 4-2).
- Maintenance of a groundwater elevation 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.

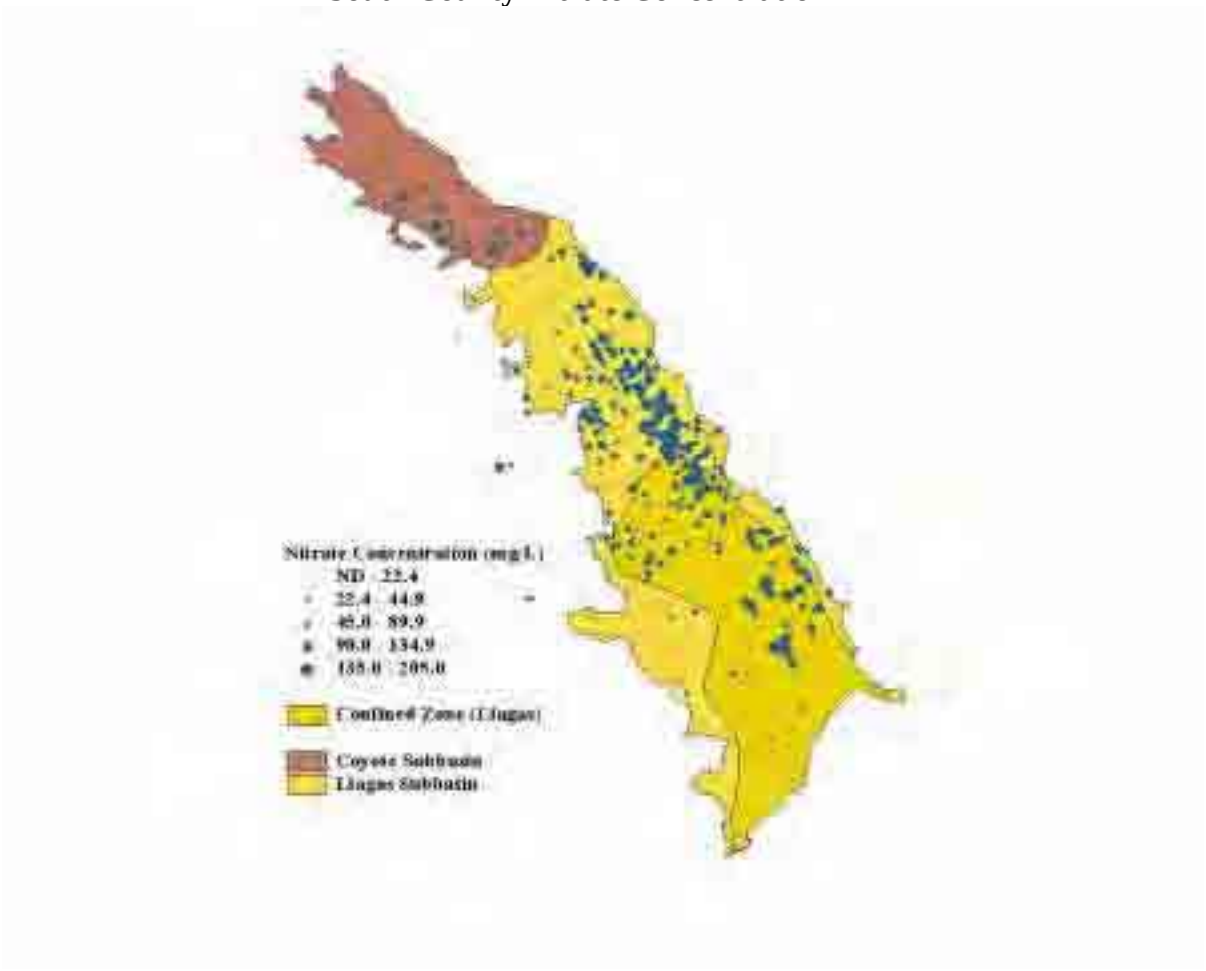
In 1997, the District began implementing the public education portion of the study recommendations. A large agricultural outreach effort was initiated. As part of that outreach, the District entered into a contract with a Mobile Irrigation Lab to offer free irrigation evaluations to farmers in order 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.

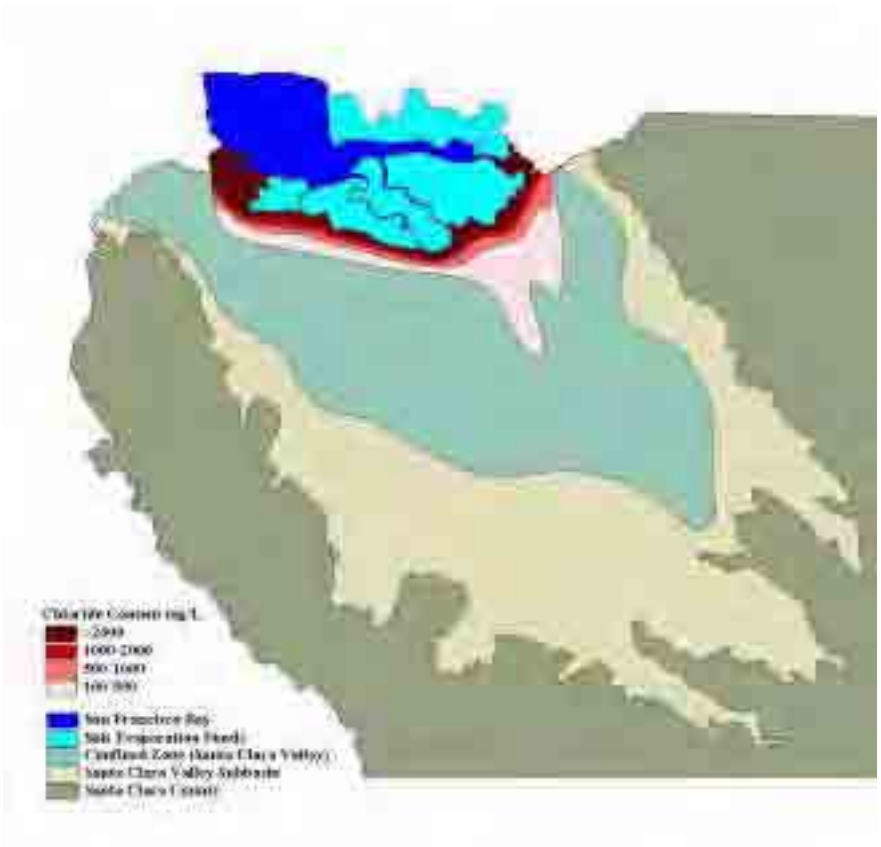
Comparison of older mineral analyses of groundwater from wells in the San Francisco bayfront area in Santa Clara and Alameda counties, some dating back to 1907, with more recent data shows that saltwater intrusion has occurred in the upper aquifer. With much higher water demands after World War II and 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.

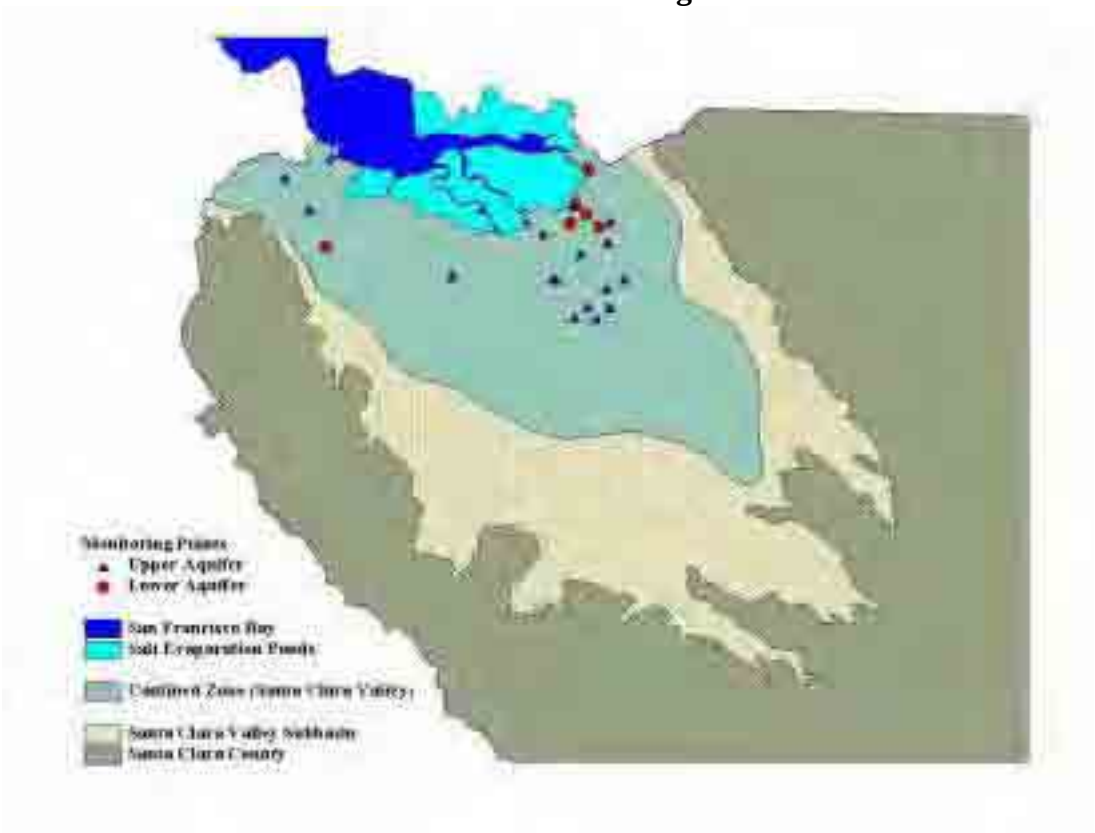
Since the inception of this program, the Board has authorized a more comprehensive well destruction program, through which abandoned wells near areas of known chemical contamination can be destroyed with District funds. This program began in October 1984, and was in part a result of general concerns 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.

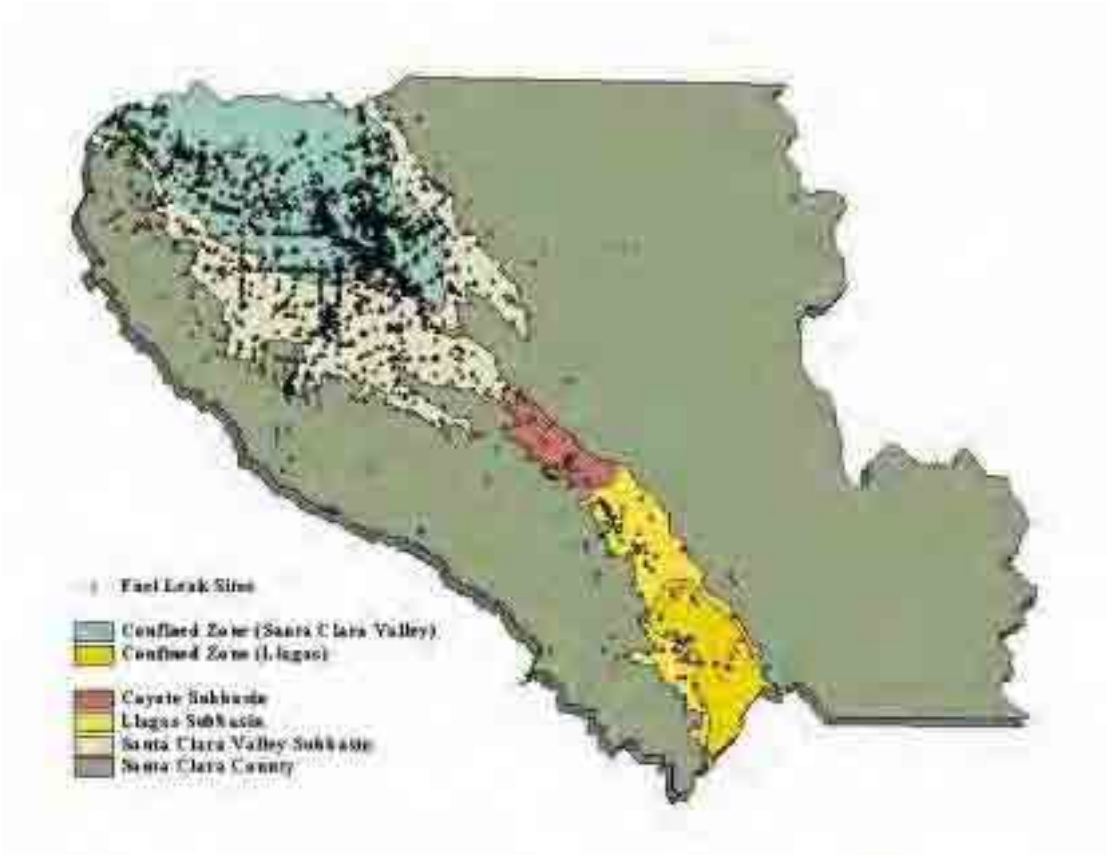
In 1987, the District entered into an informal agreement with the San Francisco RWQCB to create a pilot oversight program. At that time more than 1,000 fuel leaks had been reported within the County. The District developed an in-house technical group of employees capable of providing regulatory oversight 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 F

City of Sunnyvale
2010 Urban Water Management Plan
Water Resources Sub-element of the General Plan

Water Resources Sub-element

of the General Plan

CITY OF SUNNYVALE
DEPARTMENT OF PUBLIC WORKS

WATER RESOURCES

Sub-element of the General Plan

2008 Update

City of Sunnyvale

Adopted by City Council

on

December 16, 2008

Public Works Department
Field Services Division
P.O. Box 3707
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City of Sunnyvale
Water Resources Sub-element
of the General Plan

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EXECUTIVE SUMMARY

Sub-Element Purpose and Scope

The most important changes within this update to the Water Resources Sub-Element (as originally adopted by the City Council in 1986 and updated in 1996), relate primarily to water supply reliability issues and infrastructure replacement needs. Regulatory and environmental protection constraints on both water supply and water quality have also continued to increase. This Executive Summary provides the reader with an overview of key technical and policy issues discussed in the main body of the Sub-Element. Historic and current water system conditions are summarized with a focus on future issues and opportunities where City policy decisions are anticipated to be needed on the direction for water system activities.

This Water Resources Sub-Element establishes an updated set of integrated goals, policies, and action strategies (Section 4). The three key goals are to:

(1) Acquire and manage an adequate and reliable supply of water;
(2) Proactively maintain reliable water distribution system infrastructure;
(3) Ensure that water meets all quality, health and regulatory standards.

Water resource management issues facing the City include:

(1) State and regional water resource interdependencies;
(2) Conservation policies in an era of uncertain supplies;
(3) Water quality assurance;
(4) Development and maintenance of reliable infrastructure.
(5) Use of recycled water as an additional supply source;

The Water Resources Sub-Element is one of six sub-elements that comprise the Environmental Management Element of the City's General Plan. The other sub-elements of the Environmental Management Element include:

- 3.2 Solid Waste Management
- 3.3 Wastewater Management
- 3.4 Surface Runoff
- 3.5 Noise
- 3.6 Air Quality

The Solid Waste Management Sub-Element provides guidelines for the source reduction, collection, recycling, and disposal of solid wastes. The Wastewater Management System Sub-Element deals with the transportation and treatment of sewage and industrial waste. The Surface Runoff Sub-Element addresses surface runoff and the discharge of pollutants to creeks and South San Francisco Bay and the measures necessary to prevent flooding. The Noise Sub-Element protects residents from excessive noise that can cause physical and mental health problems. The Air Quality Sub-

Element focuses on reducing air pollutant emissions from existing sources in Sunnyvale, as well as developing a policy framework to lessen the emissions associated with future development.

Information in this Water Resources Sub-Element Update is taken from the 1996 Water Resources Sub-Element, various reports to Council, the City's 2005 Urban Water Management Plan, the City's 2000 Recycled Water Program Master Plan and Recycled Water Annual Reports, information from our water suppliers (Santa Clara Valley Water District (SCVWD) and the San Francisco Public Utilities Commission (SFPUC)), various publications and newsletters produced by the American Water Works Association, the State Department of Water Resources, the California Department of Public Health, the California Municipal Utilities Association, and others.

Community Conditions

Historic and Current Conditions

Community condition descriptions constitute the major portion of this Water Resources Sub-Element. Community conditions of the City water system are presented from three vantage points: Recent History (Section 1.0), Current Condition (Section 2.0), and Future Issues and Opportunities (Section 3.0). There have been significant advancements in pipe materials and trenchless technology and also in recycled water use and conservation efforts since the last Sub-Element update in 1996. This Executive Summary therefore focuses primarily on Future Issues and Opportunities regarding water system infrastructure needs and potential recycled water system expansion. A brief summary of the four water system components described in each of the Community Conditions Sections follows:

- Water Supply Sources;
- Water System;
- Water Demand and Demand Management; and
- Water Quality Management and Regulations.

Water Supply Sources The City's sources of potable water supply continue to include local groundwater wells, imported supplies from the SFPUC and SCVWD, plus interties (interagency connections) with other local water suppliers for emergencies. Temporary interruptions of water supply from one source can be readily offset by increasing supply from the other available sources.

During the last ten years, on average, SFPUC and SCVWD have each supplied approximately 45% of the total potable water used in the City (Figures 1 and 2). Of the remaining 10%, about 6% of the potable water demand has been supplied by seven City-owned and operated wells. To offset the potable water demand for landscape irrigation and other non-potable uses, the remaining 4% has been supplied by recycled water produced by the Sunnyvale Water Pollution Control Plant (WPCP).

The City has long-term supply contracts in place with SFPUC and SCVWD. The amount of water that can be purchased from the City's wholesalers depends on contract parameters and the availability of water. The current contract with SCVWD runs until 2050. However, the contract

with SFPUC expires June 30, 2009. Currently, the Bay Area Water Supply and Conservation Agency (BAWSCA) is negotiating a new master agreement with SFPUC on behalf of 27 suburban agencies, including Sunnyvale. Both BAWSCA and SFPUC have stated a goal of completing negotiations prior to the June 30, 2009, expiration. Though details may change, it is not expected there will be major changes in the availability of SFPUC water under a new contract. The current Water System Improvement Project (WSIP) is based upon a continuing agreement/relationship between SFPUC and all BAWSCA agencies.

The annually updated twenty year water forecast (prepared by City staff), which estimates the City's consumption requirements in future years, falls within the City's contract parameters, except for periods of drought and/or periods when the supply is reduced due to increases in government mandated Bay-Delta allocations for environmental protection concerns. Barring catastrophic events, the City has adequate supply commitments and facilities to reliably meet the projected water needs of its residents and businesses for the foreseeable future.

Water System The City water transmission and supply system (Figure 3) as of 2007 includes approximately 10 miles of 16-inch to 30-inch diameter transmission pipelines, ten storage tanks with a combined storage capacity of 27.5 million gallons (MG), seven active and one backup well with a capacity of 12.1 million gallons per day (mgd), and interties with Cal Water, Cupertino, Mountain View and Santa Clara.

The water distribution system includes over 280 miles of 6-inch to 14-inch diameter water main pipelines, approximately 28,630 water services, 3,380 fire hydrants, 250 City-owned backflow devices, and the automated supervisory control and data acquisition (SCADA) system that controls the distribution of water throughout the city. Approximately 80% of the water main pipelines were constructed in the 1960's and the remainder in the 1980's. The 1960's vintage pipelines will reach their estimated 50 year useful service life within the next several years.

Recycled water is produced at the WPCP on an intermittent basis, through process changes that further reduce the treated water to meet EPA standards for recycled water. The recycled water distribution system includes over 8 miles of 12-inch through 36-inch transmission mains and over 6 miles of 8-inch distribution lines. The system "backbone" has an inverted "U" shape (refer to Figure 4) with main lines running east-west along Caribbean Avenue and north-south on either side of the City. Major recycled water customers include the Sunnyvale Golf Course, Baylands Park, Twin Creeks Sports Complex, and Lockheed-Martin Ball Field.

Demand and Demand Management Water demand has remained relatively flat in large part due to the significant water conservation and other demand management measures implemented during and following the 1987 – 1992 drought. On-going water conservation efforts were able to reduce potable water consumption from 161 gallons per capita per day in 2000 to 139 gallons per capita per day in 2006, a 13.6% reduction. Many measures implemented by the City are coordinated with or run by SCVWD. Increased use of recycled water is another City controlled method to reduce demand for potable supply.

Water Quality Management and Regulations The City's comprehensive water quality monitoring program collects and analyzes samples from the distribution system, City-owned wells in operation, water purchased from SFPUC and SCVWD, storage tanks, and household taps, depending of the regulated parameter. Additional disinfection byproduct (DBP) and bacteriological monitoring was implemented to accommodate changes in State and Federal regulations since 1996.

Future Issues and Opportunities

Several key issues and opportunities face the City water system over the next 10 – 20 years. These include reliability of the two imported water supplies, water system infrastructure renovation needs, conservation management and education, and increased recycled water use opportunities.

SCVWD Reliability A significant future vulnerability for SCVWD is the reliability of the supplies of regional imported water from the Sacramento-San Joaquin Delta to the District. Following Delta levee failure the influx of seawater could interrupt the ability to pump usable drinking water to the State or Federal water projects for delivery to SCVWD. Global warming and rising sea level will place greater pressures on the levee systems and increase the likelihood and impacts of levee failure.

Uncertainty regarding future environmental and water rights regulations creates significant additional risks to Bay Area and statewide water supply reliability. Per court order, pumping from the Delta will likely be cut by up to one-third in 2008 and possibly in subsequent years to protect the endangered Delta smelt. It is expected that a myriad of Bay-Delta activities will continue over the next 10-20 years to address balancing the needs for ecosystem protection, with the needs for reliability of water supply and for water quality from the Delta system.

SCVWD, similar to Sunnyvale, has a significant portion of its water supply infrastructure approaching 40 to 50 years of age. Maintaining and upgrading the existing infrastructure to ensure each facility functions as intended for its useful life became the focus of SCVWD's capital improvement program (CIP) in recent years. The estimated total funding required to implement the 100 projects defined in the SCVWD 2007-2008 CIP is $2.133 billion.

SFPUC Reliability There are also uncertainties associated with SFPUC's ability to deliver Hetch Hetchy water in the event of a major earthquake. The SFPUC has identified serious concerns about portions of the Hetch Hetchy system that are aging and in need of repair or replacement. Because of the age of the system, most facilities were not designed to current seismic standards. A large earthquake or catastrophic event could result in a prolonged disruption of the Hetch Hetchy system with loss of service for two to four months. SFPUC completed an evaluation of the Hetch Hetchy water system that indicated approximately $4.4 billion in infrastructure replacement and upgrades are necessary to ensure the capacity and reliability of the water system to serve suburban users. The resultant on-going Water Supply Improvement Program is scheduled for completion in 2016.

Water System Infrastructure Perhaps the largest water system issue for the City is the need for significant and on-going investment in improvements to the water system infrastructure. Sunnyvale

is not alone in this matter. Aging infrastructure is a national issue. A significant portion of the City's over $300 million investment in water system infrastructure is represented by the transmission and distribution pipelines. Over 80% of these pipelines were installed in the 1960's. These types of pipelines generally have an estimated service life of approximately 50 years. Planned rehabilitation and/or replacement are needed to minimize the need for emergency repairs. The Long Range (20 year) Infrastructure Plan FY 07-08 shows that the over 326 miles of pipeline installed in the City have a current replacement cost of nearly $291 million.

While this update to the Sub-Element does not specifically address financial issues, excerpts from the *2007 Fiscal Sub-Element* are provided below that help describe two pertinent and major issues that will continue to affect the financial health of the Water Supply and Distribution Fund over the near and longer term. These issues are 1) substantial price increases that have been projected by City Wholesalers for purchased water, and 2) the state of Water System Infrastructure.

> ***Utility Funds*** *Especially important to the Water and Wastewater Funds is the issue of system repair and replacement. A method has been established to provide resources for the ongoing repair, replacement, and rehabilitation as part of the user rate setting process. A utility's duty to serve outlasts the life of its existing infrastructure, and utility services provided today are using up capital resources which must be replaced to serve future customers. Therefore, at a minimum, utilities are directed to target to fund depreciation each year.*
>
> *Costs for purchased water have been relatively stable from SCVWD, but are projected to rise significantly for at least the next five years. Projections from the SFPUC have not been reliable and the rates have experienced wild swings from year to year. Recent projections indicate that rates will be substantially higher over the next ten years, with annual increases ranging from 5% to a high of 17%. These large increases are due primarily to the impact of the Hetch Hetchy $4.4 billion Water System Improvement Program. The net effect of these changes to wholesale rates will be water rate increases that are significantly higher than projected inflation over the next decade.*
>
> *The second factor that will significantly impact the Water Fund over the next twenty-year planning period is infrastructure maintenance. The Water Supply and Distribution Fund has a large number of varied assets, including water mains, pumps, tanks, valves, and reservoirs. The Public Works Department has prepared a Long Range Infrastructure Plan which identifies and inventories these assets. The costs and schedules are currently being refined. Depending on assumptions regarding useful life, conditions, and costs for repair, the infrastructure projects may require additional capital to maintain the system in optimum working order.*
>
> *The City has a commitment to water conservation, and to that end has taken several steps. These include an inclining block tier rate structure that penalizes excessive water consumption; a number of conservation efforts consistent with industry Demand Management Measures (DMMs); and a recycled water program to replace the use of potable water for non-potable uses where possible. Many of the DMMs offered by the City are actually programs run by or coordinated through the SCVWD, one of the wholesalers from which the City buys water. The programs are either funded through the wholesale water rates paid by the City, or directly*

reimbursed to the City. For more information on DMMs, see the City's 2005 Urban Water Management Plan.

Recycled Water System Expansion A key opportunity for the City is to enhance its own water supply reliability by expanding recycled water use. Recycled water use offsets potable water use, is produced by and under the control of the City, and is a drought-resistant supply. It is of increasing value in that it will be available when potable water is in limited supply. However, a key issue associated with increased use of recycled water is identifying funding sources for the additional infrastructure needed to serve these new recycled water customers within and adjacent to the City. Opportunities may exist for creative partnering arrangements with SCVWD, SFPUC and the Bay Area Regional Water Recycling Program (BARWRP).

It is expected that regulatory efforts aimed at protection of the Delta will continue, at a minimum, to encourage greater water use efficiency (i.e. water conservation and water recycling) to minimize water exports from the Delta. Similar encouragements, if not mandates, for increased water recycling may be included in future WPCP National Pollutant Discharge Elimination System (NPDES) permits (next scheduled for reissuance in December 2008). Potential expansions of the recycled water system were last assessed in the 2000 Sunnyvale Recycled Water Program Master Plan. Public Works intends to update the Master Plan in 2008 in anticipation of this increased regulatory emphasis on water recycling.

The existing recycled water "backbone" distribution system in the City was designed for, and with relatively minor extensions, could serve several additional customers in and adjacent to the City (Figure 9). Several potential near-term expansion projects and partnering opportunities proposed to be evaluated in more detail in the Master Plan update are listed below.

<u>SFPUC Partnering</u> The City could provide recycled water to the Moffett Field Golf Course and proposed new development at NASA Ames that would reduce the need for potable water supplied by SFPUC. A regional partnership seems feasible with SFPUC for this project. An existing City recycled water turnout allows for potential future connection to the Moffett Golf Course. The Moffett Golf Course is currently provided up to 250,000 gallons per day by SFPUC. Various inter-jurisdictional and institutional issues need to be addressed as part of the City providing service.

<u>NASA Ames Proposed Development</u> New development is proposed to be constructed at NASA Ames. Palo Alto/Mountain View may provide recycled water service to the westerly portion of that development. The City could potentially provide service to the easterly portion.

<u>IRWMP</u> The November 2006 *San Francisco Bay Area Integrated Regional Water Management Plan* (IRWMP) has been allocated $138 million from Proposition 84. The City has a low priority "placeholder" recycled water project in the IRWMP for Moffett Field Golf Course irrigation and other irrigation and streamflow augmentation projects. There may be an opportunity during the upcoming IRWMP update process to raise the priority and funding potential of the City's projects.

Fair Oaks and Encinal Parks Existing recycled water pipelines run immediately adjacent to the City's Fair Oaks and Encinal Parks. The parks are retrofitted for recycled water usage (i.e. to separate irrigation from remaining needed potable services) and are expected to be connected to the system in the future.

Onizaka Site Re-development New development is proposed at this site and plans are in the design phase. Recycled water infrastructure is in place and available for future use.

Dual Plumbing The opportunity exists to provide recycled water (dual plumbing) for non-potable restroom use in commercial buildings and condominiums where recycled water is available. Both the Sunnyvale Materials Recovery and Transfer (SMaRT) Station and Lockheed Martin's Fleet Maintenance Facility in Sunnyvale are dual plumbed for recycled water use.

Developer Agreements Opportunities may exist to negotiate agreements with developers of new and/or reconstruction projects so that sites are designed and constructed ready to accommodate recycled water for irrigation and/or dual plumbing, and thereby avoid future retrofit costs.

Streamflow Augmentation A NASA groundwater clean-up project had been discharging extracted treated groundwater into Marriage Road Ditch northwest of the WPCP. This discharge created habitat for and now supports a population of western box turtles, a "California Species of Special Concern". With appropriate regulatory agency approvals, an opportunity may exist to replace the current treated water replacement supply with recycled water.

SCVWD Partnering The City and SCVWD have had an agreement since 1997 whereby SCVWD provides to the City an annual financial incentive payment of $115 per acre-foot of eligible recycled water delivered to local users. City and SCVWD staff have agreed to explore long-term, mutually beneficial partnerships such as capital improvement projects. These are examples of more progressive and active forms of collaboration that compliment the current system of financial reimbursements.

Long-Range Goals, Policies and Action Strategies

The Goals, Policies, and Action Strategies are specific to water resources and services in the City of Sunnyvale. However, such resources and services are also subject to additional policies that can be found in other City documents. When City Council adopts the General Plan sub-elements, it is adopting the related goals and policies. The action strategies included in this document and discussed further in Section 4.0, inform Council, and the public, regarding the initial operational steps which staff proposes to implement the goals and policies adopted by Council. Staff may create new action strategies and revise others without action by City Council. The action strategies translate the long-range goals and adopted policies into decisions and actions which address water supply and distribution needs in Sunnyvale.

Only limited fiscal policies (primarily relating to infrastructure replacement funding) are included in this Sub-Element. Fiscal policies for the entire City are found in the Fiscal Management Sub-

Element. Policies related to public input regarding water resources and services can be found in the Community Engagement Sub-Element. The Community Vision, a new section of the General Plan, describes the past, present, and desired future for Sunnyvale in broad, City-wide terms, with 15 City-wide goals, including *XII. Supportive Utilities*.

The following Goals and Policies reflect updates to the 1996 versions. Three new policies have been added to reflect the increased attention expected to be paid to recycled water use, conservation and infrastructure improvements over the next 10 years (Policy A2, Policy B.1 and Policy C.2, respectively). (Specific Action Strategies associated with each Policy are not presented in this Executive Summary, for brevity, but are included in full in Section 4, page 52 of the Sub-Element).

3.1 WATER RESOURCES: GOALS, POLICIES AND ACTION STRATEGIES

GOAL A: Water Supply *− Acquire and manage water supplies so that existing and future reasonable demands for water, as projected in the 20-year forecast, are reliably met.*

Policy A.1: Manage water supply to meet demands for potable water through the effective use of water supply agreements.

Policy A.2: Maximize recycled water use for all Title 22 approved purposes both within and in areas adjacent to the City, where feasible.

Policy A.3: Provide enough redundancy in the water supply system so that minimum potable water demand and fire suppression requirements can be met under both normal and emergency circumstances.

Policy A.4: Lower overall water demand through the effective use of water conservation programs.

GOAL B: Water Conservation *− Promote more efficient use of the City's water resources to reduce the demands placed on the City's water supplies.*

Policy B.1: Lower overall water demand through the effective use of water conservation programs designed to increase water use efficiency in the residential, commercial, industrial and landscaping arenas, partnering with our wholesalers.

GOAL C: Water Distribution *− Proactively maintain the water distribution system infrastructure to ensure the reliable and safe delivery of water under normal and emergency conditions to both current and future customers.*

Policy C.1: Maintain a preventive maintenance program that provides for reliability of potable and recycled water systems.

Policy C.2: Maintain a proactive Long Range Infrastructure Plan that identifies, schedules, funds, and implements needed system upgrades and replacements before facilities exceed their effective useful lives.

Policy C.3: Maintain an up-to-date emergency water operations plan.

GOAL D: Water Quality *− Ensure that all water meets state and federal standards for aesthetics, quality and health.*

Policy D.1: Maintain and update a comprehensive water quality-monitoring program that meets or exceeds all state and federal requirements, while also meeting specific City and residents' needs.

Policy D.2: Through an aggressive inspection and preventive maintenance program that ensures that backflow from potentially contaminated water services is prevented, maintain and update an action plan that responds to and protects water supplies from contamination.

Policy D.3: Provide appropriate security and protection of water facilities.

COMMUNITY CONDITIONS

1.0 RECENT HISTORY OF CITY WATER SYSTEM

Overview At the time of the City's incorporation in 1912, Sunnyvale's population was approximately 1,500 and the municipal water utility was completely dependent on a groundwater well for its potable water supply. The original water supply source was a privately-owned well at the Joshua Hendy Iron Works. Several years later, the Taaffe Street Plant was constructed. By 1926 three wells were in operation at this location, which are no longer in use. During World War II, war contracts awarded to the Joshua Hendy Iron Works led to the development of the Central Water Plant and Well.

After World War II, the City grew very quickly. By the early 1950s, demand for water grew to the point where the aquifers were being over-pumped. During that period, subsidence in the northern areas of the City was in excess of 0.3 feet per year. By 1952, the population of the City had risen to about 10,000, and the City entered into a contract with the City of San Francisco's Water Department, currently the San Francisco Public Utilities Commission (SFPUC), for supply of imported water from the Hetch Hetchy system. That same year, three connections were made to the San Francisco aqueducts and were supplemented by eight City-owned well sites. By 1969, the City's population had reached 96,000 and the City contracted with the Santa Clara Valley Water District (SCVWD) for two connections to their West Pipeline.

As the demand for water continued to increase during the 1970s and into the mid 1980s, the City expanded its connections to the SFPUC/Hetch Hetchy system to a total of six and added three more wells, bringing the total number of City-owned wells to eleven. After two wells were destroyed in the 1990's there were nine operational wells, with two used only for emergency backup. In 2007, one of the backup wells was de-commissioned, and was subsequently destroyed in 2008, bringing the total number of wells today to eight. To ensure water supplies during periods of emergencies, the City also constructed interties with surrounding water utilities including the cities of Santa Clara, Mountain View and Cupertino. Also, many of the California Water Service Company (Cal Water) service areas within Sunnyvale were intertied with the City's system.

The community's water demand reached a peak in 1987. At that time, when it was anticipated that the demand for water would continue to grow, the estimated "build-out" demand was 36,000 acre-feet per year. However, the prolonged six-year drought of the late 1980s and early 1990s, combined with fundamental changes in the nature of the City's industrial community, dramatically reduced the demand for water. Based on consumers' new conservation awareness, changes in the industrial community from manufacturing to new low-water usage industries and rezoning of commercial areas to high-density housing, the projection for water demand at build-out is now estimated to be 29,000 acre feet per year.

The state legislature passed two bills in 2001 requiring action by a jurisdiction to verify the adequacy of its water supply for new large development projects. Senate Bill 221 (Kuehl) and Senate Bill 610 (Costa) became effective in 2002, amending the Government Code and the Water Code, requiring that an assessment of the agency's water supply be conducted, and prohibiting the agency from approving a project if the assessment cannot verify that a sufficient water supply is, or will be, available to the subdivision prior to its completion. It affects developments in excess of 500 dwelling units in size. The City has already conducted two such assessments. One was for the Moffett Towers project, and another was for the "East Sunnyvale Industrial to Residential" project. Sunnyvale is not an expanding city, so such studies should not be frequent as there are additional, smaller developments throughout the City. Such an assessment was not required for the Sunnyvale Town Center redevelopment project, but an analysis was performed in any case to verify internally the adequacy of all City infrastructure and utility support for the project.

Sunnyvale has embraced the Ahwahnee Principles developed by the Local government commission and its Center for Livable Communities. Specific to this report are the Ahwahnee Water Principles. Developed in 2005, the 14 Ahwahnee Water Principles are intended to help guide communities concerned with their future water supplies. The principles are intended to help a community grow in a water-wise manner, plan and design water-friendly neighborhoods, make most efficient use of existing water supplies through water conservation, and implement strategies and physical changes necessary to ensure water sustainability. These principles are supported by the California State Water Resources Control Board, and the League of California Cities.

1.1 Water Supply Sources

Sunnyvale's sources of potable water supply include local groundwater wells, imported supplies from the SFPUC and SCVWD, plus interties with other local water suppliers for emergencies.

During the last ten years, on average, SFPUC and SCVWD have each supplied approximately 45% of the total potable water used in the City (Figures 1 and 2). Of the remaining 10%, about 6% of the potable water demand has been supplied by seven City-owned and operated wells. Water withdrawn from wells requires paying a pump tax to SCVWD, making the price of well water similar to SCVWD wholesale water. To offset potable water demand for landscape irrigation and other non-potable uses, the remaining 4% has been supplied by recycled water produced by the Sunnyvale Water Pollution Control Plant (WPCP).

The WPCP produces approximately 16 million gallons per day (mgd) of high quality advanced secondary treated wastewater. A portion of this is further treated to "disinfected tertiary" recycled water standards, and can be used for approved non-potable purposes such as landscape irrigation and ornamental impoundments, industrial cooling towers, and construction. Recycled water is a reliable, drought resistant City controlled supply that helps to conserve and augment the potable water supply.

1.1.1 SFPUC

In 1952 the City entered into a contract with what is now known as the SFPUC for water from the Hetch Hetchy (HH) system. Water in the HH system originates from reservoirs located in and around Yosemite National Park. This water flows by gravity from the Sierra across the Central Valley, where it is blended with water from local reservoirs, passes through the Irvington Tunnel, and then crosses the Hayward Fault. The resulting blend of water is approximately 85% from the HH system and 15% from local reservoirs in Alameda County. From the Irvington Tunnel, San Francisco Bay Division No. 1 and No. 2 pipelines cross the San Francisco Bay, while the No. 3 and No. 4 pipelines pass around the south end of San Francisco Bay. Sunnyvale has six connections to the Bay Division No. 3 and No. 4 pipelines along Highway 101, and from which it acquires close to 11,000 acre-feet of water annually.

During the 1987-1992 drought, SFPUC instituted a water banking and penalty system for its suburban customers. Sunnyvale's usage during that period was within its allocation and the City built up a considerable amount of water in the SFPUC water 'bank,' while some other customers paid significant penalties. San Francisco thereafter rescinded its emergency ordinance and eliminated all water banking at the end of the drought.

In the early 1960s, the San Francisco Public Utilities Commission was considering a major expansion of its water system, to be made possible through construction of a large reservoir in the Sierra foothills that would be jointly owned with the Modesto Irrigation District and the Turlock Irrigation District. At about the same time, the California Department of Water Resources was planning the extension of the State Water Project into the Bay Area by means of the South Bay Aqueduct.

In order to make the revenue bonds for New Don Pedro Dam marketable, the SFPUC had to demonstrate a firm customer base outside the City itself. It was at this point that wholesale customers first signed long term contracts (20 years in most cases) with the SFPUC. By so doing, most chose to rely on the SFPUC rather than the State Water Project for their long term water future, although Alameda County Water District entered into contracts with both suppliers.

It was during this period that the Bay Area Water Users Association (BAWUA) was formed as an unincorporated association. In 1974 it secured tax-exempt status under Section 501(c) (4) of the tax code, and in 1991 it was reorganized as a California nonprofit mutual benefit corporation. For over 25 years, its membership has included all agencies now represented on the Bay Area Water Supply and Conservation Agency (BAWSCA) board of directors.

In 1974, the San Francisco Board of Supervisors rejected a SFPUC proposal for a uniform 17 percent rate increase for both in-city retail and outside wholesale customers and ordered the SFPUC to impose a differential increase: 21 percent for wholesale customers and only 14 percent for San Francisco retail customers.

By this point, wholesale customers had BAWUA in place, an informal but effective organization representing their collective water interests. BAWUA was able to finance a lawsuit brought in federal district court by the City of Palo Alto and several other representative plaintiffs challenging the legality of the rate increase under the Raker Act. The wholesale customers won an injunction against the rate increase from the district court and San Francisco appealed. The U.S. Ninth Circuit Court of Appeal affirmed, holding that the “Bay Cities,” as it referred to the plaintiffs, were co-grantees along with San Francisco in the rights granted under the Raker Act. (City of Palo Alto v. City and County of San Francisco (CA 9 1977) 548 F. 2d 1374.)

The Master Contract put in place a comprehensive method for allocating the costs of the water system between San Francisco and wholesale customers. Its goal is to ensure that wholesale customers pay no more in water rates than their fair share of the wholesale water system. Thus, all costs associated solely with the Hetch Hetchy electric power operations are the responsibility of San Francisco.

Similarly, all costs of San Francisco in-city facilities and programs are allocated exclusively to the San Francisco retail customers. Costs of the wholesale system are distributed between San Francisco and wholesale customers based on relative usage – e.g., approximately one-third to San Francisco and two-thirds to the wholesale customers because wholesale customers account for nearly two-thirds of water use. The Master Contract will expire in June 2009.

In 1992, the Federal Energy Regulatory Commission (FERC) began proceedings to evaluate how much more water should be released from New Don Pedro Reservoir to support salmon in the lower Tuolumne River. The amount of new fish releases, and the allocation of responsibility for them, as between San Francisco and the irrigation districts, could have had a dramatic adverse effect on water supply reliability in the Bay Area.

BAWUA intervened on behalf of San Francisco and was successful in persuading FERC to prepare a full Environmental Impact Review (EIR) on fish releases, taking into account their impact on Bay Area water supplies during dry years. The FERC proceedings concluded with a larger amount of water released for salmon, and with the irrigation districts agreeing to assume responsibility for making those releases in exchange for annual payments from San Francisco. BAWUA is a signatory to a multi-agency agreement to promote restoration of naturally occurring salmon, and participates on the Tuolumne River Technical Advisory Committee created by that agreement. BAWUA and the SFPUC have a side agreement related to implementation of the FERC agreement.

The Facilities Reliability Program was initiated in 1994 to assess the risk of damage to critical water supply facilities in the event of a natural disaster. In 1996, a joint BAWUA/SFPUC working group recommended safety-related capital improvements and San Francisco voters approved $157 million in revenue bonds the following year to build them. In 2000, the working group recommended more substantial seismic safety improvements after the Facilities Reliability Study revealed that a major earthquake could cause massive damage to the water system, with service outages of up to 60 days.

Water Supply Master Plan. Begun in 1997, conducted by San Francisco with oversight by a joint SFPUC/BAWUA Steering Committee, and completed in 2000, the Master Plan consolidated BAWUA agencies' projected water demands to 2050 and described strategies for increasing the system's ability to reliably meet the increased demand.

The 1984 Master Contract does not address how water will be allocated between San Francisco and its wholesale customers when a drought makes rationing necessary. After protracted negotiations between BAWUA and SFPUC staff, SFPUC adopted the agreed upon Water Shortage Allocation Plan in 2001. A separate but parallel process led to unanimous agreement among all BAWUA members on a similar plan to redistribute the wholesale customers' allocation among BAWUA members. The wholesale plan also allows for "banking" of water by agencies that use less than their allocation and for transfers of banked water between BAWUA members.

In 2002, for the first time in its history, the SFPUC developed and adopted a multiyear capital improvement program (CIP), a long term financing plan and a long term strategic plan for the water system. The wholesale customers contributed to the development and content of all three documents. Drafts of the documents were presented to the Commission in February 2001, and were adopted in revised form in May 2002.

Also in 2002, in order to help protect the health, safety and economic well being of 1.7 million people in Alameda, Santa Clara and San Mateo counties that get their water from agencies who purchase it from SFPUC, the state legislature passed a serious of bills dealing with the SFPUC and its suburban wholesale customers. The Legislature was convinced that the communities in the Bay Area that depend on the regional water system faced serious problems which they would

not be able to solve without the help of State law. In assessing the water supply situation in this part of the Bay Area, the State Legislature concluded that there were problems both with the physical facilities and with the institutional arrangements for management, operation and financing of those facilities. It responded with three separate new laws, each aimed at a different part of the problem.

- AB 1823 (Authors: Assembly members Louis Papan and Joe Simitian) is aimed at solving problems with the physical facilities. In effect, it says to the City and County of San Francisco: "fix the system." This law requires San Francisco to, among other things, do the following:

    - Formally adopt the Capital Improvement Program (CIP) prepared by SFPUC dated February 25, 2002. The CIP calls for a major overhaul of the water transmission system from pipelines crossing the Central Valley to storage tanks in San Francisco neighborhoods. At that time, rehabilitation of the regional system alone was estimated to cost at least $2.9 billion.

    - Prepare an emergency response plan, in consultation with the Bay Area Water Users Association, focusing on how water service can be restored promptly after an earthquake and prohibiting discrimination against wholesale customers in the allocation of water during such a crisis.

- SB 1870 (Author: Senator Jackie Speier) focuses specifically on the financing of the $2.9 billion in rehabilitation/improvement projects needed on the regional water system, by creating the Regional Financing Authority (RFA) (of which San Francisco is a member) to provide an alternate way to raise capital for the wholesale customers' share of the regional CIP. The RFA's authority to issue bonds under SB 1870 "sunsets" in December 2020.

- AB 2058 (Authors: Assembly members Louis Papan, John Dutra and Joe Simitian) was the Legislature's response to problems related to the institutional framework in which decisions about regional water issues are made.

  The portion of the Bay Area reliant on the regional water system is unique in that residents of the communities in which two-thirds of water is used have no political representation in San Francisco and San Francisco itself is not subject to oversight by the California Public Utilities Commission as an investor-owned utility would be. In terms of the many wholesale customers who are entirely dependent on the San Francisco regional system, the SFPUC is, in effect, an unregulated monopoly.

  The Legislature noted this lack of representation, as well as its impact on water supply decisions, in the findings incorporated into AB 2058.

> "Many separate cities, districts, and public utilities are responsible for distribution of water in portions of the Bay Area served by the regional system operated by the City and County of San Francisco. Residents in the counties of Alameda, San Mateo, and Santa Clara who depend on the water made available on a wholesale basis by the regional system have no right to vote in elections in the City and County of San Francisco and are not represented on the San Francisco commission that oversees operation of the regional system.
>
> "The San Francisco regional system is vulnerable to catastrophic damage in a severe earthquake, which could result in San Francisco and neighboring communities being without potable water for up to 60 days. The San Francisco regional system is also susceptible to severe water shortages during periods of below average precipitation because of insufficient storage and the absence of contractual arrangements for alternative dry year supplies.
>
> "The lack of a local, intergovernmental, cooperative governance structure for the San Francisco regional system prevents a systematic, rational, cost-effective program of water supply, water conservation, and recycling from being developed, funded and implemented."
>
> California Water Code Section 81301(a), (b), (c).

The Legislature's overwhelming support for the bill demonstrated the state's recognition of the need for local government to protect the health, safety and economic well being of 1.7 million people, businesses and community organizations in the three counties.

Under the authority of AB 2058, the Bay Area Water Supply and Conservation Agency (BAWSCA) was created on May 27, 2003, to represent the interests of 25 cities and water districts, and two private utilities, in Alameda, Santa Clara and San Mateo counties that purchase water on a wholesale basis from the San Francisco *regional water system*.

BAWSCA is the only entity having the authority to directly represent the needs of the cities, water districts and private utilities (wholesale customers) that depend on the regional water system. BAWSCA provides the ability for the customers of the regional system to work with San Francisco on an equal basis to ensure the water system gets fixed, and to collectively and efficiently meet local responsibilities.

The original non-profit organization that represented the suburban customers agencies, BAWUA, still exists, but in a different form. Instead of consisting of 27 agency members, it has only one member: BAWSCA. The reason for the change, rather than the elimination, of the now redundant organization was to be able to continue to utilize financial reserves that BAWUA had accumulated to assist in the expenses of the agency, and to continue to take advantage of some agreements that exist between SFPUC and BAWUA from before the creation of BAWSCA. Those funds and agreements are in the name of BAWUA, and there is therefore the need to retain it as an agency until all references are changed and funds expended or transferred.

Goals
BAWSCA's goals are to ensure:

- a reliable water supply;
- high-quality water; and
- a fair price.

Authorities
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.

Governance
BAWSCA is governed by a 27-member Board of Directors comprised of respected community leaders representing the 25 cities and water districts that are member agencies of BAWSCA, and two private utilities that also have appointees to the board, Stanford University and California Water Service Company.

Challenges
BAWSCA's member agencies jointly face four significant challenges over the next 10 to 20 years:

- Ensuring the San Francisco regional water system is rebuilt to withstand seismic and other hazards;
- Make sure the agencies and their customers are treated fairly in the allocation of costs for these capital improvements;
- Promote an aggressive water efficiency program throughout the region to extend existing supplies;
- Negotiate a new water agreement with San Francisco to provide a reliable supply of high quality water at a fair price.

BAWSCA is aggressively monitoring the progress of the San Francisco Public Utility Commission's $2.9 billion Capital Improvement Program, in particular regional projects to enhance seismic safety.

Figure 1. Historical Volume of Annual Water Deliveries by Source

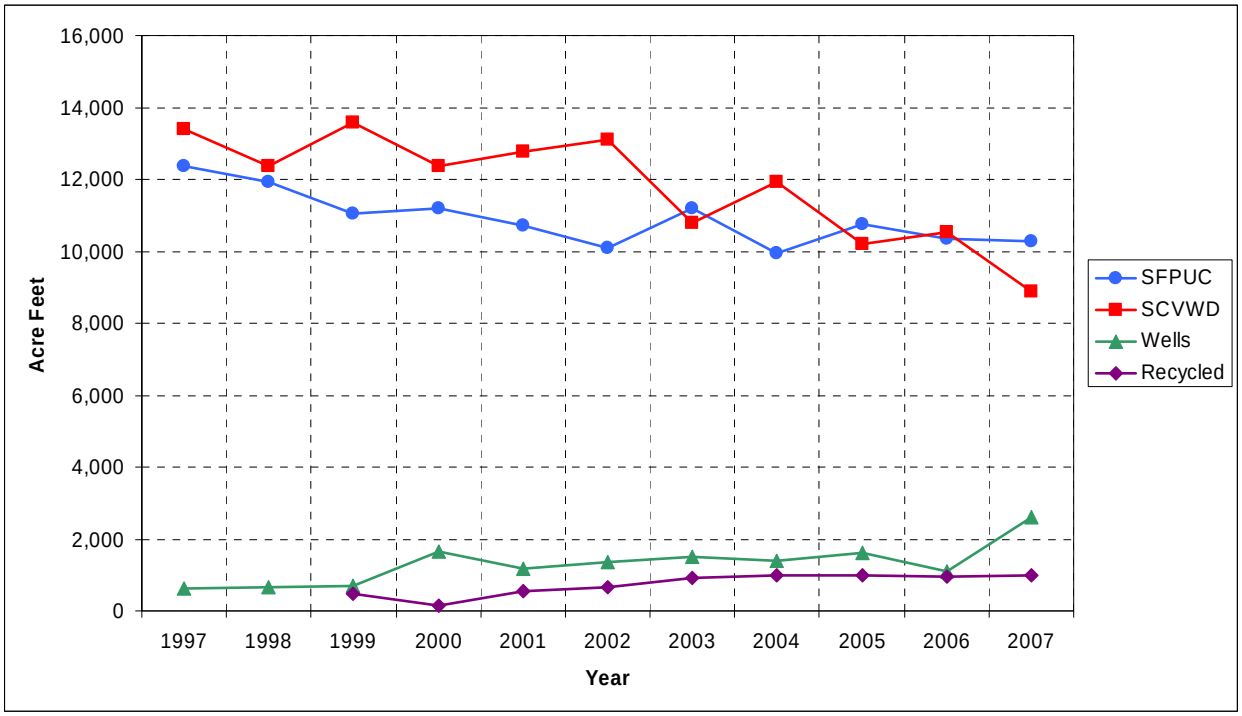
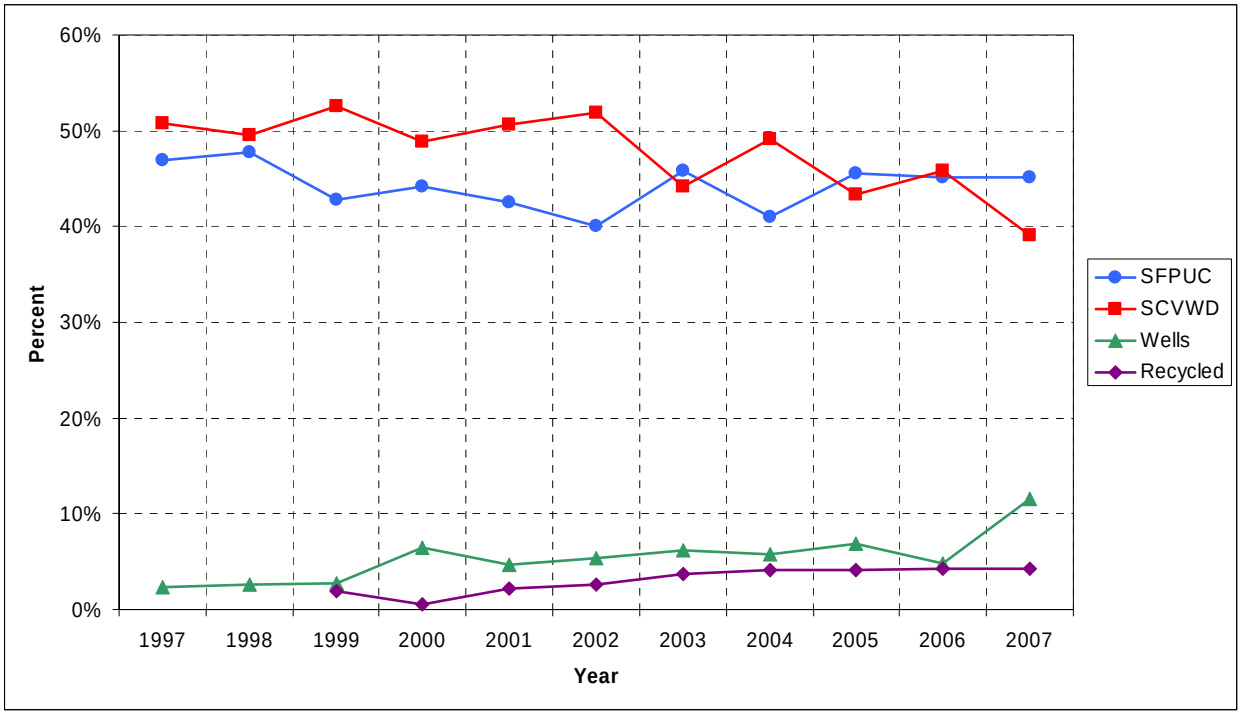


Figure 2. Historical Percentage of Annual Water Deliveries by Source


60%
50%
40%
30%
20%
10%
0%
Percent
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
Year
SFPUC
SCVWD
Wells
Recycled

1.1.2 SCVWD

SCVWD Groundwater Sources The Santa Clara Valley is situated on an alluvial plain consisting of alternating layers of sand, gravel, and clay, extending in some areas to a depth of more than 1,000 feet. This geology provides for a massive underground water basin. There are three major groundwater sub-basins in Santa Clara County: the Santa Clara sub-basin, the Coyote sub-basin, and the Llagas sub-basin. Groundwater in Santa Clara County is extracted through wells owned and operated by water retailers or private parties. In the Santa Clara and Coyote sub-basins (Santa Clara Valley), there are approximately 258 public water supply wells and over 1,200 private wells. Management of this basin is the responsibility of SCVWD, which issues permits for installation and operation of wells.

Some water percolates naturally through the ground along the perimeter of the valley in an area known as the recharge zone. The valley floor itself, because of the numerous impervious clay layers, allows minimal recharge. To enhance the recharge of water into the groundwater basin, SCVWD operates ten reservoirs and 71 percolation ponds around the Santa Clara Valley. The ten storage reservoirs, constructed in the 1930s and 1950s for water conservation, capture storm runoff that otherwise would flow into the San Francisco Bay. Reservoir water can be treated at drinking water treatment plants or recharged into the local groundwater basins. Through streams and percolation ponds, SCVWD recharges the groundwater basin with about 157,000 acre-feet of water each year.

When groundwater basins are depleted, water levels drop and land subsidence occurs, as unconsolidated clay layers are compacted. This irreversible process occurred in some areas where the ground level has sunk more than 13 feet since 1900 and has caused serious settling problems for flood drainage, sewage collection, and other major infrastructure systems. SCVWD, in cooperation with major water retailers developed a *Groundwater Management Plan*, which was updated in 2001. Through this plan, SCVWD operates to maintain groundwater levels above the subsidence level at all times. To help achieve this goal, SCVWD adopted pricing structures wherein the cost for groundwater is higher than that for imported water supplies.

SCVWD Surface Water Sources In 1969, the City contracted with SCVWD for imported water supply via two connections to SCVWD's West Pipeline. SCVWD water is imported from the Sacramento Delta, blended with local reservoir water, and conveyed through a series of aqueducts to the Rinconada Treatment Plant in Los Gatos. Treated and disinfected water is distributed to customers throughout the western portion of Santa Clara Valley. SCVWD delivers approximately 12,000 acre-feet of water per year to the City.

SCVWD obtains its water from different sources: 40% from the State Water Project (SWP), which provides water for municipal and industrial use in urban areas and agricultural interests primarily in the San Joaquin Valley and Southern California; 25% from the federal Central Valley Project (CVP), which was constructed initially to provide water for agricultural uses in the Central Valley; and 35% from local watersheds, groundwater and other miscellaneous sources (e.g., water transfers).

Construction of the SWP started in the early 1960s. Major features include the Oroville Dam on the Feather River, the Harvey O. Banks Delta Pumping Plant and the California Aqueduct. The SCVWD has an annual entitlement of 100,000 acre-feet from the SWP delivered via the South Bay Aqueduct (SBA).

The 400-mile-long Central Valley is bordered on the east by the Cascade and Sierra Nevada mountain ranges and on the west by the coastal ranges. The northern third of the valley is drained southerly by the Sacramento River, the state's largest river, yielding about 35% of the total outflow of all rivers in the state. Most of the southern two-thirds of the valley, a much drier region, is drained northerly by the San Joaquin River and its tributaries. The two rivers converge in a maze of channels and islands known as the Sacramento/San Joaquin Delta (Delta), which also receives freshwater inflow from other smaller streams. Although the San Joaquin Valley contains two-thirds of the Central Valley's farmland, it receives only one-third of the precipitation.

During the boom years following the California Gold Rush, many of the state's settlers turned to ranching and dry land farming in the Central Valley. Because of a series of severe droughts in the latter part of the nineteenth century, major redistribution of the state's water occurred to allow farming to continue in the San Joaquin Valley. Farmers pumped the groundwater extensively for crop irrigation, depleted many of the wells, which forced some farmlands out of production.

In 1933, the California Central Valley Project Act (CVPA) was enacted. In 1935, with the passage of the Federal Rivers and Harbors Act, the federal government assumed control of the CVP. Many of the CVP's facilities were constructed between 1937 and 1951. By 1990 the project included 20 dams and reservoirs with a storage capacity of 11 million acre-feet of water, 11 power plants, 50 miles of major canals and aqueducts, 3 fish hatcheries and a system of tunnels, conduits, power transmission grids and other facilities.

The Shasta and Keswick dams on the Sacramento River, and Friant Dam, on the San Joaquin River, are all part of the CVP system. Shasta Dam is the largest storage reservoir in the state (4.5 million acre-feet). Canals, such as the Friant-Kern, the Madera, the Delta Cross Channel (which carries Sacramento River water to help reduce soil salinity in the delta), and the Delta-Mendota, are used to transport water throughout the valley. Folsom Dam is one of several constructed by the U.S. Army Corps of Engineers.

Most of the water provided by the Central Valley Project is for agricultural use. Some water is diverted to municipal and industrial use. SCVWD's imported CVP water comes from the Tracy pumping plant located in the Southern Delta, through the Delta Mendota Canal to San Luis Reservoir, and through the San Felipe Project into Santa Clara County. SCVWD has a contract with the Bureau of Reclamation for approximately 152,000 acre-feet per year (AFY) of CVP water.

In 1981, the City contracted with SCVWD to purchase treated surface water. The contract has a 70-year term and will expire in 2051. The contract requires the City to submit a delivery schedule every three years to SCVWD. After reviewing its ability to deliver water to the City based on forecasted availability of supply and the total water delivery requested, SCVWD sets a three-year delivery that includes a 'Take-or-Pay' provision with maximum peak delivery limits. During periods of drought,

SCVWD's water deliveries may be curtailed by CVP and/or SWP. The SCVWD may also enact an emergency ordinance regarding usage reduction.

1.1.3 City Wells

In the recent past, the City has operated seven wells located in various areas throughout the City. Two additional wells have been maintained in stand-by mode for use as emergency backups, although one well has recently been decommissioned and is scheduled for destruction in 2008. All wells draw water from deep aquifers and have the combined ability to produce over 10,000 acre-feet annually. Wells are used primarily to supplement the imported water supplies in order to meet summer peak demands, and for emergency situations, such as fires or the loss of an imported supply source.

City well water has historically met, and continues to meet, all state and federal water quality standards. The water has shown no signs of contamination from industrial, leaking underground storage tank, or other sources.

1.1.4 Recycled Water

The City first examined the feasibility of reusing treated wastewater from the City's Water Pollution Control Plant (WPCP) for uses outside of the plant grounds in the early 1980s. The 1984 Water Reuse Feasibility Study report included a market assessment, investigation of the potential for water quality improvement, and evaluation of alternative projects. The study determined that potential demand existed, but that economic conditions were not favorable at that time. It recommended ongoing monitoring of marketing conditions relative to the cost of constructing required facilities (primarily pipelines), identifying alternative funding sources, and further assessment of the need for reducing salinity levels in the recycled water. The 1984 Feasibility Study was updated in 1989, reaffirming most of the conclusions of the earlier study.

Through the 1980s, state and local agencies continued to encourage the use of recycled water as an alternative water source. State efforts were driven in large part by the legislature's finding that use of potable domestic water for non-potable uses constitutes "a waste or unreasonable use of water". The California Water Code empowered public agencies to require the use of recycled water in cases where it is available at reasonable cost, is of adequate quality, and where its use will not be detrimental to public health or the environment, and will not adversely affect downstream water rights. The State's Recycled Water Act of 1991 further encouraged support for water recycling. The Act declared that "the use of recycled water is a cost-effective, reliable method of helping to meet California's water supply needs", and "the use of recycled water has proven to be safe from a public health standpoint". Awareness of recycled water as a drought-resistant alternative water supply also continued to grow, fueled in part by the extended drought of 1987-1992.

The 1987 Amendments to the Clean Water Act (CWA) resulted in the Regional Water Quality Control Board (RWQCB) incorporating significantly more stringent pollutant removal requirements in the National Pollutant Discharge Elimination System (NPDES) discharge permit for the WPCP. The RWQCB Water Quality Control Plan (Basin Plan) for San Francisco Bay also contains a Prohibition on discharges of treated wastewater to San Francisco Bay south of the Dumbarton

Bridge, with certain exceptions. One of the exceptions is for cases where the discharge is part of a water recycling program.

A water recycling program can therefore provide both wastewater disposal and water supply benefits. Water recycling reduces the flow and thus the total mass of certain compounds (such as copper) that are considered pollutants if discharged to the Bay. Water recycling provides a benefit to the Bay and is a potential alternative to installation of expensive new treatment processes.

For the above reasons, in 1991, the City proactively embarked upon development of a City-wide water recycling program. Based on an analysis of potential recycled water demand for landscape irrigation, industrial process use, and other potential future uses, a progressively expanded system was proposed and developed. The initial facilities were designed to supply recycled water throughout the northern part of the City, but with sufficient main-line capacity for future expansion within (and potentially outside of) the City boundaries. The distribution pipelines were designed to provide the City with the capability to ultimately recycle 100% of the WPCP flow. These initial facilities included a pump station, distribution pipelines, and improvements at the WPCP to facilitate production of "disinfected tertiary" recycled water.

An administrative program was developed to facilitate permitting of recycled water customers, monitoring, and other elements needed to meet the regulatory requirements set by the RWQCB and the Department of Health Services (now California Department of Public Health). Recycled water service to Baylands Park and the Sunnyvale Golf Course was initiated in 1996. Service to commercial/industrial sites in the Moffett Park and Lockheed/Martin areas began in 1999, and the number of hookups in those areas, and other areas served by the distribution system, has continued to grow since that time. In 2001, construction of a storage tank and second pump station at the City's former "industrial" tank site location (now referred to as the San Lucar site) was completed.

The water recycling program is supported by revenues from the sale of recycled water. The rates are set at 90% of the prevailing rate for potable water. The City provides an additional financial incentive to customers by covering a portion of the costs associated with converting an existing site to use of recycled water. A resolution adopted in 1993 by the Board of Directors of the SCVWD provided financial incentives for development of water recycling projects in Santa Clara County. The financial incentive is based on SCVWD's estimate of the avoided cost for developing an equivalent amount of potable water supply. In 1997 Sunnyvale entered into an agreement with SCVWD whereby SCVWD provided the City with $115 per acre-foot (352/million gallons) of recycled water delivered.

The City's water recycling program does not rely on a mandatory use policy, as allowed for under State law. Even though it is a voluntary program, there is significant demand for recycled water within the community as a result of the social and financial benefits associated with its use.

1.2 Water System

The City owns, operates, and maintains a water supply and distribution system (Figure 3) worth in excess of $300 million. The system includes interties with City suppliers and neighboring water

utilities, transmission pipelines, valves and regulators, booster pumps, storage reservoirs (tanks), distribution pipelines, and an automated supervisory control and data acquisition (SCADA) system that monitors and controls water supply from all sources. Through the years, the SCADA system has been upgraded to incorporate newer technology to increase system reliability and safety.

1.2.1 Water Transmission and Supply

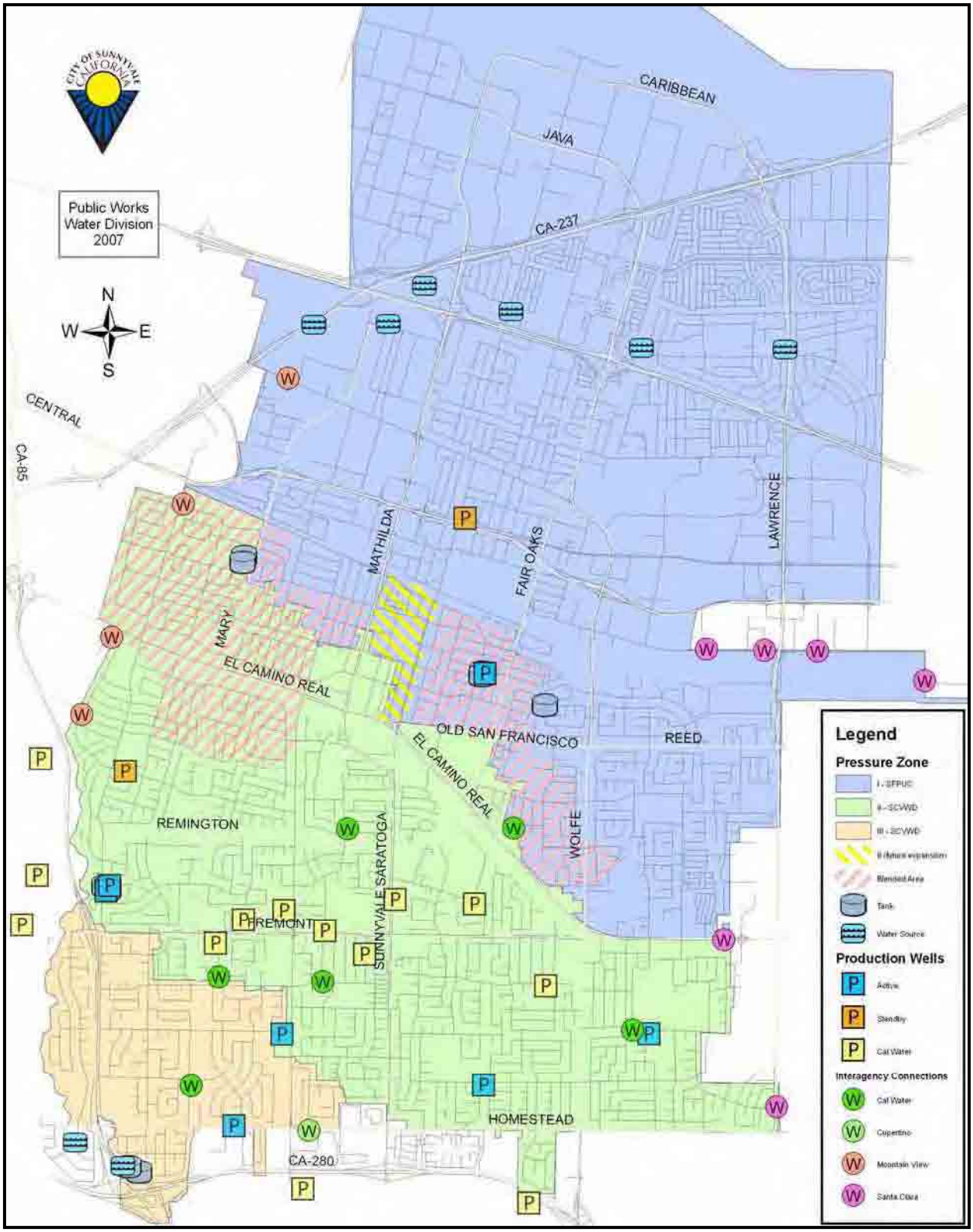
The City water transmission and supply system (Figure 3) as of 2007 includes approximately 10 miles of 16-inch to 30-inch diameter transmission pipelines, ten storage tanks with a combined storage capacity of 27.5 million gallons (MG), seven active and one backup well with a capacity of 11.4 million gallons per day (mgd), six interties with Cal Water, one intertie with the City of Cupertino, four interties with the City of Mountain View and six interties with the City of Santa Clara, and 17 booster pumps. Approximately 80% of the water main pipelines were constructed in the 1960's and the remainder in the 1980's. The 1960's vintage pipelines will reach their estimated 50 year useful life within the next several years.

The California Department of Public Health (CDPH) found that many suburban utilities do not have adequate storage capacity to meet their demands during peak water use periods. As a consequence, CDPH requested that the suburban users of the Hetch Hetchy system support the reliability of the system by developing plans to provide 8 hours of supply at maximum-day demand without fire-fighting reserves in each pressure zone. Hydraulic analyses (1995, 2007) of the City's water system have shown that the existing storage facilities meet CDPH criteria and are adequate to meet current and future needs, except for prolonged interruptions due to earthquake or other extraordinary conditions.

All active storage tanks (Figure 3) are constructed of steel and have a service life of over 100 years when properly maintained. The oldest tank has been in service for 40 years. The City has an annual program to inspect and provide required maintenance for storage tanks.

Although not obvious, ground elevations in Sunnyvale vary from sea level at the north end of the City to 300 feet above sea level at the southwest corner. Because of this elevation difference, the water system is broken up into a series of three pressure zones (Figure 3). Zone I extends roughly from El Camino Real northward to the San Francisco Bay and is supplied mostly by Hetch Hetchy water. Zone II consists of everything south of Zone I except for the southwest corner of the City. Zone II is supplied by a mixture of City wells, Hetch Hetchy water, and SCVWD water. Zone III, the smallest of the three zones, is located in the southwest corner of the City, bounded roughly by Hollenbeck Avenue on the east and Fremont Avenue on the north. Zone III is served by a combination of SCVWD treated water and City well-water.

Figure 3. Existing Water System Facilities



The purpose of creating pressure zones is to maintain both minimum and maximum pressures within the zone boundaries. Typically, a minimum pressure in any zone would not drop below 40 pounds per square inch (psi) or exceed 105 psi. Water can flow between zones through pressure-regulating valves located at the boundaries. These regulating valves are equipped with a reverse-flow feature that senses differential pressure from the zones and will automatically respond to maintain the preset pressures. The three zone boundaries have been adjusted over the years, depending on increases or decreases in water demand within the zones and the ability of the distribution system to maintain predetermined delivery pressures.

For the most part, the northern portion of the City (Zone I) is serviced directly from the Hetch Hetchy pipeline system, which operates at pressures in excess of 130 psi. Booster pumps are required for Zones II and III to maintain adequate distribution and delivery pressures because pressures in the systems that supply these zones are lower.

1.2.2 Water Distribution

The distribution system includes the smaller diameter distribution pipelines, valves and regulators, fire hydrants, backflow devices, service lines, water meters and vaults, water sampling stations, wells, miscellaneous buildings and appurtenances, and the automated supervisory control and data acquisition (SCADA) system that controls the distribution of water throughout the city.

The water distribution system as of 2007 included over of 280 miles of 6-inch to 14-inch diameter water main pipelines, approximately 28,630 water services, 3,380 fire hydrants, and 250 City-owned backflow devices. A large proportion of these distribution pipelines were also constructed in the 1960's and will reach their estimated 50 year useful service life within the next several years.

The City's 3,280 fire hydrants are continuously maintained via flow testing, cleaning, painting, and color coding to indicate flow rates. The location and placement of these hydrants are determined by the Fire Prevention Division of the Public Safety Department. Backflow preventers are installed by property owners. These devices are subject to the City's approval, annual inspection, and testing. To ensure that these devices always function properly, the City may obtain ownership of all backflow devices from private owners in the future.

Within the City's service areas, some pocketed areas adjacent to Fremont Avenue and Sunnyvale-Saratoga Road receive water from Cal Water. These areas were formerly part of the county, but have been annexed by Sunnyvale. Cal Water produces water from its own wells (Figure 3), which meets all federal and state quality requirements. The City has provided emergency connection to Cal Water service areas to improve fire flows and reliability, and all fire hydrants have been replaced to conform to City standards.

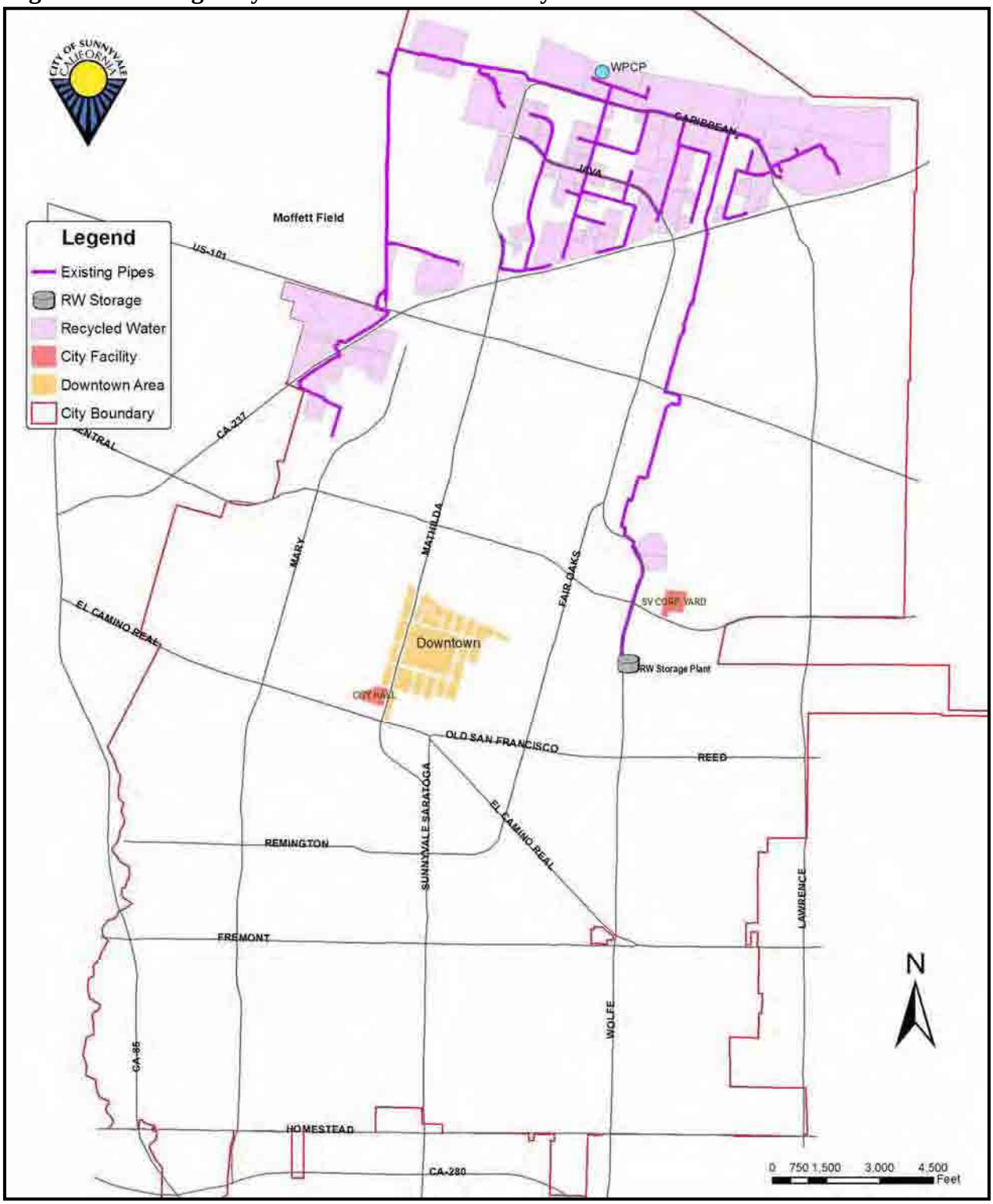
1.2.3 Recycled Water Distribution

Recycled water is produced at the WPCP on an intermittent basis, through process changes that further reduce the treated water turbidity and increase the disinfectant dose and contact time. A pump station at the WPCP delivers the water into a distribution system consisting of approximately 43,300 feet of 12-inch through 36-inch transmission mains and 34,000 feet of 8-inch

distribution lines. The system "backbone" has an inverted "U" shape with main lines running east-west along Caribbean Avenue and north-south on either side of the City (Figure 4). The San Lucar Recycled Water Pumping and Storage facilities are located at the southern terminus of the "east main" near Wolfe Road and Kifer Road. The facility provides about 1.5 million gallons of working storage capacity, and a maximum pumping capacity of approximately 5600 gallons per minute. The San Lucar facilities serve as the source of recycled water during periods of low to moderate demand, when the WPCP's recycled water production facilities are off-line. For added system reliability, potable water can be added to the system via air gaps at the WPCP and at the San Lucar storage tank.

Areas currently served by the recycled water system are shown in purple in Figure 4. Major recycled water customers include the Sunnyvale Golf Course, Baylands Park, Twin Creeks Sports Complex, and Lockheed-Martin Ball Field. In addition, the system provides water for irrigation to 75 commercial/industrial sites and 12 street median strips in the northern part of the City, and for toilet flushing and washdown at the Sunnyvale Materials Recovery and Transfer (SMaRT) facility. Recycled water is also available to tanker trucks from hydrants located at the WPCP.

Figure 4. Existing Recycled Water Distribution System



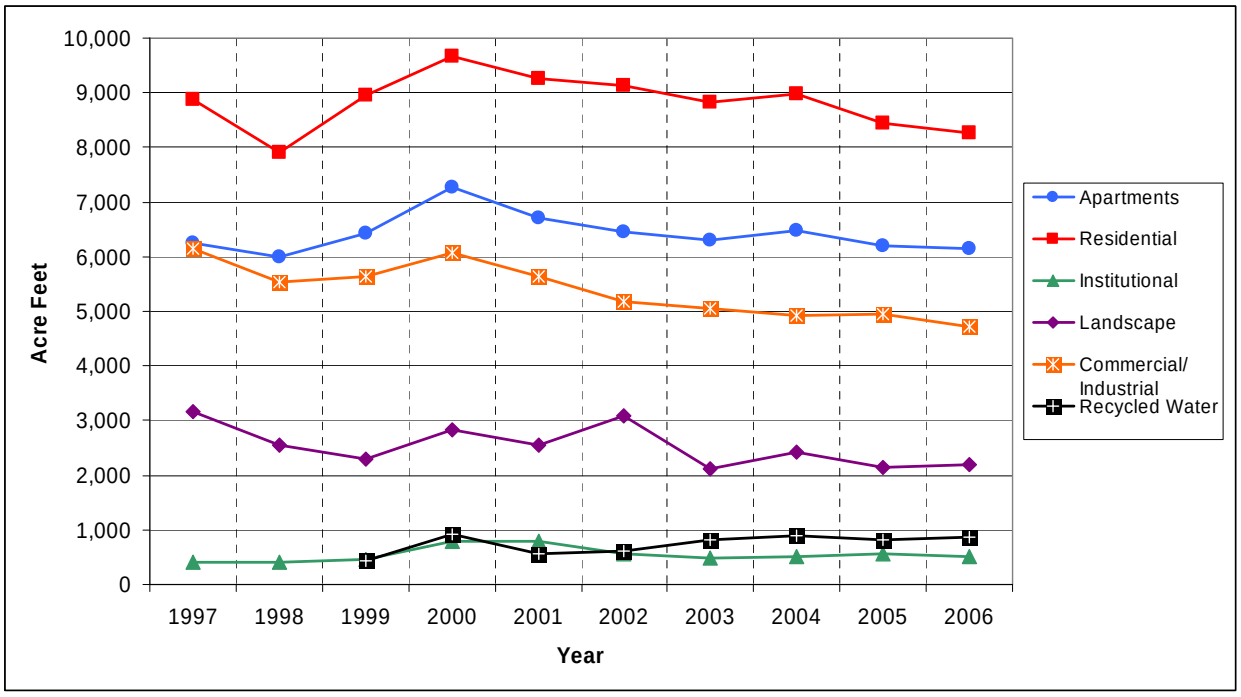
1.3 Water Demand and Demand Management

The City provides potable water to six broad customer categories: single-family residential, apartments, commercial/industrial (incorporating all non-residential accounts not classified as landscape), institutional, potable water irrigation and recycled water (Figure 5).

From 1987 to 1992 California experienced a prolonged drought, with severe water shortages and water rationing in Santa Clara County from 1989 to 1992. Through the cooperative efforts of water retailers and their customers, Santa Clara County endured the drought with minimal economic and aesthetic impacts. Between 1984 and 1993, the City experienced a decrease in water consumption, primarily due to water conservation in the residential, commercial, and industrial sectors. Some of the demand management practices that were used to maximize the availability of water supply during the drought, such as inverted rates and best management practices, continue to this day. More details on historic and future demands and demand management practices can be found in the *Sunnyvale 2005 Urban Water Management Plan* (UWMP).

After 1993, and prior to 2000, water consumption in all categories was on an upward trend. Between 2000 and 2003 demand declined for all categories in general except landscaping, with the largest decrease being in the commercial/industrial category. In 2004 demand from the residential sector increased slightly then decreased again through 2006. Demand in the commercial/industrial sector remained flat with a slight decline in 2006.

Figure 5. Annual Water Consumption by Use Category



1.4 Water Quality Management and Regulations

The principal law governing drinking water safety in the United Stated is the Safe Drinking Water Act (SDWA). Enacted in 1974, the SDWA required the US Environmental Protection Agency (USEPA) to establish comprehensive national drinking water regulations and to set enforceable standards for health-related drinking water contaminants. The SDWA amendments of 1986 required USEPA to set standards and monitoring requirements for 83 drinking water contaminants by 1989 and for a potential 25 additional contaminants every three years thereafter.

The key Federal regulations addressing primary and secondary drinking water standards for public water systems and minimum water quality monitoring requirements include:

- 40 CFR 141 National Primary Drinking Water Regulations
- 40 CFR 142 National Primary Drinking Water Regulations Implementation
- 40 CFR 143 National Secondary Drinking Water Regulations

The State of California has assumed the primacy of enforcing the rules and regulations developed under the SDWA. Potable water quality and monitoring are regulated under California's Code of Regulations, Title 22, Division 4, California Statutes Related to Drinking Water Government Codes. The City's water quality monitoring program is based on applicable SDWA and Title 22 regulations.

A list of the major regulations at least partially in effect at the time of the prior Water Resources Sub-Element (1996) follows. (These regulations and additional regulations subsequently enacted (as of late 2007) are listed in Section 2.4 and described in detail in Appendix C.)

- Safe Drinking Water Act
- Surface Water Treatment Rule
- Total Coliform Rule
- Phase II and Phase V Organic and Inorganic Chemical Rule
- Information Collection Rule
- Disinfectants and Disinfection-By-Products Rule
- Enhanced Surface Water Treatment Rule

The potential for contamination of City water sources exists from events such as vandalism, equipment breakdown, natural disaster, and groundwater intrusion by contaminants. The impact of water quality degradation could result in shutdown of one or more sources of water, low pressure flows in some portions of the distribution system, and/or curtailed water usage.

The City conducts an extensive water quality monitoring program as required by and to document compliance with all applicable State and Federal requirements. Approximately 2,392 samples are collected from the distribution system, imported sources, wells in operation, storage tanks, and/or household taps, depending on the constituent of interest. Samples are analyzed by either the City's State-certified laboratory or an outside State-certified laboratory. The City has been in consistent compliance with the requirements of its water quality monitoring program since it was instituted in 1988. (A copy of the latest version of that program can be found in Appendix D).

All records are maintained and reports filed with the California Department of Public Health (CDPH) as required. Staff keep apprised of the latest water quality concerns, technical information, and regulatory developments through training classes sponsored by American Water Works Association (AWWA), the USEPA, the CDPH, and local and national water association professional conferences.

Some of the City-operated wells are in proximity to known underground contamination or industrial areas. For that reason, monitoring for organic chemicals in the wells is performed on a monthly basis. Abandoned wells covered under pavement, houses, private yards and other developments continue to be found sporadically, usually when unexpected water is observed at the ground surface. Any such wells that are found are sealed per SCVWD guidelines.

Water purchased from SFPUC and SCVWD originates from different sources and is therefore subject to different water quality concerns than City wells. Both agencies have vigorous water quality monitoring and protection programs. SFPUC and SCVWD are responsible for conducting the monitoring required to ensure that the water delivered to the City (and other customers) complies with all State and Federal requirements.

San Francisco's Hetch Hetchy source water is Sierra snowmelt from a protected watershed that has been granted Filtration Avoidance status by the CDPH. (Filtration is normally required of all surface water supplies to remove contaminants including parasites such as Giardia and Cryptosporidium which are resistant to disinfection). The SFPUC conducts monitoring throughout its distribution system to ensure that the system remains free of parasites. No cases of disease from these organisms have been linked to the City's water supply.

The main concern associated with Delta water quality as supplied by SCVWD is control of harmful disinfection byproducts (DBP) which form when chlorine used for disinfection reacts with organic carbon and bromide present in the water. Nearly all land uses and discharges contribute some organic carbon to the Delta system including agriculture, forestry, urban runoff, treated wastewater, and runoff from natural lands. Drainage from islands with peat soils and wetlands are potentially significant, but unquantified organic carbon sources. Bromide concentrations are almost entirely due to and dependent on the amount of seawater mixing with freshwater in the Delta. Potential DBP control methods include efforts to reduce source concentrations, taking advantage of seasonal variations in the timing of water exports from the Delta, changes in disinfection processes, additional treatment (e.g., ozonation), and structural changes that would affect how water is routed through and stored in the Delta.

It is not uncommon for some customers to experience slightly varying water quality throughout the year, because there are three different water sources supplying the system. These waters blend within the distribution system (see crosshatched areas in Figure 3) depending on the daily demand, seasonal quality and relative quantity fluctuations, and temporary interruptions due to maintenance activities, resulting in water quality variances. In all cases the City's water quality meets or exceeds all federal and state requirements.

Monitoring of the non-potable recycled water quality is conducted at the WPCP in accordance with the monitoring program specified in the City's Water Reclamation Permit, issued by the RWQCB. In addition to laboratory testing of water quality indicators, the treatment process has continuous on-line monitoring to insure that recycled water disinfection requirements (turbidity, chlorine dose, and chlorine contact time) are met at all times.

After the terrorist attacks of September 11, 2001, the City applied for and received a Water Infrastructure Security grant from the U.S. Environmental Protection Agency (EPA). The money allowed the City to conduct vulnerability assessments, prepare an Emergency Operations Plan (EOP) and conduct thorough security enhancement planning for its water infrastructure. The resulting security measures, including security cameras and climb-proof fencing around vulnerable facilities, continue to protect the City's water supply from acts of foreign or domestic terrorism.

1.5 Previous Community Condition Indicators

The goals and policies established in the 1996 sub-element are included in Appendix B. The 1996 goals were as follows:

Goal 3.1A Manage future demands to ensure that existing and realistically certain future water supplies will be adequate.

Goal 3.1B Ensure that potable and recycled water meet all quality and health standards.

Goal 3.1C During emergency conditions, ensure that the water distribution system can meet minimum fire suppression and quality standards.

Goal 3.1D Manage potable water demand through the effective use of water rates, conservation programs and recycled water.

Goal 3.1E Maintain a financially stable water fund through a user-based fee system that funds operation, capital improvements, infrastructure replacement and public education programs.

Goal 3.1F Provide a customer service program that emphasizes customer satisfaction and confidence.

Goal 3.1G Support legislation and other efforts that promote the accomplishment of the City's Water Resources Sub-Element Goals and Policies.

All the above goals were achieved during the period between 1996 and 2007, although some of the policies associated with those goals were altered or not fully met due to the adverse financial climate of the first half of the decade. In particular, preventive maintenance program activities were reduced below the levels recommended by the American Water Works Association, which are the industry standards. As a consequence, the number of required unplanned repairs to the system infrastructure has increased. Water conservation programs and expansion of the recycled water system were also

placed on hold due to financial concerns. Future water supply needs and funding conditions will determine how and when these programs/projects will be brought back.

The above goals and policies adopted in 1996 are no longer entirely applicable to current conditions. The updated 2007 goals and policies are located in the Long-Range Goals, Policies and Action Strategies portion (Section 4.0) of this Sub-Element.

2.0 CURRENT CONDITION OF CITY WATER SYSTEM

2.1 Water Supply Sources

2.1.1 SFPUC Supply

The City renewed its contract with the SFPUC in 1984. After the contract expires in 2009 another renewal is anticipated, and the City's entitlement will be reviewed at that time. Maximum and minimum usages of water are stipulated in the City's current individual contract with SFPUC. The contract's maximum water supply is approximately 16,800 acre feet per year, and the minimum is 10,500 acre feet per year. If the overall usage by all suburban retail customers exceeds the maximum available level, the maximum amount of water available to Sunnyvale would be reduced from 16,800 acre-feet per year under the City's individual contract to 14,090 acre-feet per year based on the master agreement that covers both the City and other SFPUC wholesale customers.

Under the current contract and barring catastrophic events, the SFPUC can meet the demands of its retail and wholesale customers in years of average and above-average precipitation. The contract, as mentioned above, allows the SFPUC to reduce water deliveries to wholesale customers during periods of water shortage. Reductions to wholesale customers would be based on each agency's proportional purchases of water from the SFPUC during the year immediately preceding the onset of shortage, unless this formula is supplanted by a water conservation plan agreed to by all parties.

The contract's default formula discourages SFPUC's wholesale customers from reducing purchases during periods of normal water supply through demand management (i.e. conservation) programs or development of alternative supplies. However, to deal with water shortages that could develop, SFPUC and its wholesale customers adopted an Interim Water Shortage Allocation Plan (IWSAP) in calendar year 2000. This IWSAP applies to water shortages up to 20% on a system-wide basis and will remain in effect through June 2009. The IWSAP allows for voluntary transfers of shortage allocations between SFPUC and any wholesale customer and between wholesale customer agencies. Also, water "banked" by a wholesale customer, through reductions in usage greater than required, may be transferred between agencies.

The SFPUC has identified serious concerns about portions of the Hetch Hetchy system that are aging, in need of repair or replacement, and are sensitive to damage from seismic events. In response to these concerns, the SFPUC is undertaking a *Water System Improvement Program* (WSIP) that will enhance the ability of its water supply system to meet identified service goals for water quality, seismic reliability, delivery reliability and water supply.

The origins of the WSIP are rooted in the "Water Supply Master Plan" (April 2000). Planning efforts for the WSIP gained momentum in 2002 with the passage of San Francisco ballot measures Propositions A and E which approved the financing for the water system improvements. Also in 2002, Governor Gray Davis signed Assembly Bill 1823, the Wholesale Regional Water System Security and Reliability Act.

For Sunnyvale a temporary loss of Hetch Hetchy supply would eliminate the primary source of supply to Zone I and reduce the supply to Zone II. Well water from all zones could be used to temporarily replace the loss of water from Hetch Hetchy supply, but long-term replacement would require obtaining and supplying SCVWD water to Zone I.

2.1.2 SCVWD Supply

The contractual agreement between the City and SCVWD sunsets in 2051. The current contract calls for Sunnyvale to submit proposed water delivery schedules to SCVWD for three-year periods, indicating amounts of treated water desired by the City during each of the three years. There are restrictions regarding minimum water amounts that the City will purchase from SCVWD. SCVWD can make reductions to the water requested by Sunnyvale consistent with its ability to deliver water to all its customers.

To maintain water supply reliability and flexibility, SCVWD's water supply includes a variety of sources including local groundwater, imported water, local surface water, and recycled water. The District has an active conjunctive use program to optimize the use of groundwater and surface water, and to prevent groundwater overdraft and land subsidence.

Long term planning and modeling analysis performed by SCVWD as part of its *Integrated Water Resources Planning Study 2003* (IWRP) indicate that if additional investments are made, future countywide demands can reliably be met. SCVWD intends to ensure that the additional investments be undertaken in accordance with the IWRP framework, which recommends a flexible resource mix be implemented in phases over the planning horizon. This flexibility will allow SCVWD to respond to changing and uncertain future conditions. SCVWD believes that the water it supplies will reliably meet future countywide demands, through implementation of its IWRP.

In addition to the IWRP, SCVWD completed a *Water Infrastructure Reliability Project* in 2005 that assessed the vulnerability of its regional raw and treated water delivery systems. The screening process used in the reliability study identified the following hazards as those that pose the most significant risk to system functionality:

- San Andreas fault magnitude 7.9 earthquake
- Southern Hayward fault magnitude 6.67 earthquake
- 100 year flood
- 500 year flood
- Regional electric power outage

An earthquake on the region's major fault zones has the potential for disrupting the delivery of potable treated water from SCVWD's water treatment plants. The result of the combination of seismic probabilities for each one of the fault zones indicates about a 1-in-100 chance each year for a major earthquake that could result in a one- to two-week interruption of SCVWD treated water supply to the City. The possible flooding of some SCVWD facilities is of much lesser concern (relative to providing service to the City) than a seismic event.

Another vulnerability for SCVWD is the reliability of the supplies of regional imported water from the Sacramento-San Joaquin Delta to SCVWD. Recent studies indicate that levees protecting many of the Delta farming islands are extremely vulnerable to catastrophic failure. Certain conditions such as levee failure, or other Bay-Delta natural or regulatory agency driven disturbances, could interrupt the ability to pump treatable water to the State or Federal water projects for delivery to SCVWD.

A temporary loss of water supply from SCVWD could be replaced in the short term by a combination of increased production from City wells and an increase in SFPUC supply (within contract limits). The areas of the City served by SCVWD connections could be served primarily via water stored in reservoirs and secondarily by pumping of Hetch Hetchy water from the Wolfe/Evelyn Water Plant through the Wolfe/Homestead transmission main and from the Mary/Carson Water Plant into Zone II. Sufficient supply from Hetch Hetchy and well water would be required to mitigate an extended loss of SCVWD supply.

2.1.3 City Wells

Sunnyvale has seven operating wells that are kept in full production capacity and one well maintained in stand-by mode for emergencies. The seven operating wells are used as a supplemental source to the imported SFPUC and SCVWD water supplies. The wells produced approximately 1,890 acre-feet of groundwater in fiscal year 2006/07. Well water is an important component of the City's water shortage contingency plan, as indicated in the *Sunnyvale 2005 Urban Water Management Plan*.

The City completed a Drinking Water Source Assessment Program (DWSAP) for the nine groundwater sources (wells). The DWSAP was submitted to the DPH in January 2003. It evaluated potential sources and pathways of contamination and determined that none of the City wells were unacceptably vulnerable to contamination from sources such as leaking underground tanks. Routine monitoring has also consistently confirmed the absence of contamination (see the *Annual Water Quality Report*).

Because of its age existing well equipment, in particular pumps and motors, are subject to break down with greater frequency. Replacement, rather than repair, is required since most of the equipment is either approaching or at the end of its useful life expectancy. Replacement costs are identified in the Public Works Department Long Range Infrastructure Plan.

SCVWD, charged with alleviating land surface subsidence and monitoring of groundwater levels and withdrawal rates, has control over the amount of water that can be extracted from local wells.

The allowable withdrawal of groundwater by Sunnyvale depends on a number of factors, including withdrawals by other water agencies, quantity of water recharged and carryover storage from the previous year.

Currently the City is allowed to extract a much larger amount of water than it has been withdrawing for the last few years, but that could change in the future, depending on environmental circumstances. The July 2001 SCVWD Groundwater Management Plan, included as Appendix A in the *Sunnyvale 2005 Urban Water Management Plan*, describes the groundwater recharge program in detail.

Cal Water provides service from its own wells and facilities to about a dozen service area pockets in Sunnyvale many of which are intertied with the City's system.

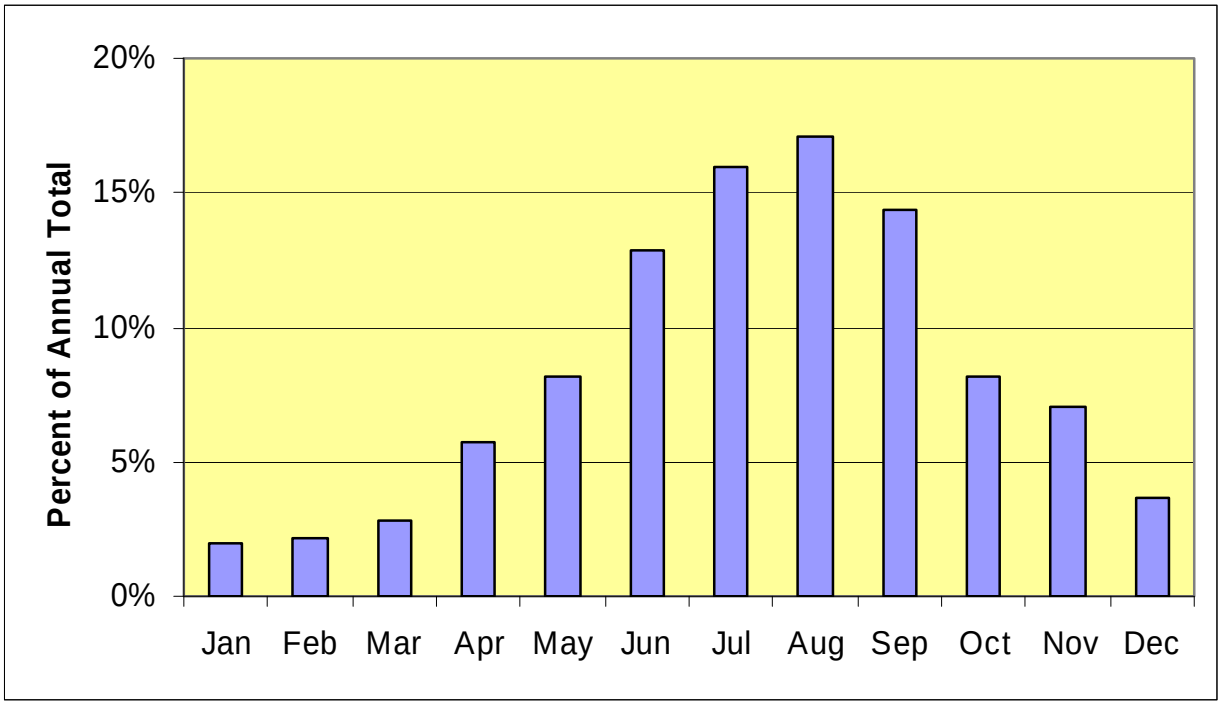
2.1.4 Recycled Water

The Sunnyvale WPCP is the supplier of recycled water to the City's recycled water distribution system, and thus the City has a high level of control over this source. The WPCP can normally meet all recycled water demand, although seasonal changes in the WPCP's oxidation ponds occasionally make it difficult to meet the more stringent water quality requirements for disinfected tertiary recycled water versus discharge to the Bay. When this or other operational problems at the plant prevent production of recycled water, potable water can be added as a substitute source at the WPCP pump station or the San Lucar storage tank.

Approximately 300 million gallons (920 acre-ft) of recycled water is currently delivered to primarily irrigation customers on an annual basis. Another approximately 300 million gallons is used at the WPCP for washdown and other process related processes for a total recycled water usage of about 1,800 acre-ft per year. Most recycled water usage occurs between April and October, with usage exceeding 1.5 mgd during the peak demand months of July and August. Nearly 35% of the total annual demand occurs during July and August (Figure 6). Because this peak demand represents only about 13% of the WPCP effluent flow during those months, significant potential for expansion of this water source still exists.

Modest increases in demand could be accommodated by the existing production and delivery systems. However, significant increases in demand will intensify the need for additional storage capacity, and may necessitate other structural and/or operational changes at the WPCP, including a possible shift from the current "batch recycled water" production mode. The WPCP's long-term Strategic Implementation Plan, initiated in 2007, will examine recycled water production as an element of the overall wastewater treatment process, and may ultimately result in changes to the processes used at the WPCP for both "normal" treatment and recycled water treatment.

Figure 6. Seasonal Recycled Water Usage



2.2 Water System

Many components of the water supply and distribution system owned, operated and maintained by the City are approaching 40 to 50 years of age. Approximately 80% of the 280 miles of transmission and distribution pipelines and related facilities, constructed in the 1960s, are therefore potentially approaching the end of their estimated 50 year service life. While actual service life varies depending on site specific factors, utility services provided today are using up infrastructure resources which must be replaced to serve future customers.

One of the City's policies (Fiscal Sub-Element 7.1.C.1.3) is that "High priority should be given to replacing capital improvements prior to the time that they have deteriorated to the point where they are hazardous, incur high maintenance costs, negatively affect property values, or no longer serve their intended purposes." The City has established methods to provide resources for the on-going repair, replacement, and rehabilitation as part of the user rate setting process. The Public Works Department maintains a Long Range (20-year) Infrastructure Plan, updated annually, that contains estimated costs and schedules for repair and replacement of the water system infrastructure.

The City conducted a Vulnerability Assessment of the water system in 2002 as required by USEPA regulations issued in response to the Bioterrorism Preparedness and Response Act of 2002 (PL 107-188). The City has implemented all of the recommendations included in the Assessment, and City water system facilities are in compliance with current security guidelines and requirements.

2.2.1 Water Transmission and Supply

A brief but severe break in a 24-inch diameter transmission main experienced in mid-2007 highlighted the aging infrastructure problem. The particular material of the failing main, techite pipe, seemed to be the cause of the problem, since pipes made of the same material have experienced the same kind of breaks in other regions of the county.

The automated supervisory control and data acquisition (SCADA) system that manages the system was upgraded in 2006. The upgrades incorporate newer technology and replacement of old infrastructure, to increase system reliability and safety.

A 2007 hydraulic analysis (prepared by Infrastructure Engineering Corp. using specialized hydraulic modeling software), confirmed that the capacity of the City's storage tanks (27.5 MG total storage) is sufficient to meet CDPH minimum recommendations. The hydraulic model also confirmed that water storage is adequate for the City's overall current and projected future needs.

The model was used to evaluate the City's service ability under emergency various conditions. If one of the SFPUC or SCVWD sources were to be interrupted, service would still be provided to all of the City's customers with adequate pressures without using the wells. With two of the six SFPUC connections interrupted, service would be provided without appreciable pressure differences in Zone I. If all six of the SFPUC connections were lost, pressures would decrease by 50% in Zones I and II with minimum pressures as low as 20 to 30 psi, which is sufficient pressure according to national AWWA guidelines. The Wolfe-Homestead transmission main is designed to maintain desirable pressures under emergency conditions. Without the SCVWD connections, Zone III can be supplied by the Wright Avenue Plant pumps. The Wright tanks can supply Zone III for approximately eight days. Water from Zone III wells could be diverted to the Wright tanks before storage is depleted.

Since Sunnyvale's water supply comes mainly from the two wholesale providers (SCVWD and SFPUC), well water is only utilized during peak demand, emergency, and drought situations. Because of this redundancy and the high historic degree of reliability, the City has no current capital projects intended to increase its potable water supply.

2.2.2 Water Distribution

The same aging problem that affects the water transmission and supply system is impacting the smaller diameter pipeline distribution system, but at a higher rate. Many main breaks, large and small, have occurred during the early to mid-2000's timeframe, and the frequency of breaks appears to be increasing.

The City has included several projects in its Long-Range Capital Improvement Plan to replace or repair elements of the water distribution system. One project will replace the most at risk distribution main pipes on a yearly basis, at a rate of 0.3 miles per year ramping up to 2 miles per year by 2011. Fiscal Year 2005/2006 marked the beginning of these pipeline replacement projects.
The 2007 hydraulic model also showed 204 identified hydrants that would fail to meet required fire flow while maintaining the necessary residual pressure of 20 psi. The cause of this failure is the inadequate size of the water mains in the area that feed the hydrants.

Water loss within the City's distribution system can occur from various causes such as leaks, breaks, malfunctioning valves and water meter reading inaccuracies. Annually approximately one-third of the distribution system is tested for leaks. Other losses come from legitimate uses such as water main and hydrant flushing, tests of fire suppression systems and street cleaning. The approximate 3% losses experienced by the City's water distribution system are substantially lower than the 10% losses typically experienced by systems in urban areas. Ninety-five percent of public water distribution systems experience losses between 7 and 15%.

Elevation differences within the City have necessitated the establishment of three pressure zones, as indicated on Figure 3. The zone boundaries will be adjusted in 2008 to respond to the Downtown Redevelopment Project currently underway.

2.2.3 Recycled Water Distribution

The recycled water distribution system is relatively new, and thus not subject to the same aging problems that face the water system. Main breaks or leaks are very rare, and losses from the system are negligible. Even so, the distribution system is inherently somewhat less reliable than the potable water system, because it relies on a single storage tank, and because there are not redundant pathways available to reach a given site (i.e. the system of mains is not "looped"). Because recycled water is used almost entirely for irrigation purposes, a temporary loss of service does not impose the same hardship as a loss of potable water does. This would change if more recycled water were used for industrial processes or "dual plumbing" uses.

2.3 Water Demand and Demand Management

The amount of water that can be purchased from the City's wholesalers depends on contract parameters and the availability of water. The twenty year water forecast prepared by City staff, which estimates the City's consumption requirements in future years, falls within the City's contract parameters, except for periods of drought and/or periods when the supply is reduced due to increases in government mandated increased Bay-Delta allocations for environmental protection concerns. The Fiscal Year 2007/2008 twenty year forecast, by supplier, is shown in Table 1.

Association of Bay Area Governments (ABAG) projections show an increase in jobs in 2010 that would, at that time, increase the amount of water the commercial sector would require. Given the almost complete build-out of land in the City, we expect multi-family water demand to increase in the future when older, low-density housing is replaced by high-density home developments. More details on growth projections and future water demands by user type can be found in the *Sunnyvale 2005 Urban Water Management Plan* and in other applicable *General Plan* Sub-Elements.

Table 1. Twenty-Year Water Delivery Forecast by Source

Projected Water Deliveries (Acre-feet)					
Year	**SFPUC**	**SCVWD**	**Wells**	**Recycled**	**Yearly Totals**
2007	9,521	12,974	1,988	1,800	26,283
2008	9,521	13,465	1,994	1,800	26,780
2009	9,521	13,956	1,999	1,800	27,276
2010	9,521	14,447	2,005	1,800	27,773
2011	11,762	11,479	2,800	1,800	27,841
2012	11,605	11,703	2,800	1,800	27,908
2013	11,605	12,943	1,628	1,800	27,976
2014	10,104	13,999	2,140	1,800	28,043
2015	10,104	13,772	2,435	1,800	28,111
2016	12,210	11,369	2,800	1,800	28,179
2017	11,773	11,872	2,800	1,800	28,245
2018	11,773	13,110	1,629	1,800	28,312
2019	11,773	12,682	2,124	1,800	28,379
2020	11,773	12,452	2,420	1,800	28,445
2021	12,658	11,255	2,800	1,800	28,513
2022	12,142	11,837	2,800	1,800	28,579
2023	12,142	13,077	1,628	1,800	28,647
2024	10,585	14,189	2,140	1,800	28,714
2025	10,585	13,960	2,435	1,800	28,780
2026	13,106	11,165	2,800	1,800	28,871
Total	223,784	255,706	46,165	36,000	561,655

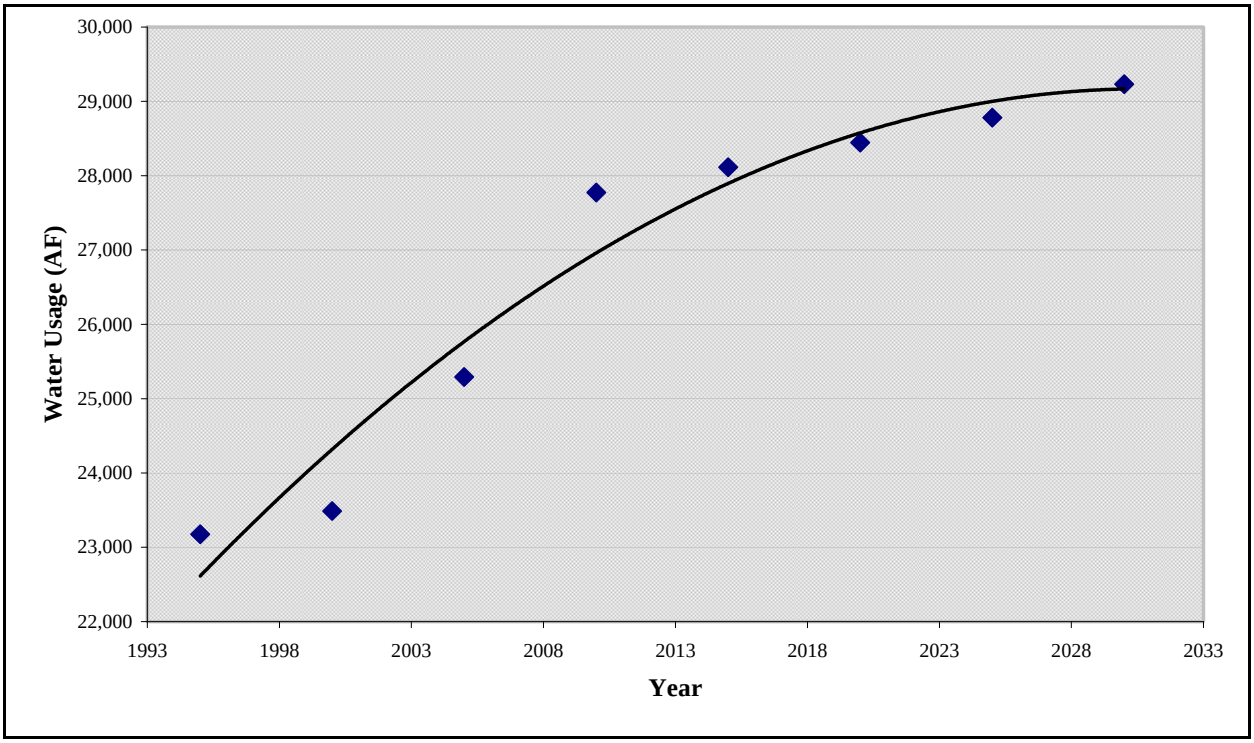
The 1,800 acre-feet of projected recycled water deliveries includes both the approximately 900 acre-feet of in-plant WPCP process usage and the approximately 300 million gallons (920 acre-ft) of recycled water delivered outside the WPCP for primarily irrigation usage. Table 1 does not include additional deliveries that would occur if the City chooses to expand the recycled water distribution system to serve additional users (see Section 3.3).

Water use varies depending on weather, seasonal climatic patterns, business conditions and the economy. Long-term trends in water requirements are valuable in projecting future supply needs. Figure 6 illustrates past, current and projected total water usage through 2030. Additional details on the current and planned water supplies to meet these demands shown through 2030 and the associated numbers of single family, multi-family, commercial, and landscape accounts responsible for the demand are provided in the *Sunnyvale 2005 Urban Water Management Plan* (Tables 2.2.1 and 2.5.1).

ABAG projects the City's population to increase as follows:

Year 2010: 135,800
Year 2015: 140,600
Year 2020: 146,900
Year 2025: 152,500
Year 2030: 159,100

Figure 7. Historic and Projected Water Demand



The City has a commitment to water conservation. Measures implemented include an inclining block tier rate structure that penalizes excessive water consumption; a number of conservation efforts consistent with industry Best Management Practices (BMPs); and a recycled water program to replace the use of potable water for non-potable uses where possible. Many of the Demand Management Measures (DMMs) offered by Sunnyvale are actually programs run by or coordinated through SCVWD. The programs have been either funded through the wholesale water rates paid by Sunnyvale, or directly reimbursed by the City. The DMMs implemented by the City, water usage restrictions during normal and drought years and other details can be found in the *Sunnyvale 2005 Urban Water Management Plan*.

Additional information on water conservation measures and programs can be found in the *SCVWD Urban Water Management Plan 2005*, the *SCVWD Water Use Efficiency Annual Report 2005-2006 and on the SCVWD Conservation* website. The SFPUC also has its corresponding *2005 Urban Water Management Plan for the City and County of San Francisco.*

The City's drought response is based on the Sunnyvale Water Conservation Plan. This plan, adopted in 1977 and updated in 1989, includes mandatory and voluntary water use restrictions associated with different levels of reduction, rate block adjustments for each level, and approaches for enforcement. Table 2 presents the magnitude of mandatory water use prohibitions and the supply reduction stage when the corresponding prohibitions go into effect. As described in Section 4.4 of the UWMP, Stage 1 mandatory prohibitions would for example include use of decorative fountains while Stage 4 mandatory prohibitions would include utilization of potable water for any City operation where recycled water could be used.

Table 2. Stages of Action in Response to Water Supply Shortage

Stage No.	% Shortage
1	25
2	35
3	45
4	50% or greater

The City's water conservation efforts reduced potable water consumption from 161 gallons per capita per day in 2000 to 139 gallons per capita per day in 2006, a 13.6% reduction. By 2030 the City expects to save almost 800 acre feet of water per year through conservation measures.

Temporary interruptions of water supply from one source can be readily offset by increasing supply from the other available sources. Longer disruptions can also be ameliorated in the same way, though it would take more operational effort by City staff to maintain adequate water supply. The City has budgeted a capital project to connect one or more of the City wells to a transmission main that can provide well water throughout the City if water supply from SFPUC or SCVWD (or both) is interrupted.

The City will continue to plan and coordinate its water needs with regional and local wholesalers and retailers for best management of available water supplies. Barring catastrophic events, the City has adequate supply commitments and facilities to reliably meet the projected water needs of its residents and businesses for the next twenty years.

2.4 Water Quality Management and Regulations

The SDWA regulations have continued to evolve as more monitoring data have been collected by water systems, monitoring and detection capabilities have improved, and new constituents of concern have been identified. The key drinking water regulations are listed below along with their date of promulgation. Each regulation is described in more detail in Appendix C. USEPA maintains a complete listing of *SDWA regulations and guidance*.

Regulations to Control Microbial Contaminants

- Total Coliform Rule (1989)
- Surface Water Treatment Rule (SWTR) (1989)
- Interim Enhanced SWTR (1998)
- Long-Term 1 Enhanced SWTR (2002)
- Long-Term 2 Enhanced SWTR (2006)
- Filter Backwash Recycling Rule (2001)
- Ground Water Rule (2006)

Regulations to Control Chemical Contaminants

- Arsenic Rule (2001)
- Lead and Copper Rule (1991, 2007)
- Stage 1 Disinfectants/Disinfection By-products Rule (1998)
- Stage 2 Disinfectants/Disinfection By-products Rule (2006)
- Radionuclides Rule (2000)
- Radon Rule (1999)

The City's comprehensive water quality monitoring program collects and analyzes samples from the distribution system, City-owned wells in operation, water purchased from SFPUC and SCVWD, storage tanks, and household taps, depending of the regulated parameter. Additional disinfection byproduct (DBP) and bacteriological monitoring was implemented (Appendix D) to accommodate changes in State and Federal regulations since 1996. City staff continue to closely track new and proposed regulations and update monitoring and analyses accordingly.

The California Department of Public Health (CDPH) requires the City to distribute to all customers an *Annual Water Quality Report*. The report provides information on contaminants that may be present in the three source waters and in the distribution system. Testing has consistently shown that the water provided by the City meets established water quality standards.

The SFPUC and SCVWD both currently provide water that is disinfected with chloramines, a combination of chlorine and ammonia, rather than chlorine alone. Chloramines are more stable than chlorine, and thus provide longer protection in the distribution system against bacteria and viruses. Chloramines also produce lower levels of disinfection byproducts such as trihalomethanes (THM) when reacting with any organic carbon or bromide present. The Stage 1 and Stage 2 Disinfectants/Disinfection By-products Rules have progressively lowered the allowable level of exposure to DBP. Reducing organic carbon and bromide levels in source water to help reduce

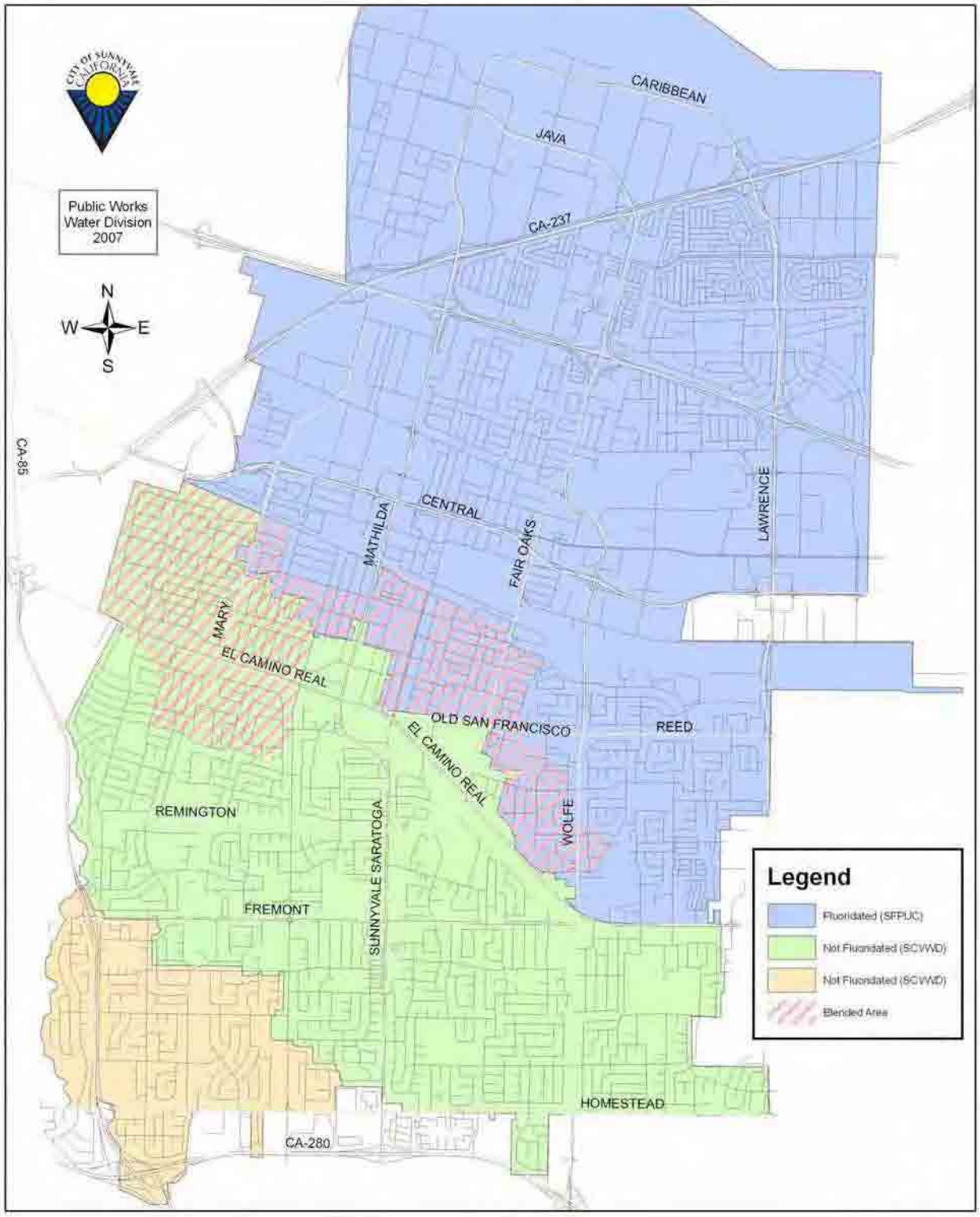
DBP formation are among the primary goals of the source control elements of the CALFED Drinking Water Quality Program.

SCVWD installed ozone treatment facilities at its Santa Teresa and Penitencia water treatment plants in 2006 and 2007. Ozone treatment is scheduled to come on-line at the Rinconada water treatment plant in 2013. Use of ozone instead of chlorine or chloramines as the primary disinfectant reduces the formation of THM but can produce bromate, another disinfection byproduct of concern. Ozone can also be effective at controlling tastes and odors in source water, typically caused by blooms of certain types of algae during warm months in water transported from the Delta.

SCVWD changed the chemical added to its treated water for corrosion control from zinc orthophosphate to orthophosphate. This has not affected consumers or compliance with the Lead and Copper Rule. However, it has reduced the amount of zinc in potable water used and discharged to the sewer system, conveyed to the WPCP, treated and discharged to San Francisco Bay.

The SFPUC completed construction of the new, system-wide fluoridation facility in 2005. Beginning November 2005 all water delivered from the SFPUC was fluoridated (see *Fluoridation Facts and Information* for more details). SCVWD has no plans at this time to fluoridate its water, nor does the City fluoridate its well water. As a result, some areas of Sunnyvale receive fluoridated water (the northern part of the City approximately north of El Camino Real), other areas receive non-fluoridated water (southern portion), and some areas receive a mixture. City staff manages the water system to provide consistent concentrations of fluoride by keeping the SFPUC and SCVWD service areas separated as much a possible (see Figure 8 *Fluoride Map* boundaries for Sunnyvale).

Figure 8. Fluoridated Water Service Areas



2.5 Community Condition Indicators

The current Community Condition Indicators (Table 3) is an update of the 1996 version (Appendix B). Some Community Condition Indicators from the 1996 Sub-Element were deleted (primarily unrelated wastewater, stormwater, and development-based indicators), while others were added to provide better indicators of water usage and infrastructure condition in Sunnyvale through the years.

Table 3. Community Condition Indicators

	Community Condition Indicators				
Community Condition Indicators		2003/04	2004/05	2005/06	2006/07
Water Resources Sub-Element - 3.1					
		Actual	Actual	Actual	Projected
3.1.1	Millions of gallons of water purchased annually:				
	San Francisco PUC (SFPUC)	9,687	9,781	12,377	10,639
	Santa Clara Valley Water District (SCVWD)	10,426	11,285	10,299	12,061
	Well Water – SCVWD	1,334	1,560	1,375	1,100
	Millions of gallons of recycled water produced annually	1,815	1,724	1,994	1900
3.1.2	Unit cost for well water ($/acre-foot)	500.14	467.93	484.80	504.20
3.1.3	Unit cost for SCVWD water ($/acre-foot)	507.85	493.77	508.95	534.40
3.1.4	Unit cost for SFPUC water ($/acre-foot)	592.93	530.69	480.20	552.23
3.1.5	Cost to deliver water ($/100 cubic-feet)	1.37	1.46	1.61	1.70
3.1.6	Average daily water supply in million gallons	22.79	21.73	20.26	21.88
3.1.7	Miles of City water mains				
	Potable water mains	282.7	282.7	282.7	283.7
	Recycled water mains	14.7	14.7	14.7	15.7
3.1.8	Miles of City water mains replaced	N/A	N/A	N/A	0.45
3.1.9	Water use peak/minimum day in million gallons	46 / 11	43 / 11	40 / 10	44 / 11
3.1.10	Per-capita potable water supply (gallons/day)	161	152	150	153
3.1.11	Water meters	28,303	28,946	26,836	26900
3.1.12	Fire hydrants	3,385	3,400	3,381	3390
3.1.13	Storage capacity (million gallons)/Number of average daily supply days	27.5 / 1.2	27.5 / 1.3	27.5 / 1.4	27.5 / 1.2
3.1.14	Wells/production capacity (gallons/minute)	9 / 7,824	9 / 7,824	9 / 7,824	9 / 7,824
3.1.15	Energy cost for well water produced ($/acre-foot)	98.53	63.18	64.75	71.10
3.1.16	Water system losses (% of total supply)	N/A	3	3	3
3.1.17	Emergency repairs (# of callouts/year)	17	44	61	66
3.1.18	Distribution main breaks (#/year)	16	22	27	30

3.0 FUTURE ISSUES AND OPPORTUNITIES

This section highlights several key issues and opportunities facing the City water system over the next 10 – 20 years. Perhaps the largest water system issue is the need for significant and on-going investment in improvements to the water system infrastructure. Much of the water system facilities, constructed in the 1960's, are approaching the end of their estimated 50 year service life. Planned rehabilitation and/or replacement are needed to minimize the need for emergency repairs. Sunnyvale is not alone in this matter. Aging infrastructure is a national issue.

Another issue facing the City, but not directly under the City's control, is the reliability of the two imported water supplies. There are increasing demands upon and uncertainties associated with the availability of SCVWD's main source of supply, the Delta. There are also uncertainties associated with SFPUC's ability to deliver Hetch Hetchy water in the event of a major earthquake, pending completion in 2016 of on-going system-wide seismic improvements.

On the other hand, a key opportunity available to the City is to enhance its own water supply reliability by expanding recycled water use. Recycled water use offsets potable water use, is produced by and under the control of the City, and is a drought-resistant supply. It is of increasing value in that it will be available when potable water is in limited supply. The existing distribution pipeline network can be readily extended to serve new users.

A key issue associated with increased use of recycled water is identifying funding sources for the additional infrastructure needed to serve these new recycled water customers within and adjacent to the City. Opportunities may exist for creative partnering arrangements with SCVWD and/or SFPUC.

3.1 Water Supply Sources

ABAG is predicting that by 2025 Sunnyvale could grow by 13 percent, adding 19,500 residents, and reaching a population of 152,500. Sunnyvale's water supply is adequate to meet projected growth of the City. Current improvements to the SFPUC Hetch Hetchy system (see below) provide for an approximate 5% increase in future supply to Sunnyvale (Community Vision May 2007). In addition, the City has the ability to double its supply from groundwater through the drilling of additional wells.

Innovative demand-side influence programs can help balancing future supply versus demand. Techniques such as water banking, water transfers, conjunctive use, plumbing retrofits, Xeriscaping, rate structures encouraging conservation, and other more restrictive demand side management options could be put into effect if needed. These measures, together with increased use of recycled water for non-potable purposes, appear adequate to ensure sufficient water supply to meet the foreseeable needs of the future.

3.1.1 SFPUC Supply

Negotiations will occur with SFPUC on the next water contract to replace the one expiring in 2009. The Bay Area Water Supply and Conservation Agency (BAWSCA) will negotiate on behalf of Sunnyvale and 27 other agencies. SFPUC does not anticipate that water quality issues will, in the future, alter the SFPUC's current water management strategies or supply reliability. The price of water provided by SFPUC, however, will be impacted by the SFPUC's capital improvement projects and programs.

The SFPUC has identified serious concerns about portions of the Hetch Hetchy system that are aging and in need of repair or replacement. Because of the age of the system, most facilities were not designed to current seismic standards, and the system is vulnerable to earthquakes. A large earthquake or catastrophic event could result in a prolonged disruption of the Hetch Hetchy system with loss of service for two to four months. SFPUC completed an evaluation of the Hetch Hetchy water system that indicated approximately $4.4 billion in infrastructure replacement and upgrades are necessary to ensure the capacity and reliability of the water system for the suburban users (see SFPUC, Bay Area Water Users Association: Water Supply Master Plan - A Water Resource Strategy for the SFPUC, April 2000).

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 is undertaking a *Water System Improvement Program* (WSIP). 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 its customers in a reliable, affordable and environmentally sustainable manner. The WSIP is expected to be completed by 2016 and also includes:

- Replacement of Calaveras Dam with a new dam located downstream of the existing dam;
- San Joaquin Regional Water Quality Improvement Project, involving the Tesla Portal Disinfection Facility, the Hetch Hetchy Advanced Disinfection Project and the Lawrence Livermore Filtration Project.

WSIP implementation would involve using additional water supplies to serve customer needs through 2030, as well as constructing repairs and/or improvements to many facilities within the existing system located in Tuolumne, Stanislaus, San Joaquin, Alameda, Santa Clara, San Mateo, and San Francisco counties. To that extent, a Draft Program Environmental Impact Report (PEIR) on the WSIP has been prepared by the San Francisco Planning Department to identify potentially significant environmental effects of the proposed program, the general environmental effects of implementing 22 facility projects, ways to minimize those effects, and feasible alternatives.

3.1.2 SCVWD Supply

As referenced in Section 2.4, the water supplied by SFPUC has been fluoridated since November 2005, but water supplied by SCVWD is not fluoridated. SCVWD has indicated that they will begin fluoridation of the water they treat when the economic factors are worked out. Sunnyvale voters determined in November 2000 that they wanted the City to accept fluoridated water from

its wholesale providers. This issue was raised in anticipation of the SFPUC intent to fluoridate, but will also apply to SCVWD fluoridation efforts, whenever that may be.

SCVWD, similar to Sunnyvale, has a significant portion of its water supply infrastructure approaching 40 to 50 years of age. Maintaining and upgrading the existing infrastructure to ensure each facility functions as intended for its useful life became the focus of SCVWD's capital improvement program (CIP) in recent years. The purpose of the CIP is to serve as a tool to integrate District work with the larger community by aligning District planning with other local planning efforts, and clarifying regional roles to avoid wasteful duplication of effort.

The majority of capital projects in SCVWD's *2007-2008 Capital Improvement Program* are related to asset management which replaces aging equipment and facilities, or infrastructure reliability, which protects the county's baseline water supply. The estimated total funding required to implement the 100 projects defined in the SCVWD 2007-2008 CIP is $2.133 billion.

A significant future vulnerability for SCVWD is the reliability of the supplies of regional imported water from the Sacramento-San Joaquin Delta to the District. Studies indicate that levees protecting many of the Delta farming islands are extremely vulnerable to catastrophic failure leading to flooding and seawater intrusion. Under certain conditions following levee failure the influx of seawater could interrupt the ability to pump usable drinking water to the State or Federal water projects for delivery to SCVWD. Global warming and rising sea level will place greater pressures on the levee systems and increase the likelihood and impacts of levee failure.

In mid-2007, the SCVWD requested a ten percent voluntary water cutback. SCVWD made the request because of the dry 2006 – 2007 winter and the nine day shut down of pumping from the Delta (beginning May 31, 2007) to protect the endangered Delta smelt. Late in August 2007, a U.S. District court then ruled that the State's water supply through the Delta could be cut by up to one-third in subsequent years to protect the smelt. Monitoring results in late 2007 found the Delta smelt numbers remaining at historically low levels, increasing the likelihood of the proposed cutbacks.

Uncertainty regarding future environmental and water rights regulations creates significant additional risks to Bay Area and statewide water supply reliability. In December 2007 the State Water Resources Control Board (SWB) adopted Resolution No. 2007-0079 *Water Boards' Actions to Protect Beneficial Uses of the San Francisco Bay/Sacramento San Joaquin Delta Estuary*. The Resolution itemizes the multiple issues facing the Delta Estuary and the efforts underway to address them. It commits the Water Boards to work with stakeholders to prepare a strategic work plan by June 2008 that prioritizes and describes the activities to ensure that impairments to beneficial uses are comprehensively addressed while balancing the need for water quality and water supply reliability. *Water use efficiency* (e.g., conservation, water recycling) within the Bay-Delta, its tributaries and the export areas, was identified as critical to ensuring protection of beneficial uses.

The Governor's Delta Vision Blue Ribbon Task Force in December 2007 released its final report *Our Vision for California's Delta*, which offers a vision for sustainable management of the Sacramento-San Joaquin Delta for 30 to 50 years into the future. The Task Force recommended a significant increase in conservation and water system efficiency, new facilities to move and store

water, and likely reductions in the amount of water taken out of the Delta watershed. The Task Force also recommended a new governing structure for the Delta that would have secure funding and the ability to approve spending, planning and water export levels.

The Association of Metropolitan Water Agencies in December 2007 released a report on *Implications of Climate Change for Urban Water Utilities*. The report forecasts the likely impacts of climate change on water supplies in different regions of the U.S., such as an accelerated hydrologic cycle of evaporation and precipitation, water contamination, rising sea levels and pressure on terrestrial and aquatic ecosystems. Among the actions that the report suggests water systems take to prepare for the impacts of climate change are vulnerability assessments to identify short-term adaptation needs, cooperative planning and modeling efforts among utilities to devise strategies addressing likely regional water resource issues, and efforts by utilities to reduce their own greenhouse gas emissions.

It is expected that a myriad of Bay-Delta activities will continue over the next 10-20 years to address concerns over balancing the needs of ecosystem protection with the reliability of water supply and water quality available from the Delta system.

3.1.3 City Wells

The City is planning to destroy one of its two standby wells and to replace it with a new well. Staff are investigating alternative sites for locating a new well.

Sunnyvale's 20-year budget includes a well study, to be conducted in Fiscal Year 2014/2015, which will look into the need to install new wells. If the study concludes that the City needs more available well water, a project will be set up at that time.

3.1.4 Recycled Water Supply

The WPCP has the capacity to produce and deliver recycled water at a rate up to approximately 7.5 million gallons/day (mgd). Such production involves operational changes to meet the more stringent turbidity and disinfection requirements for recycled water. To minimize cost impacts, plant operators reduce the flow through the WPCP's final (tertiary) plant processes to match the actual recycled water demand flow, typically about 6 mgd rate. Such a flow reduction is possible because the WPCP's oxidation ponds can store the extra volume on a short-term basis, however, the plant must in turn increase tertiary plant flows above the average rate to make up for the period of reduced flow.

Other WPCP operational strategies, such as meeting the stringent discharge limits for ammonia, may also require control of tertiary plant flow and/or use of the oxidation ponds for short-term storage. At times, these other needs conflict with the strategy for recycled water production. The WPCP's recently initiated Strategic Implementation Plan (SIP) will include an evaluation of recycled water production in the context of the overall future needs of the plant. A possible outcome of the SIP process might be a recommendation for true side-stream recycled water production, as compared to the current "batch" production method.

Increased recycled water storage capacity would also facilitate recycled water production, by allowing the production cycle to operate at the maximum possible rate over a shorter period of time. This operational need converges with the distribution system's need for additional storage to enhance reliability and accommodate increased deliveries, as described in Section 3.3.1.

3.2 Water System Infrastructure

There are other City plans, policies, and goals outside this Sub-Element relevant to the water system infrastructure issues facing the City. This section, in part, provides excerpts from those documents, so as to provide within this Sub-Element, the pertinent information needed by City policy makers to inform future decisions regarding planning for and funding infrastructure improvements.

3.2.1 Infrastructure Goals

Long-range goals are the described as the heart of the City's General Plan. General Plan goals are generally not prioritized; each one is as important as all others in charting the long-range course for the City. As presented within the City's *Community Vision* portion of the General Plan, the goals are City-wide in nature. In contrast, the goals within each functional element (Sub-element) of the General Plan are more specific, focusing on the subject matter of that element. One of the fifteen City-wide goals, *XII. Supportive Utilities*, cited below, provides context and direction for the policies and actions associated with the more specific long range infrastructure goals contained in this Water Resources Sub-Element (Section 4.0).

> ***XII. Supportive Utilities****: To provide and maintain water, sewer, solid waste disposal, and drainage facilities that are safe, efficient, and reliable, and which can develop sufficient capacity to meet the expected growth of the city.*
>
> *The health, safety, and quality of life of a city is dependent upon the quality of its supporting infrastructure, including water distribution, sanitary sewer system, solid waste collection and disposal, and surface drainage. Much of the utility infrastructure serving Sunnyvale has been in place for many years, requiring a high level of maintenance and replacement. In addition, the City must be prepared to expand the capacity of that infrastructure in step with population and economic growth so as to maintain the overall quality of life (Community Vision 2007, pp. 49-50).*

3.2.2 Infrastructure Funding

The City provides high-quality water service to residents and businesses, funded through user and service fees, not taxes. The fees for water services also cover capital improvements and maintenance. While this update to the Sub-Element does not specifically address financial issues, excerpts from the *2007 Fiscal Sub-Element* (edited to remove factual information previously presented), are provided below that help inform two pertinent and major issues that will continue to affect the financial health of the Water Supply and Distribution Fund over the near and longer term.

These issues are 1) substantial increases that have been projected by City Wholesalers for purchased water, and 2) the state of Water System Infrastructure.

Utility Funds *Especially important to the Water and Wastewater Funds is the issue of system repair and replacement. A method has been established to provide resources for the ongoing repair, replacement, and rehabilitation as part of the user rate setting process. A utility's duty to serve outlasts the life of its existing infrastructure, and utility services provided today are using up capital resources which must be replaced to serve future customers. Therefore, at a minimum, utilities are directed to target to fund depreciation each year. This means that rates are set at a level at which revenues not only cover all obligations of the utility, but also the annual depreciation expense. This depreciation expense should be set aside as cash in a reserve to be drawn upon for capital needs. The reserve is not intended to entirely cash fund all future repairs and replacements, but instead to serve as a sinking fund which helps to keep rates from spiking during periods of high capital needs. Other sources such as current rates and bonded indebtedness also will be needed to provide funds for the total capital requirements.*

Water Supply and Distribution Fund *The Water Supply and Distribution Fund accounts for all revenues and expenses related to the City-operated water utility. Purchased water is by far the largest expenditure within the Fund, accounting for about 70% of direct operating costs. Sunnyvale receives water from four different sources. The amount purchased from each depends upon the price per acre foot and minimums required by each contract. For FY 2006/2007, approximately 45% of the City's water was projected to come from SFPUC, 45% from SCVWD, with 6% from wells and 4% from recycled water.*

Recycled water is provided for landscape irrigation for various facilities located in the northern third of the City. The cost for recycled water is borne by both the Water Supply and Distribution Fund and the Wastewater Management Fund. The City is currently reviewing the costs and benefits of producing recycled water to determine whether to expand the program in other areas of the City (see Section 3.3).

The remaining direct operating costs within the Water Supply and Distribution Fund are related to City activities involved in operating and maintaining a water supply and distribution system. The system includes ten storage reservoirs and approximately 280 miles of transmission and distribution mains. Other activities include management of the wholesale water contracts, effective utilization of conservation programs, recycled water and City-owned wells, and meeting all water quality and health standards.

Revenues consist primarily of water rates, which must be set to maintain the fund in a sustainable financial position. Water rates are set through the use of a Twenty Year Water Production Forecast (see Section 2.3). This analysis examines the total amount of water that will be needed for the next twenty years, taking into account demand trends, water conservation, growth and projections of population. Projections from each of the City's water wholesalers for the next year and longer term are another important factor

for the City's water production forecast. The fact that Sunnyvale utilizes long-range financial planning and sets utility rates every year helps to minimize rate swings to customers. The use of a twenty-year water production forecast also allows the City to identify which water source will be the most cost-effective each year and to purchase accordingly.

Costs for purchased water have been relatively stable from SCVWD, but are projected to rise significantly for at least the next five years. Projections from the SFPUC have not been reliable and the rates have experienced wild swings from year to year. Recent projections indicate that rates will be substantially higher over the next ten years, with annual increases ranging from 5% to a high of 17%. These large increases are due primarily to the impact of the Hetch Hetchy $4 billion Water System Improvement Program. The net effect of these changes to wholesale rates will be water rate increases that are significantly higher than projected inflation over the next decade.

The second factor that will significantly impact the Water Fund over the next twenty-year planning period is infrastructure maintenance. The Water Supply and Distribution Fund has a large number of varied assets, including water mains, pumps, tanks, valves, and reservoirs. The Public Works Department has prepared a Long Range Infrastructure Plan which identifies and inventories these assets. The costs and schedules are currently being refined. Depending on assumptions regarding useful life, conditions, and costs for repair, the infrastructure projects may require additional capital to maintain the system in optimum working order.

Selected Financial Policies from the 2007 Fiscal Sub-Element are listed below that will guide City decisions to be made regarding the scheduling and funding of water and recycled water system infrastructure improvements over the next ten-plus years.

<u>Capital Improvement Policies 7.1C.1 Capital Improvement Plan</u>

- *An updated Twenty-Year Capital Improvement Plan shall be prepared on a two-year budget cycle (C.1.1).*

- *High priority should be given to replacing capital improvements prior to the time that they have deteriorated to the point where they are hazardous, incur high maintenance costs, negatively affect property values, or no longer serve their intended purposes (C.1.3).*

- *New or expanded capital improvements should maximize value and avoid duplication whenever possible by partnering with other entities to pool resources or share facilities (C.1.4).*

- *Priority will be given to the repair and replacement of existing infrastructure as compared to the provision of new or expanded facilities (C.1.5).*

- *The decision on whether to repair or to replace an existing capital asset will be based on which alternative is most cost-effective or provides the best value to the City (C.1.6).*

- *Capital improvements should be maintained to the level required to adequately protect the City's capital investment and to minimize future maintenance and replacement costs (C.1.9).*

- *The Infrastructure Renovation and Replacement Fund shall be used to account for projects related to the City's Long-Range Infrastructure Plan for the renovation and replacement of existing general City assets. Infrastructure projects related to the City's utilities shall be accounted for in the respective utility fund (C.1.11).*

- *Governmental capital improvements should be funded on a "pay-as-you-go" basis in most cases. Alternate financing strategies may be considered in light of the specific project and the consequences of each financing strategy (C.2.1).*

- *Development-related improvements such as sidewalks, curbs and gutters, street lights, and water and sewer lines should be funded by those directly benefiting from the improvements (C.2.2) (Financial Sub-Element pp. 66-67).*

Capital Improvement Policies 7.1L Enterprise Fund Policies

- *Capital improvements associated with the existing infrastructure of a utility should be primarily funded from two sources: rate revenue and debt financing (L.1b.1).*

- *New improvements or expanded capacity in any utility should be funded by those benefiting through specific charges, such as connection fees, impact fees, or mitigation fees (L.1b.2).*

- *Local, state, and federal funding sources, such as grants and contributions, should be pursued for utility-related capital improvement projects consistent with City priorities (I.1b.3).*

- *Water and wastewater improvements should be designed and constructed to the size required to serve the City's capacity needs when fully developed, plus any required redundancy to assure reliable operation and provision of service (L.1b.4) (pp. 75-76).*

3.2.3 Water Main Infrastructure Status

A significant fraction of the City's over $300 million investment in water system infrastructure is represented by the transmission and distribution pipelines. Over 80% of these pipelines were installed in the 1960's. These types of pipelines generally have an estimated service life of approximately 50 years. Factors that affect the service life include in part pipeline material, construction practices, soil corrosivity, corrosion protection, and groundwater levels. It is therefore difficult to predict what the actual service life of a pipeline segment will be. Some types of pipeline

materials are known to be trouble prone (subject to leaks) sooner, while pipelines of other materials installed with good corrosion control, could continue to serve trouble free for decades beyond 50 years.

Table 4 presents an inventory of all the installed water mains by pipeline diameter with the corresponding replacement cost for that size of pipe. This is based on information from the Long Range (20 year) Infrastructure Plan as of FY 07-08. The table shows that the over 326 miles of pipeline installed in the City would have a current replacement cost of nearly $291,000,000.

Table 4. Long Range Infrastructure Plan FY 07-08
Water Main Inventory and Replacement Costs

Water System Pipelines (inches)	Linear Feet Installed	Unit Replacement Cost ($/ft)	Replacement Cost ($)
30	13,205	750	9,903,750
24	22,205	650	14,433,250
16-20	72,451	220	15,939,243
12-14	285,200	220	62,744,056
10	203,831	145	29,555,452
8	674,657	145	97,825,306
6-7	398,179	130	51,763,209
1.5-5.5	87,515	100	8,751,494
Total Water System	**1,721,833 ft (or 326.1 miles)**	**----**	**290,917,655**

3.3 Recycled Water Distribution System

It is expected that regulatory efforts aimed at protection of the Delta will continue, at a minimum, to encourage greater water use efficiency (i.e. water conservation and water recycling) to minimize water exports from the Delta. Similar encouragements, if not mandates, for increased water recycling may be included in future WPCP NPDES permits. In May 2007 the Bay Area Clean Water Agencies (BACWA) produced a report *The Importance of Recycled Water to the San Francisco Bay Area*. The report provides a comprehensive summary of the need for and benefits of water recycling locally.

In November 2007 the SWB issued its *Draft Strategic Plan Update 2008 – 2012*. Program Priority 4 in that Plan Update is Water Use Efficiency. One of the Objectives under the associated Water Use Efficiency Goal is to "*Increase water recycling by focusing on flows that would otherwise be discharged to water bodies from which the water cannot be recovered.*" The associated Action is to "*Require the development of Water Recycling Plans for wastewater treatment plants … within each facility's upcoming permitting cycle.*" The WPCP discharges to San Francisco Bay, which fits the description of a water body "from which the water cannot be recovered" (i.e. for irrigation or other non-potable beneficial reuse purpose).

Potential expansions of the recycled water system were last assessed in the 2000 Sunnyvale Recycled Water Program Master Plan. The City intends to update the Master Plan in 2008.

3.3.1 Recycled Water System Expansion

The existing recycled water "backbone" distribution system in the City, with relatively minor extensions, could serve several additional customers in and adjacent to the City. Figure 9 shows potential irrigation sites throughout the City and the conceptual pipeline extensions that would be needed to serve them. Several potential near-term expansion projects that are proposed to be evaluated in more detail in the Master Plan update are described below.

Moffett Field Golf Course The Moffett golf course is located at the northeast corner of Moffett Field, along the City's westerly border (Figure 9. The City's existing recycled water pipeline (West Main) runs very close to, and was designed to allow for potential future connection to the Moffett Golf Course. The Moffett Golf Course is currently provided water by SFPUC. The City only provides wastewater service to (a portion of) Moffett Field. The estimated peak irrigation demand of about 250,000 gallons per day represents a significant opportunity for expanded recycled water use. Various inter-jurisdictional and institutional issues would need to be addressed between the owner and operator of the golf course, the SFPUC, and the City as part of the City providing service.

NASA Ames Proposed Development There is a proposed new development to be constructed at NASA Ames. Palo Alto/Mountain View may provide recycled water service to the westerly portion of that development. The City could potentially provide service to the easterly portion. There may be potential for an intertie between the two recycled water services. There may be other areas along the City's border with Mountain View that could be served by relatively short extensions to the City's system, compared to pipelines that would be required for Mountain View serve those same areas.

Fair Oaks and Encinal Parks Existing recycled water pipelines run immediately adjacent to the City's Fair Oaks and Encinal Parks. The parks are retrofitted for recycled water usage (i.e. separate irrigation from remaining needed potable services) and are expected to be connected to the system in the future.

Onizuka Site Re-Development New development is proposed at this site and plans are in the design phase. Recycled water infrastructure is in place and available for future use.

Dual Plumbing The opportunity exists to provide recycled water (dual plumbing) for non-potable restroom use in commercial buildings and in condominiums. This is generally only feasible for new construction or significant reconstruction given the high cost of retrofitting an existing building with new recycled water piping. Several commercial complexes in the area including Nortel, Yahoo, and Cisco are dual plumbed for toilet flushing. Both the Sunnyvale Materials and Recovery and Transfer (SMaRT) Station and Lockheed Martin's Fleet Maintenance Facility in Sunnyvale are dual plumbed for recycled water use.

Developer Agreements Opportunities may exist to negotiate agreements with developers of new and/or reconstruction projects so that the sites are designed and constructed ready to accommodate

recycled water for irrigation and/or dual plumbing, where appropriate. This would avoid the costs of retrofitting sites in the future.

Streamflow Augmentation A NASA groundwater clean-up project had been discharging extracted treated groundwater into Marriage Road Ditch west of the WPCP. In the process, this continuous flow into Marriage Road Ditch created habitat that supports a population of western box turtles, a "California Species of Special Concern". The clean-up project ended and the discharge was temporarily replaced by NASA with potable water. There is concern about adverse impacts on the turtle's if/when the potable discharge stops. There is a recycled water pipeline in the immediate vicinity of Marriage Road Ditch. With appropriate regulatory agency approvals, an opportunity may exist to replace the current treated water replacement supply with recycled water to provide equivalent flow (30 gpm) to maintain habitat acceptable to support the turtles.

SCVWD Partnering The City and SCVWD have had an agreement since 1997 whereby SCVWD provides to the City an annual financial incentive payment of $115 per acre-foot of eligible recycled water delivered to local users. City and SCVWD staff have agreed to explore long-term, mutually beneficial partnerships such as capital improvement projects. These are examples of more progressive and active forms of collaboration that compliment the current system of financial reimbursements.

3.3.2 Recycled Water System Operation

Reliability The existing recycled water distribution system main transmission lines form an inverted "U", with two north-south main lines on either side of the City connected by an east-west "header" (See Figure 9). Water is introduced into the header from the WPCP located at the north end of Borregas Avenue. The San Lucar Storage and Pumping Facility is located at the southern end of the "east main". Construction of a second east-west connecting main would create a looped system and provide the following benefits:

- Increased system reliability. This is of particular importance if uses for recycled water are to expand into areas other than landscape irrigation.
- Increase maintainability; allowing deliveries to continue when segments of the main are shut down.
- Improved pressure at new and existing sites on the west main. This will become increasingly important as recycled water demand increases on the western side of Sunnyvale (e.g. Moffett Golf Course).

Maude Avenue has been identified as the most suitable route for looping the existing distribution system. The project would involve approximately 8600 feet of 10-inch to 14-inch pipe. One moderate sized use site (Bishop Elementary School) is located along the route, and another industrial park site would likely be served.

Staffing Operating the recycled water system is similar to the City operating a second water utility. Furthermore, the recycled water permit issued by the RWB imposes additional monitoring and

reporting on the City. For example, each site where recycled water is used is supposed to be inspected at least annually. For irrigation sites, there is increasing regulatory concern about "incidental runoff" from overspray and/or over irrigation reaching a storm drain and ultimately a surface water. Inspections are part of the best management practices (BMPs) that are required to implemented to minimize incidental runoff. Recycled water usage records are required be kept for each site, compiled, and submitted annually by the City to the RWB. Additional staff time will therefore be required to manage the recycled water system as additional users are added.

3.3.3 Recycled Water Funding

SCVWD The City and SCVWD have had an agreement since 1997 whereby SCVWD provides to the City an annual financial incentive payment of $115 per acre-foot of eligible recycled water delivered to local users. Eligible recycled water is defined as water that supplements the county water supply and reduces the need for potable water supplied by SCVWD. City and SCVWD staff have agreed to explore long-term, mutually beneficial partnerships. These may take the form of more progressive and active forms of collaboration, which would be different from passive financial reimbursements. For example, SCVWD entered into an agreement with the South Bay Water Recycling (SBWR) and invested approximately $5.5 million, or 25% of total construction costs, in seven miles of the 30-inch Silver Oaks pipeline to Coyote Valley. As part of the agreement, SCVWD maintains the sole right to use a capacity of 5 mgd, and any unused capacity of the total 15 mgd, and becomes the recycled water wholesaler to the Santa Teresa area and Coyote Valley. SCVWD's Board policy aims for recycled water to be 5% of their total water use in the year 2010 and 10% of the total water use by 2020.

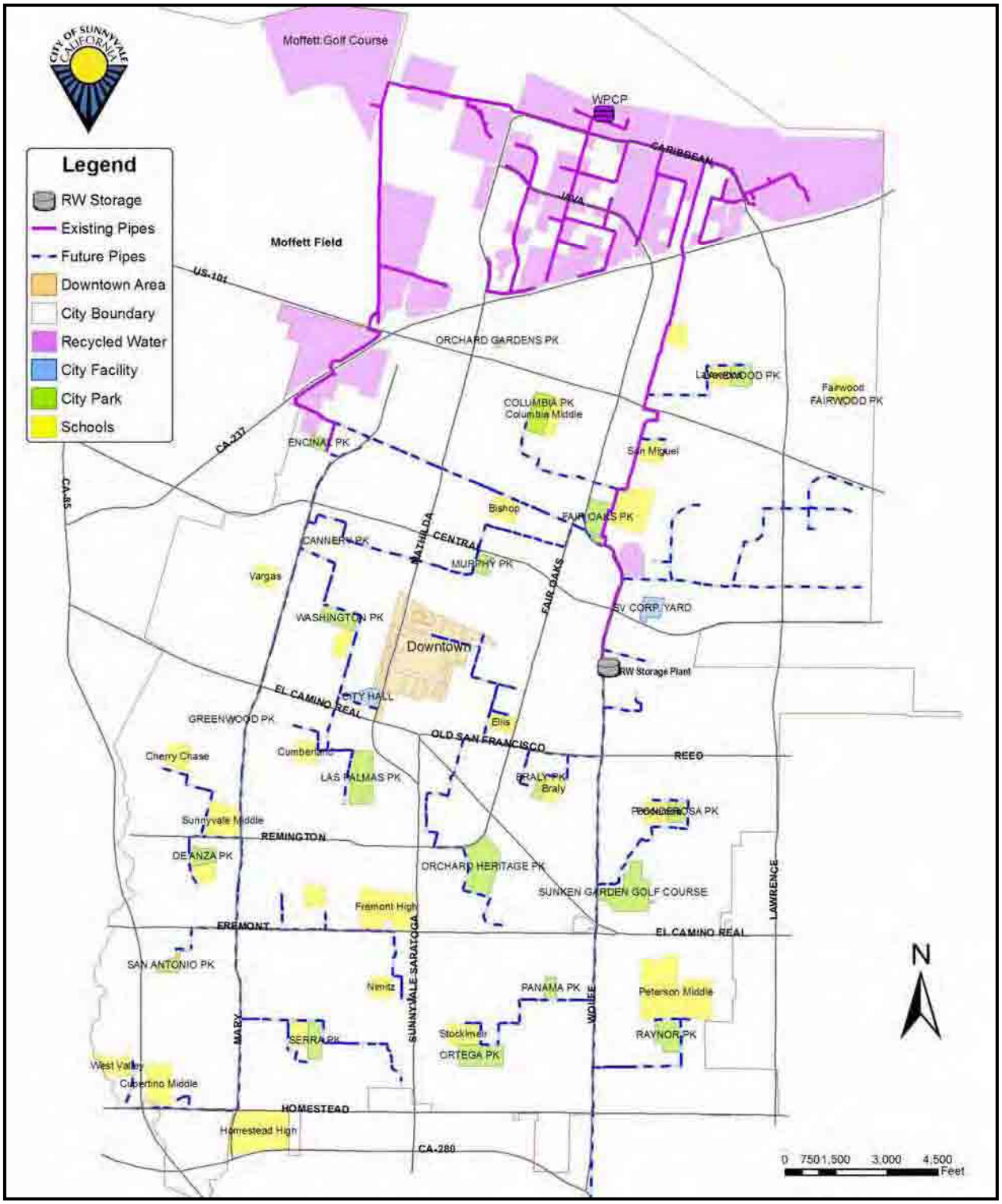
SFPUC As described in Section 3.3.1, an opportunity exists for the City to provide recycled water to the Moffett Field Golf Course and proposed new development at NASA Ames. This would reduce the need for potable water supplied by SFPUC. SFPUC has been pursuing regional partnerships, for example with Daly City and Pacifica, to irrigate golf courses in those cities with recycled water instead of SFPUC supplied water. A similar partnership would seem feasible with the City for the Moffett Field Golf Course and proposed NASA Ames sites.

IRWMP The *San Francisco Bay Area Integrated Regional Water Management Plan* (IRWMP), completed in November 2006, is a nine-county effort to coordinate and improve water supply reliability, protect water quality, manage flood protection, maintain public health standards, protect habitat and watershed resources, and enhance the overall health of the Bay. The Bay Area has been allocated $138 million for IRWMP projects from Proposition 84. The City has a "placeholder" recycled water project in the IRWMP for Moffett Field Golf Course irrigation and other irrigation and streamflow augmentation projects. The project was classified as Priority Tier 3 (lowest), one that could potentially be implemented by 2020. The IRWMP will likely have to be revised/updated in 2008/2009. If the City can develop projects (like Moffett) that could be implemented near-term, there may be an opportunity during the update process to raise the priority of the City's projects in the IRWMP and thereby increase the chances for obtaining funding.

Facilities Planning Grant The State Water Resources Control Board Water Recycling Funding Program operates a Water Recycling Facilities Planning Grant Program. Grants are provided for

facilities planning studies to determine the feasibility of using recycled water to offset the use of fresh/potable water from state and/or local supplies. The grant will cover 50% of eligible costs up to $75,000. This represents a potential funding source for the City to update its Recycled Water Master Plan (see Section 3.3.1) and to evaluate in more detail the feasibility and cost of extending the recycled water distribution system to potentially serve Moffett Golf Course, NASA/Ames, and new irrigation sites within the City. Additional grant application information is presented at the Facilities Planning Grant Program website. Applications are accepted on a continuous basis.

Figure 9. Potential Future Recycled Water Distribution System



4.0 LONG-RANGE GOALS, POLICIES AND ACTION STRATEGIES

The following policies are specific to water resources and services in the City of Sunnyvale. However, such resources and services are also subject to additional policies that can be found in other City documents. In particular, limited fiscal policies (primarily relating to infrastructure replacement funding) and policies related to public input regarding water resources and services are included below. Instead, fiscal policies for the entire City are found in the Fiscal Management Sub-Element, and City-wide policies can be found in the Community Participation Sub-Element. A separate document, the Community Vision, describes the past, present, and desired future of Sunnyvale in broad, city-wide terms.

When City Council adopts the General Plan sub-elements it is adopting the related goals and policies. The action strategies included in this document are to inform Council, and the public, regarding the initial operational steps which staff proposes to implement the goals and policies adopted by Council. Staff may create new action strategies, and revise others, without action by City Council. Action strategies are short-range in nature. They translate the long-range goals and adopted policies into decisions and actions which address water supply and distribution needs in Sunnyvale. They are the critical link between long-range planning and current decision-making.

The following policies reflect updates to the 1996 policies. Three new policies and associated action strategies have been added to reflect the increased attention expected to be paid to recycled water use, conservation and infrastructure improvements over the next 10 years (Policy A.2, Policy B.1 and Policy C.2, respectively).

GOAL A: Water Supply − Acquire and manage water supplies so that existing and future reasonable demands for water, as projected in the 20-year forecast, are reliably met.

Policy A.1: Manage water supply to meet demands for potable water through the effective use of water supply agreements.

Action Strategies

A.1a: Negotiate for long-term supply commitments, using future demands as projected by 20-Year Water Forecast and Water Model software.

A.1b: Support future reasonable, cost-effective, and environmentally sound water supply enhancement projects of San Francisco Public Utilities Commission (SFPUC), the Bay Area Water Supply and Conservation Agency (BAWSCA), the Santa Clara Valley Water District (SCVWD) and the Bay Area Regional Water Recycling Program (BARWRP).

A.1c: Investigate possibilities to increase well water sources within the City.

A.1d: Co-ordinate with the California Water Supply Company (Cal Water) to assure that sufficient water is available for emergency response, including emergency interties as necessary, in areas of Sunnyvale that receive their basic water from Cal Water.

A.1e: Purchase potable water utilizing the most cost-effective source(s) within contractual requirements with suppliers, based on projected calculations in the 20-Year Water Forecast.

Policy A.2: Maximize recycled water use for all Title 22 approved purposes both within and in areas adjacent to the City, where feasible.

Action Strategies

A.2a: Extend service to and retrofit City and private irrigation sites within close proximity of existing recycled water distribution pipelines.

A.2b: Coordinate with SCVWD, SFPUC, Mountain View, and Palo Alto to provide service to Moffett Field Golf Course and proposed new development at NASA Ames.

A.2c: Investigate recycled water interties and agreements to improve system reliability and to facilitate regional recycled water deliveries.

A.2d: Pursue developer commitments to provide recycled water facilities in new and redevelopment projects for irrigation and dual plumbing, where feasible.

A.2e: Coordinate with the WPCP long-term Strategic Implementation Plan to identify additional facilities needed to increase recycled water production capacity, reliability, and/or storage to meet projected peak City-wide recycled water demands.

A.2f: Update the 2000 Recycled Water Master Plan to provide a current roadmap for potential expansions to the City's recycled water system.

A.2g: Provide for annual inspection of recycled water usage sites and backflow prevention devices and for annual reporting to regulatory agencies.

A.2h: Pursue opportunities for external funding for existing and future recycled water projects by supporting the efforts of regional water quality and recycling organizations such as BARWRP as they seek and apply for funding for expansion and continued support of recycled water and water quality in the region.

Policy A.3: Provide enough redundancy in the water supply system so that minimum potable water demand and fire suppression requirements can be met under both normal and emergency circumstances.

Action Strategies

A.3a: Maintain a Supervisory Control and Data Acquisition (SCADA) system that can respond swiftly to water demands and can also be utilized to optimize the mix of all sources, based on projections in the 20-Year Water Forecast.

A.3b: Utilize multiple water sources/providers to ensure water availability at all times.

A.3c: Secure agreements with surrounding suppliers and water retail agencies to provide water when a Sunnyvale source is unavailable.

A.3d: Develop and maintain City-owned wells to be used as a water source when other supplies are unavailable, under peak or emergency conditions and for future needs.

GOAL B: Water Conservation − Promote more efficient use of the City's water resources to reduce the demands placed on the City's water supplies

Policy B.1: Lower overall water demand through the effective use of water conservation programs designed to increase water use efficiency in the residential, commercial, industrial and landscaping arenas, partnering with our wholesalers.

Action Strategies

B.1a: Develop staged conservation plans that will effectively respond to periods of water shortages or droughts. The plans will include the use of restrictions tailored to the level of conservation required, and will be coordinated with other concerned agencies.

B.1b: Keep the community regularly advised as to the status of the City's water supply, how they can achieve conservation goals, and how the community is progressing toward those goals.

B.1c: Develop partnerships with other agencies and participate in their programs to achieve regional water conservation goals.

B.1d: Support the Ahwanne Water Principles put forward by the Local Government Commission (LGC) in 2005 and participate in the continued update of the principles to promote the efficient use of the City's water resources.

B.1e: Develop comprehensive plans that employ tools such as individual water metering and demand based pricing to encourage conservation.

GOAL C: Water Distribution − Proactively maintain the water distribution system infrastructure to ensure the reliable and safe delivery of water under normal and emergency conditions to both current and future customers.

Policy C.1: Maintain a preventive maintenance program that provides for reliability of potable and recycled water systems.

Action Strategies

C.1a: Provide, implement and keep up-to-date a maintenance management system.

C.1b: Provide for periodic inspection and assessment of water system components.

C.1c: Perform preventive maintenance on all system components per AWWA standards, to eliminate the need for major unscheduled repairs or replacements.

C.1d: Maintain accurate and up-to-date records and maps that can be swiftly updated.

Policy C.2: Maintain a proactive Long Range Infrastructure Plan that identifies, schedules, funds, and implements needed system upgrades and replacements before facilities exceed their effective useful lives.

Action Strategies

C.2a: Annually update the 20-year Long Range Infrastructure Plan with current projects, costs, and schedules.

C.2b: Proceed with projects as identified in the Plan to replace aging facilities before the end of their useful life as funding permits.

C.2c: Identify opportunities to coordinate planned infrastructure improvements with other City development or repair projects.

Policy C.3: Maintain an up-to-date emergency water operations plan.

Action Strategies

C.3a: Develop and maintain a water-modeling software program (hydraulic network analysis) that will allow staff to check the adequacy of storage facilities and distribution system on a periodic basis.

C.3b: Provide sufficient storage and backup power to meet minimum requirements for water during emergencies.

C.3c: Periodically assess the need for additional backup power at key water facilities and establish capital projects as needed to provide for the necessary addition(s).

C.3d: Maintain sufficient emergency interconnections with other water utilities.

C.3e: Maintain standard operating procedures for responding to losses of supply or during water contamination events.

C.3f: Develop and maintain standard operating procedures for notifying the public during losses of supply or water contamination events.

GOAL D: Water Quality − Ensure that all water meets state and federal standards for aesthetics, quality and health.

Policy D.1: Maintain and update a comprehensive water quality-monitoring program that meets or exceeds all state and federal requirements, while also meeting specific City and residents' needs.

Action Strategies

D.1a: Monitor state and federal legislation to ensure that the City's sampling and testing procedures meet all requirements.

D.1b: Work in collaboration with water suppliers to ensure that all purchased water meets or exceeds all required standards.

D.1c: Provide staff with adequate certification training as required by California Department of Health.

D.1d: Provide the public with information and seek public input relative to the City's water quality program.

Policy D.2: Maintain an aggressive inspection and preventive maintenance program that ensures that backflow from potentially contaminated water services is prevented.

Action Strategies

D.2a: Ensure that adequate backflow prevention devices are installed.

D.2b: Monitor annual backflow devices testing program.

D.2c: Perform backflow investigations and inspections as required by state regulations.

D.2d: Investigate the potential for the City owning all backflow devices, thereby ensuring their proper function and maintenance.

Policy D.3: Provide appropriate security and protection of water facilities.

Action Strategies

D.3a: Actively work with the SCVWD to identify all private wells in the city and advise the owners of health risks, adequate quality testing, etc.

D.3b: Encourage proper abandonment of private wells and hook up to the City's water system.

D.3c: Evaluate susceptibility of potential terrorist and criminal threats in light of post 9/11 vulnerability assessments and take corrective actions prescribed by the findings of future assessments that can reduce or mitigate the risk of serious consequences from natural disasters and adversarial actions (e.g., vandalism, acts of terrorism).

Policy D.4: Maintain and update an action plan that responds to and protects water supplies from contamination.

Action Strategies

D.4a: Maintain an emergency action plan to isolate and halt delivery of known or suspected contaminated water to customers.

D.4b: Maintain a program to notify customers of known or suspected contaminated water and of the City's action plan.

APPENDICES

APPENDIX A

1996 GOALS and POLICIES

Goal 3.1A ***Manage future demands to ensure that existing and realistically certain future water supplies will be adequate.***

Policy 3.1A.1 Contract for water supplies based on projected reasonable demands.

Policy 3.1A.2 Purchase potable water utilizing the most cost-effective sources(s), subject to contractual requirements with our suppliers.

Policy 3.1A.3 Maintain a cost-effective preventative maintenance program that provides for sufficient reliability of all potable and reclaimed water system facilities.

Goal 3.1B ***Ensure that potable and reclaimed water meet all quality and health standards.***

Policy 3.1B.1 Ensure that backflow from potentially contaminated water services is prevented through an aggressive inspection and maintenance program.

Policy 3.1B.2 Develop a comprehensive water quality monitoring program that meets or exceeds all state and federal requirements, while also meeting specific needs of the City and our citizens.

Policy 3.1B.3 Develop an action plan to respond to and protect from contamination of water supplies.

Goal 3.1C ***During emergency conditions, ensure that the water distribution system can meet minimum fire suppression and quality standards.***

Policy 3.1C.1 Maintain an emergency water operations plan.

Policy 3.1C.2 Provide sufficient storage and backup power to meet minimum requirements for water during emergencies.

Goal 3.1D ***Manage potable water demand through the effective use of water rates, conservation programs and reclaimed water.***

Policy 3.1D.1 Provide for an on-going potable water conservation program.

Policy 3.1D.2 Provide for potable water conservation programs that will effectively respond to periods of water shortages/droughts.

Policy 3.1D.3 Expand opportunities for reclaimed water use consistent with ecology needs of the Bay and/or diminished potable water supplies.

Goal 3.1E ***Maintain a financially stable water fund through a user-based fee system that funds operation, capital improvements, infrastructure replacement and public education programs.***

Policy 3.1E.1 Establish potable and reclaimed water rate structure that will ensure funding of capital improvements, operational and maintenance needs, and the development of an adequate infrastructure replacement reserve.

Policy 3.1E.2 Establish rate structures that encourage on-going potable water conservation and that can be modified to achieve even greater levels of water conservation during period of water shortages/droughts.

Policy 3.1E.3 Establish and maintain adequate reserve levels to replace or renovate Water Fund infrastructure components in order to maximize asset life and meet future community needs.

Goal 3.1F ***Provide a customer service program that emphasizes customer satisfaction and confidence.***

Policy 3.1F.1 Maintain the provision of a high quality, dependable source of both potable and reclaimed water at a reasonable and competitive cost to the consumer.

Policy 3.1F.2 Inform customers on issues relating to water supply, quality, rates, conservation, and other matters.

Policy 3.1F.3 Solicit customer input through consumer surveys, City-wide events, and other forums.

Policy 3.1F.4 Monitor customer satisfaction through periodic surveys and responses to citizen inquiries.

Policy 3.1F.5 Train and encourage employees to develop a customer service work ethic.

Goal 3.1G ***Support legislation and other efforts that promote the accomplishment of the City's Water Resources Sub-Element Goals and Policies.***

Policy 3.1G.1 Support efforts by both the federal and state governments to work cooperatively with municipal governments to ensure safe drinking water.

Policy 3.1G.2 Seek support for federal and state funding of Sunnyvale's water resources projects and programs.

Policy 3.1G.3 Oppose efforts to unreasonably reduce the availability of water supply to Sunnyvale.

Policy 3.1G.4 Support efforts to encourage reasonable demand side water conservation programs.

Policy 3.1G.5 Support legislation that would allow greater flexibility for water transfers, subject to protection of water rights and any adverse impacts on affected communities.

Policy 3.1G.6 Support legislation and regulations that establish beneficial water quality standards that are based on scientific facts, benefit-risk analyses, and other supportable evidence.

APPENDIX B

1996 COMMUNITY CONDITION INDICATORS

1996 Community Condition Indicators

Previous community condition indicators are presented below in Table 1. New indicators are under Current Community Conditions. **Table 1**

Community Condition Indicators **Water Resources Sub-Element - 3.1**		2004/05	2005/06		2006/07	
		Actual	Actual	% Change	Projected	% Change
3.1.1	Millions of gallons of water sold annually:					
	Residential	4,724	4,581	-3.0%	4,948	8.0%
	Other	2,908	2,812	-3.3%	3,037	8.0%
3.1.2	Average daily water demand in million gallons	21.73	20.26	-6.8%	21.88	8.0%
3.1.3	Miles of City water mains and appurtenances	282.7	282.7	0.0%	282.7	0.0%
3.1.4	Water use peak/minimum day in million gallons	4.000000000	3.636363636	-7.0%	4	10.0%
3.1.5	Cost to delivery water ($/100 cubic-feet)	1.46	1.61	10.3%	1.7	5.6%
3.1.6	Unit cost for well water ($/acre-foot)	467.93	484.8	3.6%	504.2	4.0%
3.1.7	Unit cost for SCVWD water ($/acre-foot)	494.77	508.95	3.1%	534.4	5.0%
3.1.8	Unit cost for SFWD water ($/acre-foot)	530.68	480.2	-9.5%	552.23	15.0%
3.1.9	Annual consumption per acre (acre-foot/acre)	1.59	1.6	0.6%	1.72	7.5%
3.1.10	Water services	28,946	26,836	-7.3%	26,900	0.2%
3.1.11	Fire hydrants	3,400	3,381	-0.6%	3,390	0.3%
3.1.12	Storage capacity (million gallons)	28	28	0.0%	28	0.0%
3.1.13	Wells/production capacity (gallons/minute)	9,824	9,7,824	0.0%	9/7,824	0.0%
3.1.14	Energy cost for water produced ($/acre-foot)	13.33	11.84	-11.2%	10	-15.5%
3.1.15	Number of samples collected for testing-Delete 03/04 per PW	Delete*	Delete*		Delete*	NA
3.1.16	Curb miles of streets that require sweeping	665	665	0.0%	665	0.0%
3.1.17	Miles of storm water lines	327.07	327.07	0.0%	327.07	0.0%
3.1.18	Drop inlets in storm drainage system	4,188	3,050	-27.1%	3,050	0.0%
3.1.19	Miles of sanitary sewer mains - Delete, duplicate with 3.3.1	Delete*	Delete*		Delete*	NA
3.1.20	Millions of gallons of liquid wastes treated per year - See 3.3.2	Delete*	Delete*		Delete*	NA
3.1.21	Average daily volume of liquid wastes in millions of gallons - See 3.3.3	Delete*	Delete*		Delete*	NA
3.1.22	Average dry weather (May-October inclusive) liquid waste flow per day as a percentage of treatment plant design capacity-See 3.3.4	Delete*	Delete*		Delete*	NA
		Actual	Actual	% Change	Projected	% Change
3.1.23	Redevelopments and utility additions which require map updates	5	14	180.0%	28	100.0%
3.1.24	Subdivision construction permit applications	11	11	0.0%	11	0.0%
3.1.25	Development permit applications	4	9	125.0%	12	33.3%
3.1.26	New developments requiring map changes	24	27	12.5%	28	3.7%
3.1.27	Street cut permit applications	265	282	6.4%	342	21.3%
3.1.28	Air pollution: Days ozone standards exceeded per year	7	6	-14.3%	6	0.0%
3.1.29	Tons of res. Comm./ind. Solid wastes disposed anually	87,500	89,485	2.2%	93,033	4.0%

** Items deleted 03/04 due to changes in Wastewater Management Sub-element.*

APPENDIX C

STATE AND FEDERAL REGULATIONS

Safe Drinking Water Act Regulations

The principal law governing drinking water safety in the United Stated is the Safe Drinking Water Act (SDWA), the common name for Title XIV of the US Public Health Service Act. The SDWA works in concert with the Clean Water Act (CWA), which controls the discharge of pollutants into lakes, rivers, and streams. Enacted in 1974, the SDWA authorizes the US Environmental Protection Agency (USEPA) to establish comprehensive national drinking water regulations, conduct special studies and research, and oversee implementation of the act.

The SDWA established a cooperative program among local, state, and federal agencies. The act required promulgation of primary drinking water regulations designed to ensure safe drinking water for consumers. These regulations were the first to apply to all public water systems in the United States, covering both chemical and microbial contaminants. The SDWA mandated a major change in the surveillance of drinking water systems by establishing specific roles for federal and state governments and for public water suppliers.

State governments, through their health departments and environmental agencies, received the major responsibility, called primary enforcement responsibility, or primacy, for the administration and enforcement of the regulations set by USEPA. The SDWA set a schedule and procedures for developing new drinking water standards, which included health-based goals, known as maximum contaminant level goals (MCLGs), and technically achievable standards, known as maximum contaminant levels (MCLs). The act also authorized USEPA to establish treatment techniques instead of MCLs when it is not economically or technologically feasible to determine the level of a contaminant.

The MCLs and treatment techniques comprise the National Primary Drinking Water Regulations (NPDWRs) and are federally enforceable. The act also authorized USEPA to establish National Secondary Drinking Water Regulations (NSDWRs), which are nonenforceable standards established to control aesthetic parameters such as taste and odor. The key regulations are listed below, organized by those to control microbial contaminant and chemical contaminants.

Regulations to Control Microbial Contaminants

- Total Coliform Rule (TCR)
- Surface Water Treatment Rule (SWTR)
- Interim Enhanced SWTR (IESWTR)
- Long-Term 1 ESWTR (LT1ESWTR)
- Long-Term 2 ESWTR (LT2ESWTR)
- Filter Backwash Recycling Rule (FBRR)
- Ground Water Rule (GWR)

Regulations to Control Chemical Contaminants

- Arsenic Rule
- Lead and Copper Rule (LCR)

- Stage 1 Disinfectants/Disinfection By-products Rule (Stage 1 D/DBPR)
- Stage 2 Disinfectants/Disinfection By-products Rule (Stage 2 D/DBPR)
- Radionuclides Rule
- Radon Rule

Regulations to Control Microbial Contaminants

Total Coliform Rule (TCR)

The TCR, promulgated in June 1989 and effective as of January 1991, set both a Maximum Contaminant Level Goal (MCLG) and a Maximum Contaminant Level (MCL) for total coliform bacteria in drinking water. The rule also details the type and frequency of testing that water systems must perform.

Surface Water Treatment Rule (SWTR)

The SWTR, promulgated in June 1989 and effective as of January 1991, aims to prevent waterborne diseases caused by viruses, Legion Ella and Giardia lamblia (a chlorine-resistant protozoan). These disease-causing microbes are present at varying concentrations in most surface waters. The rule requires water systems to treat water from surface water sources to reduce the occurrence of unsafe levels of these microbes.

Interim Enhanced Surface Water Treatment Rules (IESWTR)

Waterborne disease outbreaks linked to Cryptosporidium, particularly the 1993 outbreak in Milwaukee, Wisconsin, raised concerns about the adequacy of the SWTR to protect the public against water borne pathogens. The new rule, promulgated in December 1998, added a layer of requirements for systems that are subject to the SWTR and that serve more than 10,000 people. The rule's tightened turbidity performance criteria and individual filter monitoring requirements are intended to optimize treatment reliability and enhance physical removal efficiencies to minimize Cryptosporidium levels in finished water.

Long-Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR)

EPA finalized the LT1ESWTR in January 2002. The purpose of the LT1ESWTR is to improve control of microbial pathogens, specifically the protozoan Cryptosporidium, in drinking water, and to address risk trade-offs with disinfection byproducts. The rule will require certain public water systems to meet strengthened filtration requirements. It will also require systems to calculate levels of microbial inactivation to ensure that microbial protection is not jeopardized if systems make changes to comply with requirements of the Stage 1 Disinfectants and Disinfection Byproducts Rule (stage 1 D/DBPR).

Long-Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR)

EPA promulgated the LT2ESWTR in January 2006. It requires a series of actions extending through April 2015. The purpose of the LT2ESWTR is to reduce illness linked with the contaminant Cryptosporidium and other disease-causing microorganisms in drinking water. The rule supplements existing regulations by targeting additional Cryptosporidium treatment requirements to higher risk systems. This rule also contains provisions to reduce risks from uncovered finished water reservoirs and to ensure that systems maintain microbial protection when they take steps to decrease the formation of disinfection byproducts that result from chemical water treatment such as chlorination.

Filter Backwash Recycling Rule (FBRR)

In May 2001, EPA released a rule governing the process of recycling waste water generated by the backwashing of drinking water filters. The FBRR is intended to reduce the possibility for recycle practices within the water treatment process to adversely affect the performance of the drinking water treatment plant. Also, the rule is intended to help prevent microbes, such as Cryptosporidium, from passing through treatment systems and into finished drinking water.

Ground Water Rule (GWR)

In November 2006 EPA finalized the GWR. The purpose of the rule is to provide for increased protection against microbial pathogens in public water systems that use ground water sources. EPA is particularly concerned about ground water systems that are susceptible to fecal contamination since disease-causing pathogens may be found in fecal contamination. The GRW will apply to public water systems that serve ground water. The rule also applies to any system that mixes surface and ground water if the ground water is added directly to the distribution system and provided to consumers without treatment. If the GWR required samples tests positive for fecal contamination, this rule requires the system to notify the State and the public and to comply with the treatment requirements by December 1, 2009.

Regulations to Control Chemical Contaminants

Arsenic Rule

In January 2001 USEPA finalized a regulation to reduce the public health risks from arsenic in drinking water. It revised the current drinking water standard for arsenic from 0.050 mg/L, set in 1942, to 0.010 mg/L, which became effective in January 2006. The rule also sets the arsenic MCLG to zero and requires monitoring for new systems and new drinking water sources. It also clarifies procedures for determining compliance with MCLs for previously regulated inorganic contaminants, synthetic organic contaminants, and volatile organic contaminants.

Lead and Copper Rule (LCR)

The LCR, promulgated in June 1991 and effective December 1992, is substantially different from other chemical regulations. The other rules require water systems to treat water so that it is clean and safe to drink when it leaves their facilities. This rule regulates two contaminants that nearly always taint drinking water after it leaves the treatment plant. The rule therefore requires systems to monitor drinking water at customer taps. If lead concentrations exceed an action level of 15 ppb or copper concentrations exceed an action level of 1.3 ppm in more than 10% of customer taps sampled, the system must undertake a number of additional actions to control corrosion. If the action level for lead is exceeded, the system must also inform the public about steps they should take to protect their health. The LCR was revised in October 2007 requiring drinking water utilities to obtain regulatory agency approval before changing their treatment processes or adding new water sources. It requires distribution of tap water lead monitoring results to occupants of the monitored homes and additional public education activities if action levels are exceeded.

Stage 1 Disinfectants/Disinfection By-products Rule (Stage 1 D/DBPR)

Promulgated with the IESWTR in December 1998, the Stage 1 D/DBPR applies to both surface and groundwater systems. Its objective is to limit public exposure to disinfection by-products (DBP), which are formed when organic materials, naturally present in source waters, combine with a disinfectant such as chlorine. Common organics present in many surface water sources are humic acids. Disinfectants commonly used in drinking water treatment include chlorine, chloramines, ozone, and chlorine dioxide. The amount and type of DBPs formed depend on many factors, including the amount and type of organic precursors, initially present, pH, Time of exposure to disinfectant, temperature, and type of disinfectant.

The rule lowered the allowable Total Trihalomethane (TTHM) level from 0.10 mg/L to 0.080 mg/L and added a new MCL for the sum of five haloacetic acids (HAA5) at 0.060 mg/L, chlorite at 1.0 mg/L, and bromate at 0.010 mg/L. It also established maximum residual disinfectant levels for chlorine (4 mg/L as Cl2), chloramines (4 mg/L as Cl2), and chlorine dioxide (0.8 mg/L as ClO2).

Stage 2 Disinfectants/Disinfection By-products Rule (Stage 2 D/DBPR)

The Stage 2 D/DBPR, promulgated in January 2006, supports its Stage 1 predecessor by requiring water systems to meet existing DBP MCLs at each monitoring site in the distribution system instead of averaging results from several sites. Stage 1 Rule compliance is determined on a single system wide running annual average of all samples. The new sampling sites are to be determined using a risk-targeting approach to identify locations where customers are exposed to the highest levels of regulated DBPs. The goal is to reduce DBP exposure among all customers.

Radionuclides Rule

USEPA promulgated revised drinking water standards for radionuclide contaminants (other then radon) in December 2000, updating regulations first set in 1976. The regulation retained existing standards for combined radium-226/228, adjusted gross alpha, beta particle, and photon radioactivity. It also set a new standard for uranium (30ug/L) as required by the SDWA and an MCLG of zero for all radionuclides. In addition, the rule promulgated separate monitoring requirements for radium-228 to ensure compliance with the combined radium-226/228 standard.

Radon Rule

The Radon Rule was first proposed in November 1999 and is now expected to be promulgated in late 2007 at the earliest. As proposed, the rule reflects a framework set forth in the 1996 SDWA amendments that provides for a multimedia approach to address the public health risks from radon in drinking water and in indoor air from soil. The framework reflects the fact that radon released to indoor air from soil under homes and buildings, is the main source of exposure. Radon released from tap water is a much smaller source of radon in indoor air, which makes it more cost-effective to reduce the risk from radon in indoor air.

The proposed rule would establish an MCL of 300pCi/L for radon in drinking water. This MCL would have to be met by systems that do not implement a broad program to mitigate radon in air and water. Water systems that implement such a multimedia mitigation program would have to meet a radon MCL of 4,000pCi/L.

APPENDIX D

WATER QUALITY MONITORING PROGRAM

Water Quality Monitoring, City of Sunnyvale

Parameter	Number of Samples	Sample Frequency	Analyses
Bacteriology	• 46 (30 required) from distribution system • one from each operating well, imported water connection, and storage tanks	weekly	• total and e-coli coliform
Disinfectant Residual	• 31 from distribution system • one from each imported water connection and storage tanks	weekly	• total chlorine • Heterotrophic plate count (HPC) bacteria
Physical/Aesthetics	same locations as disinfectant residuals	weekly	• odor, color, turbidity, pH, temperature
Hardness/Conductivity	all distribution system sampling locations	quarterly	• total hardness as $CaCO_3$
Total Trihalomethanes (TTHMs)/ Haloacetic Acids HAA5s	8 sites, four samples per each imported water source (City-owned wells are not tested because they are not chlorinated.) • 25% of samples from extreme ends of distribution system • 75% of samples at locations representative of City's population distribution	quarterly	• TTHMs by GC/MS • HAA5s by GC
General Physical/ Mineral/Inorganic	Each City-owned well (Imported water is responsibility of wholesaler.)	3 years, except asbestos (9 years) and nitrate (1 year)	• general physical • mineral • inorganic (Specific analyses in Attachment A)
Radiochemicals	Each City-owned well (Imported water is responsibility of wholesaler.)	quarterly samples at 4-year intervals	• Gross alpha particle activity

Parameter	Number of Samples	Sample Frequency	Analyses
Volatile Organic Chemicals (VOCs)	Each City-owned well (Imported water is responsibility of wholesaler.)	quarterly	Specific analyses in Attachment A
Synthetic Organic Chemicals (SOCs)	Two samples from each City-owned well (Imported water is responsibility of wholesaler.)	quarterly samples at 3-year intervals	Specific SOC analyses in Attachment B
Metals	Three sites	Biweekly	Cu, Ni, Pb, Cr, An, Na, Ag, Cd, As, Se, Hg, Be
Tap Water Metals	50 Sunnyvale homes	Triennial	Lead and copper
Miscellaneous Tests	Additional tests and analyses performed as required to evaluate concerns identified by customer inquiries and complaints.		

Water Supply and Distribution
Monitoring Information Program for Water Analysis Plan

General System Information

There are three sources of water: The San Francisco Public Utilities Commission (SFPUC) Hetch Hetchy (HH) System with six connections; the Santa Clara Valley Water District (SCVWD) with two connections and eight City owned wells. There are also about a dozen service area pockets in Sunnyvale receiving water from the California Water Company (Cal Water). The water provided by SCVWD and SFPUC is disinfected with and therefore contains chloramines. Since November 2005, all SFPUC water is fluoridated. Well water is tested but is not required to be treated.

The City of Sunnyvale's Distribution System is a pressure maintained system for which the Supervisory Control & Data Acquisition (SCADA) system is located in the Department of Public Work's Corporation Yard, 221 N. Commercial Avenue. Pressure sensed at several locations within the system is monitored and recorded. The SCADA system then can activate pumping stations and supply valves to ensure consistent water supply to Sunnyvale's residents.

Zone I consists mostly of Hetch Hetchy water, north of El Camino Real. The central and southern parts of the zone receive a mixture of Hetch Hetchy and well-water. The Schroeder and Central wells are located approximately in the central section of this zone.

Zone II also consists of a mixture of Hetch Hetchy water and well-water. The Losse, Raynor, Ortega, Hamilton (two wells), and Serra wells are in this zone.

Zone III is served primarily by SCVWD, with only the Westmoor well in this zone. SCVWD water enters Zone III from two separate turnouts: one at the Wright Plant, and the other on Barranca Avenue, south of Homestead.

In the event of any interruption in service from the SCVWD water into Zone III, there are a series of Cla-Valves, equipped with reverse flow features that allow water from Zone II to enter Zone III and maintain equivalent pressures within the zone until SCVWD water service is restored. SCVWD water also enters a portion of the southeast end of Zone II, from Zone III, through a pressure regulating valve to maintain pressures in that area. In addition, there are emergency interties with Mountain View, Cupertino, Santa Clara, and Cal Water Service, one of which is automatic. The rest of the interties are based on pressure differential.

Pressures are maintained within the three zones by pressure regulating valves that regulate flows on source lines or from booster pump stations to the respective zones. Storage capacity of 27.5 million gallons is distributed through the system in five ground level reservoirs constructed of welded steel.

City personnel assigned to the Water Program are scheduled on a continuing and standby basis to maintain the system at the highest level of service.

General

The City of Sunnyvale maintains records on all water quality complaints received and corrective actions taken. This information is held by the City's Water Section for a period of at least five years for bacteriological analyses and for at least ten years for chemical analysis, for CDPH review.

System Sampling

A. Bacteriology:

There are 28,630 service connections serving a population of 133,544 as of 2006. The minimum number of samples required is 30 per week; 46 samples are collected from stations in each of the three pressure zones in the system. These sampling points are within the distribution system and will represent "as delivered" water.

Weekly samples are also collected from each operating well, imported water connection, and water storage tank. These 26 additional samples are reported also and reflect the total bacteriological load.

Frequency: Weekly

Stations: Distribution system, imported sources, wells in operation and storage tanks **Attachment 1**

Analysis:
1) Coliform - total and E-coli
2) Heterotrophic plate count

Method:
1) Colilert-SM 9223
2) HPC SM 9215B

The City's Laboratory prepares sterile sample bottles containing thiosulfate. Distribution System personnel and lab/field technicians are thoroughly trained by certified laboratory staff to collect the water samples each week. Collected samples are held in a chilled ice chest prior to delivery to the lab for analysis.

Repeat sample sets are collected within 24 hours of a positive total coliform analysis. All repeat samples are collected within +5 service connections of the original sample site. Each repeat sample set includes: (1) one sample from the original sample site, (2) one sample upstream within five service connections, and (3) one sample downstream within five service connections.

If one or more samples in the repeat sample set are total coliform-positive, an additional set of repeat samples is collected. This process is repeated until either no coliforms are detected in one complete repeat sample set or the MCL for total coliforms is exceeded.
Sunnyvale will immediately notify the CDPH if a significant rise in bacterial count occurs. Any of the following events will indicate a possible significant rise:

(1) a total coliform-positive routine sample followed by two total coliform positive repeat samples
(2) a sample that is positive for fecal coliform
(3) the total coliform maximum contamination level is exceeded

Sunnyvale will report immediately to the CDPH when a "MCL" violation occurs. Any of the following events will be considered a violation:

(1) when more than 5% of the samples collected during the month are total coliform-positive (5% of 184 samples equals 9 total coliform positives)
(2) when any repeat sample is fecal coliform-positive
(3) when any repeat sample following a fecal coliform positive routine sample is total coliform-positive

Sunnyvale will report the month's analytical results by the tenth day of the following month. Copies of bacteriological monitoring results for all positive routine samples and all repeat samples will be submitted directly to the CDPH. All reports will be retained in the Sunnyvale files for a period of five years.

Sunnyvale will request the CDPH to invalidate a sample:

(1) for which a total coliform-positive has been obtained: (a) if all repeat samples collected at the same tap as the original total coliform-positive samples are also total coliform-positive and all repeat samples collected within five service connections of the original tap are not coliform-positive; or (b) if prescribed analytical methods were not followed, in which case the following will be provided:

a. Laboratory Invalidation Error Letter
b. Sample Identification
c. Description of Accident or Error
d. Copies of Pertinent Records
e. Lab Observations

(2) for which no total coliform-positive has been obtained if the laboratory suspects interferences with the analysis.

B. Disinfectant Residual Monitoring

The total number of distribution system sample points mostly under the influence of imported surface water is 31. Chlorine residual samples are collected concurrent with bacteriological samples, and both chlorine residual and HPCs are reported for surface water-influenced sample stations.

Frequency: Weekly

Stations: Distribution system, imported sources, wells in operation, and storage tanks **Attachment 2**

Analysis:
1) Chlorine residual - total
2) HPC

Method:
1) HACH colorimeter - DPD field kit- SM 4500-Cl G
2) SM 9215B

C. Water Quality - Physical/Aesthetics:

Frequency: Weekly

Stations: Same as for disinfectant residual monitoring

Analysis:
(1) Odor
(2) Color
(3) Turbidity
(4) pH
(5) Temperature °F

Method:
(1) Threshold odor test
(2) Chloroplatinate standard/HACH DR 2800
(3) NTU- HACH model 2100 N (EPA 180.1)
(4) EPA 150.1
(5) Field test - calibrated thermometer

D. Water Quality – Hardness/Conductivity:

Frequency: Quarterly

Stations: Distributions system, wells in operation, imported sources

Analysis:
(1) Total Hardness as CaC03
(2) Conductivity at 25o

Method:
(1) EDTA titration (EPA 130.2)
(2) EPA 120.1

E. Total Trihalomethanes:

Frequency: Quarterly (DBP Stage I) **Attachment 3**

Stations: Eight sites are collected for DBP Stage I, four samples per treatment plant. The imported sources of water constitute two treatment plants for the City. The City-owned wells are not chlorinated.

(1) 25% of samples will be taken at extreme ends of the distribution system

(2) 75% at locations representative of population distribution

Analysis: Total trihalomethanes by GC/MS

Method: EPA Method 524.2

F. Halo Acetic Acids (HAA5's) **Attachment 4**

Frequency: Quarterly (DBP Stage I)

Stations: Eight sites are collected for DBP Stage I, four samples per treatment plant. The imported sources of water constitute two treatment plants for the City. The City-owned wells are not chlorinated.

(1) 25% of samples will be taken at extreme ends of the distribution system

(2) 75% at locations representative of population distribution

Analysis: by GC

Method: SM 6251B

DBP Stage I Standard Monitoring Plan Sites (SMP)
and Total Coliform Rule (TCR) plan number

SMP 1 Duane & Lawrence #2 TCR
SMP 2 Hermosa off Pastoria #55 TCR
SMP 3 146 Acalanes #44 TCR
SMP 4 Sunset & Washington #46 TCR
SMP 5 Sidney & Belfry #27 TCR
SMP 6 Cascade & Bonneville #32 TCR
SMP 7 The Dalles & Belleville #38 TCR
SMP 8 1397 Bedford #39 TCR

DBP Stage II Sites **Attachment 5 & 6**

SMP 1 Fair Oaks Hetch Hetchy #7 TCR
SMP 2 Mary Hetch Hetchy #57 TCR
SMP 3 Wright Ave #36 TCR
SMP 4 814 Quetta #29 TCR
SMP 5 11th & G #65 TCR
SMP 6 Murphy & ECR #49 TCR
SMP 7 Morse & Waddington #54 TCR
SMP 8 Jackpine Ct #14 TCR
SMP 9 Manzano Way #3 TCR
SMP 10 Poplar & Bryant #18 TCR
SMP 11 Waxwing & Lochinvar #20 TCR
SMP 12 Wright & La Salle #35 TCR
SMP 13 Rembrandt & Crescent #25 TCR
SMP 14 Caribbean & Moffett #64 TCR
SMP 15 Fremont & Mary #31 TCR
SMP 16 Olive & Mary #45 TCR

G. Chemistry/Chemical Quality:

1. General Physical/Mineral/Inorganic

Frequency: Three-year intervals: on a consecutive rotational basis, three well sources per year for all parameters except Asbestos and Nitrate. Asbestos: one sample every nine years. Nitrate as NO_3: one sample every year, with frequency increasing to quarterly samples if results are >50% of the MCL (MCL is 45 mg/L).

Stations: Water sources: City-owned wells only (Imported water shall be the responsibility of the wholesaler: Title 22:64437)

Analysis:

a) General Physical/Mineral: Total Hardness as $CaCO_3$, Calcium, Magnesium, Sodium, Total Alkalinity (Hydroxide, Carbonate, Bicarbonate), Sulfate, Chloride, Nitrate (as NO_3), Fluoride, pH, Specific Conductance, Total Dissolved Solids, Turbidity, Apparent Color, Odor Threshold, MBAS, Zinc, Iron, Copper, Manganese and Silver.

b) Inorganic Chemical: Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Lead, Manganese, Mercury, Nickel, Selenium, Thallium,

c) Additional Analyses: Asbestos, Nitrite as N, Cyanide

Method: As prescribed by Federal Register: Primary Drinking Water Standards, and "Standard Methods"

2. Radiochemicals:

Frequency: 4-year intervals, 4 quarterly samples: on a consecutive rotational basis, three well sources per year.

Stations: Water sources: City-owned wells only (Imported water shall be the responsibility of the wholesaler).

Analysis:
a) Gross alpha particle activity
b) Gross beta
c) Radium 226
d) Radium 228
e) Strontium-90
f) Tritium
g) Uranium (PCI/L)

3. VOCs:

Frequency: Quarterly

Stations: Water sources: City-owned wells only (imported water shall be the responsibility of the wholesaler: Title 22:64437)

Analysis: Volatile Organic Chemicals **Attachment 7**

Method: EPA Method 524.2

4. SOCs:

Frequency: Initial monitoring waived based on past non-detect results. Repeating monitoring is two quarterly samples every three years beginning in 1996.

Stations: Water sources: City-owned wells only (Imported water shall be the responsibility of the wholesaler: Title 22:64437)

Analysis: Synthetic Organic Chemicals **Attachment 8**

Method: As prescribed by Federal Register: Primary Drinking Water Standards

5. Lead and Copper:

Frequency: Triennial

Stations: Tap water from 50 Sunnyvale homes

Analysis: Lead and copper

Method: As prescribed by Federal Register: Primary Drinking Water Standards

APPENDIX E

EMERGING WATER QUALITY MANAGEMENT AND REGULATION ISSUES

Emerging Water Quality Management and Regulation Issues

It is anticipated that water quality management will primarily be impacted in two areas during the nominal ten year term of this Sub-element: new Bay-Delta system regulations and increased attention to Endocrine Disrupting Compounds (EDCs).

Bay-Delta The issues involved with how to balance and manage Bay-Delta water quality, export quantity, and protection of beneficial uses are incredibly complex and involve a multitude of stakeholders. Key aspects have been addressed in earlier sections under SCVWD water supply. SCVWD provides nearly 50% of the City's supply and any regulatory actions taken to restrict deliveries from either the CWP or CVP to SCVWD can be expected to have parallel impacts on reductions in the amount of water able to be provided to the City. Similarly, catastrophic natural unpredictable events such as earthquakes or other causes of major levee failures could reduce the amount of potable water able to be withdrawn by SCVWD and others from the Delta. The State and Regional Water Boards will be preparing a strategic work plan by June 2008 to identify additional measures, and to coordinate existing multi-party actions, to further protect Bay-Delta water quality and beneficial uses. Climate change may result in many overarching impacts to water resource management for all water purveyors.

Future plans for the State Water Project (SWP) include various water management strategies such as water recycling and water conservation, groundwater recharge and banking, conjunctive management of surface and groundwater resources, treatment of contaminated groundwater basins, water transfers/marketing and brackish and ocean water desalination environmental restoration. The California Department of Water Resources, in partnership with the U.S. Bureau of Reclamation, is also studying five surface storage projects: Shasta Lake Water Resources Investigation; North-of-the-Delta Offstream Storage; In-Delta Storage; Los Vaqueros Reservoir Expansion; and Upper San Joaquin River Basin Storage Investigation.

Endocrine Disrupting Compounds There is growing public and regulatory interest in a group of generally unregulated compounds variously categorized as Endocrine Disrupting Compounds (EDCs), Contaminants of Emerging Concern (CEC), pharmaceutical and personal care products (PPCP), micropollutants, and other names. These chemicals have been detected in lakes, rivers, and streams as a result of discharges of treated municipal, commercial, and industrial wastewaters into these waterbodies. While these chemicals can be detected, their ecological and potential human health impacts are largely unknown. There are not MCLs or aquatic life water quality objectives established for this vast number of constituents.

EPA is proposing to conduct an Endocrine Disruptor Screening Program (EDSP) in 2008 to conduct an initial screening and testing and to submit an Information Collection Request (ICR) to develop more information on how to test for EDCs, what EDCs to focus on, and how to establish aquatic organism and human health levels of concern. Given that the Bay-Delta contains approximately three percent treated wastewater, there is at least a public perception issue about potential impacts on the SWP/CVP imported supplies.

SCVWD reviewed the emerging contaminant issue relative to its *Advanced Recycled Water Treatment Feasibility Project*. Technical Memorandum 4 (August 2004) notes that:

> *Emerging contaminants as a whole are typically not regulated locally or federally, and most often are organic compounds. Water professionals from academic and regulatory communities, and public and private entities believe that these compounds may possess the potential to be a threat to the environment or human health. Federal and state agencies have posted abbreviated lists of these contaminants, but these lists do not include all potential compounds of concern.*
>
> *The District is concerned with the presence of emerging contaminants in its waters because of potential adverse carcinogenic, developmental and reproductive effects on humans and wildlife. The compounds measured in the Water Quality Sampling Program that represent emerging contaminants can be separated into four families: Natural and synthetic hormones, industrial compounds, pharmaceuticals, and DBPs. These family groups overlap considerably, but are separated as such for discussion purposes.*
>
> *Natural and synthetic hormones have been shown to have the potential to disrupt the natural endocrine system of animals and humans at relatively low environmental levels. Industrial compounds – consisting of mainly detergent compounds, their metabolites, and halogenated compounds – are suspected of having endocrine disrupting capabilities. However, it is currently believed that concentrations of the certain industrial compounds need to be 10,000 or 100,000 times greater than concentration of a particular hormone to adversely affect the endocrine system.*
>
> *The health effects of these compounds at trace levels are currently undetermined. At this time, there is generally less concern regarding pharmaceuticals than other emerging contaminants because their occurrence levels are typically much lower than prescribed doses. The potential health effects of low concentrations of individual pharmaceuticals or combinations of compounds have not been established, and research continues.*

The issue of EDCs is more of an issue with wastewater discharges and to a lesser degree with recycled water projects, than with potable water projects. In comments on the SWBs' draft Water Recycling Policy (October 2007) for example, some environmental activist groups raised the spectre of potential adverse impacts to groundwater from irrigating with recycled water containing EDCs.

APPENDIX F

DEFINITIONS OF WATER RESOURCES SUB-ELEMENT ACRONYMS

DEFINITIONS OF WATER RESOURCES SUB-ELEMENT ACRONYMS

ABAG	Association of Bay Area Governments
BARWRP	Bay Area Regional Water Recycling Program
BAWSCA	Bay Area Water Supply and Conservation Agency
BAWUA	Bay Area Water Users Association
BMP	Best Management Practices
BuRec	Bureau of Reclamation
Cal Water	California Water Service Company
CCF	Hundred Cubic Feet
CCOR	California Code of Regulations
CCSF	City and County of San Francisco
CDPH	California Department of Public Health
CEQA	California Environmental Quality Act
CIP	Capital Improvement Program
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
CWA	Clean Water Act
D-DBP	Disinfectants - Disinfection By-Products Rule
Delta	Sacramento/San Joaquin Delta
DMM	Demand Management Measure
DWR	Department of Water Resources (State)
DWSAP	Drinking Water Source Assessment Program
EIR	Environmental Impact Review
EPA	Environmental Protection Agency (Federal)
ESWTR	Enhanced Surface Water Treatment Rule
FERC	Federal Energy Regulatory Commission
GPD	Gallons Per Day
HH	Hetch Hetchy
ICR	Information Collection Rule
IWRP	Integrated Water Resources Plan
IWSAP	Interim Water Shortage Allocation Plan
LGC	Local Government Commission
LCR	Lead and Copper Rule
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MGD	Million Gallons Per Day
NPDES	National Pollutant Discharge Elimination System
RWQCB	Regional Water Quality Control Board
SBA	South Bay Aqueduct
SCADA	Supervisory Control and Data Acquisition System
SCVWD	Santa Clara Valley Water District
SDWA	Safe Drinking Water Act

SFPUC	San Francisco Public Utilities Commission
SMaRT	Sunnyvale Materials Recovery and Transfer
SOC	Synthetic Organic Chemicals
SWP	State Water Project
SWTR	Surface Water Treatment Rule
TCR	Total Coliform Rule
THM	Trihalomethanes
TTHM	Total Trihalomethanes
USEPA	US Environmental Protection Agency
UWMP	Urban Water Management Plan
VOC	Volatile Organic Chemicals
WPCP	Water Pollution Control Plant
WSIP	Water System Improvement Program

APPENDIX G

LIST OF WEB-SITE LINKS FOUND IN WATER SUB-ELEMENT

List of Web-Site Links Found in Water Sub-Element

City of Sunnyvale

- 2007 Fiscal Sub-Element: *http://sunnyvale.ca.gov/Departments/Community+Development/General+Plan/*
- 2005 Urban Water Management Plan (UWMP): *http://sunnyvale.ca.gov/Departments/Public+Works/Water+Supply/Current+Urban+Water+Management+Plan.htm*
- Community Vision: *http://sunnyvale.ca.gov/Departments/Community+Development/General+Plan/*
- Annual Water Quality Report: *http://sunnyvale.ca.gov/Departments/Public+Works/Water+Supply/Water+Quality+Report.htm*
- General Plan: *http://sunnyvale.ca.gov/Departments/Community+Development/General+Plan/*
- Fluoridation Facts and Information: *http://sunnyvale.ca.gov/Departments/Public+Works/Water+Supply/Fluoridation+Facts+and+Information.htm*
- Fluoride Map: *http://sunnyvale.ca.gov/NR/rdonlyres/F9172110-3AC3-4D61-964F-377A65CC963A/O/FluorideMapFinal.pdf*

Santa Clara Valley Water District (SCVWD)

- 2005 Urban Water Management Plan: *http://www.valleywater.org/water/Technical_Information/Technical_Reports/index.shtm#urban*
- 2003 Integrated Water Resources Planning Study: *http://www.valleywater.org/Water/Where_Your_Water_Comes_From/How_much_do_we_need/index.shtm*
- Water Infrastructure Reliability Project: *http://www.valleywater.org/media/pdf/Reliability Report Exec Summary.pdf*
- Ground Water Management Plan: *http://www.valleywater.org/water/Technical_Information/Technical_Reports/index.shtm*
- 2005-2006 Water Use Efficiency Annual Report: *http://www.valleywater.org/media/pdf/WUE_AR_2005-2006_web.pdf*
- 2007-2008 Capital Improvement Program (CIP): *http://www.valleywater.org/Water/_Capital_Improvement_Program/2007-2008_program/index.shtm*
- Advanced Recycled Water Treatment Feasibility Project: *http://www.valleywater.org/Water/Water_conservation/Recycled_water/_recycled_water_info/Recycled_water_documents.shtm*

San Francisco Public Utilities Commission (SFPUC)

- 2005 Urban Water Management Plan for the City and County of San Francisco**:** *http://www.sfgov.org/site/frame.asp?u=http://www.sfwater.org/*
- Water System Improvement Program **(**WSIP**):** *http://www.sfgov.org/site/frame.asp?u=http://www.sfwater.org/*

State of California

- Water Resources Control Board adopted Resolution No**.** 2007-0079**:** *http://www.waterboards.ca.gov/resdec/resltn/2007/rs2007_0079.pdf*
- Governor's Delta Vision Blue Ribbon Task Force**:** *http://deltavision.ca.gov/BlueRibbonTaskForce/FinalVision/Delta_Vision_Final.pdf*
- Water Resources Control Board Water Recycling Funding Program: *http://www.waterboards.ca.gov/recycling/facilitiesplan.html*

United State Environmental Protection Agency (USEPA)

- Safe Drinking Water Act (SDWA) regulations and guidance: *http://www.epa.gov/safewater/regs.html*

Bay Area Integrated Regional Water Management Plan

- The San Francisco Bay Area Integrated Regional Water Management Plan (IRWMP): *http://www.bayareairwmp.net/*

Date of Sampling: _____ Date of Analysis:_____ Collector:_____

Time of Sampling: _____ Time of Analysis:_____ Analyst:_____

Preservative: $Na_2S_2O_3$ Comp Method: GRAB

	Incubation Period			
	BEGIN:		END:	
	Date	Time	Date	Time
Coliform:	_____	_____	_____	_____
HPC:	_____	_____	_____	_____

ATTACHMENT 1

City of Sunnyvale

BACTERIOLOGY ANALYSIS OF POTABLE WATER
COMPLIANCE MONITORING SAMPLES

Source	Total Coliform * 24 hr	E. Coli * 24 hr	HPC (CFU/mL)	Comments/Other
1. Arques & DeGuigne				
2. Duane & Lawrence Exp.				
3. Manzano				
4. Reamwood & Elko				
6. Meadowlake				
8. Oakmead Parkway				
9. Arques & Lawrence				
10. Kifer & Calabazas				
11. Kifer & San Ysidro				
12. Aster				
13. Sequoia & Bluebonnet				
14. Jackpine Ct				
15. Ponderosa & Rosette Ct.				
16. Lily & Lawrence Exp.				
17. Fremont & Wolfe Park				
18. Poplar & Bryant				
20. Waxwing & Lochinvar				
21. Peacock & Homestead				
22. Homestead & Bluejay				
24. Wolfe & Inverness				
25. Rembrandt & Crescent				
26. Dunholme & Floyd				
27. Sidney & Belfry				
28. Hollenbeck & Sheraton				
29. 814 Quetta				
30. Mango & Remington				
31. Fremont & Mary (S/E)				
32. Cascade & Franchere				
35. Wright & LaSalle				
38. The Dalles & Belleville				
39. 1397 Bedford				
43. Bernardo & Parkington				
44. 146 Acalanes				
45. Olive & Mary S/W corner				
46. Sunset & Washington				
47. Washington Park				
48. S. Frances & Olive				
49. Murphy & E.C.R.				
50. McKinley				
53. Bishop School				
54. Morse & Waddington				
55. Hermosa & Pastoria				
61. Borregas & Persian (S/E)				
62. Fairoaks & Tasman (N/E)				
63. Java & Channel				
64. Caribbean & E. Channel				
65. 11th & E. St				

Method: Total Coliform and E. Coli by Chromogenic/Fluorogenic substrate – 100 ml/sample
* Colilert

PW 204-2 (07/07)

Date of Sampling: _____ Time Analysis-End: _____

Time of Sampling: _____ Preservative: None

Date of Analysis: _____ Comp Method: Grab

Time Analysis-Begin: _____ Analyst/Collector: _____

ATTACHMENT 2

Field Testing for the City of Sunnyvale Potable Compliance Monitoring Stations

	Source	Sample Time	pH	Odor	Total Chlorine	Temperature ^0F
1	Arques & DeGuigne					
2	Duane & Lawrence Expy					
3	Manzano					
4	Reamwood & Elko					
6	Meadowlake					
8	Oakmead Parkway					
9	Arques & Lawrence					
10	Kifer & Calabazas					
11	Kifer & San Ysidro					
12	Aster					
13	Sequoia & Bluebonnet					
14	Jackpine Ct.					
15	Ponderosa & Rosette Ct.					
16	Lily & Lawrence Expy.					
17	Fremont & Wolfe Park					
18	Poplar & Bryant					
20	Waxwing & Lochinvar					
21	Peacock & Homestead					
22	Homestead & Bluejay					
24	Wolfe & Inverness					
25	Rembrandt & Crescent					
26	Dunholme & Floyd					
27	Sidney & Belfry					
28	Hollenbeck & Sheraton					
29	814 Quetta					
30	Mango & Remington					
31	Fremont & Mary (S/E)					
32	Cascade & Bonneville					
35	Wright & LaSalle					
38	The Dalles & Belleville					
39	1397 Bedford					
43	Bernardo & Parkington					
44	146 Acalanes					
45	Olive & Mary (S/W)					
46	Sunset & Washington					
47	Washington Park					
48	S. Frances & Olive					
49	El Camino & Murphy					
50	McKinley					
53	Bishop School					
54	Morse & Waddington					
55	Hermosa off Pastoria					
61	Borregas & Persian (S/E)					
62	Fairoaks & Tasman (N/E)					
63	Java & Channel					
64	Caribbean & E. Channel					
65	11th & E St					

Remarks:

QUARTERLY DISINFECTION BYPRODUCTS REPORT **STAGE I**

ATTACHMENT 3

System Name: City of Sunnyvale

System No: 4310014

	Year	2007				2008				2009				Sample Station Average
	TTHM	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	
Sources	#5 Lawrence Hetch-Hetchy													
	#7 Fairoaks Hetch-Hetchy													
	#36 Wright Plant(SCVWD)													
	#37 Baranca(SCVWD)													
Hetch-Hetchy	#2 Duane & Lawrence Exp													
	#55 Hermosa off Pastoria													
	#44 146 Acalanes													
	#46 Sunset &Washington													
SCVWD	#27 Sidney& Belfry													
	#32 Cascade & Bonneville													
	# 38 The Dalles & Belleville													
	#39 1397 Bedford													
Blend	Site No. 13													
	Site No. 14													
	Site No. 15													
	Site No. 16													
	Quarterly System-wide Average													

* = Sampling stations removed from Stage I list

	2nd Qtr.	3nd Qtr.	4th Qtr.
2006 Quarterly System-wide Ave. for TTHM			

	2007				2008				2009			
Running Annual Arithmetic Average	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.

Source No. 1	Site No.	Location
(Hetch Hetchy)	1	(#2) Duane and Lawrence Expy
	2	(#55) Hermosa Off Pastoria
	3	(#44) 146 Acalanes
	4	(#46) Sunset and Washington

Source No. 2	Site No.	Location
(SCVWD Stations)	5	(#39) 1397 Bedford
	6	(#32) Cascade and Bonneville
	7	(#38) The Dalles and Belleville
	8	(#27) Sidney & Belfry

QUARTERLY DISINFECTION BY-PRODUCTS REPORT **STAGE I**

ATTACHMENT 4

System Name: **City of Sunnyvale**

System No: **4310014**

	Year	2007				2008				2009				Sample Station Average
	HAA5	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	
Sources	#5 Lawrence Hetch-Hetchy													
	#7 Fairoaks Hetch Hetchy													
	#36 Wright Plant (SCVWD)													
	#37 Baranca (SCVWD)													
Hetch-Hetchy	#2 Duane&Lawrence Expy													
	#55 Hermosa off Pastoria													
	#44 146 Acalanes													
	#46 Sunset& Washington													
SCVWD	#27 Sidney&Belfry													
	#32 Cascade&Bonneville													
	#38 The Dalles&Belleville													
	#39 1397 Bedford													
	Quarterly System-wide Average													

* = stations taken off stage I sampling list

2006 Quarterly System-wide Ave. for HAA	2nd Qtr.	3nd Qtr.	4th Qtr.

	2007				2008				2009			
Running Annual Arithmetic Average	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.

STATIONS		**Location**
(Hetch Hetchy)		(#2) Duane and Lawrence Expy
		(#55) Hermosa Off Pastoria
		(#44) 146 Acalanes
		(#46) Sunset and Washington

STATIONS		**Location**
(SCVWD Stations)		(#39) 1397 Bedford
		(#32) Cascade and Bonneville
		(#38) The Dalles and Belleville
		(#27) Sidney&Belfry*

60 DAY DISINFECTION BY-PRODUCTS **STAGE II** REPORT

ATTACHMENT 5

System Name: City of Sunnyvale

System No: 4310014

Year	2007	2008					2009				Sample Station Average
TTHM	4th Qtr.	1st Qtr.		2nd Qtr	3rd Qtr		4th Qtr	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	
SMP# 1 (7 Fairoaks Hetch-Hetchy)												
SMP #2 (57 Mary Hetch-Hetchy)												
SMP #3 (36 wright Plant (SCVWD)												
SMP # 4 (29 814 Quetta Ave)												
SMP # 5 (65 11th Ave & E St)												
SMP #6 (49 Murphy & E.C.R)												
SMP # 7 (54 Morse & Waddington)												
SMP # 8 (14 jackpine Ct).												
SMP # 9 (3 Manzano Way)												
SMP # 10 (18 Poplar & Bryant)												
SMP # 11 (20 Waxwing & Lochinvar)												
SMP #12 (35 Wright & Lasalle)												
SMP # 13(25 Rembrandt & Crescent)												
SMP # 14 (64 Caribbean & Moffet Park)												
SMP # 15 (31 Fremont & Mary)												
SMP # 16 (45 Olive & Mary)												
Quarterly System-wide Ave.												
Running Annual Arithmetic Average	2007	2008					2009				
	4th Qtr.	1st Qtr.		2nd Qtr	3rd Qtr		4th Qtr	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.

Source No. 1	Site No.	Location
(Hetch Hetchy)	1	
	2	
	3	
	4	

Source No. 2	Site No.	Location
(SCVWD Stations)	5	
	6	
	7	
	8	

60 DAY DISINFECTION BYPRODUCTS **STAGE II** REPORT

ATTACHMENT 6

System Name: **City of Sunnyvale**

System No: **4310014**

Year	2007	2008						2009				Sample Station Average
HAA5	4th Qtr.	1st Qtr.		2nd Qtr	3rd Qtr		4th Qtr	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	
Sources / Stations												
SMP# 1 (7 Fairoaks Hetch-Hetchy)												
SMP #2 (57 Mary Hetch-Hetchy)												
SMP #3 (36 wright Plant (SCVWD)												
SMP # 4 (29 814 Quetta Ave)												
SMP # 5 (65 11th Ave & E St)												
SMP #6 (49 Murphy & E.C.R)												
SMP # 7 (54 Morse & Waddington)												
SMP # 8 (14 jackpine Ct).												
SMP # 9 (3 Manzano Way)												
SMP # 10 (18 Poplar & Bryant)												
SMP # 11 (20 Waxwing & Lochinvar)												
SMP #12 (35 Wright & Lasalle)												
SMP # 13(25 Rembrandt & Crescent)												
SMP # 14 (64 Caribbean & Moffet Park)												
SMP # 15 (31 Fremont & Mary)												
SMP # 16 (45 Olive & Mary)												
60 Day-wide Average												

Running Annual Arithmetic Average	2007	2008						2009			
	4th Qtr.	1st Qtr.		2nd Qtr	3rd Qtr		4th Qtr	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.

Source No. 1	Location
(Hetch Hetchy)	

Source No. 2	Location
(SCVWD Stations)	

*0 result is actually <1.0

Attachment 7

Volatile Organic Chemicals (VOCs)

Regulated

Benzene
Carbon Tetrachloride
1,2-Dichlorobenzene (o-DCB)
1,4-Dichlorobenzene (p-DCB)
1,1-Dichloroethane (1,1-DCA)
1,2-Dichloroethane (1,2-DCA)
1,1-Dichloroethylene (1,1-DCE)
cis-1,2-Dichloroethylene (c-1,-DCE)
trans-1,2-Dichloroethylene (t-1,2-DCE)
Dichloromethane (Methylene Chloride)
1,2-Dichloropropane
Total 1,3-Dichloropropene
Ethyl Benzene
Methyl tert-Butyl Ether (MTBE)
Monochlorobenzene (Chlorobenzene)
Styrene
1,1,2,2-Tetrachloroethane
Tetrachloroethylene (PCE)
Toluene
1,2,4-Trichlorobenzene
1,1,1-Trichloroethane (1,1,1-TCA)
1,1,2-Trichloroethane (1,1,2-TCA)
Trichloroethylene (TCE)
Trichlorofluoromethane (FREON 11)
Trichlorotrifluoroethane (FREON 113)
Vinyl Chloride (VC)
m,p-Xylene
o-Xylene
Total Xylenes (m,p,&o)
Dibromochloropropane (DBCP)
Ethylene Dibromide (EDB)

Unregulated

Bromobenzene
Bromochloromethane
Bromomethane (Methyl Bromide)
n-Butylbenzene
sec-Butylbenzene
tert-Butylbenzene
Chloroethane
2-Chloroethylvinyl Ether
Chlormethane (Methyl Chloride)
2-Chlorotoluene
4-Chlorotoluene
Dibromomethane
1,3-Dichlorobenzene (m-DCB)
Dichlorodifluoromethane (Freon 12)
1,3-Dichloropropane
2,2-Dichloropropane
1,1-Dichloropropene
Hexachlorobutadiene
Isopropylbenzene (Cumene)
p-Isopropyltoluene
Naphthalene
n-Propylbenzene
1,1,1,2-Tetrachloroethane
1,2,3-Trichlorobenzene
1,2,3-Trichloropropane
1,2,4-Trimethylbenzene
1,3,5-Trimethylbenzene

Attachment 8

Synthetic Organic Chemicals (SOCs)

Dibromochloropropane (DBCP)
Ethylene Dibromide (EDB)
Endrin
Lindane (gamma-BHC)
Methoxychlor
Toxaphene
Chlordane
Diethylhexylphthalate (DEHP)
Heptachlor
Heptachlor epoxide
Atrazine
Molinate (Ordram)
Simazine (Princep)
Thiobencarb (Bolero)
Alachlor (Alanex)
Bentazon (Basagran)
Benzo (a) pyrene
2,4-D
2,4,5-TP (Silvex)
Carbofuran (Furadan)
Dalapon (Dowpon)
Dinoseb (DNBP)
Diquat
Di (2-ethylhexyl) adipate
Endothall
Glyphosate
Hexachlorobenzene
Hexachlorocyclopentadiene
Oxamyl (Vydate)
Pentachlorophenol (PCP)
Pichloram (Tordon)
Polychlorinated Biphenlys (Tot PCB,s)
Aldicarb (Temik)
Aldicarb sulfone
Aldicarb sulfoxide
Aldrin
Bromacil (Hyvar)
Butachlor
Carbaryl (Sevin)
Total DCPA Mono & Diacid Degradate
Diazinon
Dicamba (Banvel)
Dieldrin
Dimethoate (Cygon)
3-Hydroxycarbofuran
Methomyl
Metolachlor
Metribuzin
Propachlor
PCB 1016 Aroclor
PCB 1221 Aroclor
PCB 1232 Aroclor
PCB 1242 Aroclor
PCB 1248 Aroclor
PCB 1254 Aroclor
PCB 1260 Aroclor
Caffeine

RESOLUTION NO. 359-08

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF SUNNYVALE ADOPTING AND INCORPORATING INTO THE GENERAL PLAN THE UPDATED WATER RESOURCES SUB-ELEMENT OF THE ENVIRONMENTAL MANAGEMENT ELEMENT

WHEREAS, the Department of Public Works has proposed an amendment to the General Plan of the City of Sunnyvale, as amended, by updating the Water Resources Sub-Element of the Environmental Management Element as set forth in Report to Council No. 08-366, dated December 16, 2008; and

WHEREAS, a Negative Declaration has been prepared in compliance with the California Environmental Quality Act of 1970, as amended; and

WHEREAS, the City Council held a two noticed public hearings to consider adoption of the updated Water Resources Sub-Element on July 12, 2008 and July 28, 2008, at which time no public input was received; and

WHEREAS, the Planning Commission held a noticed public hearing on the adoption of the updated Water Resources Sub-Element of the Environmental Management Element of the Sunnyvale General Plan on November 24, 2008, after which the Planning Commission recommended to adopt by resolution the updated Water Resources Sub-element to the Environmental Management Element of the Sunnyvale General Plan.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF SUNNYVALE THAT:

1. The City Council hereby adopts the Negative Declaration and finds and determines that the proposed updated Water Resources Sub-Element of the Environmental Management Element of the Sunnyvale General Plan conforms with the requirements provided for in the Sunnyvale Municipal Code, that it is a suitable and logical change of the General Plan for the development of the City of Sunnyvale, and that it is in the public interest.

2. The updated Water Resources Sub-Element of the Environmental Management Element of the Sunnyvale General Plan, as adopted, is hereby added to the General Plan of the City of Sunnyvale, as amended, and a copy of which is on file in the Office of the City Clerk of the City of Sunnyvale.

3. The Mayor and City Clerk are directed to endorse the updated Water Resources Sub-Element of the Environmental Management Element to the General Plan of the City of Sunnyvale, as amended, and to show that the same has been adopted by the City Council.

4. The City Clerk is directed to file a certified copy of the update to the General Plan of the City of Sunnyvale, as amended, with the Board of Supervisors and the Planning Commission of the County of Santa Clara and the planning agency of each city within the County of Santa Clara. The City Clerk is directed further to file a certified copy of the update with the legislative body of each city, the land of which may be included in said plan.

Adopted by the City Council at a regular meeting held on December 16, 2008, by the following vote:

AYES: SPITALERI, HAMILTON, HOWE, LEE, SWEGLES, MOYLAN, WHITTUM
NOES: NONE
ABSTAIN: NONE
ABSENT: NONE

ATTEST:

City Clerk
(SEAL)

APPROVED:

Mayor

APPROVED AS TO FORM AND LEGALITY:

David E. Kahn, City Attorney

Appendix G

City of Sunnyvale
2010 Urban Water Management Plan
Water Shortage Contingency Plan and Municipal Code

REPORT TO MAYOR AND COUNCIL **NO: 11-041**

Council Meeting: March 1, 2011

SUBJECT: Approval by Resolution of the Tier 2 Drought Implementation Plan (DRIP) for Wholesale Customers of San Francisco Pursuant to Section 3.11.C of the Water Supply Agreement with San Francisco

REPORT IN BRIEF

Council is requested to approve by resolution (Attachment A) indicating Sunnyvale's acceptance and approval of the Tier 2 Drought Implementation Plan (DRIP) for Bay Area Water Supply and Conservation Agency (BAWSCA) customers. The DRIP presents to our wholesale water provider, San Francisco Public Utility Commission (SFPUC), how the BAWSCA agencies want the available water divided among agencies in the case of a source reduction up to 20%. A Tier 1 plan, between SFPUC and the total of BAWSCA agencies, was approved in July 2009, with the adoption of the Water Supply Agreement (WSA) with SFPUC. The BAWSCA agencies negotiated this Tier 2 arrangement over the past year and a half to replace a similar agreement approved in 2000 which also expired in July 2009. Both the Tier 1 plan (between SFPUC and BAWSCA) and the Tier 2 plan (among the BAWSCA agencies) are for a 20% source reduction condition. Adoption by all 26 BAWSCA agencies is mandatory for this agreement to be presented to SFPUC. The Tier 1 Plan, the methodology developed for the Tier 2 Plan, the individual allocations under the Tier 2 plan, and the draft resolution developed by BAWSCA staff are attached for information (Attachment B).

BACKGROUND

In July 2009, in connection with adoption of the WSA, the Wholesale Customers and San Francisco adopted a Water Shortage Allocation Plan to allocate water from the San Francisco Regional Water System (RWS) to retail and Wholesale Customers during system-wide shortages of 20% or less (the Tier 1 Plan, between SFPUC and BAWSCA). The Tier 1 Plan replaced the prior Tier 1 Interim Water Shortage Allocation Plan, which was adopted in 2000 and expired in June 2009. The Tier 1 plan allocated water for SFPUC and the BAWSCA agencies as a group, for shortages up to 20%. The provisions of the Tier 1 Plan allow wholesale customers to "bank" drought allocations and to voluntarily transfer them to each other and San Francisco. The Tier 1 plan also presents an updated schedule for actions preceding and during a drought.

Section 3.11.C of the WSA authorizes the Wholesale Customers to adopt a methodology for allocating the water which is collectively available to the 26 Wholesale Customers, through the Tier 1 plan, among each individual Wholesale Customer (the "Tier 2 Plan"). The original Tier 2 Plan was adopted in 2000, and expired in June 2009, on the same date that the previous contract with SFPUC expired. The WSA also commits SFPUC to honor allocations of water unanimously agreed to by all Wholesale Customers or, if unanimous agreement cannot be achieved, water allocations that have been adopted by the BAWSCA Board of Directors. The WSA also provides that the SFPUC can allocate water supplies as necessary during a water shortage emergency if no agreed upon plan for water allocation has been adopted by the 26 Wholesale Customers or the BAWSCA Board of Directors.

Commencing in October 2009, Appointed Water Management Representatives of each of the Wholesale Customers began meeting to develop a set of principles to serve as guidelines for an equitable allocation methodology, as well as formulas and procedures, to implement those principles. These principles include:

- Providing certainty of drought allocations with consistent and pre-determined rules for calculation;
- Providing sufficient amounts of water for basic needs of customers;
- Creating an incentive for water conservation at all times and the development and management of alternative water supplies;
- Avoiding preventable, adverse economic impacts;
- Avoiding reallocation of water supply assets and investments among agencies without mutual consent and compensation; and
- Recognizing inherent differences in land use and climate.

The Tier 2 Plan establishes an allocation formula that will determine how the available water from the RWS will be allocated among the individual Wholesale Customers in system-wide shortages up to 20% (the same restriction as the Tier 1 plan between SFPUC and BAWSCA). The Tier 2 Plan is shown as Exhibit 1 to Attachment A and has been endorsed by all of the Wholesale Customers who participated in the formulation process for the past year.

In general, the allocation formula can be described as follows:

- 33.3% weight applied to individual agency's Individual Supply Guarantee (with slight variations for Hayward, San Jose, and Santa Clara)

- 66.6% weight applied to a Base/Seasonal calculation using 3 year average monthly production values for all supply sources
- 10% minimum cutback and maximum cutback equal to no more than the average cutback plus 20%
- Guaranteed sufficient supply of water to East Palo Alto to meet health and safety needs for its community

EXISTING POLICY

GOAL 4.1A: Water Supply – Acquire and manage water supplies so that existing and future reasonable demands for water, as projected in the 20-year forecast, are reliably met.

Policy 4.1A.1: Manage water supply to meet demands for potable water through the effective use of water supply agreements.

Policy 4.1.3: Provide enough redundancy in the water supply system so that minimum potable water demand and fire suppression requirements can be met under both normal and emergency circumstances.

FISCAL IMPACT

There is no fiscal impact for adoption of the Tier 2 Drought Implementation Plan.

PUBLIC CONTACT

Public contact was made by posting the Council agenda on the City's official-notice bulletin board outside City Hall, in the Council Chambers lobby, in the Office of the City Clerk, at the Library, Senior Center, Community Center, and Department of Public Safety; posting the agenda and report on the City's Web site; and making the report available at the Library and the Office of the City Clerk.

ALTERNATIVES

1. Approve by resolution, the Tier 2 Drought Implementation Plan pursuant to Section 3.11.C of the Water Supply Agreement with San Francisco.

2. Do not approve the attached resolution and request additional information from BAWSCA prior to approving any Drought Implementation Plan with San Francisco and the BAWSCA agencies.

RECOMMENDATION

Staff recommends Alternative No. 1: Approve by resolution (Attachment A), the Tier 2 Drought Implementation Plan pursuant to Section 3.11.C of the Water Supply Agreement with San Francisco.

This plan has been negotiated with all BAWSCA agencies, and represents what was agreed to be the fairest overall plan for the Tier 2 division of available water in the case of a drought with limitations up to 20%. It is recommended for all the BAWSCA agencies to approve this plan in order to meet the requirements of the WSA, and avoid the decision being turned over to the BAWSCA Board, or even the SFPUC, for a unilateral decision.

Reviewed by:

Marvin A. Rose, Director, Public Works
Prepared by: Jim Craig, Superintendent of Field Services

Approved by:

Gary M. Luebbers
City Manager

Attachments

A. Resolution
B. Final Tier 2 Transmittal package from Arthur R. Jensen, CEO/General Manager, BAWSCA

ATTACHMENT A

CITY OF SUNNYVALE

RESOLUTION NO. _____

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF SUNNYVALE APPROVING TIER 2 DROUGHT IMPLEMENTATION PLAN PURSUANT TO SECTION 3.11.C OF THE WATER SUPPLY AGREEMENT WITH SAN FRANCISCO

WHEREAS, The City of Sunnyvale is one of 26 agencies in San Mateo, Santa Clara and Alameda Counties which purchase water from the City and County of San Francisco (San Francisco) pursuant to a Water Supply Agreement entered into in 2009 (Agreement). Collectively these 26 agencies are referred to in the Agreement as Wholesale Customers.

WHEREAS, Section 3.11 of the Agreement addresses times when insufficient water is available in the San Francisco Regional Water System to meet the full demands of all users. Section 3.11.C provides that during periods of water shortage caused by drought, the San Francisco Public Utilities Commission (SFPUC) will allocate available water between its retail customers and the Wholesale Customers collectively, in accordance with a schedule contained in the Water Shortage Allocation Plan set forth in Attachment H to the Agreement (Tier 1 Plan).

WHEREAS, Section 3.11.C authorizes the Wholesale Customers to adopt a Drought Allocation Plan, including a methodology for allocating the water which is collectively available to the 26 Wholesale Customers among each individual Wholesale Customer (Tier 2 Plan). It also commits the SFPUC to honor allocations of water unanimously agreed to by all Wholesale Customers or, if unanimous agreement cannot be achieved, water allocations that have been adopted by the Board of Directors of the Bay Area Water Supply and Conservation Agency (BAWSCA). The Agreement also provides that the SFPUC can allocate water supplies as necessary during a water shortage emergency if no agreed upon plan for water allocation has been adopted by the 26 Wholesale Customers or the BAWSCA Board of Directors.

WHEREAS, commencing in October 2009, representatives appointed by the managers of each of the Wholesale Customers have been meeting to develop a set of principles to serve as guidelines for an equitable allocation methodology, as well as formulas and procedures, to implement those principles. These discussions, and supporting technical analyses, have been conducted with the assistance of BAWSCA staff.

WHEREAS, The Tier 2 Plan, attached to this resolution as Exhibit A, has been endorsed by all of the Wholesale Customer representatives who participated in the formulation process and they have committed to recommend that it be formally adopted by the governing body of their respective agencies.

WHEREAS, The Tier 2 Plan allocates the collective Wholesale Customer share among each of the 26 wholesale customers through December 31, 2018 to coincide with San Francisco's deferral of decisions about additional water supply until at least 2018.

ATTACHMENT A

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF SUNNYVALE THAT:

1. The Tier 2 Drought Implementation Plan, a copy of which is attached hereto as Exhibit A, is approved.

2. This approval is conditioned upon all of the other 25 Wholesale Customers approving the Plan, such approvals being evidenced through adoption of similar resolutions or, in the case of private-sector organizations, by other equivalently binding written commitments signed by an executive officer acting within the scope of delegated authority, and all such approvals occurring on or before June 30, 2011.

If such resolutions or binding commitments are not adopted by that date, this resolution will automatically expire and be of no further effect after June 30, 2011, unless it has been extended prior thereto by further action of this Sunnyvale City Council.

Adopted by the City Council at a regular meeting held on _____, 2011, by the following vote:

AYES:
NOES:
ABSTAIN:
ABSENT:

ATTEST: APPROVED:

_____ _____

City Clerk Mayor
(SEAL)

APPROVED AS TO FORM AND LEGALITY:

_____
David E. Kahn, City Attorney

EXHIBIT A

TIER 2 DROUGHT IMPLEMENTATION PLAN AMONG WHOLESALE CUSTOMERS

This Tier 2 Drought Implementation (Plan) describes the method for allocating the water made available by the San Francisco Public Utilities Commission (SFPUC) among the Wholesale Customers during shortages caused by drought. This Plan is adopted pursuant to Section 3.11.C of the July 2009 Water Supply Agreement between the City and County of San Francisco and the Wholesale Customers (Agreement).

SECTION 1. APPLICABILITY AND INTEGRATION

Section 1.1 **Applicability**. This Plan applies when, and only when, the SFPUC determines that a system-wide water shortage of 20 percent or less exists, as set forth in a declaration of water shortage emergency adopted by the SFPUC pursuant to California Water Code Sections 350 *et seq.* This Plan applies only to water acquired and distributed by the SFPUC to the Wholesale Customers and has no effect on water obtained by a Wholesale Customer from any source other than the SFPUC.

Section 1.2 **Integration with Tier 1 Water Shortage Allocation Plan**. The Agreement contains, in Attachment H, a Water Shortage Allocation Plan which, among other things, (a) provides for the allocation by the SFPUC of water between Direct City Water Users (e.g., retail water customers within the City and County of San Francisco) and the Wholesale Customers collectively during system-wide water shortages of 20 percent or less, (b) contemplates the adoption by the Wholesale Customers of this Plan for allocation of the water made available to Wholesale Customers collectively among the 26 individual Wholesale Customers, (c) commits the SFPUC to implement this Plan, and (d) provides for the transfer of both banked water and shortage allocations between and among the Wholesale Customers and commits the SFPUC to implement such transfers. That plan is referred to as the Tier 1 Plan.

The Tier 1 Plan also provides the methodology for determining the Overall Average Wholesale Customer Reduction, expressed as a percentage cutback from prior year's normal SFPUC purchases, and Overall Wholesale Customer Allocation, in million gallons per day, both of which are used in determining the Final Allocation Factor for each Wholesale Customer. The Overall Average Wholesale Customer Reduction is determined by dividing the volume of water available to the Wholesale Customers (the Overall Wholesale Customer Allocation), shown as a share of available water in Section 2 of the Tier 1 Plan, by the prior year's normal total Wholesale Customers SFPUC purchases and subtracting that value from one.

This Plan is referred to in the Agreement as the Tier 2 Plan. It is intended to be integrated with the Tier 1 Plan described in the preceding paragraph. Terms used in this Plan are intended to have the same meaning as such terms have in the Tier 1 Plan.

SECTION 2. ALLOCATION OF WATER AMONG WHOLESALE CUSTOMERS

Section 2.1 Annual Allocations Among the Wholesale Customers. The annual water supply allocated by the SFPUC to the Wholesale Customers collectively during system-wide shortages of 20 percent or less shall be apportioned among them based on the methodology described in this Section.

Section 2.2 Methodology for Allocating Water Among Wholesale Customers. The water made available to the Wholesale Customers collectively will be allocated among them in proportion to each Wholesale Customer's Allocation Factor, adjusted as described in the following subsections below. The Wholesale Customer Allocation Factors will only be calculated at the onset of a drought and will remain the same until such time as the SFPUC declares the shortage condition over. The Wholesale Customer Allocation Factors will be recalculated during subsequent shortage periods for use during those specific periods.

Section 2.2.1 Step One: Determination of Base/Seasonal Purchase Cutback For Each Wholesale Customer. The first step requires calculating the Wholesale Customer's Base/Seasonal Purchase Cutback. This calculation has seven parts. An example of Steps 1b-1f is presented in Table 2. Step 1g is shown in columns 3-6 in Table 3. For steps 1b-1g, the calculation uses average monthly production values for the three years preceding the drought for all potable supply sources, expressed as a monthly value in hundred cubic feet:

- Step 1a: Each agency's total annual purchases from the SFPUC will be compared to its Individual Supply Guarantee (ISG), with any annual purchases above its ISG subtracted from that agency's total annual SFPUC purchases by subtracting the amount on a monthly basis in proportion to the agency's monthly SFPUC purchase pattern,

- Step 1b: Calculate Average Monthly and Total Production for the three fiscal years immediately preceding the drought, excluding years during which shortage allocations were in effect, based on monthly production data from the SFPUC and Wholesale Customers,

- Step 1c: Calculate Base Component which is equal to the Average Monthly Production during the base months of December, January, February and March, multiplied by 12,

- Step 1d: Calculate Seasonal Component as the difference between Total Production and Base Component,

- Step 1e: Calculate an agency's Base/Seasonal Allocation , expressed in hundred cubic feet, by multiplying the Base Component by one minus the Base Reduction Percentage, or 90%, and the Seasonal Component by the percentage needed (Seasonal Reduction Percentage) to achieve the required Overall Average Wholesale Customer Reduction, which is expressed as a percentage,

- Step 1f: Calculate the Base/Seasonal Allocation Cutback Percentage for each agency by dividing its Base/Seasonal Allocation by the agency's Total Production, and

- Step 1g: Calculate the Base/Seasonal Purchase Cutback Percentage by multiplying the Base/Seasonal Allocation Cutback percentage times the lesser of: (a) the immediately preceding SFPUC purchases or (b) ISG, adjusting the Seasonal percentage above until the total reduction equals the Overall Average Wholesale Customer Reduction.

Additionally, adjustments to the Base Component for Stanford University will be made to remove that two week time period that the University is completely closed during the winter break per policy set by the University President as long as that policy remains in place. This adjustment will be removed at such time as the seasonal closure policy is terminated by Stanford University.

Section 2.2.2 <u>Step Two: First Adjustment for San Jose and Santa Clara</u>. The resulting Base/Seasonal Purchase Cutback Percentage in Section 2.2.1 for San Jose and Santa Clara will be compared to the highest Base/Seasonal Purchase Cutback percentage of the other Wholesale Customers. If both San Jose's and Santa Clara's percentage reductions are larger than the highest percentage reduction among any other Wholesale Customers, the Base/Seasonal Purchase Cutback percentage established under Section 2.2.1 will remain unchanged. If either San Jose's percentage cutback or Santa Clara's percentage cutback, or both, is smaller than the highest Base/Seasonal Purchase Cutback percentage of other Wholesale Customers, the Base/Seasonal Allocation (in mgd) of San Jose or Santa Clara, or both, will be reduced so that the percentage cutback of each is no smaller than that of the Wholesale Customers' otherwise highest percentage cutback. The amount of shortage allocation (in mgd) removed from San Jose and/or Santa Clara will be reallocated among the remaining Wholesale Customers in proportion to the Base/Seasonal Allocation of each.

Section 2.2.3 <u>Step Three: Determination of Weighted Purchase Cutback For Each Wholesale Customer</u>. Each agency's weighted allocation is calculated by multiplying its Adjusted Base/Seasonal Allocation in Section 2.2.2 by 66.66% and its Fixed Component by 33.33%. The Fixed Component is (i) the Wholesale Customer's ISG provided for in the Agreement, or (ii) in the case of Hayward, 25.11 mgd, or (iii) in the case of San Jose and Santa Clara, consistent with the limit on purchases from SFPUC set forth in Section 4.05 of the Agreement, e. g., 4.5 mgd each. The amount of the Fixed Component for each Wholesale Customer is shown on Table 1.

Section 2.2.4 <u>Step Four: Second Adjustment for San Jose and Santa Clara</u>. The resulting Weighted Allocations for San Jose and Santa Clara will be compared to the highest Weighted Purchase Cutback, shown as a percentage, of the other Wholesale Customers. If both San Jose's and Santa Clara's percentage cutback is larger than the highest percentage cutback among other Wholesale Customers, the Weighted Purchase Cutbacks established under Section 2.2.3 will remain unchanged. If either San Jose's

percentage cutback or Santa Clara's percentage cutback, or both, is smaller than the highest percentage cutback of any other Wholesale Customers, the Weighted Shortage Allocation (in mgd) of San Jose or Santa Clara, or both, will be reduced so that the percentage reduction of each is no smaller than that of the Wholesale Customers' otherwise highest Weighted Percentage Cutback. The amount of allocation (in mgd) removed from San Jose and/or Santa Clara will be reallocated among the remaining Wholesale Customers in proportion to the Weighted Shortage Allocation of each.

Section 2.2.5 **Step Five: Adjustment for Minimum and Maximum Cutbacks**. Using the Adjusted Weighted Purchase Cutbacks, either a 10% minimum cutback or maximum cutback, as defined below, is applied to any agency whose Adjusted Weighted Purchase Cutback falls outside this range:

- A minimum 10% cutback is applied to the individual agency Adjusted Weighted Allocation, with the reapportioned water being placed in the hardship bank for allocation to East Palo Alto.

- A maximum cutback of the average cutback plus 20% (e.g. 15% average cutback results in a maximum cutback of 15% + 20% = 35%) is applied to the individual agency Adjusted Weighted Allocation, with the water necessary to meet that level being subtracted in proportion to each Wholesale Customer's Adjusted Weighted Allocation from all remaining agencies, except those at agencies subject to the minimum cutback above.

The result is the Adjusted Minimum/Maximum Purchase Cutback, expressed as a percentage.

Section 2.2.6 **Step Six: Adjustment to Provide Sufficient Supply for East Palo Alto**. In order to provide for sufficient water supply for water customers served by the City of East Palo Alto (EPA), the maximum Final Purchase Cutback applied at any given time to EPA will be equal to 50% of the Overall Average Wholesale Customer Reduction. The water needed to accommodate the guaranteed maximum cutback to EPA will be provided in two ways:

- First, water from the hardship bank provided by the 10% minimum cutback will be first added to the EPA Adjusted Weighted Purchase Allocation, and

- Second, the balance of water needed for EPA will be deducted on a prorated basis from those agencies with a pre-drought residential per capita water use greater than 55 gallons per capita per day (as documented in the most recent BAWSCA Annual Survey) in proportion to each agency's Min./Max. Adjusted Allocation and who are not subject to the minimum and maximum reductions already applied per Section 2.2.5

The result is the Allocation with EPA Adjustment, expressed as an mgd.

Section 2.2.7 **Step Seven: Determination of Final Allocation Factor.** Each Wholesale Customer's Final Allocation Factor is the fraction expressed as a percentage, the numerator of which is the particular Wholesale Customer's "Final Allocation with EPA Adjustment" (in mgd) as calculated in Steps One through Six and the denominator of which is the Overall Wholesale Customer Allocation (in mgd), a number provided by the SFPUC during the drought period as determined by the SFPUC in the Tier 1 Plan.

Section 2.2.8 **Example Calculation**. Table 2 presents a sample of the calculations involved in Steps 1b-1f. Table 3 presents a sample of the calculations involved in Step 1g and Steps Two through Seven, using the values from Tables 1 and 2 and recent water use data for the other values. Tables 2 and 3 are presented for illustrative purposes only and do not supersede the foregoing provisions of this Section 2.2. In the event of any inconsistency between this Section 2.2 and Tables 2 and 3, the text of this section will govern.

Section 2.3 **Calculation of Individual Wholesale Customer Allocation Factors; Directions to SFPUC**. The Tier 1 Plan contemplates that in any year in which the methodology described above must be applied, the Bay Area Water Supply and Conversation Agency (BAWSCA) will calculate each Wholesale Customer's individual percentage share of the amount of water made available to the Wholesale Customers collectively, following the methodology described above and defined above as Wholesale Customer Allocation Factors. The Tier 1 Plan requires SFPUC to allocate water to each Wholesale Customer in accordance with calculations delivered to it by BAWSCA.

Each Wholesale Customer authorizes BAWSCA to perform the calculations required, using water sales data furnished to it by the SFPUC, and to deliver to SFPUC a list of individual Wholesale Customer Allocation Factors so calculated as contemplated by the Tier 1 Plan. Neither BAWSCA nor any officer or employee of BAWSCA shall be liable to any Wholesale Customer for any such calculations made in good faith, even if incorrect.

SECTION 3. GENERAL PROVISIONS

Section 3.1 **No Third-Party Beneficiaries**. This Plan is for the sole benefit of the Wholesale Customers and shall not be construed as granting rights to any person other than another Wholesale Customer.

Section 3.2 **Governing Law**. This Plan is made under and shall be governed by the laws of the State of California.

Section 3.3 **Effect on Water Supply Agreement.** This Plan describes the method for allocating water from the SFPUC among the Wholesale Customers during system-wide water shortages of 20 percent or less declared by the SFPUC. The provisions of this Plan, and the Tier 1 Plan contained in Attachment H to the Agreement with which it is integrated, are intended to implement Section 3.11 of the Agreement. The Plans do not

affect, change or modify any other section, term or condition of the Agreement or of the individual Water Sales Contracts between each Wholesale Customer and San Francisco.

Section 3.4 **Amendment**. This Plan may be amended only by the written agreement of all Wholesale Customers.

Section 3.5 **Termination**. This Plan shall expire on December 31, 2018. It may be terminated prior to that date only by the written agreement of all Wholesale Customers.

BAWSCA
Bay Area Water Supply & Conservation Agency

TO: BAWSCA Appointed Water Management Representatives

FROM: Arthur R. Jensen, Chief Executive Officer/General Manager

DATE: November 5, 2010

SUBJECT: Tier 2 Drought Implementation Plan

Summary

The Tier 2 Drought Implementation Plan (Tier 2 Plan or DRIP), which was developed with your agency's participation, is now ready for adoption by your agency. This Plan, along with the Tier 1 Plan, which has already been adopted, establishes how the water available to the Wholesale Customers will be allocated among themselves. You agency must adopt the Tier 2 Plan by resolution. Accompanying this memorandum is a template resolution (Enclosure 1) for use by your agency in adopting the Tier 2 Plan.

The Tier 1 Plan, which allocates water from the San Francisco Regional Water System (RWS) among San Francisco retail and Wholesale Customers during system-wide shortages of 20% or less, was adopted by your agency and San Francisco as part of the 2009 Water Supply Agreement (WSA). The WSA authorizes the Wholesale Customers to adopt a methodology for allocating the water, which is collectively available to the 26 Wholesale Customers, among each individual Wholesale Customer. A copy of the Tier 1 Plan is attached to this memorandum as Enclosure 2.

The Tier 2 Plan, which documents the Tier 2 allocation methodology, is shown as Exhibit A and has been endorsed by all of the Wholesale Customer Appointed Water Management Representatives who participated in the formulation process for the past year. Agency staff of all the Wholesale Customers have committed to recommend that the Tier 2 Plan be formally adopted by the governing body of their respective agencies.

Action Required

In order to implement the Tier 2 Plan as recommended by the Appointed Water Management Representatives, the template resolution endorsing and adopting the Tier 2 Plan must be adopted by all 26 Wholesale Customers. In order to ensure the Tier 2 Plan is adopted by all agencies in time for inclusion into the 2010 Urban Water Management Plans, please adopt the Plan by March 31, 2011. However, the resolution is written to allow until June 30, 2011 for adoption by all Wholesale Customers. If all Wholesale Customers have not adopted the Tier 2 Plan by June 30th of next year, then all of the resolutions adopting the Tier 2 Plan will not take effect and will automatically expire.

Background

In July 2009, in connection with adoption of the WSA, the Wholesale Customers and San Francisco adopted a Water Shortage Allocation Plan to allocate water from the RWS to retail and Wholesale Customers during system-wide shortages of 20% or less (the Tier 1 Plan). The Tier 1 Plan replaced the prior Tier 1 Interim Water Shortage Allocation Plan, adopted in 2000 and expired in June 2009, which allocated water for shortages up to 20%. The provisions of the Tier 1 Plan allow wholesale customers to "bank" drought allocations and to voluntarily transfer them to each other and San Francisco. The Tier 1 plan also presents an updated schedule for actions preceding and during a drought.

Section 3.11.C of the WSA authorizes the Wholesale Customers to adopt a methodology for allocating the water which is collectively available to the 26 Wholesale Customers among each individual Wholesale Customer (the "Tier 2 Plan"). The Tier 2 Plan adopted in 2000 expired in June 2009. The WSA also commits the SFPUC to honor allocations of water unanimously agreed to by all Wholesale Customers or, if unanimous agreement cannot be achieved, water allocations that have been adopted by the Board of Directors of the Bay Area Water Supply and Conservation Agency ("BAWSCA"). The WSA also provides that the SFPUC can allocate water supplies as necessary during a water shortage emergency if no agreed upon plan for water allocation has been adopted by the 26 Wholesale Customers or the BAWSCA Board of Directors.

Commencing in October 2009, Appointed Water Management Representatives of each of the Wholesale Customers have been meeting to develop a set of principles to serve as guidelines for an equitable allocation methodology, as well as formulas and procedures, to implement those principles. These principles include:

- Providing certainty of drought allocations with consistent and pre-determined rules for calculation;
- Providing sufficient amounts of water for basic needs of customers;
- Creating an incentive for water conservation at all times and the development and management of alternative water supplies;
- Avoiding preventable, adverse economic impacts;
- Avoiding reallocation of water supply assets and investments among agencies without mutual consent and compensation; and
- Recognizing inherent differences in land use and climate.

The discussions, and supporting technical analyses, were conducted with the assistance of BAWSCA staff.

On August 25, 2010, the Appointed Water Management Representatives unanimously agreed to recommend adoption of the Tier 2 Plan to each of their respective governing bodies.

Term of Tier 2 Drought Implementation Plan

The Tier 2 Plan term is through December 31, 2018. The Tier 2 Plan allocates the collective Wholesale Customer share among each of the 26 wholesale customers through 2018 to coincide with San Francisco's deferral of decisions about additional supply until at least 2018. At the same time, the SFPUC imposed the Interim Supply Limitation which limits the volume of water that the RWS could deliver to San Francisco and the Wholesale Customers to 265 MGD until at least 2018.

The adoption and implementation of the Tier 1 and 2 Plans and San Francisco's unilateral imposition of the Interim Supply Limitation are independent and unrelated. The Tier 1 and Tier 2 Drought Allocation Plans apply only during times of water shortages caused by drought. San Francisco's Interim Supply Limitation applies in all years through at least 2018, regardless of water supply availability.

Effect of Tier 2 Drought Implementation Plan

The Tier 2 Plan will establish an allocation formula that will determine how the available water from the RWS will be allocated among the individual Wholesale Customers in system-wide shortages up to 20%.

In general, the allocation formula can be described as follows:

- 33.3% weight applied to individual agency's Individual Supply Guarantee (with slight variations for Hayward, San Jose, and Santa Clara)
- 66.6% weight applied to a Base/Seasonal calculation using 3 year average monthly production values for all supply sources
- 10% minimum cutback and maximum cutback equal to no more than the average cutback plus 20%
- Guaranteed sufficient supply of water to East Palo Alto to meet health and safety needs for its community

Supporting Documents and Enclosures

Enclosed are several supporting documents that may be useful for your agency in developing the staff report and/or presentation for your governing board on this subject. These enclosures include:

- Template Agency Resolution (Enclosure 1)
    - Exhibit A: Tier 2 Drought Allocation Plan and attachments (including an example calculation).
- Tier 1 Plan as adopted as part of 2009 Water Supply Agreement (Enclosure 2)

In addition, the spreadsheets used for calculating Tier 2 Allocations will be transmitted to you via e-mail.

Procedure & Schedule

The sample resolution (Enclosure 1) should be reprinted (modified if necessary to fit your agency's preferred format) and presented to your governing board in time for it to be enacted well in advance of the requested March 31, 2011 deadline. Once the resolution has been adopted by your agency, please send a copy of the signed resolution to:

Ms. Nicole M. Sandkulla
Water Resources Manager
Bay Area Water Supply and
Conservation Agency
155 Bovet Road, Suite 302
San Mateo, CA 94402

Once all agencies have adopted the resolutions, the Tier 2 Plan will take effect. If you or other members of your agency's staff have any questions about the enclosed resolution or supporting material, please call Ms. Sandkulla at (650) 349-3000. If your city attorney or district counsel has legal questions, they should feel free to call Ms. Allison Schutte at (415) 995-5823.

Respectfully submitted,

ARTHUR R. JENSEN, CEO/General Manager
Bay Area Water Supply and Conservation Agency

Enclosures

cc: BAWSCA Board of Directors

[NAME OF AGENCY]

RESOLUTION NO. _____

APPROVING TIER 2 DROUGHT IMPLEMENTATION PLAN
PURSUANT TO SECTION 3.11.C
OF THE WATER SUPPLY AGREEMENT WITH SAN FRANCISCO

THIS RESOLUTION IS ADOPTED in light of the following facts and circumstances:

1. The *[Name of Agency]* is one of 26 agencies in San Mateo, Santa Clara and Alameda Counties which purchase water from the City and County of San Francisco (San Francisco) pursuant to a Water Supply Agreement entered into in 2009 (Agreement). Collectively these 26 agencies are referred to in the Agreement as Wholesale Customers.

2. Section 3.11 of the Agreement addresses times when insufficient water is available in the San Francisco Regional Water System to meet the full demands of all users. Section 3.11.C provides that during periods of water shortage caused by drought, the San Francisco Public Utilities Commission (SFPUC) will allocate available water between its retail customers and the Wholesale Customers collectively, in accordance with a schedule contained in the Water Shortage Allocation Plan set forth in Attachment H to the Agreement (Tier 1 Plan).

3. Section 3.11.C authorizes the Wholesale Customers to adopt a Drought Allocation Plan, including a methodology for allocating the water which is collectively available to the 26 Wholesale Customers among each individual Wholesale Customer (Tier 2 Plan). It also commits the SFPUC to honor allocations of water unanimously agreed to by all Wholesale Customers or, if unanimous agreement cannot be achieved, water allocations that have been adopted by the Board of Directors of the Bay Area Water Supply and Conservation Agency (BAWSCA). The Agreement also provides that the SFPUC can allocate water supplies as necessary during a water shortage emergency if no agreed upon plan for water allocation has been adopted by the 26 Wholesale Customers or the BAWSCA Board of Directors.

4. Commencing in October 2009, representatives appointed by the managers of each of the Wholesale Customers have been meeting to develop a set of principles to serve as guidelines for an equitable allocation methodology, as well as formulas and procedures, to implement those principles. These discussions, and supporting technical analyses, have been conducted with the assistance of BAWSCA staff.

5. The Tier 2 Plan, attached to this resolution as Exhibit A, has been endorsed by all of the Wholesale Customer representatives who participated in the formulation process and they have committed to recommend that it be formally adopted by the governing body of their respective agencies.

6. The Tier 2 Plan allocates the collective Wholesale Customer share among each of the 26 wholesale customers through December 31, 2018 to coincide with San Francisco's deferral of decisions about additional water supply until at least 2018.

NOW, THEREFORE, BE IT RESOLVED by the *[Governing Board]* of *[Name of Agency]* as follows:

1. The Tier 2 Drought Implementation Plan, a copy of which is attached hereto as Exhibit A, is approved.

2. This approval is conditioned upon all of the other 25 Wholesale Customers approving the Plan, such approvals being evidenced through adoption of similar resolutions or, in the case of private-sector organizations, by other equivalently binding written commitments signed by an executive officer acting within the scope of delegated authority, and all such approvals occurring on or before June 30, 2011.

If such resolutions or binding commitments are not adopted by that date, this resolution will automatically expire and be of no further effect after June 30, 2011, unless it has been extended prior thereto by further action of this *[Council, Board, etc.]*.

PASSED AND ADOPTED this _____ day of _____, 201__, by the following vote:

AYES:

NOES:

ABSENT:

_____
President, City Council

Approved as to form:

ATTEST:

_____
City Attorney

_____
City Clerk

TABLE 1 - FIXED COMPONENT FOR USE IN TIER 2 ALLOCATION CALCULATION

Wholesale Customer	Fixed Component
ACWD	13.76
Brisbane/GVMID	0.98
Burlingame	5.23
Coastside	2.18
CWS Total	35.68
Daly City	4.29
East Palo Alto	1.96
Estero	5.90
Hayward	25.11
Hillsborough	4.09
Menlo Park	4.46
Mid Pen WD	3.89
Millbrae	3.15
Milpitas	9.23
Mountain View	13.46
North Coast	3.84
Palo Alto	17.07
Purissima Hills	1.62
Redwood City	10.93
San Bruno	3.25
San José	4.50
Santa Clara	4.50
Stanford	3.03
Sunnyvale	12.58
Westborough	1.32

TABLE 2 - BASE/SEASONAL CUTBACK CALCULATION FOR TIER 2 DROUGHT IMPLEMENTATION PLAN (DRIP) (Steps 1b-1f of DRIP Calculation)

ATTACHMENT B

BASE/SEASONAL CUTBACK CALCULATION
3 YEAR ROLLING AVERAGE OF TOTAL PRODUCTION

All Units In Hundred Cubic Feet (HCF) Except Where Otherwise Notes

Base Percentage Reduction =	10.00%
Seasonal Percentage Reduction =	65.00%
Number of Fiscal Years in Average =	1.0

Three-year averages by source

	July	August	September	October	November	December	January	February	March	April	May	June	Total
SFPUC Net	9,492,234	8,865,793	8,847,818	7,624,081	5,785,671	5,320,333	4,925,451	4,167,812	4,333,119	5,780,803	7,102,580	7,427,737	79,673,432
Groundwater	1,969,068	2,014,327	1,682,556	1,449,343	1,179,106	1,375,812	1,099,608	983,756	1,084,734	1,389,622	1,662,344	1,647,268	17,537,545
Other	2,744,449	2,669,344	2,537,606	2,418,221	1,644,468	874,833	1,391,142	1,320,782	1,606,115	2,004,769	2,517,062	2,675,045	24,403,836
Subtotal	14,205,751	13,549,464	13,067,981	11,491,646	8,609,245	7,570,977	7,416,201	6,472,350	7,023,968	9,175,195	11,281,986	11,750,050	121,614,813
SFPUC Excess	(36,886)	(33,367)	(35,125)	(28,015)	(18,394)	(11,600)	(10,843)	(11,088)	(8,721)	(16,898)	(25,409)	(27,984)	(264,330)
Net	14,168,865	13,516,097	13,032,856	11,463,631	8,590,851	7,559,378	7,405,358	6,461,262	7,015,246	9,158,297	11,256,577	11,722,066	121,350,483

Three-year rolling monthly production average by Wholesale Customer with SFPUC purchases limited to ISG on a yearly basis

	(1) July	(2) August	(3) September	(4) October	(5) November	(6) December	(7) January	(8) February	(9) March	(10) April	(11) May	(12) June	(13) Total Production	(14) Base Component	(15) Seasonal Component	(16) Base/Seasonal Allocation	(17) Base/Seasonal Cutback % (To Tab 2, Col 4)
ACWD	2,598,324	2,521,779	2,356,517	2,088,213	1,483,726	1,389,921	1,331,023	1,102,420	1,303,110	1,683,608	2,074,964	2,226,985	22,160,590	15,379,420	6,781,170	16,214,887	26.83%
Brisbane/GVMID	35,597	36,251	34,821	31,630	25,808	17,907	20,064	11,403	17,339	16,961	25,289	28,775	301,845	200,139	101,706	215,722	28.53%
Burlingame	237,426	236,780	214,046	203,879	183,921	127,936	130,576	132,703	110,995	141,580	164,657	202,117	2,086,616	1,506,630	579,986	1,558,962	25.29%
Coastside	118,409	120,160	102,807	103,917	69,291	70,976	72,928	57,246	48,396	79,714	90,816	102,112	1,036,773	748,636	288,136	774,620	25.29%
CWS	2,139,140	2,093,378	1,954,875	1,694,788	1,100,278	996,843	1,007,651	846,173	1,026,988	1,408,292	1,697,865	1,805,399	17,771,671	11,632,966	6,138,705	12,618,216	29.00%
Daly City	324,019	340,112	305,711	309,038	318,039	278,252	269,650	234,447	294,435	260,687	261,671	250,006	3,446,067	3,230,352	215,715	2,982,817	13.44%
East Palo Alto	100,845	98,204	99,301	92,276	74,634	56,388	70,278	60,063	54,918	67,468	89,886	71,174	935,435	724,941	210,494	726,120	22.38%
Estero	304,604	294,448	299,906	248,800	231,729	136,155	133,622	145,923	92,203	162,122	208,383	252,034	2,509,929	1,523,709	986,220	1,716,515	31.61%
Hayward	983,955	851,762	917,490	828,612	740,510	843,184	700,858	519,840	611,449	572,724	849,545	836,615	9,256,544	8,025,993	1,230,551	7,654,087	17.31%
Hillsborough	250,428	239,293	339,873	187,852	149,425	70,505	57,857	68,263	46,840	77,287	127,533	179,470	1,794,626	730,395	1,064,231	1,029,836	42.62%
Menlo Park	205,878	197,865	195,391	171,845	118,504	78,597	80,370	82,369	70,962	108,772	169,161	151,171	1,630,885	936,894	693,991	1,086,101	33.40%
Mid Pen WD	174,821	168,580	176,218	154,115	126,396	83,564	95,477	90,390	83,076	124,092	124,306	141,794	1,542,829	1,057,521	485,308	1,121,627	27.30%
Millbrae	132,776	130,963	122,123	112,057	102,206	73,644	74,678	70,473	68,880	78,212	89,547	112,449	1,168,008	863,025	304,983	883,467	24.36%
Milpitas	560,066	511,819	499,068	456,297	339,619	346,470	345,211	313,013	348,809	390,135	458,282	487,604	5,056,393	4,060,509	995,884	4,003,018	20.83%
Mountain View	696,607	601,089	571,691	507,741	332,245	317,851	306,054	307,473	316,164	466,737	552,409	584,813	5,560,874	3,742,626	1,818,248	4,004,750	27.98%
North Coast	175,214	142,592	149,874	131,114	136,038	107,334	115,408	100,129	70,449	138,934	123,139	96,305	1,486,530	1,179,960	306,570	1,169,264	21.34%
Palo Alto	710,992	687,471	674,410	599,590	409,114	261,926	291,888	274,558	221,426	413,454	602,470	529,719	5,677,018	3,149,394	2,527,624	3,719,123	34.49%
Purissima Hills	116,098	102,177	112,087	86,968	57,418	30,674	27,294	31,514	18,976	46,701	77,214	85,712	792,832	325,373	467,459	456,447	42.43%
Redwood City	593,464	576,449	627,527	521,009	427,638	275,051	298,520	280,891	257,786	377,386	415,099	397,489	5,048,309	3,336,744	1,711,565	3,602,117	28.65%
San Bruno	177,048	195,589	172,534	162,980	128,108	140,430	140,637	109,929	143,808	160,884	162,280	183,615	1,877,842	1,604,412	273,430	1,539,671	18.01%
Stanford	127,534	102,493	119,688	94,886	78,913	65,097	99,295	69,251	59,292	81,719	90,169	118,440	1,106,776	878,805	227,971	870,714	21.33%
Sunnyvale	1,150,141	1,043,040	991,516	862,693	653,331	669,034	578,608	502,957	578,103	757,643	906,030	960,437	9,653,533	6,986,106	2,667,427	7,221,095	25.20%
Westborough	39,266	51,302	44,708	44,615	38,399	23,623	51,170	33,520	35,133	29,513	31,342	41,224	463,815	430,338	33,477	399,021	13.97%
	11,952,651	11,343,597	11,082,182	9,694,915	7,325,290	6,461,362	6,299,117	5,444,948	5,879,536	7,644,625	9,392,057	9,845,460	102,365,739	72,254,888	30,110,851	75,568,197	26.18%
San Jose	1,166,894	1,084,954	1,005,465	846,564	569,616	484,680	495,721	417,476	510,636	726,102	910,264	999,166	9,217,538	5,725,539	3,491,999	6,375,185	30.84%
Santa Clara	1,049,320	1,087,546	945,209	922,152	695,945	613,336	610,520	598,838	625,074	787,570	954,256	877,440	9,767,206	7,343,304	2,423,902	7,457,339	23.65%
	14,168,865	13,516,097	13,032,856	11,463,631	8,590,851	7,559,378	7,405,358	6,461,262	7,015,246	9,158,297	11,256,577	11,722,066	121,350,483	157,578,619	66,137,603	89,400,721	26.33%

Column Notes

(1) thru (12) Calculated as the net potable water supply production for all sources, three-year rolling average, by month, and by suburban purchaser, with ISG limits imposed on Annual SFPUC Purchases from Step 1a (Step 1b)

(13) Sum of columns (1) thru (12)

(14) Base Component: Calculated as the winter average usage (Cols 6 through 9 - December through March), multiplied by 12 (Step 1c)

(15) Seasonal Component: Calculated as the total production (Col 13) minus the base component (Col 14) (Step 1d)

(16) Base/Seasonal Allocations: Calculated as the Base Component minus the Base Reduction plus the Seasonal Component minus the Seasonal Reduction (Step 1e)

(17) Base/Seasonal Cutback: Calculated as the ratio of an agency's Base/Seasonal Allocation to its Total Production, minus 1, expressed as a percent (Step 1f)

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 cutback: -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 cutbac -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).

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). Indivdual 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

ATTACHMENT H

WATER SHORTAGE ALLOCATION PLAN

This Interim Water Shortage Allocation Plan ("Plan") describes the method for allocating water between the San Francisco Public Utilities Commission ("SFPUC") and the Wholesale Customers collectively during shortages caused by drought. The Plan implements a method for allocating water among the individual Wholesale Customers which has been adopted by the Wholesale Customers. The Plan includes provisions for transfers, banking, and excess use charges. The Plan applies only when the SFPUC determines that a system-wide water shortage due to drought exists, and all references to "shortages" and "water shortages" are to be so understood. This 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 ("Agreement").

SECTION 1. SHORTAGE CONDITIONS

1.1. Projected Available SFPUC Water Supply. The SFPUC shall make an annual determination as to whether or not a shortage condition exists. The determination of projected available water supply shall consider, among other things, stored water, projected runoff, water acquired by the SFPUC from non-SFPUC sources, inactive storage, reservoir losses, allowance for carryover storage, and water bank balances, if any, described in Section 3.

1.2 Projected SFPUC Purchases. The SFPUC will utilize purchase data, including volumes of water purchased by the Wholesale Customers and by Retail Customers (as those terms are used in the Agreement) in the year immediately prior to the drought, along with other available relevant information, as a basis for determining projected system-wide water purchases from the SFPUC for the upcoming year.

1.3. Shortage Conditions. The SFPUC will compare the available water supply (Section 1.1) with projected system-wide water purchases (Section 1.2). A shortage condition exists if the SFPUC determines that the projected available water supply is less than projected system-wide water purchases in the upcoming Supply Year (defined as the period from July 1 through June 30). When a shortage condition exists, SFPUC will determine whether voluntary or mandatory actions will be required to reduce purchases of SFPUC water to required levels.

1.3.1 Voluntary Response. If the SFPUC determines that voluntary actions will be sufficient to accomplish the necessary reduction in water use throughout its service area, the SFPUC and the Wholesale Customers will make good faith efforts to reduce their water purchases to stay within their annual shortage allocations and associated monthly water use budgets. The SFPUC will not impose excess use charges during periods of voluntary rationing, but may suspend the prospective accumulation of water bank credits, or impose a ceiling on further accumulation of bank credits, consistent with Section 3.2.1 of this Plan.

1.3.2 Mandatory Response. If the SFPUC determines that mandatory actions will be required to accomplish the necessary reduction in water use in the SFPUC service area, the SFPUC may implement excess use charges as set forth in Section 4 of this Plan.

1.4. Period of Shortage. A shortage period commences when the SFPUC determines that a water shortage exists, as set forth in a declaration of water shortage emergency issued by the SFPUC pursuant to California Water Code Sections 350 et seq. Termination of the water shortage emergency will be declared by resolution of the SFPUC.

SECTION 2. SHORTAGE ALLOCATIONS

2.1. Annual Allocations between the SFPUC and the Wholesale Customers. The annual water supply available during shortages will be allocated between the SFPUC and the collective Wholesale Customers as follows:

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 water allocated to the SFPUC shall correspond to the total allocation for all Retail Customers.

2.2 Annual Allocations among the Wholesale Customers. The annual water supply allocated to the Wholesale Customers collectively during system wide shortages of 20 percent or less will be apportioned among them based on a methodology adopted by all of the Wholesale Customers, as described in Section 3.11(C) of the Agreement. In any year for which the methodology must be applied, the Bay Area Water Supply and Conservation Agency ("BAWSCA") will calculate each Wholesale Customer's individual percentage share of the amount of water allocated to the Wholesale Customers collectively pursuant to Section 2.1. Following the declaration or reconfirmation of a water shortage emergency by the SFPUC, BAWSCA will deliver to the SFPUC General Manager a list, signed by the President of BAWSCA's Board of Directors and its General Manager, showing each Wholesale Customer together with its percentage share and stating that the list has been prepared in accordance with the methodology adopted by the Wholesale Customers. The SFPUC shall allocate water to each Wholesale Customer, as specified in the list. The shortage allocations so established may be transferred as provided in Section 2.5 of this Plan. If BAWSCA or all Wholesale Customers do not provide the SFPUC with individual allocations, the SFPUC may make a final allocation decision after first meeting and discussing allocations with BAWSCA and the Wholesale Customers.

The methodology adopted by the Wholesale Customers utilizes the rolling average of each individual Wholesale Customer's purchases from the SFPUC during the three immediately

preceding Supply Years. The SFPUC agrees to provide BAWSCA by November 1 of each year a list showing the amount of water purchased by each Wholesale Customer during the immediately preceding Supply Year. The list will be prepared using Customer Service Bureau report MGT440 (or comparable official record in use at the time), adjusted as required for any reporting errors or omissions, and will be transmitted by the SFPUC General Manager or his designee.

2.3. Limited Applicability of Plan to System Wide Shortages Greater Than Twenty Percent. The allocations of water between the SFPUC and the Wholesale Customers collectively, provided for in Section 2.1, apply only to shortages of 20 percent or less. The SFPUC and Wholesale Customers recognize the possibility of a drought occurring which could create system-wide shortages greater than 20 percent despite actions taken by the SFPUC aimed at reducing the probability and severity of water shortages in the SFPUC service area. If the SFPUC determines that a system wide water shortage greater than 20 percent exists, the SFPUC and the Wholesale Customers agree to meet within 10 days and discuss whether a change is required to the allocation set forth in Section 2.1 in order to mitigate undue hardships that might otherwise be experienced by individual Wholesale Customers or Retail Customers. Following these discussions, the Tier 1 water allocations set forth in Section 2.1 of this Plan, or a modified version thereof, may be adopted by mutual written consent of the SFPUC and the Wholesale Customers. If the SFPUC and Wholesale Customers meet and cannot agree on an appropriate Tier 1 allocation within 30 days of the SFPUC's determination of water shortage greater than 20 percent, then (1) the provisions of Section 3.11(C) of the Agreement will apply, unless (2) all of the Wholesale Customers direct in writing that a Tier 2 allocation methodology agreed to by them be used to apportion the water to be made available to the Wholesale Customers collectively, in lieu of the provisions of Section 3.11(C).

The provisions of this Plan relating to transfers (in Section 2.5), banking (in Section 3), and excess use charges (in Section 4) shall continue to apply during system-wide shortages greater than 20 percent.

2.4. Monthly Water Budgets. Within 10 days after adopting a declaration of water shortage emergency, the SFPUC will determine the amount of Tier 1 water allocated to the Wholesale Customers collectively pursuant to Section 2.1. The SFPUC General Manager, using the Tier 2 allocation percentages shown on the list delivered by BAWSCA pursuant to Section 2.2, will calculate each Wholesale Customer's individual annual allocation. The SFPUC General Manager, or his designee, will then provide each Wholesale Customer with a proposed schedule of monthly water budgets based on the pattern of monthly water purchases during the Supply Year immediately preceding the declaration of shortage (the "Default Schedule"). Each Wholesale Customer may, within two weeks of receiving its Default Schedule, provide the SFPUC with an alternative monthly water budget that reschedules its annual Tier 2 shortage allocation over the course of the succeeding Supply Year. If a Wholesale Customer does not deliver an alternative monthly water budget to the SFPUC within two weeks of its receipt of the Default Schedule, then its monthly budget for the ensuing Supply Year shall be the Default Schedule proposed by the SFPUC.

Monthly Wholesale Customer water budgets will be derived from annual Tier 2 allocations for purposes of accounting for excess use. Monthly Wholesale Customer water budgets shall be adjusted during the year to account for transfers of shortage allocation under Section 2.5 and

transfers of banked water under Section 3.4.

2.5. Transfers of Shortage Allocations. Voluntary transfers of shortage allocations between the SFPUC and any Wholesale Customers, and between any Wholesale Customers, will be permitted using the same procedure as that for transfers of banked water set forth in Section 3.4. The SFPUC and BAWSCA shall be notified of each transfer. Transfers of shortage allocations shall be deemed to be an emergency transfer and shall become effective on the third business day after notice of the transfer has been delivered to the SFPUC. Transfers of shortage allocations shall be in compliance with Section 3.05 of the Agreement. The transferring parties will meet with the SFPUC, if requested, to discuss any effect the transfer may have on its operations.

SECTION 3. SHORTAGE WATER BANKING

3.1. Water Bank Accounts. The SFPUC shall create a water bank account for itself and each Wholesale Customer during shortages in conjunction with its resale customer billing process. Bank accounts will account for amounts of water that are either saved or used in excess of the shortage allocation for each agency; the accounts are not used for tracking billings and payments. When a shortage period is in effect (as defined in Section 1.4), the following provisions for bank credits, debits, and transfers shall be in force. A statement of bank balance for each Wholesale Customer will be included with the SFPUC's monthly water bills.

3.2. Bank Account Credits. Each month, monthly purchases will be compared to the monthly budget for that month. Any unused shortage allocation by an agency will be credited to that agency's water bank account. Credits will accumulate during the entire shortage period, subject to potential restrictions imposed pursuant to Section 3.2.1. Credits remaining at the end of the shortage period will be zeroed out; no financial or other credit shall be granted for banked water.

3.2.1. Maximum Balances. The SFPUC may suspend the prospective accumulation of credits in all accounts. Alternatively, the SFPUC may impose a ceiling on further accumulation of credits in water bank balances based on a uniform ratio of the bank balance to the annual water allocation. In making a decision to suspend the prospective accumulation of water bank credits, the SFPUC shall consider the available water supply as set forth in Section 1.1 of this Plan and other reasonable, relevant factors.

3.3. Account Debits. Each month, monthly purchases will be compared to the budget for that month. Purchases in excess of monthly budgets will be debited against an agency's water bank account. Bank debits remaining at the end of the fiscal year will be subject to excess use charges (see Section 4).

3.4. Transfers of Banked Water. In addition to the transfers of shortage allocations provided for in Section 2.5, voluntary transfers of banked water will also be permitted between the SFPUC and any Wholesale Customer, and among the Wholesale Customers. The volume of transferred water will be credited to the transferee's water bank account and debited against the transferor's water bank account. The transferring parties must notify the SFPUC and BAWSCA of each transfer in writing (so that adjustments can be made to bank accounts), and will meet with the SFPUC, if requested, to discuss any affect the transfer may have on SFPUC operations. Transfers of banked water shall be deemed to be an emergency transfer and shall become effective on the third business day after notice of the transfer has been delivered to the SFPUC.

If the SFPUC incurs extraordinary costs in implementing transfers, it will give written notice to the transferring parties within ten (10) business days after receipt of notice of the transfer. Extraordinary costs means additional costs directly attributable to accommodating transfers and which are not incurred in non-drought years nor simply as a result of the shortage condition itself. Extraordinary costs shall be calculated in accordance with the procedures in the Agreement and shall be subject to the disclosure and auditing requirements in the Agreement. In the case of transfers between Wholesale Customers, such extraordinary costs shall be considered to be expenses chargeable solely to individual Wholesale Customers and shall be borne equally by the parties to the transfer. In the case of transfers between the SFPUC and a Wholesale Customer, the SFPUC's share of any extraordinary transfer costs shall not be added to the Wholesale Revenue Requirement.

3.4.1. Transfer Limitations. The agency transferring banked water will be allowed to transfer no more than the accumulated balance in its bank. Transfers of estimated prospective banked credits and the "overdrafting" of accounts shall not be permitted. The price of transfer water originally derived from the SFPUC system is to be determined by the transferring parties and is not specified herein. Transfers of banked water shall be in compliance with Section 3.05 of the Agreement.

SECTION 4. WHOLESALE EXCESS USE CHARGES

4.1. Amount of Excess Use Charges. Monthly excess use charges shall be determined by the SFPUC at the time of the declared water shortage consistent with the calendar in Section 6 and in accordance with Section 6.03 of the Agreement. The excess use charges will be in the form of multipliers applied to the rate in effect at the time the excess use occurs. The same excess use charge multipliers shall apply to the Wholesale Customers and all Retail Customers. The excess use charge multipliers apply only to the charges for water delivered at the rate in effect at the time the excess use occurred.

4.2 Monitoring Suburban Water Use. During periods of voluntary rationing, water usage greater than a customer's allocation (as determined in Section 2) will be indicated on each SFPUC monthly water bill. During periods of mandatory rationing, monthly and cumulative water usage greater than a Wholesale Customer's shortage allocation and the associated excess use charges will be indicated on each SFPUC monthly water bill.

4.3. Suburban Excess Use Charge Payments. An annual reconciliation will be made of monthly excess use charges according to the calendar in Section 6. Annual excess use charges will be calculated by comparing total annual purchases for each Wholesale Customer with its annual shortage allocation (as adjusted for transfers of shortage allocations and banked water, if any). Excess use charge payments by those Wholesale Customers with net excess use will be paid according to the calendar in Section 6. The SFPUC may dedicate excess use charges paid by Wholesale Customers toward the purchase of water from the State Drought Water Bank or other willing sellers in order to provide additional water to the Wholesale Customers. Excess use charges paid by the Wholesale Customers constitute Wholesale Customer revenue and shall be included within the SFPUC's annual Wholesale Revenue Requirement calculation.

SECTION 5. GENERAL PROVISIONS GOVERNING WATER SHORTAGE ALLOCATION PLAN

5.1. Construction of Terms. This Plan is for the sole benefit of the parties and shall not be construed as granting rights to any person other than the parties or imposing obligations on a party to any person other than another party.

5.2. Governing Law. This Plan is made under and shall be governed by the laws of the State of California.

5.3. Effect on Agreement. This Plan describes the method for allocating water between the SFPUC and the collective Wholesale Customers during system-wide water shortages of 20 percent or less. This Plan also provides for the SFPUC to allocate water among the Wholesale Customers in accordance with directions provided by the Wholesale Customers through BAWSCA under Section 2.2, and to implement a program by which such allocations may be voluntarily transferred among the Wholesale Customers. The provisions of this Plan are intended to implement Section 3.11(C) of the Agreement and do not affect, change or modify any other section, term or condition of the Agreement.

5.4. Inapplicability of Plan to Allocation of SFPUC System Water During Non-Shortage Periods. The SFPUC's agreement in this Plan to a respective share of SFPUC system water during years of shortage shall not be construed to provide a basis for the allocation of water between the SFPUC and the Wholesale Customers when no water shortage emergency exists.

5.5. Termination. This Plan shall expire at the end of the Term of the Agreement.. The SFPUC and the Wholesale Customers can mutually agree to revise or terminate this Plan prior to that date due to changes in the water delivery capability of the SFPUC system, the acquisition of new water supplies, and other factors affecting the availability of water from the SFPUC system during times of shortage.

SECTION 6. ALLOCATION CALENDAR

6.1. Annual Schedule. The annual schedule for the shortage allocation process is shown below. This schedule may be changed by the SFPUC to facilitate implementation.

6.1.1

In All Years	Target Dates
1. SFPUC delivers list of annual purchases by each Wholesale Customer during the immediately preceding Supply Year	November 1
2. SFPUC meets with the Wholesale Customers and presents water supply forecast for the following Supply Year	February
3. SFPUC issues initial estimate of available water supply	February 1
4. SFPUC announces potential first year of drought (if applicable)	February 1
5. SFPUC and Wholesale Customers meet upon request to exchange information concerning water availability and projected system-wide purchases	February 1-May 31
6. SFPUC issues revised estimate of available water supply, and confirms continued potential shortage conditions, if applicable	March 1
7. SFPUC issues final estimate of available water supply	April 15th or sooner if adequate snow course measurement data is available to form a robust estimate on available water supply for the coming year.
8. SFPUC determines amount of water available to Wholesale Customers collectively	April 15th or sooner if adequate snow course measurement data is available to form a robust estimate on available water supply for the coming year.

In Drought Years	Target Dates
9. SFPUC formally declares the existence of water shortage emergency (or end of water shortage emergency, if applicable) under Water Code Sections 350 et. seq.	April 15-31
10. SFPUC declares the need for a voluntary or mandatory response	April 15-31
11. BAWSCA submits calculation to SFPUC of individual Wholesale Customers' percentage shares of water allocated to Wholesale Customers collectively	April 15- 31
12. SFPUC determines individual shortage allocations, based on BAWSCA's submittal of individual agency percentage shares to SFPUC, and monthly water budgets (Default Schedule)	April 25—May 10
13. Wholesale Customers submit alternative monthly water budgets (optional)	May 8-May 24
14. Final drought shortage allocations are issued for the Supply Year beginning July 1 through June 30	June 1
15. Monthly water budgets become effective	July 1
16. Excess use charges indicated on monthly Suburban bills	August 1 (of the beginning year) through June 30 (of the succeeding year)
17. Excess use charges paid by Wholesale Customers for prior year	August of the succeeding year

Chapter 12.34. WATER CONSERVATION RESTRICTIONS

12.34.010. Purpose and application.

The purpose of this chapter is to identify and restrict nonessential water uses which, if allowed, would constitute wastage of the water supply of the city. The provisions of this chapter shall apply to all persons or entities using water obtained from the city of Sunnyvale both in and outside the city of Sunnyvale and within the city's water service area, and regardless of whether any person or entity using water has a contract for water service with the city. Use of water by the city itself shall be in conformance with a water conservation plan to be presented by the city manager to the city council for approval, and which shall essentially conform to the provisions of this chapter. This chapter is adopted pursuant to the provisions of Water Code Section 350, et seq., the city charter and the common law. (Ord. 2433-93 § 1 (part)).

12.34.020. Nonessential uses prohibited.

The following uses, methods, types or techniques of uses of water are hereby determined and declared nonessential, and except as expressly provided to the contrary, are hereby prohibited:

(a) Allowing or maintaining broken or defective plumbing, sprinklers, watering or irrigation systems which permit the escape or leakage of potable water.

(b) Using potable water in any manner which causes, allows or permits the flooding of any premises, or any portion thereof, or which causes, allows or permits water to escape from any premises or any portion thereof and flow into gutters, streets, or any surface water drainage system.

(c) Using any hose or similar device using potable water for washing automobiles, trucks, buses, boats, trailers, equipment, recreational vehicles, mobilehomes or other vehicles or machinery, unless the hose or device is equipped with a positive automatic shutoff valve.

(d) Using potable water to wash sidewalks, driveways, filling station aprons, patios, parking lots, porches or other paved or hard surfaced areas, unless there is a positive automatic shutoff valve on the outlet end of the hose.

(e) The service of water by any restaurant or other eating or refreshment establishment to any patron, except upon the specific request by a patron for such services.

(f) Installation of any single pass cooling process in new construction.

(g) Any use of nonpotable water not in compliance with all federal, state and local laws, rules and regulations. Use of reclaimed water from the city's water pollution control plant shall be subject to the discretion of the director of public works. (Ord. 2433-93 § 1 (part)).

12.34.030. Exceptions.

(a) The director of public works is hereby authorized to grant to any user an exception to the prohibitions set forth in Section 12.34.020, upon a finding by the director that such exception is necessary to prevent an emergency condition affecting the health, sanitation or fire protection of such user, and that the user to whom such adjustment or exception pertains has adopted or used all practicable water conservation measures.

(b) Exceptions permitted hereunder shall be made only upon written application submitted to the director setting forth a statement of justification for such exception. The director may attach conditions, specifications or other qualifying provisions to any exception granted. (Ord. 2433-93 § 1 (part)).

12.34.040. Penalty—Flow restricting devices.

(a) Upon a determination by the director of public works that a user has continuously or repeatedly violated or failed to comply with one or more provisions of Section 12.34.020, or of any conditions of any exception granted pursuant to the provisions of Section 12.34.030, the director may issue an order to cease and desist from continued or repeated violation, and further order such user to comply forthwith with such provisions or terms of exception, or otherwise to take appropriate remedial or preventive action. If after the issuance of such cease and desist order, such user continues to consume or use, or again consumes or uses water in violation of any such provision or condition of exception, the director may order the installation of a flow restricting device upon the water service line to the premises of such user. Such flow restricting device shall be installed and maintained for a period of not less than three days nor more than ten days for a first violation, and shall be installed and maintained for not less than ten days for each succeeding violation, and may be ordered to remain installed and maintained for a period of up to three months upon a finding by the director that any user is habitually in violation of any of the provisions of this chapter, or the provisions of any exception granted pursuant to Section 12.34.030.

(b) Prior to installation of any such flow restricting device, the director shall give written notice of intent to install such device, including the reasons for the proposed installation. The notice shall specify the date, time and place at which the user or other interested party may appear before the director to present any evidence or reasons why such installation should not occur. Instead of appearing, the user or other interested party may present written material to the director at or before the time specified. The installation of a flow restricting device shall not occur less than twenty-four hours after the time specified in the notice. The written notice shall be delivered personally, or by posting with the United States mail service, first class postage prepaid, certified mail, and addressed to the last known address of the user to whom given. Copies of the notice shall also be delivered personally or by mail as specified above, to the owner of the property on which the flow restrictor is proposed to be installed as shown on the last equalized assessment roll of the county assessor, county of Santa Clara, and to the person or entity shown on the latest city records as being responsible for payment of utility charges on such property, if either or both is different from the user to whom the notice is sent.

(c) There are hereby established, and there shall be imposed and levied charges in the amount of fifty dollars for each installation and fifty dollars for each removal of flow restricting devices under this section. (Ord. 2433-93 § 1 (part)).

12.34.050. Implementation.

The director of public works is authorized to delegate authority granted under this chapter to such deputies, officers, employees or agents of the city as the director shall designate, and to establish such rules, regulations and procedures, and to prepare or furnish such forms as the director deems necessary or appropriate to carry out the provisions of this chapter. (Ord. 2433-93 § 1 (part)).

12.34.060. Notices.

Except as otherwise provided, notices required to be given pursuant to the provisions of this chapter shall be in writing, may be combined with water service bills or other written communication, and shall be delivered personally, or by posting with the United States mail service, first class postage prepaid, and addressed to the last known address of the user to whom given, or to the owner of the premises to which the water service of such user pertains, shown on the last equalized assessment roll of the county assessor, county of Santa Clara. (Ord. 2433-93 § 1 (part)).

12.34.070. Violations.

It is unlawful for any person, firm, partnership, association, corporation or political entity to use water obtained from the water system of the city of Sunnyvale in violation of any provision of this chapter or in violation of the conditions of any exception granted pursuant to Section 12.34.040 of this chapter. Use of water by any user in accordance with the provisions of any exception granted by the director shall not be deemed in violation of this chapter. Violations of this chapter shall be punishable as infractions. (Ord. 2433-93 § 1 (part)).

12.34.080. Remedies cumulative.

The remedies and penalties provided for in this chapter shall be cumulative and not exclusive, and shall be in addition to any or all other remedies available to the city. (Ord. 2433-93 § 1 (part)).

Chapter 12.34. WATER CONSERVATION RESTRICTIONS

12.34.010. Purpose and application.

The purpose of this chapter is to identify and restrict nonessential water uses which, if allowed, would constitute wastage of the water supply of the city. The provisions of this chapter shall apply to all persons or entities using water obtained from the city of Sunnyvale both in and outside the city of Sunnyvale and within the city's water service area, and regardless of whether any person or entity using water has a contract for water service with the city. Use of water by the city itself shall be in conformance with a water conservation plan to be presented by the city manager to the city council for approval, and which shall essentially conform to the provisions of this chapter. This chapter is adopted pursuant to the provisions of Water Code Section 350, et seq., the city charter and the common law. (Ord. 2433-93 § 1 (part)).

12.34.020. Nonessential uses prohibited.

The following uses, methods, types or techniques of uses of water are hereby determined and declared nonessential, and except as expressly provided to the contrary, are hereby prohibited:

(a) Allowing or maintaining broken or defective plumbing, sprinklers, watering or irrigation systems which permit the escape or leakage of potable water.

(b) Using potable water in any manner which causes, allows or permits the flooding of any premises, or any portion thereof, or which causes, allows or permits water to escape from any premises or any portion thereof and flow into gutters, streets, or any surface water drainage system.

(c) Using any hose or similar device using potable water for washing automobiles, trucks, buses, boats, trailers, equipment, recreational vehicles, mobilehomes or other vehicles or machinery, unless the hose or device is equipped with a positive automatic shutoff valve.

(d) Using potable water to wash sidewalks, driveways, filling station aprons, patios, parking lots, porches or other paved or hard surfaced areas, unless there is a positive automatic shutoff valve on the outlet end of the hose.

(e) The service of water by any restaurant or other eating or refreshment establishment to any patron, except upon the specific request by a patron for such services.

(f) Installation of any single pass cooling process in new construction.

(g) Any use of nonpotable water not in compliance with all federal, state and local laws, rules and regulations. Use of reclaimed water from the city's water pollution control plant shall be subject to the discretion of the director of public works. (Ord. 2433-93 § 1 (part)).

12.34.030. Exceptions.

(a) The director of public works is hereby authorized to grant to any user an exception to the prohibitions set forth in Section 12.34.020, upon a finding by the director that such exception is necessary to prevent an emergency condition affecting the health, sanitation or fire protection of such user, and that the user to whom such adjustment or exception pertains has adopted or used all practicable water conservation measures.

(b) Exceptions permitted hereunder shall be made only upon written application submitted to the director setting forth a statement of justification for such exception. The director may attach conditions, specifications or other qualifying provisions to any exception granted. (Ord. 2433-93 § 1 (part)).

12.34.040. Penalty—Flow restricting devices.

(a) Upon a determination by the director of public works that a user has continuously or repeatedly violated or failed to comply with one or more provisions of Section 12.34.020, or of any conditions of any exception granted pursuant to the provisions of Section 12.34.030, the director may issue an order to cease and desist from continued or repeated violation, and further order such user to comply forthwith with such provisions or terms of exception, or otherwise to take appropriate remedial or preventive action. If after the issuance of such cease and desist order, such user continues to consume or use, or again consumes or uses water in violation of any such provision or condition of exception, the director may order the installation of a flow restricting device upon the water service line to the premises of such user. Such flow restricting device shall be installed and maintained for a period of not less than three days nor more than ten days for a first violation, and shall be installed and maintained for not less than ten days for each succeeding violation, and may be ordered to remain installed and maintained for a period of up to three months upon a finding by the director that any user is habitually in violation of any of the provisions of this chapter, or the provisions of any exception granted pursuant to Section 12.34.030.

(b) Prior to installation of any such flow restricting device, the director shall give written notice of intent to install such device, including the reasons for the proposed installation. The notice shall specify the date, time and place at which the user or other interested party may appear before the director to present any evidence or reasons why such installation should not occur. Instead of appearing, the user or other interested party may present written material to the director at or before the time specified. The installation of a flow restricting device shall not occur less than twenty-four hours after the time specified in the notice. The written notice shall be delivered personally, or by posting with the United States mail service, first class postage prepaid, certified mail, and addressed to the last known address of the user to whom given. Copies of the notice shall also be delivered personally or by mail as specified above, to the owner of the property on which the flow restrictor is proposed to be installed as shown on the last equalized assessment roll of the county assessor, county of Santa Clara, and to the person or entity shown on the latest city records as being responsible for payment of utility charges on such property, if either or both is different from the user to whom the notice is sent.

(c) There are hereby established, and there shall be imposed and levied charges in the amount of fifty dollars for each installation and fifty dollars for each removal of flow restricting devices under this section. (Ord. 2433-93 § 1 (part)).

12.34.050. Implementation.

The director of public works is authorized to delegate authority granted under this chapter to such deputies, officers, employees or agents of the city as the director shall designate, and to establish such rules, regulations and procedures, and to prepare or furnish such forms as the director deems necessary or appropriate to carry out the provisions of this chapter. (Ord. 2433-93 § 1 (part)).

12.34.060. Notices.

Except as otherwise provided, notices required to be given pursuant to the provisions of this chapter shall be in writing, may be combined with water service bills or other written communication, and shall be delivered personally, or by posting with the United States mail service, first class postage prepaid, and addressed to the last known address of the user to whom given, or to the owner of the premises to which the water service of such user pertains, shown on the last equalized assessment roll of the county assessor, county of Santa Clara. (Ord. 2433-93 § 1 (part)).

12.34.070. Violations.

It is unlawful for any person, firm, partnership, association, corporation or political entity to use water obtained from the water system of the city of Sunnyvale in violation of any provision of this chapter or in violation of the conditions of any exception granted pursuant to Section 12.34.040 of this chapter. Use of water by any user in accordance with the provisions of any exception granted by the director shall not be deemed in violation of this chapter. Violations of this chapter shall be punishable as infractions. (Ord. 2433-93 § 1 (part)).

12.34.080. Remedies cumulative.

The remedies and penalties provided for in this chapter shall be cumulative and not exclusive, and shall be in addition to any or all other remedies available to the city. (Ord. 2433-93 § 1 (part)).

Chapter 19.37. LANDSCAPING, IRRIGATION AND USEABLE OPEN SPACE

19.37.010. Purpose.

The purpose of this chapter is to ensure that adequate landscaped areas and useable open space are provided where applicable for all zoning districts; to promote the conservation and efficient use of water and to prevent the waste of this valuable resource; and to promote water conservation as one component of sustainable building practices. This chapter shall be construed to assure consistency with the requirements of the Water Conservation in Landscaping Act of the California Government Code, or any successor statute, and any applicable implementing regulations, as they exist at the time of enactment or as later amended. In addition to compliance with the provisions in this chapter, projects shall comply with stormwater management requirements set forth in Chapter 12.60. (Ord. 2918-10 § 3).

19.37.020. Applicability.

All provisions of this chapter shall apply to the following landscaping projects:

(a) Individual Single-Family or Duplex Residential Projects. New landscaping installations equal to or greater than one thousand square feet in connection with construction of a new dwelling unit.

(b) All Other Projects. New landscaping installations or landscaping rehabilitation projects equal to or greater than one thousand square feet.

(c) Exemptions. Landscaping and irrigation requirements shall not apply to:

(1) Projects that fall below the square footage thresholds stated in subsections (a) and (b);

(2) Individual single-family or duplex residential projects that are not in connection with construction of a new dwelling unit;

(3) Registered local, state or federal historical sites where landscaping establishes a historical landscaping style, as determined by the Heritage Preservation Commission, planning commission, or by any applicable public board or commission responsible for architectural review or historic preservation;

(4) Ecological restoration or mined-land reclamation projects that do not require a permanent irrigation system; or

(5) Community gardens, plant collections (as part of botanical gardens and arboretums open to the public), non-irrigated areas designated for non-development (e.g., open spaces and existing native vegetation), agricultural uses, commercial nurseries and sod farms. (Ord. 2918-10 § 3).

19.37.030. Definitions.

The following terms and definitions pertain to the water efficiency sections of this chapter:

(a) “Applied water” means the portion of water supplied by the irrigation system to the landscaped area.

(b) “Automatic irrigation controller” means an automatic timing device used to remotely control valves that operate an irrigation system. Automatic irrigation controllers schedule irrigation events using either evapotranspiration (weather-based) or soil moisture data.

(c) “Certified professional” means a licensed landscape architect, a licensed landscape contractor, a licensed professional engineer, certified irrigation designer, or any other person authorized by the state to design a landscape or irrigation system, or a certified landscape irrigation auditor.

(d) “Conversion factor (0.62)” means the number that converts acre-inches per acre per year to gallons per square

foot per year.

(e) "Drip irrigation" means any non-spray low volume irrigation system utilizing emission devices with a flow rate measured in gallons per hour. Low volume irrigation systems are specifically designed to apply small volumes of water slowly at or near the root zone of plants.

(f) "Estimated total water use" (ETWU) means the total water used for the landscaped area as described in Section 19.37.050.

(g) "ET adjustment factor" (ETAF) means 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 landscaped area. ETAF for a special landscaped area shall not exceed 1.0.

(h) "Evapotranspiration rate" means the quantity of water evaporated from adjacent soil and other surfaces and transpired by plants during a specified time.

(i) "Hardscape" means any durable material (pervious and non-pervious) in a landscaped area, such as decks, patios or pedestrian walkways, and other non-irrigated elements which may include art work, benches, and bicycle parking.

(j) "Hydrozone" means a portion of the landscaped area having plants with similar water needs. A hydrozone may be irrigated or non-irrigated.

(k) "Irrigation audit" means an in depth evaluation of the performance of an irrigation system. An irrigation audit includes, but is not limited to: inspection, system tune up, system test with distribution uniformity or emission uniformity, correction of any overspray or runoff that causes overland flow, and preparation of an irrigation schedule.

(l) "Irrigation efficiency" (IE) means 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. Required irrigation efficiency is described in Section 19.37.110.

(m) "Low water use plant" means a plant species whose water needs are compatible with local climate and soil conditions. 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 considered low water use plants.

(n) "Maximum applied water allowance" (MAWA) means the upper limit of annual applied water for the established landscaped area as specified in Section 19.37.050.

(o) "Mulch" means any organic material such as leaves, bark, straw, compost, or inorganic mineral materials such as rocks, gravel, and decomposed granite left loose and applied to the soil surface for the beneficial purposes of reducing evaporation, suppressing weeds, moderating soil temperature, and preventing soil erosion.

(p) "Native plant" means a plant indigenous to a specific area of consideration. For the purposes of these guidelines, the term shall refer to plants indigenous to the coastal ranges of central and northern California, and more specifically to such plants that are suited to the ecology of the present or historic natural community(ies) of the project's vicinity.

(q) "No water using plant" means a plant species with water needs that 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.

(r) "Plant factor" or "plant water use factor" is a factor, when multiplied by ETo (reference evapotranspiration), estimates the amount of water needed by plants. For purpose of calculation of the ETWU, use values from WUCOLS, or equivalent reference subject to approval by the director of community development.

(s) "Precipitation rate" means the rate of application of water measured in inches per hour.

(t) "Recreational area" means areas dedicated to active play such as parks, sports fields, and golf courses where turf provides a playing surface.

(u) "Reference evapotranspiration" or "ETo" means a standard measurement of environmental parameters which affect the water use of plants. For purposes of calculation of the MAWA and ETWU, as described in Section 19.37.050, use current reference evapotranspiration data, such as from the California Irrigation Management Information System (CIMIS), or other equivalent data, or soil moisture sensor data.

(v) "Runoff" means water which is not absorbed by the soil or landscaping to which it is applied and flows from the landscaped area.

(w) "Soil moisture sensing device" or "soil moisture sensor" means a device that measures the amount of water in the soil. The device may also suspend or initiate an irrigation event.

(x) "Special landscaped area" (SLA) means an area of the landscaping dedicated solely to edible plants, areas irrigated with recycled water, water features using recycled water, and areas dedicated to active play such as parks, sports fields, golf courses, and where turf provides a playing surface.

(y) "Turf" means a ground cover surface of mowed grass.

(z) "Water feature" means a design element where open water performs an aesthetic or recreational function. Water features include ponds, lakes, waterfalls, fountains, artificial streams, spas, and swimming pools (where water is artificially supplied).

(aa) "WUCOLS" means the 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. (Ord. 2918-10 § 3).

19.37.040. Minimum landscaped area and useable open space.

(a) Minimum Landscaped Area. Table 19.37.040 describes the minimum landscaped area and useable open space required by zoning district. In addition to the minimum landscaped area, areas not used for buildings, parking lot areas, driveways or pedestrian walkways shall be landscaped unless the review authority determines that landscaping is not necessary to achieve the purposes of this chapter. For requirements specific to single family uses, see subsection (f).

(b) Landscaped Buffer Required. A landscaped buffer is required for any property with a nonresidential use in a residential zoning district that abuts a residential use. It is also required for properties of any use in a nonresidential zoning district which abuts a residential zoning district. See Section 19.37.080 for buffer landscaping design requirements.

(c) Landscaped Frontage Strip Required. A fifteen-foot wide landscaped frontage strip is required for all properties except those noted below in subsection (f). The frontage strip is measured from the inside edge of the public sidewalk, or if no sidewalk exists, from the curb. See Section 19.37.090 for frontage strip landscaping design requirements.

(d) Useable Open Space Required. Useable open space is required for all duplex and multifamily residential properties as described in Table 19.37.040. Useable open space areas that meet the definition of landscaping may contribute towards the minimum landscaped area of the site. See Section 19.37.100 for useable open space design requirements.

(e) Specific Plan, Precise Plan and Other Specialized Plan Areas. Minimum landscaped area and useable open space for properties within a specialized plan's prescribed area are described in their individual plans.

(f) Allowances and Limitations for Single-Family Uses and Single-Family Zoning Districts.

(1) Allowances for Single-Family Zoning Districts. Yards are not required to be landscaped in single-family zoning districts; however other provisions in Title 19 may apply.

(2) Limitation on Paved Areas in the R-0 and R-1 Zoning Districts. Not more than fifty percent of the required front yard of any lot within an R-0 or R-1 zoning district shall be paved with asphalt, concrete cement, or any other impervious surface, except as may be required to meet off-street parking and access requirements of Chapter 19.46.

(3) Landscaped Frontage Strip for Single-Family Uses. A landscaped frontage strip is not required in any zoning district for single-family residential uses which have a frontage on a public street.

Table 19.37.040

Minimum Landscaped Area and Useable Open Space by Zoning District

Zoning District	Useable Open Space	Other Landscaped Area	Parking Lot Landscaped Area	Total Landscaped Area
R-0	N/A	N/A	N/A	N/A
R-1	N/A	N/A	N/A	N/A
R-1.5	N/A	N/A	N/A	N/A
R-1.7/PD	N/A	N/A	N/A	N/A
R-2	500 sq. ft./unit[1]	850 sq. ft./ unit	20% of the parking lot area	Total minimum landscaped area is the combination of the minimum parking lot landscaped area and other landscaped area. In no case shall this total be less than 20% of the lot area.
R-3	400 sq. ft./unit	425 sq. ft./unit		
R-4	380 sq. ft./unit	375 sq. ft./unit		
R-5	380 sq. ft./unit	375 sq. ft./ unit		
C-1	N/A	12.5% of floor area		
C-2	N/A	12.5% of floor area		
C-3	N/A	12.5% of floor area		
C-4	N/A	12.5% of floor area		
O	N/A	10% of lot area		
P-F	N/A	10% of lot area		
M-S	N/A	10% of floor area		
M-3	N/A	10% of floor area		

[1] One thousand square feet of useable open space is required for a property with an accessory living unit.
(Ord. 2918-10 § 3).

19.37.050. Water efficiency design requirements.

Water Efficiency in Design. Landscaped areas shall be designed to achieve water efficiency. Landscaping design and plant selection may be based on one of two options. Regardless of which option is selected, all other criteria described in this chapter shall apply. The options include:

(a) Option 1—Turf Limitation and Minimum Area with Water Conserving Plants. Turf area shall not be more than twenty-five percent of the landscaped area, and native, low water use or no water use plants shall be installed in at least eighty percent of all non-turf landscaped areas.

(b) Option 2—Water Budget Calculations. If the turf limitation option is not selected, a water budget calculation shall be prepared and shall adhere to the following requirements:

(1) The plant factor shall be obtained from WUCOLS or an equivalent reference subject to approval by the director of community development. For areas that mix plants with different water uses, the plant factor calculation is based on the proportion of the respective plant factors, or based on the plant factor of the higher water using plant. 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.

(2) All water features shall be included in the high water use hydrozone.

(3) All special landscaped areas (SLA) shall be identified and their water use included in the water budget

calculations.

(4) The reference evapotranspiration adjustment factor (ETAF) for SLAs shall not exceed 1.0. The ETAF for all other landscaped areas shall not exceed 0.7.

(5) Maximum applied water allowance (MAWA) shall be calculated using the following equation:

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 (to gallons)

0.7 = Reference evapotranspiration adjustment factor (ETAF)

LA = Planted landscaped area including SLA and not including hardscapes (square feet)

0.3 = Additional water allowance for SLA

SLA = Special landscaped area (square feet)

(6) Estimated total water use (ETWU) will be calculated using the equation below. The sum of the ETWU calculated for all hydrozones shall not exceed the MAWA.

$$ETWU = (ETo)(0.62)\left(\frac{PF \times HA}{IE} + SLA\right)$$

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 landscaped area (square feet)

0.62 = Conversion factor

IE = Irrigation efficiency (minimum 0.70)

(Ord. 2918-10 § 3).

19.37.060. General planting, soil management and water feature design requirements.

(a) Plant Material. In addition to the requirements below, plant selection and installation shall be done in accordance with accepted horticultural industry practices.

(1) Variety. Landscaping shall include trees, shrubs, vines, flowers, ground covers or a combination thereof.

(2) Size at Time of Planting. Plant materials shall be sized and spaced to achieve immediate effect, in accordance with horticultural industry practices and at the discretion of the director of community development. Trees shall be of minimum fifteen gallon size. Twenty-four or thirty-six inch box trees may be required at the discretion of the director of community development.

(3) Number of Trees. There shall be one tree per one thousand square feet of required landscaped area in addition to required street trees and parking lot trees.

(4) Turf. All turf areas shall be planted with tall fescue or similar turf requiring less water. Turf shall not be planted on slopes greater than ten percent where the toe of the slope is adjacent to an impermeable hardscape.

(b) Grouping of Plants. Plants with similar water needs shall be grouped (also described as a hydrozone). Areas that mix plants with different water uses may be allowed if a water budget is performed.

(c) Soil Management.

(1) Mulch. A minimum two-inch layer of mulch shall be applied on all non-turf soil areas.

(2) Soil Amendments. Soil amendments, such as compost, shall be incorporated according to the soil conditions at the project site and based on what is appropriate for selected plans.

(3) Grading. If the project includes grading, the grading shall be designed to minimize soil erosion, runoff and water waste. The grading shall avoid soil compaction in planted landscaped areas.

(d) Water Features. Recirculating water systems shall be used for water features. Where available, recycled water shall be used for water features. (Ord. 2918-10 § 3).

19.37.070. Parking lot landscaping design requirements.

(a) Parking Lot Shading. Trees shall be planted and maintained throughout the lot to ensure that at least fifty percent of the parking area will be shaded within fifteen years after the establishment of the lot.

(1) Solar Energy Systems as Shading. Up to twenty-five percent of the fifty percent parking lot shading requirement (twelve and one-half percent of the total parking lot area) may be met with installation of solar energy systems rather than trees.

(2) Calculation of Shading. Shading shall be calculated by using the diameter of the tree crown at fifteen years or the dimensions of any roofed area supporting the solar energy system within the parking lot area.

(3) Surfaces Subject to Shading Calculation. All surfacing on which a vehicle can drive is subject to shade calculation, including all parking stalls, vehicular drives within the property regardless of length, drive-through lanes, and all maneuvering areas regardless of depth. The following surface areas are exempt from shading requirements: truck loading areas in front of overhead doors, truck maneuvering and parking areas unconnected to and exclusive of any vehicle parking, surfaced areas not to be used for vehicle parking, driving or maneuvering, provided they are made inaccessible to vehicles by a barrier such as bollards or fencing, display, sales, service, or vehicular storage areas for automobile dealerships (required parking for auto dealerships is still subject to shading requirements), or surfaced areas existing prior to January 1, 2002.

(b) Ground Cover and Shrubs on Parking Islands. Parking islands shall contain living ground cover or shrubs with the trees, unless it can be shown that ground cover is incompatible with the tree. Where living ground cover is unsuitable, the director of community development may allow porous, nonliving ground cover such as pebbles or tanbark.

(c) Drainage Design. Landscaping islands and parking islands shall be designed to integrate parking lot and site drainage in order to reduce storm water runoff velocities and minimize non-point source pollution. When six-inch concrete curbs are installed, they shall have drainage “weep holes.”

(d) Wheel Stops. Concrete wheel stops shall be installed when landscaped areas are not adequately protected. (Ord. 2918-10 § 3).

19.37.080. Buffer landscaping design requirements.

The following is a list of design requirements for buffer landscaping.

(a) Width. The buffer shall maintain a width of at least ten feet.

(b) Landscaping. The buffer shall include a planted screen of approved trees and shrubs which shall be placed along the length of the buffer at intervals not to exceed twenty feet, provided, however, that the director of community development may grant exceptions through a miscellaneous plan permit when warranted by conditions on the property.

(c) Wall Design. The buffer shall include a decorative masonry wall six feet in height measured from the highest

adjoining grade. When the adjacent nonresidential building is two stories or more in height, the decorative masonry wall shall be eight feet measured from the highest adjoining grade. Where a residential use is permitted in a nonresidential zoning district, the wall shall be required on the residential property, unless a wall already exists.

(d) Specific Plan, Precise Plan and other specialized plan areas. Properties within a specialized plan's prescribed area may be subject to additional buffer landscaping design requirements, as described in their individual plans. (Ord. 2918-10 § 3).

19.37.090. Frontage strip landscaping design requirements.

(a) Width. The frontage strip shall be fifteen feet wide along the entire street frontage measured from the inside edge of the public sidewalk, or if no sidewalk exists, from the curb.

(b) Landscaping Allowances. Frontage strip landscaping may be crossed by walkways and access drives.

(c) Specific Plan, Precise Plan and Other Specialized Plan Areas. Properties within a specialized plan's prescribed area may vary from these frontage strip design requirements, as described in their individual plans. (Ord. 2918-10 § 3).

19.37.100. Useable open space design requirements.

(a) Function. Useable open space must be designed to be accessible to, and useable for outdoor living, recreation or utility use.

(b) Location. Useable open space may not be located in any required front yard area.

(c) Minimum Useable Open Space Dimensions and Area. Each useable open space area shall have at least a twelve foot dimension in any direction and a minimum area of two hundred square feet except for:

(1) Private balconies must have a minimum of seven feet in any direction and a minimum area of eighty square feet.

(2) Roofs, decks or porches must have a minimum of ten feet in any direction and a total of one hundred twenty square feet.

(d) Private Useable Open Space Required. In the R-4 and R-5 zoning districts, a minimum of eighty square feet per unit shall be designed as private useable open space.

(e) Specific Plan, Precise Plan and Other Specialized Plan Areas. Properties within a specialized plan's prescribed area may vary from these useable open space design requirements, as described in their individual plans. (Ord. 2918-10 § 3).

19.37.110. Irrigation system design requirements.

(a) Irrigation System Required. All landscaped areas shall have a permanent irrigation system, except for single-family detached and duplex dwellings.

(b) Irrigation Efficiency. Irrigation systems shall be designed and maintained to meet or exceed an average landscaping irrigation efficiency of seventy percent.

(c) Water Waste Prohibited. Water waste resulting from an inefficient irrigation system leading to runoff, low head drainage, overspray, or other similar conditions where water flows onto adjacent property, non-irrigated areas such as walkways, roadways or structures is prohibited.

(d) Hydrozone Irrigation. Systems shall be designed to meet the individual needs of each plant group. Valves and control circuits shall be separated based on the required rate and quantity of water used.

(1) Valves. Each valve shall irrigate a hydrozone with similar site, slope, sun exposure, soil conditions and plant materials with similar water use. Where feasible, trees shall be placed on separate valves from shrubs, groundcovers, and turf.

(2) Sprinkler Heads. Sprinkler heads and other emission devices shall be selected based on what is appropriate for the plant type within that hydrozone. Sprinkler heads must have matched precipitation rates within each circuit.

(e) Low Volume Irrigation. Bubbler or drip-type irrigation, or other low-flow, non-spray technology shall be provided for:

(1) Trees and shrubs.

(2) Mulched areas.

(3) Areas with slope greater than ten percent, unless it can be demonstrated that no runoff or erosion will occur if other types of irrigation is used.

(4) Areas that are less than eight feet wide in any direction.

(f) Overhead Sprinkler Irrigation. Overhead irrigation systems may be used for clustered shrub plantings. Areas within two feet of a non-permeable surface may not be irrigated using overhead sprinkler irrigation unless it can be demonstrated that no runoff would occur, or the adjacent non-permeable surface is designed and constructed to drain entirely to landscaping.

(g) Irrigation Controllers and Sensors. All irrigation controllers must utilize either evapotranspiration or soil moisture sensor data and be capable of dual or multiple programming. Irrigation systems shall also incorporate sensors (rain, freeze, wind, etc.) that suspend or alter irrigation operation during unfavorable weather conditions.

(h) Screening of Devices. Irrigation controllers and backflow devices shall be screened from public view.

(i) Scheduling. Irrigation must be scheduled between eight p.m. and ten a.m. (Ord. 2918-10 § 3).

19.37.120. Landscaping and irrigation approval.

(a) Permit Required. Except as otherwise provided in this chapter, no person shall install or modify any landscaped area described in Section 19.37.020 without first obtaining a miscellaneous plan permit for each such action, in accordance with the procedure described in Chapter 19.82.

(b) Landscaping and Irrigation Plans Required. Landscaping and irrigation plans shall be required for any modification or installation of new landscaping that falls within the thresholds stated in this chapter. The plans shall meet the information requirements determined by the director of community development to comply with the provisions of this chapter.

(1) Preparation by Certified Professional. Landscaping and irrigation plans shall be prepared by, and bear the signature of, a certified professional, except for new landscaping installations or landscaping rehabilitation projects with less than two thousand five hundred square feet of landscaped area. (Ord. 2918-10 § 3).

19.37.130. Landscaping irrigation audit and maintenance.

(a) Irrigation Audit Required. Prior to approval of occupancy by a building official, a landscaping irrigation audit shall be conducted and an irrigation audit report shall be submitted for projects with landscaping and irrigation plans approved after June 10, 2010.

(1) Audit by Certified Professional. The landscaping irrigation audit shall be conducted and the report shall be prepared by a certified professional, except for new landscaping installations or landscaping rehabilitation projects with less than two thousand five hundred square feet of landscaped area.

(2) Audit Report Content. The irrigation audit report shall include, but not be limited to: inspection, system tune-up, system test with distribution uniformity, correction of any overspray or runoff that causes overland flow, and preparation of an irrigation schedule.

(b) Submittal of Landscaping Maintenance Schedule. Prior to the final inspection by the building official, a

regular maintenance schedule shall be submitted to the director of community development for review and approval. The maintenance schedule shall include, but not be limited to, routine inspection; adjustment and repair of the irrigation system and its components; aerating and dethatching turf areas; replenishing mulch; fertilizing; pruning; weeding in all landscaped areas; and removing obstructions to irrigation spray heads or other emission devices. Landscaping shall be maintained in accordance with the approved maintenance schedule.

(c) General Maintenance. Landscaping shall be maintained in compliance with the approved landscaping plan, and shall be maintained in a neat, clean and healthful condition. Removed landscaping shall be replaced with specimen plants to match the approved landscaping plan. (Ord. 2918-10 § 3).

Appendix H

City of Sunnyvale
2010 Urban Water Management Plan
Sunnyvale's Fiscal Year 2010/2011 Utility Fee Schedule

SECTION 1.01 WATER SERVICE FEES

A. **Single-Family Residential Water Service Fees** **Charge Code: 799918 Object Level 3 & 4: 3055**

The service charges to single-family residential users who are billed monthly and bi-monthly shall be based on meter size as follows:

Meter Size		Current	
5/8" x 3/4"	– Monthly	5.63	Water Meter Use Fees
	– Bi-Monthly	11.26	Water Meter Use Fees
3/4"	– Monthly	7.14	Water Meter Use Fees
	– Bi-Monthly	14.28	Water Meter Use Fees
1"	– Monthly	10.13	Water Meter Use Fees
	– Bi-Monthly	20.26	Water Meter Use Fees
1 1/2"	– Monthly	17.62	Water Meter Use Fees
	– Bi-Monthly	35.24	Water Meter Use Fees
2"	– Monthly	26.61	Water Meter Use Fees
	– Bi-Monthly	53.22	Water Meter Use Fees

B. **Multi-Family and Mobile Home Residential Water Service Fees** **Charge Code: 799918 Object Level 3 & 4: 3055**

The service charges to multi-family and mobile home users who are billed monthly and bi-monthly shall be based on meter size as follows. In mobile home developments where dwelling units are served by individual public meters, and not by a master meter, the single-family residential water service rate shall apply.

Meter Size	Current	
5/8" x 3/4" (monthly)	6.60	Water Meter Use Fees
bi-monthly	13.20	Water Meter Use Fees
3/4" (monthly)	8.57	Water Meter Use Fees
bi-monthly	17.14	Water Meter Use Fees
1" (monthly)	12.52	Water Meter Use Fees
bi-monthly	25.04	Water Meter Use Fees
1 1/2" (monthly)	22.42	Water Meter Use Fees
bi-monthly	44.84	Water Meter Use Fees
2" (monthly)	34.29	Water Meter Use Fees
bi-monthly	68.58	Water Meter Use Fees
3" (monthly)	65.94	Water Meter Use Fees
bi-monthly	131.88	Water Meter Use Fees
4" (monthly)	101.54	Water Meter Use Fees
bi-monthly	203.08	Water Meter Use Fees
6" (monthly)	200.46	Water Meter Use Fees
bi-monthly	400.92	Water Meter Use Fees
8" (monthly)	319.14	Water Meter Use Fees
bi-monthly	638.28	Water Meter Use Fees
10" (monthly)	457.61	Water Meter Use Fees
bi-monthly	915.22	Water Meter Use Fees
12" (monthly)	892.78	Water Meter Use Fees
bi-monthly	1,785.56	Water Meter Use Fees

C. **Fire Line Water Service Fees** **Charge Code: 799918 Object Level 3 & 4: 3055**

The monthly and bi-monthly service charge for fire line standby is based on meter size as follows:

Size of Meter	Current	
Under 4" (monthly)	6.20	Water Meter Use Fees
bi-monthly	12.40	Water Meter Use Fees
4" & Over (monthly)	14.48	Water Meter Use Fees
bi-monthly	28.96	Water Meter Use Fees

WATER SERVICE FEES (continued)

D. **Commercial Water Service Fees** **Charge Code: 799918** **Object Level 3 & 4: 3055**

The service charges to commercial users who are billed monthly and bi-monthly shall be based on meter size as follows:

Meter Size	Current	
5/8" x 3/4" (monthly)	6.60	Water Meter Use Fees
bi-monthly	13.20	Water Meter Use Fees
3/4" (monthly)	8.57	Water Meter Use Fees
bi-monthly	17.14	Water Meter Use Fees
1" (monthly)	12.52	Water Meter Use Fees
bi-monthly	25.04	Water Meter Use Fees
1 1/2" (monthly)	22.42	Water Meter Use Fees
bi-monthly	44.84	Water Meter Use Fees
2" (monthly)	34.29	Water Meter Use Fees
bi-monthly	68.58	Water Meter Use Fees
3" (monthly)	65.94	Water Meter Use Fees
bi-monthly	131.88	Water Meter Use Fees
4" (monthly)	101.54	Water Meter Use Fees
bi-monthly	203.08	Water Meter Use Fees
6" (monthly)	200.46	Water Meter Use Fees
bi-monthly	400.92	Water Meter Use Fees
8" (monthly)	319.14	Water Meter Use Fees
bi-monthly	638.28	Water Meter Use Fees
10" (monthly)	457.61	Water Meter Use Fees
bi-monthly	915.22	Water Meter Use Fees
12" (monthly)	892.78	Water Meter Use Fees
bi-monthly	1,785.56	Water Meter Use Fees

E. **Landscape Water Service Fees** **Charge Code: 799918** **Object Level 3 & 4: 3055**

The service charges to landscape users who are billed monthly and bi-monthly shall be based on meter size as follows:

Meter Size	Current	
5/8" x 3/4" (monthly)	5.63	Water Meter Use Fees
bi-monthly	11.26	Water Meter Use Fees
3/4" (monthly)	7.14	Water Meter Use Fees
bi-monthly	14.28	Water Meter Use Fees
1" (monthly)	10.13	Water Meter Use Fees
bi-monthly	20.26	Water Meter Use Fees
1 1/2" (monthly)	17.62	Water Meter Use Fees
bi-monthly	35.24	Water Meter Use Fees
2" (monthly)	26.60	Water Meter Use Fees
bi-monthly	53.20	Water Meter Use Fees
3" (monthly)	50.56	Water Meter Use Fees
bi-monthly	101.12	Water Meter Use Fees
4" (monthly)	77.50	Water Meter Use Fees
bi-monthly	155.00	Water Meter Use Fees
6" (monthly)	152.36	Water Meter Use Fees
bi-monthly	304.72	Water Meter Use Fees
8" (monthly)	242.19	Water Meter Use Fees
bi-monthly	484.38	Water Meter Use Fees

SECTION 1.02 WATER WITHIN CITY LIMITS.
(Sunnyvale Municipal Code Chapter 12.24) Water sold to consumers within the corporate limits of the City of Sunnyvale shall be sold at the rates specified.

A. **Users Billed Monthly** **Charge Code: 799918** **Object Level 3 & 4: 3056**

All potable water users billed monthly, except landscape, agricultural and institutional users, shall pay a water charge for each one hundred cubic feet, or part thereof, of water as follows:

(1) **Multi-Family and Mobile Home Metered Water Fees**[1]

Hundred Cubic Feet (CCF)	Rate Per CCF Current	
0 - 4	1.64	Water Sales- Metered
5 - 23	3.14	Water Sales- Metered
24 - 35	4.64	Water Sales- Metered
36 +	6.14	Water Sales- Metered

(2) **Single-Family Residential Users**

Hundred Cubic Feet (CCF)	Rate Per CCF Current	
0 - 6	1.64	Water Sales- Metered
7 - 33	3.14	Water Sales- Metered
34 - 50	4.64	Water Sales- Metered
51 +	6.14	Water Sales- Metered

[1] *In residential developments where two (2) or more dwelling units are served by a common meter, the upper limit (in cubic feet) of each rate block shall be multiplied by the dwelling units served by the common meter in calculating the rates to be applied to water usage monitored by the common meter. In such case, the lower limit of each rate block shall be one (1) cubic foot over the upper limit of the next lower rate block.*

(3) **Commercial, Industrial, Fire Line and New Construction Users**

Hundred Cubic Feet (CCF)	Rate Per CCF Current	Water Sales- Metered
0 - 6	1.64	Water Sales- Metered
7 - 20	3.19	Water Sales- Metered
21 - 50	3.40	Water Sales- Metered
51 - 500	3.50	Water Sales- Metered
501 - 1250	3.60	Water Sales- Metered
1251 - 2500	3.69	Water Sales- Metered
2501 +	3.77	Water Sales- Metered

B. **Users Billed Bi-Monthly** **Charge Code: 799918** **Object Level 3 & 4: 3056**

All potable water users billed bi-monthly, except landscape, agricultural and institutional users shall pay a water charge for each one hundred cubic feet, or part thereof, of water as follows:

(1) **Multi-Family and Mobile Home Metered Water Fees**[2]

Hundred Cubic Feet (CCF)	Rate Per CCF Current	Water Sales- Metered
0 - 8	1.64	Water Sales- Metered
9 - 46	3.14	Water Sales- Metered
47 - 70	4.64	Water Sales- Metered
71 +	6.14	

[2] *In residential developments where two (2) or more dwelling units are served by a common meter, the upper limit (in cubic feet) of each rate block shall be multiplied by the dwelling units served by the common meter in calculating the rates to be applied to water usage monitored by the common meter. In such case, the lower limit of each rate block shall be one (1) cubic foot over the upper limit of the next lower rate block.*

WATER WITHIN CITY LIMITS - Users Billed Bi-Monthly (continued)

(2) **Single-Family Residential Users**

Hundred Cubic Feet (CCF)	Rate Per CCF Current	
0 - 12	1.64	Water Sales- Metered
13 - 66	3.14	Water Sales- Metered
67 - 100	4.64	Water Sales- Metered
101 +	6.14	Water Sales- Metered

(3) **Commercial, Industrial, Fire Line and New Construction Users**

Hundred Cubic Feet (CCF)	Rate Per CCF Current	
0 - 12	1.64	Water Sales- Metered
13 - 40	3.19	Water Sales- Metered
41 - 100	3.40	Water Sales- Metered
101 - 1000	3.50	Water Sales- Metered
1001 - 2500	3.60	Water Sales- Metered
2501 - 5000	3.69	Water Sales- Metered
5001 +	3.77	Water Sales- Metered

C. **Landscape Users** **Charge Code: 799918** **Object Level 3 & 4: 3056**

All landscape users shall pay a water charge of $3.47 per CCF for all water drawn for landscaping uses. Water Sales- Metered

D. **Agricultural and Institutional Users** **Charge Code: 799918** **Object Level 3 & 4: 3056**

All agricultural and institutional users shall pay a water charge of $1.64 per CCF for all water drawn for agricultural or institutional uses. Water Sales- Metered

E. **Recycled Water Charges** **Charge Code: 799918** **Object Level 3 & 4: 3060**

(1) All agricultural and institutional recycled water users shall pay a water charge of $1.48 per CCF for all water drawn for agricultural or institutional uses. Water Recycled

(2) All landscape users shall pay a water charge of $3.13 per CCF for all water drawn for landscaping purposes

SECTION 1.03. WATER OUTSIDE CITY LIMITS. The charges for all water, except reclaimed water, delivered through water meters to consumers outside the corporate limits of the City shall be equal to ~~three times~~ the charges set forth in Sections 1.01 and 1.02.

ATTACHMENT B

RESOLUTION NO. _____

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF SUNNYVALE UPDATING AND ADOPTING THE CITY OF SUNNYVALE URBAN WATER MANAGEMENT PLAN 2010

WHEREAS, the California Legislature enacted Assembly Bill 797 (Water Code Section 10610 *et seq.*), known as the Urban Water Management Planning Act, during the 1983-1984 Regular Session, and as amended subsequently, which mandates that every supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre feet of water annually, prepare an Urban Water Management Plan, the primary objective of which is to plan for the conservation and efficient use of water; and

WHEREAS, the City of Sunnyvale is an urban supplier providing water to over 141,000 customers; and

WHEREAS, the City of Sunnyvale has adopted an Urban Water Management Plan in accordance with the State requirements; and

WHEREAS, the City is required to review the Plan at least once every five years and make amendments or changes to the Plan which are indicated by the review; and

WHEREAS, the Plan must be adopted by Council after public review and hearing, and filed with the California Department of Water Resources within thirty days of adoption; and

WHEREAS, the City of Sunnyvale reviewed its Plan and prepared and circulated for public review a draft updated Urban Water Management Plan, and a properly noticed public hearing regarding the Plan was held by the City Council on June 28, 2011; and

WHEREAS, the City of Sunnyvale did prepare and shall file said Plan with the California Department of Water Resources in a timely manner;

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF SUNNYVALE THAT:

1. The Sunnyvale Urban Water Management Plan 2010 is hereby adopted and filed with City Clerk;

2. The Director of Public Works is hereby authorized and directed to file the City of Sunnyvale Urban Water Management Plan 2010 with the California Department of Water Resources within 30 days after this date.

Adopted by the City Council at a regular meeting held on _____, 2011, by the following vote:

AYES:
NOES:
ABSTAIN:
ABSENT:

ATTEST:

_____
City Clerk
(SEAL)

APPROVED:

_____
Mayor

APPROVED AS TO FORM AND LEGALITY:

_____
David Kahn, City Attorney