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

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

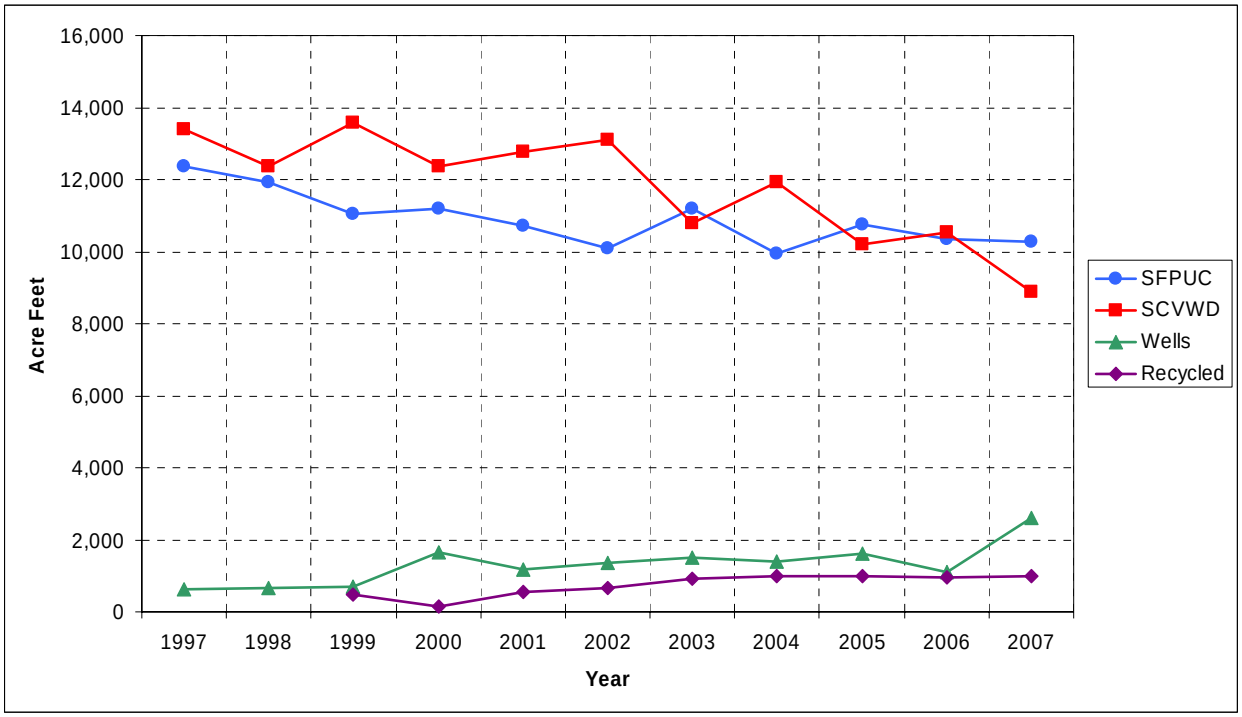
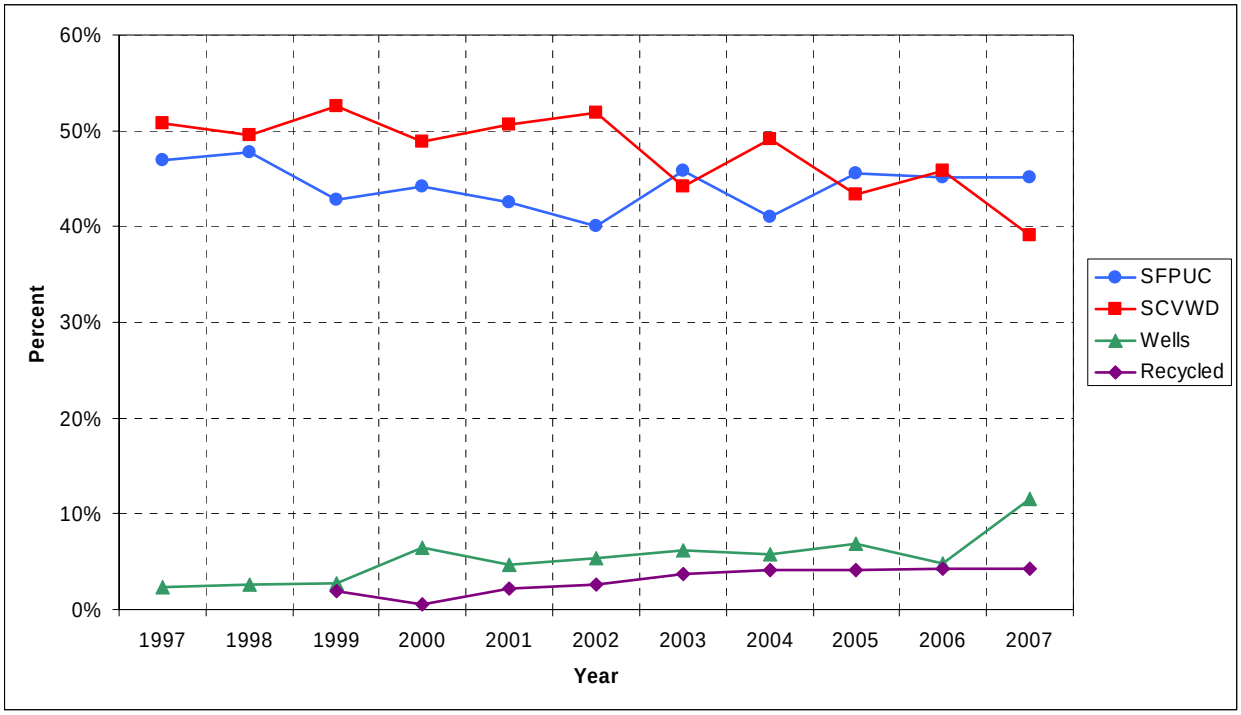


Figure 2. Historical Percentage of Annual Water Deliveries by Source


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

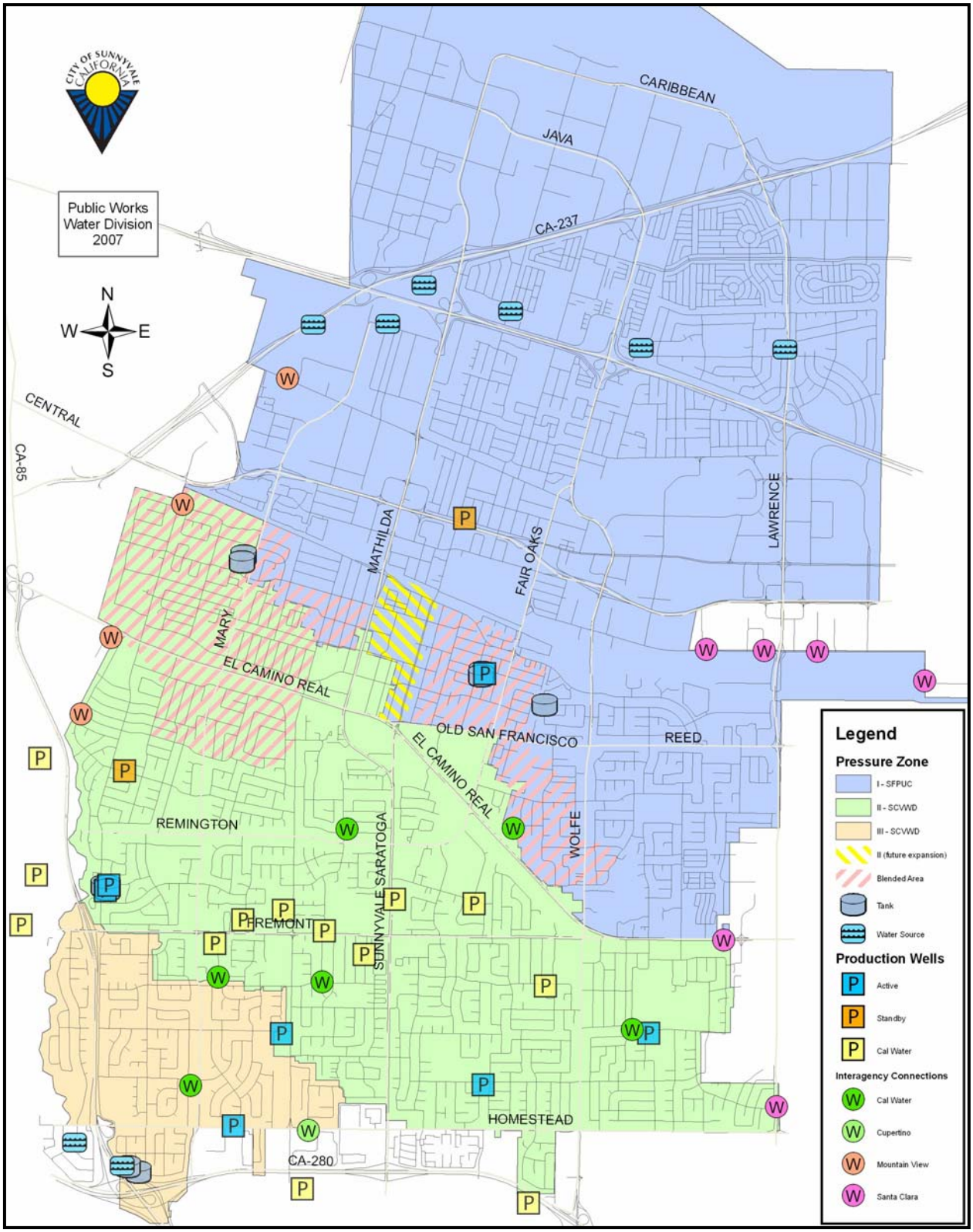
The City water transmission and supply system (Figure 3) as of 2007 includes approximately 10 miles of 16-inch to 30-inch diameter transmission pipelines, ten storage tanks with a combined storage capacity of 27.5 million gallons (MG), seven active and one backup well with a capacity of 11.4 million 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.

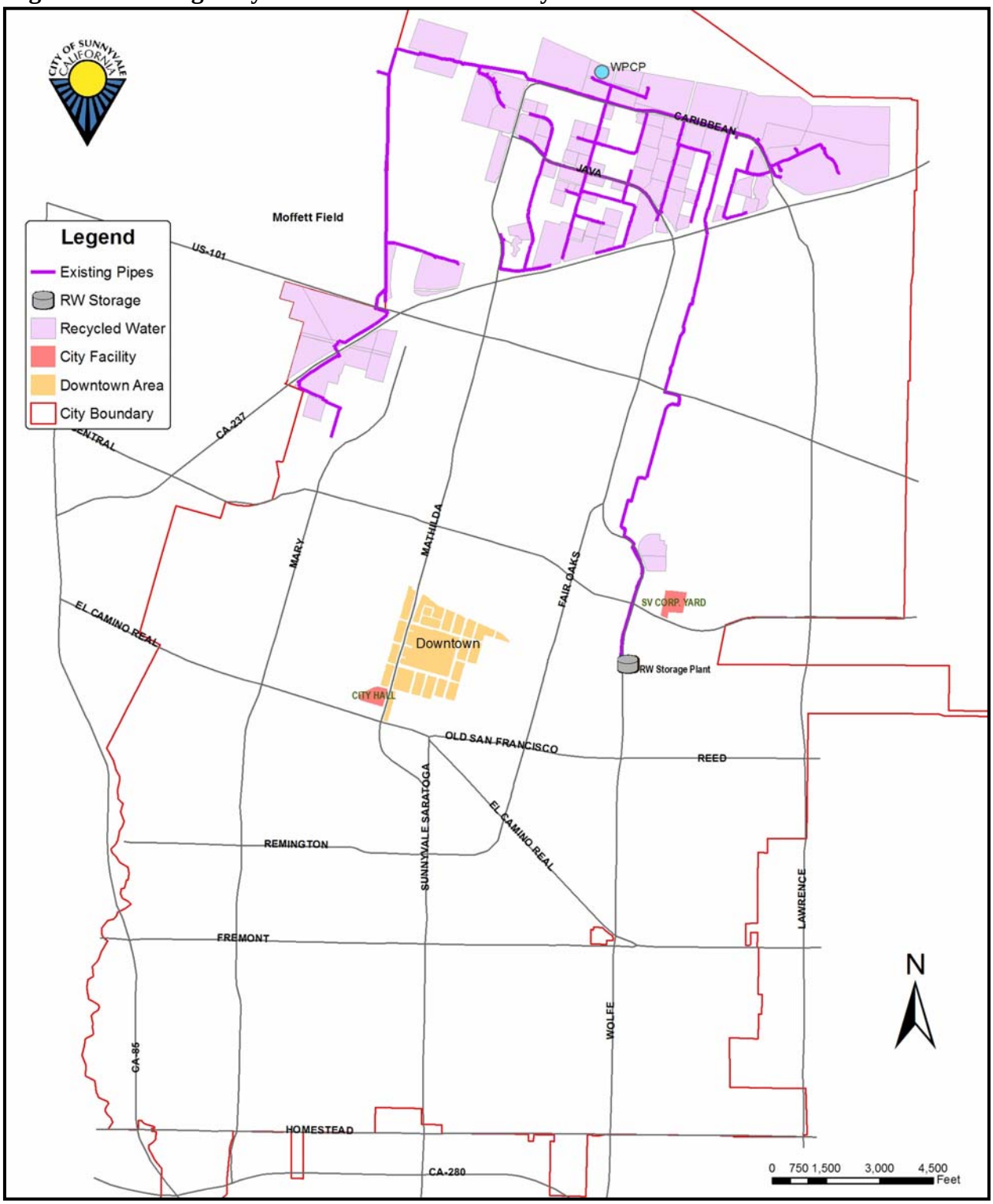
1.2.3 Recycled Water Distribution

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



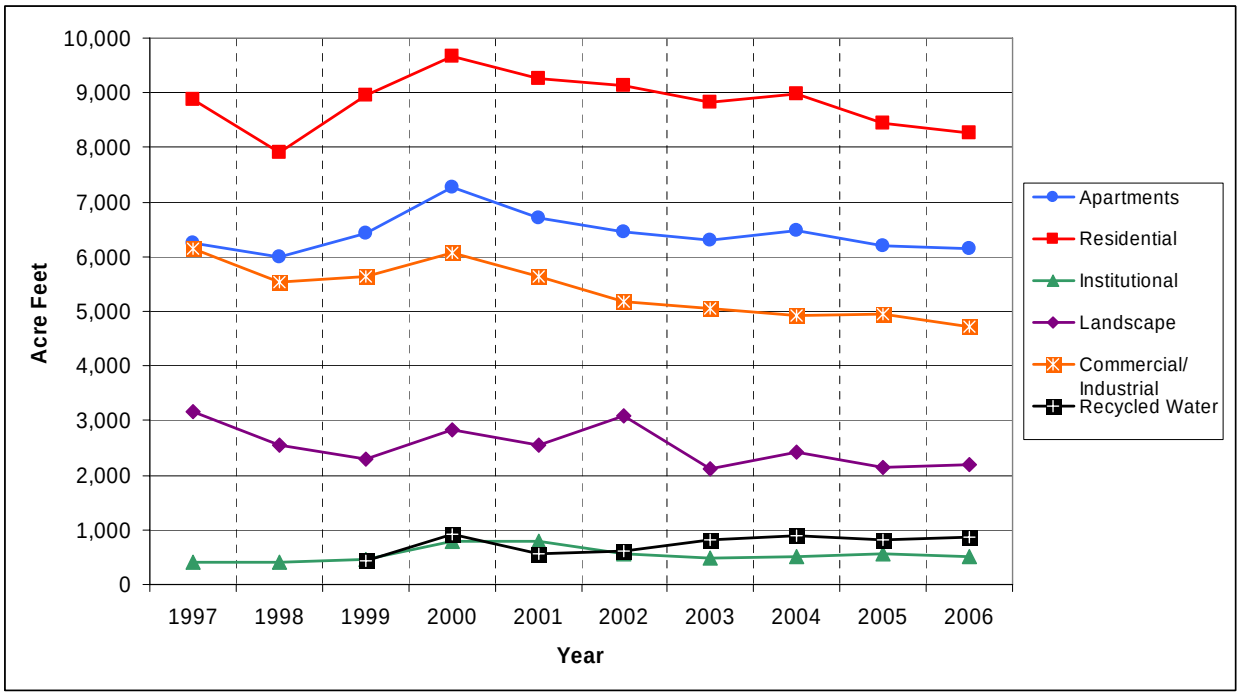
1.3 Water Demand and Demand Management

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.

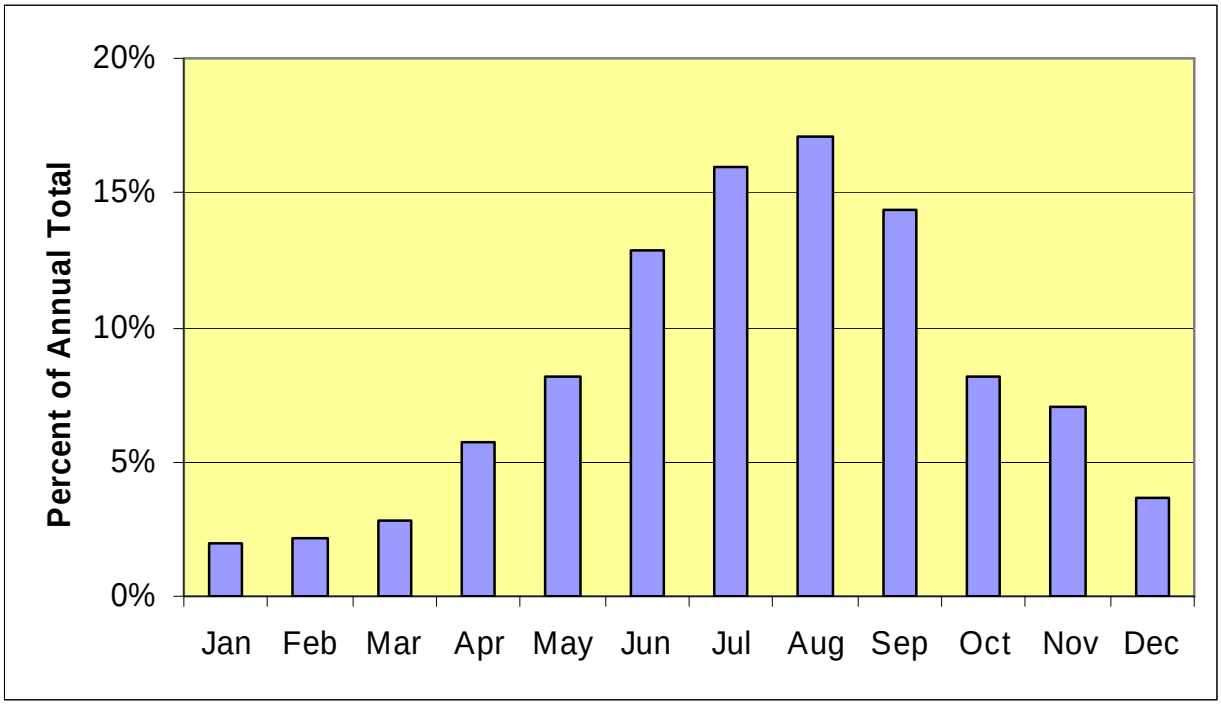
2.1.4 Recycled Water

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

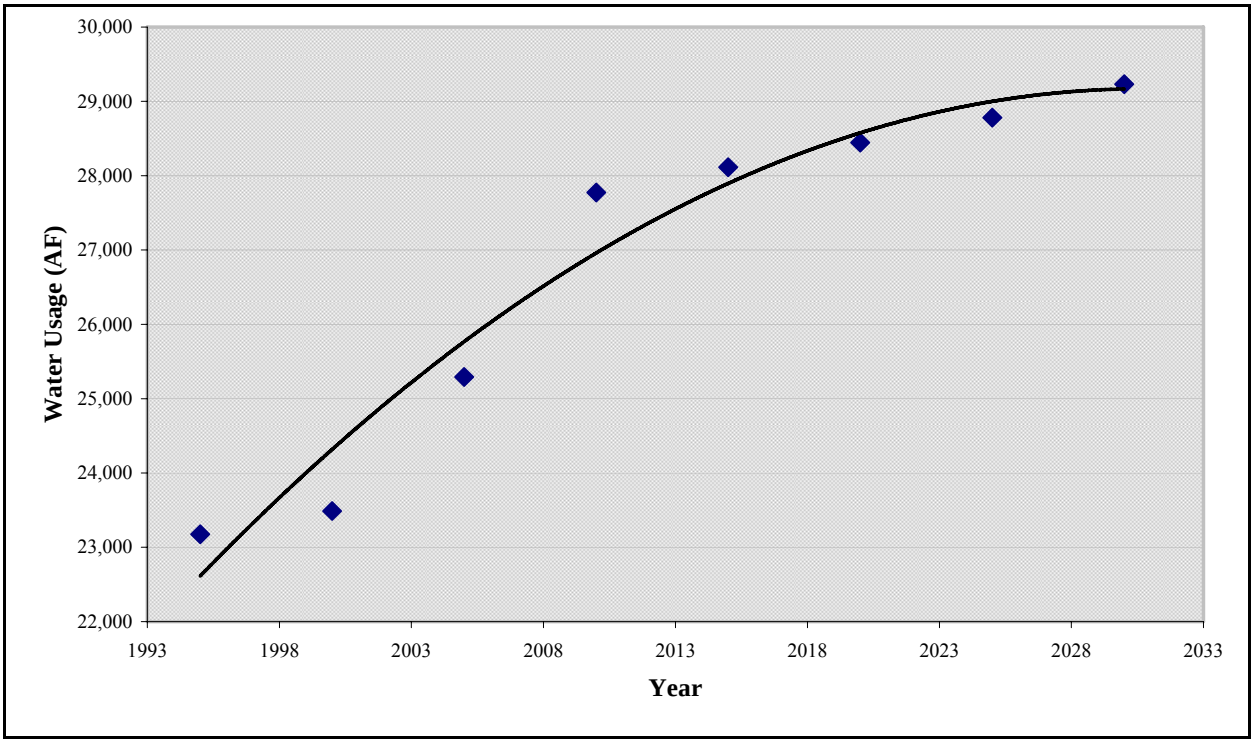
The 1,800 acre-feet of projected recycled water deliveries includes both the approximately 900 acre-feet of in-plant WPCP process usage and the approximately 300 million gallons (920 acre-ft) of recycled water delivered outside the WPCP for primarily irrigation usage. Table 1 does not include additional 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

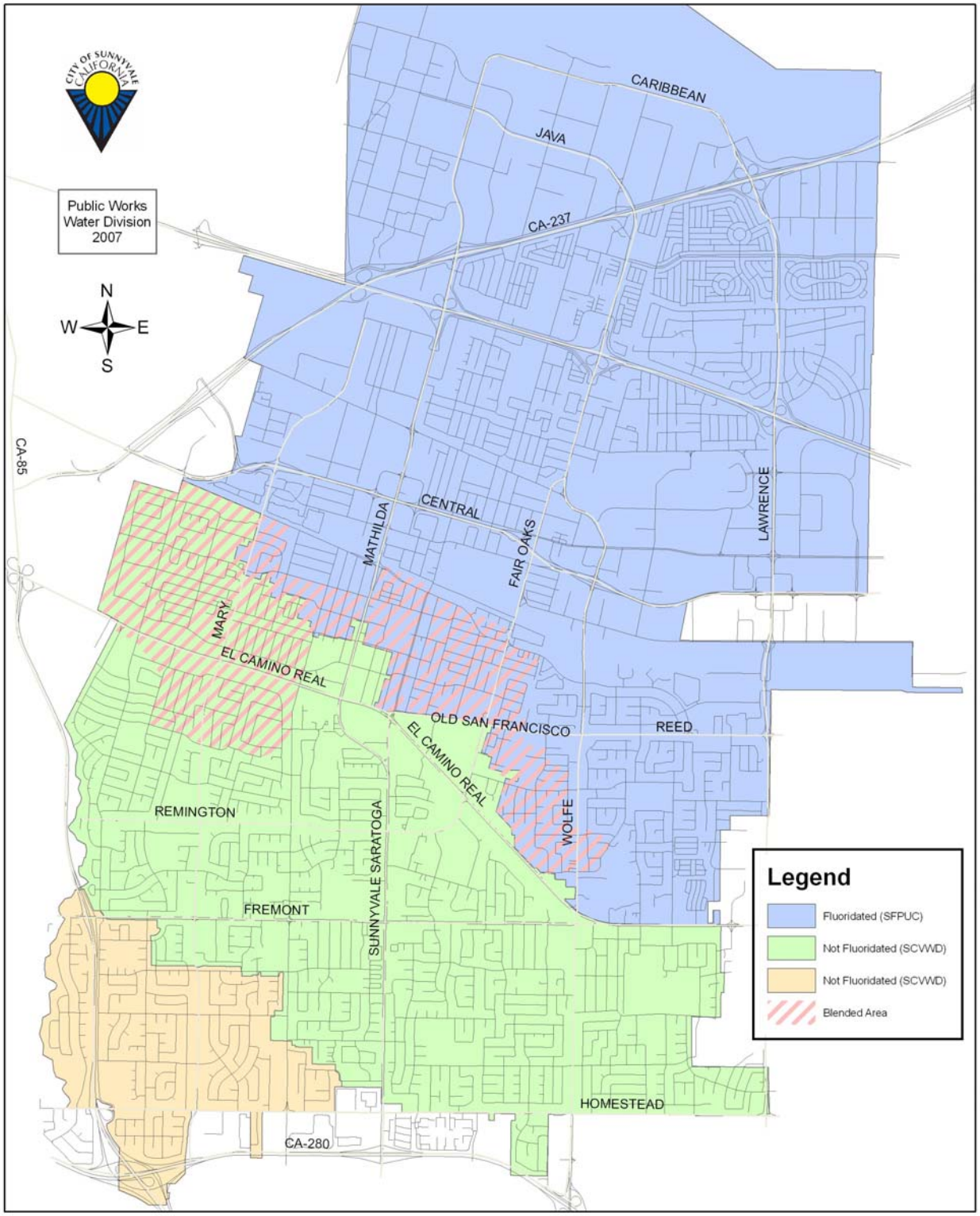
DBP formation are among the primary goals of the source control elements of the CALFED Drinking Water Quality Program.

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.

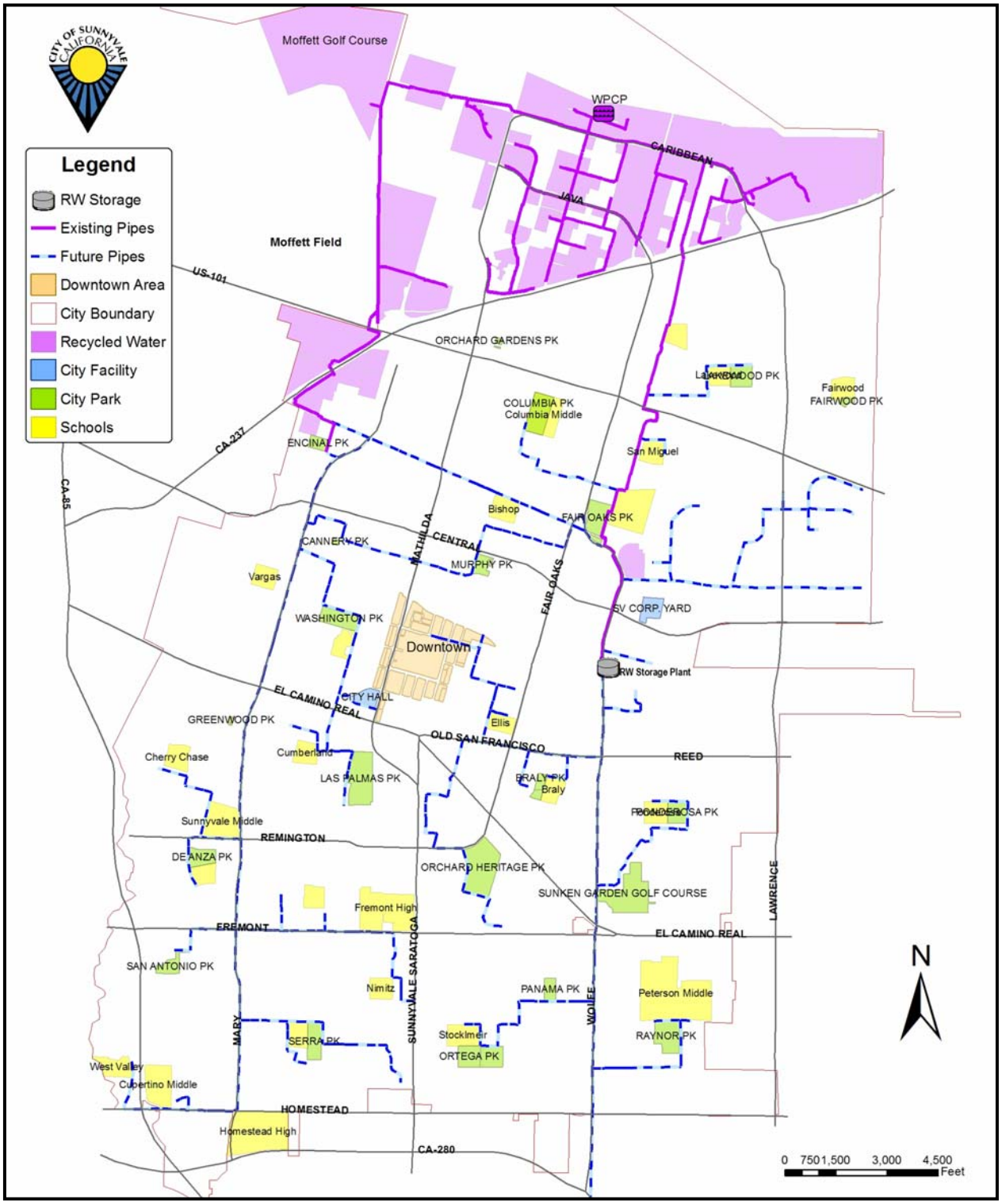
SFPUC As described in Section 3.3.1, an opportunity exists for the City to provide recycled water to the Moffett Field Golf Course and proposed new development at NASA Ames. This would reduce the need for potable water supplied by SFPUC. SFPUC has been pursuing regional partnerships, for example with 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 Actual	2005/06 Actual	% Change	2006/07 Projected	% Change
3.1.1	Millions of gallons of water sold annually:					
	Residential	4,723	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	3.909090909	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 ($/acre-foot)	493.77	508.95	3.1%	534.4	5.0%
3.1.8	Unit cost for SFWD water ($/acre-foot)	530.69	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)	9/7,824	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	4,183	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
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	87,599	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