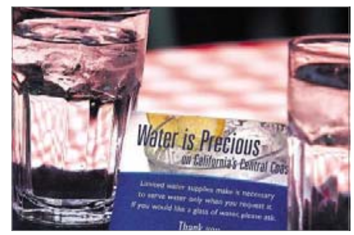
City of Santa Cruz

2010 Urban Water Management Plan



Prepared by: City of Santa Cruz Water Department December 2011

City of Santa Cruz Water Department

2010 Urban Water Management Plan

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Chapter 1

INTRODUCTION

1.1 Urban Water Management Planning Act

This report has been prepared by the City of Santa Cruz Water Department in response to the Urban Water Management Planning Act. The Act, which became part of the California Water Code with the passage of Assembly Bill 797 in 1983, requires that every urban water supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually prepare and adopt an Urban Water Management Plan, and to update it every five years.

The Act requires water agencies to evaluate and describe their water resource supplies and projected needs over a twenty-year planning horizon, and to address a number of related subjects including water conservation, water service reliability, water recycling, opportunities for water transfers, and contingency plans for drought events.

The Act recognizes that water is a limited and renewable resource subject to ever-increasing demands and that conservation and efficient use of urban water supplies is a statewide concern. The Act also states that a long-term reliable supply of water is essential to protect the productivity of California's businesses and economic climate and, as part of its long-range planning activities, every urban water supplier should make every effort to ensure the appropriate level of reliability in its water service sufficient to meet the needs of its various categories of customers during normal, dry, and multiple dry years.

The purpose, required contents, and process for preparing and adopting Urban Water Management Plans are specified in Water Code sections 10608 and 10610 – 10656 (Appendix A). The overall goal is to provide water suppliers throughout the state a framework for carrying out their long-term planning responsibilities and for reporting their strategies to meet future water challenges to both state government and the communities they serve.

1.2 Legislation, 2005 to Present

The Act has been amended numerous times by the Legislature over the years. The most significant legislative change since the City last updated its plan in 2005 resulted from the passage of SBX7-7, also known as the Water Conservation Bill of 2009 (Appendix B). This legislation mandates urban per capita water use be reduced 20 percent by the year 2020. Under the law, each urban water supplier is required to determine its baseline daily per capita water use and to calculate future water use targets in accordance with technical methodologies developed by the California Department of Water Resources, and to include this information beginning in its 2010 Urban Water Management Plan. Progress towards decreasing daily per capita water use and achieving future water use targets is then to be documented in subsequent plans over the next two five-year submittal cycles.

Other new provisions to the Act require:

- Eligibility of state-funded grants and loans to be conditioned on the implementation of the 14 demand management measures listed in Water Code section 10631.

- Water agencies to grant a priority in the provision of water service to housing units affordable to lower income households.

- Indirect potable reuse to be considered as an option for a potential use of recycled water.

1.3 Uses of an Urban Water Management Plan

Urban Water Management Plans serve a variety of purposes and are intended to be consistent with and support other local, regional, and statewide plans and processes. Information about water use and supplies reported by water agencies is collected and used by the state in updating the California Water Plan every five years, next scheduled for 2013. They provide a common basis for cooperative water resource management through preparation of Integrated Regional Water Management Programs, such as one now being implemented in Santa Cruz County, of which the City of Santa Cruz is a project partner. Land use agencies rely on a water agency’s Urban Water Management Plan as a long-range planning document to aid in updating city and county General Plans and for preparation of environmental documents under the California Environmental Quality Act (CEQA). They also serve as a detailed source of information to coordinate local water supply availability and certain land use decisions made by cities and counties under Senate Bills 610 and 221 of 2001.

1.4 City of Santa Cruz' 2010 Urban Water Management Plan

This document constitutes the fifth update of the City's Urban Water Management Plan. The first version was adopted by City Council in 1986. The plan was most recently updated in 2005 and adopted in early 2006.

There are multiple approaches that may be taken to prepare an Urban Water Management Plan. For this submittal cycle, the City has elected to maintain the same basic structure and organization as the 2005 plan, while updating each section with more recent information and expanding portions to address new requirements.

Besides fulfilling its statutory obligations, a primary goal in updating this plan is to evaluate and assess the many changes to supply and demand conditions that have occurred in the intervening years. About five years ago, the City Council unanimously adopted a separate Integrated Water Plan or "IWP" that set forth a preferred strategy to address the City's current and future water needs and its vulnerability to water shortage. Since then, circumstances and events have evolved in a way that was difficult to foresee only a few short years ago. Some of the factors that have changed in the last five years include the following:

- **Effects of Water Shortage.** For the first time since the early 1990's, local water resources were stressed by three years of below normal rainfall and runoff, forcing the City to declare a water shortage and to enact water restrictions in 2009.

- **Reduced Surface Water Diversions Due to Endangered Species Regulation.** The City faces losing a portion of its long-established surface water resources to satisfy federal and state endangered species regulations. Interim flow releases began in 2007, increasing in 2008. What was an uncertain prospect five years ago now looms large in the form of much greater instream flow releases going forward.

- **Decreased Groundwater Availability.** There is a growing acknowledgement today that the sustainable production capability of the groundwater basin from which the City and other users draw is substantially less than previously assumed.

- **Aging Infrastructure.** Key components of the City water system, including Bay Street Reservoir and North Coast System, have reached the end of their useful life and are now in the process of reconstruction, adding pressure on limited financial resources.

- **Changing Shape of Demand.** Instead of stabilizing and rising gradually over time as projected five years ago, water use in the City's service area dropped off substantially compared to prior years. A combination of factors, including changes in pricing and overall water rates, ongoing water conservation efforts, temporary water restrictions, unseasonable weather conditions, housing market collapse, local business closures, and economic recession have all contributed to this trend.

As elsewhere in California, the circumstances surrounding water supply and demand in the central coast region are dynamic. This plan acknowledges that the future is both variable and uncertain, and that change will continue to occur.

1.5 Development Process of the 2010 Plan

The normal submittal cycle requires that Urban Water Management Plans be prepared and submitted in December of years ending in five and zero. However, because of recent changes to State law, the deadline for the plan due in 2010 was extended to July 2011.

The process of updating the City's Urban Water Management Plan actually has been a continuous activity since the previous version was adopted in 2006. The top recommendation in the earlier plan was to better prepare for the possibility of future water shortages. Over a three-year period beginning in 2006, the City conducted a comprehensive update of its Water Shortage Contingency Plan through a collaborative, open, and public process involving the City Water Department staff, the City's Water Commission, City Council, stakeholders, and the general public. This plan was formally adopted by City Council as an amendment to the City's 2005 Urban Water Management Plan in March 2009. An accompanying ordinance establishing updated water shortage regulations and restrictions was adopted in April 2009 and revised in May 2010.

Analysis and data collection has also been an ongoing activity. The City updated its water demand models 2009/10. New 20-year water demand forecast scenarios were developed in late 2010 in conjunction with a water supply assessment that served to support a comprehensive update of the City's General Plan 2030. Beginning in 2009, data have been collected and organized to support accurate representation of the City's per capita water use, consistent with the statewide 20x2020 Water Conservation Plan, updating of the California Urban Water Conservation Council MOU, and SB7.

Early in 2011, the City participated in a planning workshop and various webinars sponsored by the California Department of Water Resources (DWR). In March 2010, the City hosted and led a coordination meeting with other major public water agencies and land use agencies in Santa Cruz County. This meeting was attended by representatives of DWR and the Association of Monterey Bay Area Governments (AMBAG).

Water Department staff prepared the draft water management plan in spring and summer of 2011. Development of this plan was coordinated with neighboring water agencies, city and county land use agencies within the service area, as well as the staff from the City's wastewater treatment facilities, City of Scotts Valley, and the Santa Cruz County Sanitation District. Written notice regarding the plan review and update was sent to both the City of Capitola and the County of Santa Cruz in May 2011, more than 60 days prior to the public hearing, in accordance with Section 10621(b) of the Act. Preparation of the plan was facilitated by the state's *Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan* (DWR, 2011).

The City Water Commission reviewed the plan on October 3 and November 7, 2011 and the document was made available for public inspection, review, and comment. The draft plan was circulated to all major public water utilities in Santa Cruz County, including the following:

- Soquel Creek Water District
- San Lorenzo Valley Water District
- Scotts Valley Water District
- Central Water District
- City of Watsonville

The draft plan was also transmitted to the County of Santa Cruz, the City of Capitola, AMBAG, and the Santa Cruz Local Agency Formation Commission.

The City Council held a public hearing on the plan in accordance with Water Code section 10642 on November 22, 2011. Notice of the time and place of the hearing published pursuant to Section 6066 of the Government Code prior to the hearing. This public hearing also served to satisfy the requirements of Water Code section 10608.26 relating to urban per capita water use reduction.

City Council adopted the plan on _____, 201_. The resolution adopting the plan is included in Appendix C. The final plan was then submitted to the California Department of Water Resources and the California State Library, and transmitted to all jurisdictions receiving water service from the City of Santa Cruz in _____, 201_.

1.6 Report Format

The report is organized in accordance with the specific provisions of the Act as follows:

Chapter 2 – Profile of Service Area and Water Department (10631(a)): describes the City's water service area including population, climate, and other demographic factors affecting the City's water management planning.

Chapter 3 – Water Supply System (10631(b)): describes the City's water supply system, explains how the system is operated, and presents information on water production levels. It also presents information about the groundwater basin that the City relies on for part of its supply, and the current conditions, trends, and concerns related to ongoing groundwater production in the basin.

Chapter 4 – Past, Current, and Projected Water Use (10631(e)): explains the City's customer classification system, discusses the water use characteristics of the different customer groups, and discusses past, current, and projected water use by category of use. It also provides information about the City's baseline per capita water use and urban water use targets in accordance with Water Code section 10608.

Chapter 5 – Water Supply Reliability (10635(a) and 10631(c)): characterizes the reliability of the City water supply system, provides an updated assessment of the system reliability under differing hydrologic conditions, and describes the overall approach and the status of programs and projects the City is pursuing to improve its water supply reliability.

Chapter 6 – Water Demand Management Program (10631(f)): describes the water demand management measures currently being implemented by the City and discusses the planning process underway to guide water conservation activities in future years.

Chapter 7 – Water Recycling (10633(a)–(g)): describes the City's wastewater collection, treatment, and disposal system, and provides information on recycled water and its potential for use as a supplemental source of water supply in the service area.

Chapter 8 – Water Shortage Contingency Plan (0632(a)-(i)): summarizes the City's recently updated Water Shortage Contingency Plan and presents information about how the City manages the water system in a declared water shortage. It also describes actions that would be undertaken in response to a catastrophic interruption of water supplies, including a regional power outage, earthquake, or other emergency situation.

Chapter 9 – Planning for Climate Change: presents information about potential water supply and demand effects related to climate change, the risks they impose, and planning efforts underway to reduce these risks and exposure to these hazards in the future.

Chapter 10 – Goals and Policies for Managing the Santa Cruz Water System: presents long-term goals, polices, and actions to guide management of the water system through the year 2030 and ensure that the water supply continues to meet the needs of the community well into the future.

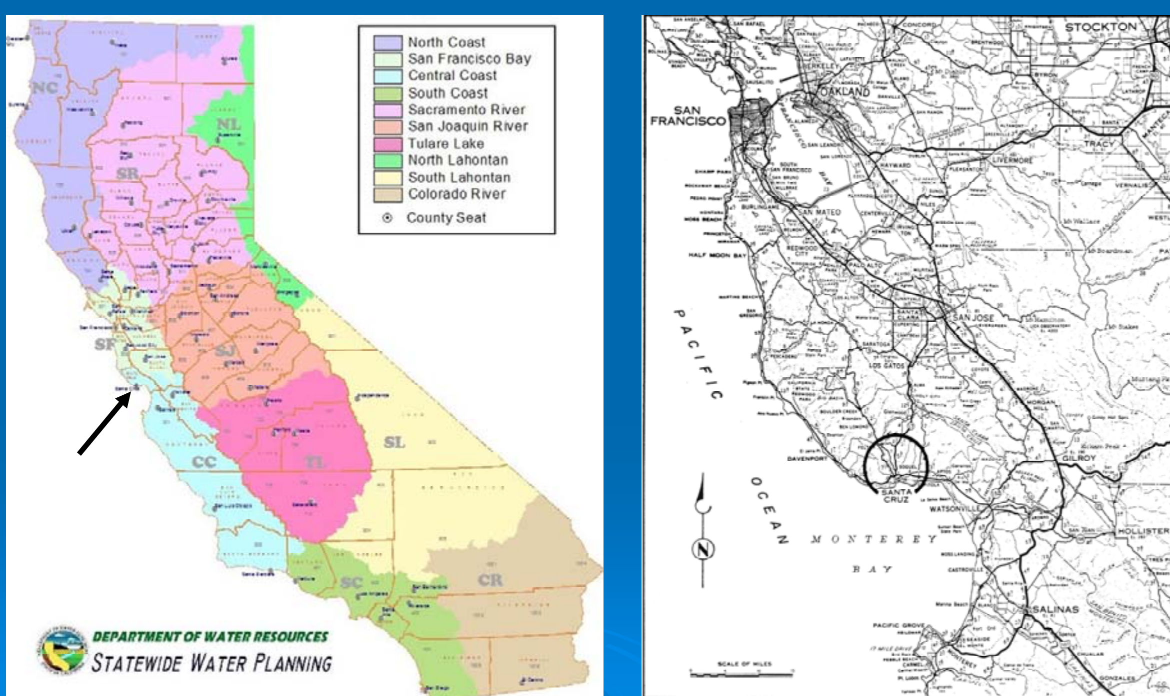
Chapter 2

PROFILE OF SERVICE AREA AND WATER DEPARTMENT

The City of Santa Cruz is located on the central coast of California along the northern shore of Monterey Bay. The City's position on the northern end of the state's Central Coast hydrologic region (Region 3) and vicinity relative to the San Francisco Bay Area are shown below in Figure 2-1.

Water service is provided to an area approximately 20 square miles in size, including the entire City of Santa Cruz, adjoining unincorporated areas of Santa Cruz County, a small part of the City of Capitola, and coastal agricultural lands north of the city. The geographic area served by the City water system (not including the north coast) is shown in Figure 2-2.

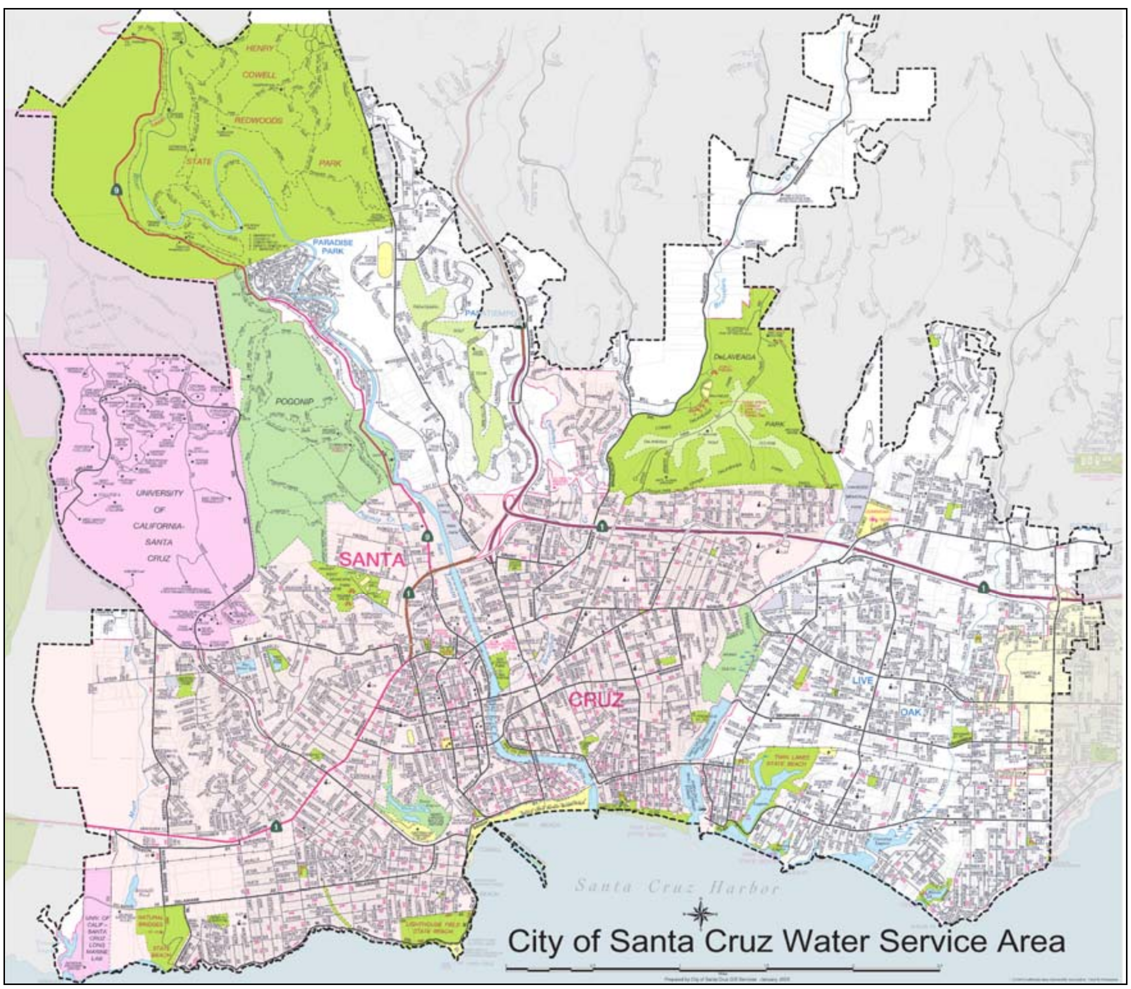
Figure 2-1 Hydrologic Regions of California and City of Santa Cruz Vicinity Map



People are drawn to the Santa Cruz area for its recreational attractions, its small town ambiance and sense of community, its pleasant weather, its natural beauty and scenic coastline, and its higher education facilities. The sandy beaches and nearby mountains attract millions of visitors to the region every year. The City is bounded by several state parks and open-space lands that provide facilities for bicycling, hiking and other outdoor activities. The seashore and ocean waters of the Monterey Bay National Marine Sanctuary serve as a prime destination in the summer months for sunbathers, surfers, and tourists. Other visitor attractions include the Santa Cruz Beach Boardwalk, Municipal Pier, and Pacific Avenue Mall.

The [University of California, Santa Cruz](#) is situated atop the upper west side of the City overlooking the downtown area and Monterey Bay. The campus is nationally recognized for its quality of instruction, its academic stature, and its research impact. It currently accommodates an enrollment of about 16,300 students during the academic year.

Figure 2-2. City of Santa Cruz Water Service Area



Water Code Section 10631(a) requires urban water suppliers to:

> "*Describe the service area of the supplier, including the current and projected population, climate, and other demographic factors affecting the supplier's water management planning.*"

Many underlying factors influence water demand systemwide and are taken into account in the City's water management planning. These include weather and climate, population, housing and community development, employment and the economy, price, and effectiveness of water conservation programs. The relative importance of these factors as well as the time scale on which they shape overall demand for water varies. Some, like weather, are more important in the short-term, while others, like population growth, develop over long periods of time.

In terms of water system management and planning, variations that occur in short time frames – one year or less – mainly affect budgeting, financial management, and system operations. Variations that occur over the long term – years to decades – affect capital planning for system infrastructure, from sizing and phasing of treatment and distribution system improvements to system capacity and raw water supply.

The factors pertaining to the City's service area and community makeup and their significance to the City's water management and planning are discussed below. How water conservation and pricing factor into the City's water management is covered later in Chapter 6.

2.1 Climate

Santa Cruz enjoys a pleasant Mediterranean climate that is characterized by warm, mostly dry summers and mild, wet winters. Due to its proximity to Monterey Bay, fog and low overcast are common during the night and morning hours, especially in the summer. Monthly and annual climate data for Santa Cruz are shown in Table 2-1 below.

Mean monthly temperatures range between 50 and 64 degrees, with the warmest weather usually occurring during August and September. Extreme temperatures are rare and short-lived, with weather conditions being moderated by the oceanic influence and presence of summer fog.

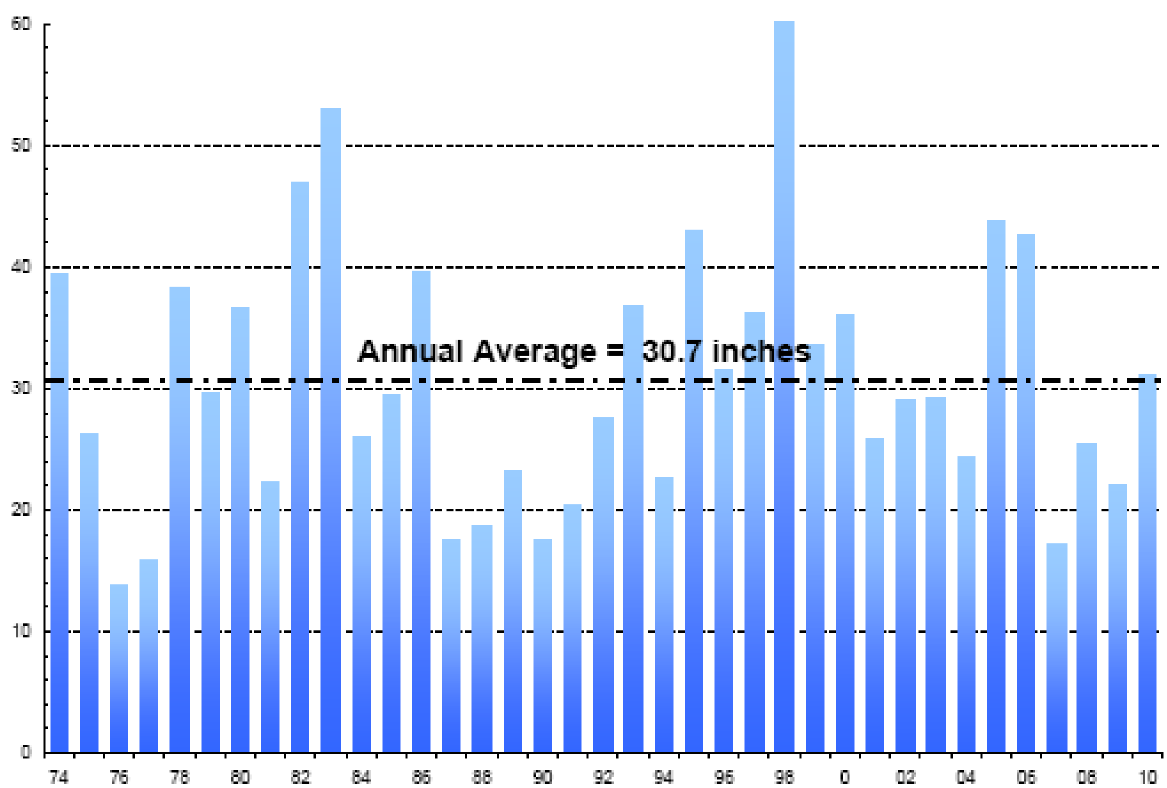
Table 2-1. Climate Data for Santa Cruz (a)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Mean High Temp (F)	60.9	63.2	64.6	68.4	71.3	74.4	75.7	76.2	77.0	73.7	65.8	60.3	69.3
Mean Low Temp (F)	38.8	41.0	41.8	42.9	45.8	49.4	51.2	51.7	50.7	47.3	42.9	38.8	45.2
Mean Temperature (F)	49.9	52.1	53.2	55.7	58.6	61.9	63.5	64.0	63.9	60.5	54.3	49.5	57.3
Precipitation (in)	6.49	6.15	4.78	1.97	0.70	0.18	0.14	0.11	0.41	1.44	4.08	4.22	30.7
Evapotranspiration (in) (b)	1.5	1.8	2.6	3.5	4.3	4.4	4.8	4.4	3.8	2.8	1.7	1.2	36.6

Notes:
(a) National Climate Data Center 1971-2000 Monthly Normals
(b) CA Department of Water Resources

Rainfall in Santa Cruz averages 30.7 inches annually, but varies considerably from year to year. The bulk of seasonal rainfall occurs between November and March. Annual rainfall amounts over the last 37 years are shown in Figure 2-3. During this time, annual precipitation ranged from a minimum of 13.9 inches in 1976 to a maximum of 60.2 inches in 1998. In the watershed above the City's reservoir in the Santa Cruz Mountains, rainfall averages nearly 50 inches per year.

Figure 2-3. Annual Rainfall at Santa Cruz



Reference evapotranspiration - a standard measurement of environmental parameters used for determining irrigation needs - averages 36.6 inches per year in Santa Cruz. Average monthly evapotranspiration varies seasonally from a low of 1.2 inches in December to a high of 4.8 inches in July.

Like other coastal communities, the marine influence on local air temperature, humidity, and cloud cover helps keep demand for water relativity low in the City's service area compared to inland locations elsewhere in California and acts to moderate outdoor water use during peak summer season.

2.2 Population

The current population residing in the Santa Cruz water service area, according to the 2010 US Census is estimated to be 91,291 people. Some 59,946 people, or about two thirds of the total population, live inside the City limits. Of these, about 8,100 people including students, faculty, staff, and their families reside on the UC Santa Cruz campus. It is estimated that another 31,345 people, or 34 percent of the service area population, live outside the City limits.

Table 2-2 shows the change in the service area population from 2000 to 2010. The City's population grew by over 5,000 during this time, or about one percent per year, while the population in the unincorporated area seems to have actually declined by 446 people over the same time period.

Table 2-2. Change in Service Area Population, 2000-2010(a)

Year	2000	2010	Change	% Change
City of Santa Cruz	54,588	59,946	5,358	9.8%
Santa Cruz County	30,328	29,882	-446	-1.5%
City of Capitola	1,281	1,463	182	14.2%
Service Area Total	86,197	91,291	5,094	5.9%

Notes:
(a) Source: US Census and City of Santa Cruz GIS

Table 2-3 shows the projected population in the City's water service area by jurisdiction to the year 2035, in five-year increments. These figures are derived from a regional population forecast prepared by the Association of Monterey Bay Area Governments

(AMBAG, 2008)[1]. The forecast was based on the previous 2000 Census and includes the increase in enrollment and population growth that is anticipated to occur at the University of California over the next ten years. According to the forecast, the total number of people receiving water service is expected to grow by about 9,500 people to almost 102,000 in 2030 and reach 104,000 in 2035. This equates to a relatively low population growth rate of about 0.5 percent per year. About one quarter of this total expected population growth is related to increased enrollment planned at the University. AMBAG expects to update its population forecast for the Monterey Bay region in 2012 using the 2010 US census data.

Table 2-3. Population Forecast for the Santa Cruz Water Service Area (a)

Year	2010	2015	2020	2025	2030	2035
City of Santa Cruz	58,919	62,480	63,265	64,649	65,884	67,807
Santa Cruz County	32,236	32,831	33,478	34,162	34,746	35,176
City of Capitola	1,010	1,020	1,050	1,070	1,070	1,075
Service Area Total	92,165	96,331	97,793	99,881	101,700	104,058

Notes:
(a) Source: AMBAG Monterey Bay Area 2008 Regional Forecast

Population is a key trend factor in determining water use. In recent years, however, reductions in per capita water use over the last decade have more than offset gradual population increases; that is, even though the service area population has been slowly but steadily rising, total water use has declined. At what point this trend may reverse is unknown. More information on per capita water use is covered in Chapter 4 of this report.

2.3 Housing

According to utility billing records, there are some 36,651 housing units within the City's water service area. The number of housing units, broken down by account type and jurisdiction is shown in Table 2-4 below. Approximately 18,862, or a little over half of all households in the service area are classified as single family accounts[2]. The other

[1] The actual 2010 population according to the US Census differs from AMBAG's 2010 forecast population by a total of 874 people, or < 1 percent. Population growth in the City of Santa Cruz was higher than forecasted by AMBAG. Outside the City limits, the population declined slightly, whereas AMBAG had forecast it would increase by about 1,000 people from 2000 to 2010. In addition, there were slight differences in the methods used between the City GIS staff and AMBAG to determine service area population where the service area boundary and census blocks boundaries do not coincide.

[2] Water account categories are not the same as housing type. A single family account has one dwelling unit per meter, but may be any type of residence. A multifamily account has two or more dwelling units per meter.

17,789 homes are multiple family dwelling units consisting of various housing types including duplexes, condominium and townhouse complexes, apartments, mobile homes and alternative housing types such as live/work units, mixed use development, single room occupancy, and accessory dwelling units. The figures below do not include dormitory rooms, apartments, and other housing units located on the UC Santa Cruz main campus. A large proportion of the local housing stock (over 50 percent) is rented.

Table 2-4. Number of Housing Units, by Account Type and Jurisdiction (a)

	Single Family	Multi-Family	Total
City of Santa Cruz	12,122	9,763	21,885
Santa Cruz County	6,604	7,907	14,511
City of Capitola	136	119	255
Service Area Total	18,862	17,789	36,651

Notes:

(a) Source: Santa Cruz Municipal Utilities Billing System

Over the past five-year period, about 700 new housing units were added in the service area, the majority of which (542) were classified as single family residential accounts. In the past few years, though, new housing construction has plummeted following the deep downturn in the housing market that began in 2007.

Each of the three jurisdictions served by the City has an adopted Housing Element that addresses its required regional fair share of the statewide housing needs established by AMBAG. These documents set forth goals and objectives for housing construction, rehabilitation, and conservation for the period 2007 - 2014.

The regional housing goals for the three jurisdictions served by the City are shown below in Table 2-5. For this housing element cycle, the City is planning for an additional 672 units, some of which already has been approved and is under construction. The County is planning for a total of 1,289 units to be built Countywide through 2014, of which perhaps 254 units would be located within the City water service area. Capitola has a goal to construct 143 units by 2014 in its housing element, but only a small number of these are expected to fall into the City’s water service area. Together, these housing plans represent a total residential development potential in the near term of about 965 new homes.

Table 2-5. Regional Housing Goals (a)

Period: 2007-2014	Total Housing Units		Units in Lower Income Categories	
	Entire Jurisdiction	City Water Service Area	Entire Jurisdiction	City Water Service Area
City of Santa Cruz	672	672	263	263
Santa Cruz County (b)	1,289	254	505	167
City of Capitola (c)	143	39	56	6
Service Area Total	--	965	--	436

Notes:

(a) Source: City and County housing elements

(b) Santa Cruz County Planning Department

(c) Capitola Community Development Department

It is important to note that while each jurisdiction must demonstrate it can accommodate its fair share of the regional housing needs, it does not necessarily mean such housing actually will be constructed. Also unknown is the type of housing that might be built over the next few years under these housing plans.

SB 1087 of 2005

State housing law was recently amended to ensure adequate water service is available to accommodate housing needs, especially for housing lower income households. Under the law, water and sewer providers are required to:

1. *Adopt written policies and procedures granting priority in the provision of service to housing units affordable to lower income households. (See Appendix I);*
2. *Make specific written findings before it can deny, condition the approval of, or reduce the amount of services applied for in proposed developments with lower income housing; and*
3. *Include projected water use for single-family and multifamily housing needed for lower income households (Refer to Chapter 4.)*

2.4 Community Growth and Development

All three jurisdictions served by the Santa Cruz water system have general plans, local coastal programs, zoning regulations and development standards that determine the location, type, and density of growth allowed in the region. The General Plan serves as the principal policy and planning document guiding long-range land use decisions in cities and counties. Both the cities of Santa Cruz and Capitola are actively in the process of updating their General Plans, although they are at different stages of the process, as described below.

City of Santa Cruz The City is well along towards completing a comprehensive update to its existing General Plan, which covered the period 1990 - 2005. The new General Plan will extend to 2030, corresponding with the timeline for this Urban Water Management Plan. Public review of the draft General Plan and its accompanying Environmental Impact Report (EIR) is scheduled for the latter half of 2011, followed by consideration and adoption by City Council, expected in early 2012.

City of Capitola It has just begun a 2-3 year process to update its General Plan. Although no decisions have yet been reached, it is considering the possibility of adding mixed-use development or increasing the intensity of land use in selected areas of Capitola served by the City.

County of Santa Cruz The current General Plan for the County was adopted in 1994. No comprehensive update is anticipated. The County does, however, intend to begin a process, consistent with a regional growth strategy developed by AMBAG known as the "Blueprint", to coordinate local transportation improvements and land use changes at certain "opportunity sites", some of which are located within the City's water service area.

In the process of developing the City's new General Plan, a buildout projection was prepared for the City's Planning Department that provides new information about residential and commercial development foreseen in the City over the next 20 years. This information was used in developing new water demand projections described in Chapter 4. In the other jurisdictions, no new information about community growth and development was available. Therefore, other techniques were use to forecast water use outside the City limits.

University of California In addition to city and county General Plans, the University of California recently approved separate Long Range Development Plans (LRDPs) for both its main campus (in 2006) and its marine science campus located on the western edge of the City (in 2007). These plans provide a comprehensive framework to guide physical development, land use, and resource protection to meet the University's academic and institutional objectives through the year 2020. These documents and their companion EIRs were used to adjust and account for future University water needs.

The UCSC LRDP envisions increasing enrollment to 19,500 by 2020 and expanding academic, support, and housing space on campus from 4.8 to 8.0 million gross square feet. To do so, it intends to extend development north of the existing campus beyond the current City limits and present water service area boundary. The timing of any such physical expansion, however, remains uncertain due to state budgetary constraints, lengthy regulatory approvals, and ongoing legal challenges.

Other local factors concerning community growth and development that affect water management and planning are the following:

Service Area Boundary The size of the City water service area has remained relatively fixed over time due to a long-standing prohibition against new water connections along the north coast, the acquisition of open space lands which created a greenbelt around the City, and the County's urban services boundary, all of which have served to inhibit urban sprawl. Accordingly, most growth and redevelopment that does happen going forward is expected to be concentrated within the confines of the existing service area boundary. Any proposed changes to the City's service area boundary that do come forward are subject to approval by both City Council and the Santa Cruz Local Agency Formation Commission (LAFCO). The only known location where this might change in the future is at the University. There are currently two applications concerning UC Santa Cruz pending before LAFCO. One proposes to expand the City's Sphere of Influence to add 374 acres known as the "north campus". The other application seeks LAFCO's authorization for the City of Santa Cruz to provide extraterritorial water and sanitary sewer services to the north campus unincorporated area in accordance with Government Code section 56133.

Diminishing Vacant Land Within the City of Santa Cruz, only a small amount of land remains undeveloped. The same is true in the parts of the County and City of Capitola served by the City. Because of the relative scarcity of raw land, the majority of future growth in the area is likely to be achieved through redevelopment, remodeling, increased density on underutilized land, and infill development in the urban core and along major transportation corridors, along with new construction on the little amount of vacant land remaining. The trend toward higher density and redevelopment can result in more people using more water, but new buildings also tend to be more water efficient than the older construction they replace.

Coastal Zone Management Many of the major decisions made by local governing bodies about public improvements and private development are also subject to the review and oversight of, or may be appealed to, the California Coastal Commission. Accordingly, change in the City water service area tends to occur slowly, if at all, and only after exhaustive public process.

2.5 Employment and the Economy

The State Employment Development Department estimates annual average employment within the City's water service area in 2010 to average about 40,600, which represents over 50 percent of all non-farm jobs in Santa Cruz County (CA EDD, 2011). The three largest employment sectors are health services, education, and retail trade. The University is a key component of the region's economic fabric in terms of employment, spending, research, and business creation. It is the area's largest single employer. Tourism and lodging is another major economic driver in the community. Commercial development is centered in downtown Santa Cruz, around 41st Avenue in Capitola, and along the major transportation corridors including Mission, Ocean, and Water Streets and Soquel Avenue. The Harvey West area and west side of Santa Cruz support a diverse mix of light industry, retail, high tech, research, and consumer goods and service enterprises. Regional hospitals, medical, and health care facilities and services are concentrated along Soquel Drive in unincorporated Santa Cruz County.

Like elsewhere in California and across the nation, the Santa Cruz region experienced a severe economic downturn that accompanied the financial crisis and recession of the late 2000s. As a result, local unemployment rates more than doubled from less than 5 percent in 2007 to almost 11 percent in 2010.

Water use trends in Santa Cruz reflect the evolving economy. Beginning with the loss of several long-established manufacturing and technology employers earlier in the decade to the recent recession and corresponding loss of jobs, vacant commercial space, and reduction in personal income, all of these factors have contributed to the decline in total water requirements over time. While the economy and unemployment rate now appear to be slowly recovering, what happens going forward and its effect shaping system water use is difficult to tell.

2.6 Water Department

The Santa Cruz Water Department is a municipal utility that is owned and operated by the City of Santa Cruz. It is led by a Director who is appointed by the City Manager. The governing body for the Water Department is the City Council. A seven-member Water Commission advises Council on policy matters involving the operations and management of the water system. The Commission is composed of six members who reside within the City limits and one member who resides in the unincorporated portion of the water service area.

The Department is organized into nine sections. These include Administration, Engineering, Customer Service, Water Conservation, Water Resources, Production, Water Quality, Distribution, and Recreation. There is currently the equivalent of 95 full-time staff positions in the Water Department. An organization chart of the Water Department is shown in Figure 2-5.

The Water Department's adopted mission statement is as follows:

"To provide a safe, clean, and continuous supply of water for municipal and fire protection purposes that meets or exceeds local, State, and Federal standards for public health and environmental quality, and to provide courteous, responsive, and efficient service in the most cost-effective manner to our customers".

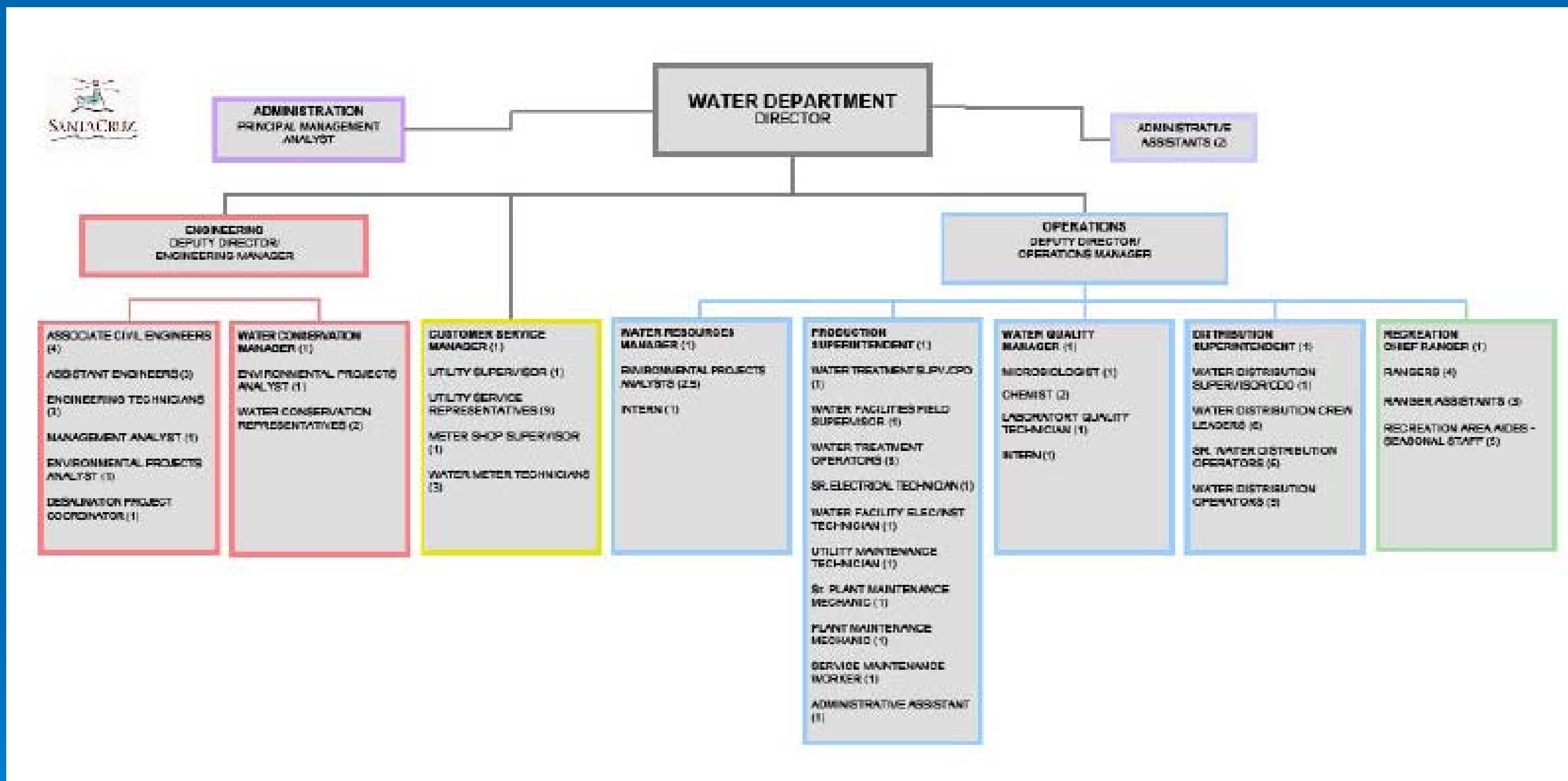
The water supply system operated by the Department consists of several surface water diversions, Loch Lomond reservoir, and a small well field. Major facilities include a 20 million-gallon per day (mgd) conventional surface water treatment plant, several pump stations, and 16 distribution reservoirs storing almost 15 million gallons of treated water. There are also about 300 miles of pipe and over 24,350 active water meters in service. The water system is regulated under a drinking water permit issued by the CA Department of Public Health through its Drinking Water Program.

The Department operates financially as an enterprise in which all the costs of running the system are paid by water rates, service charges, and related revenues. The Water Fund receives no tax or general fund revenues.

The Water Department's annual operation and maintenance budget is approximately $21 million. Capital improvement expenses have varied between $8-10 million annually in the past few years. A number of critical components, including major pipelines, pumps, and reservoir facilities are approaching or have exceeded their useful life and must be modernized to continue delivering a safe, clean, and reliable supply of drinking water. In all, over $96 million in capital improvements are needed over the next decade to maintain and enhance the integrity of the water system. Another $68 million is earmarked for a supplemental water supply project.

In addition to providing water service, the Department has responsibility for billing and customer service functions related to sewer and refuse service inside the City limits.

Figure 2-5. Water Department Organization Chart



Chapter 3

WATER SUPPLY SYSTEM

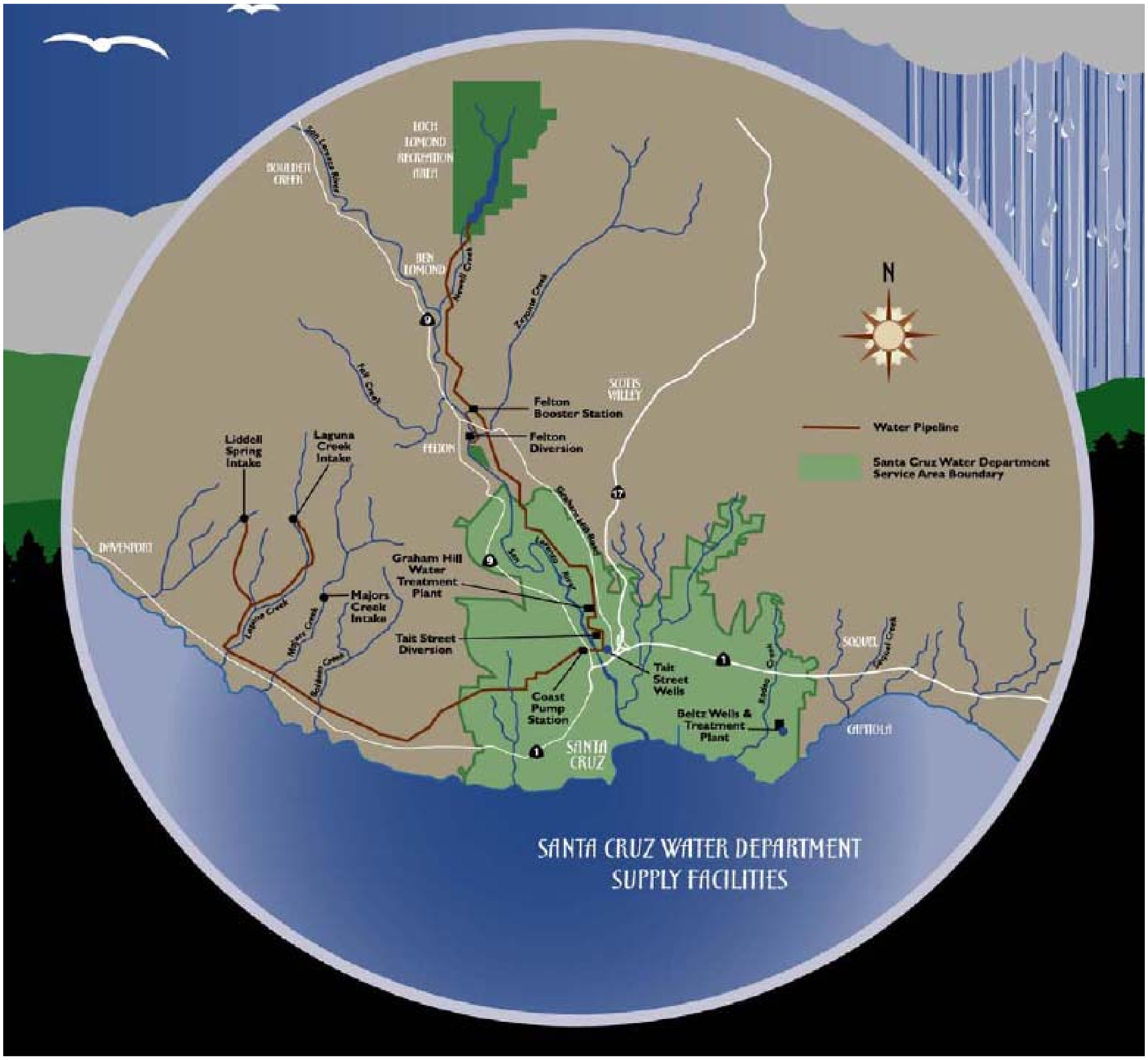
This chapter describes the City's water supply system, explains how the system is operated, and presents information on water production volumes. This chapter also presents information about the groundwater basin that the City relies on for part of its supply, and the current conditions, trends, and concerns related to ongoing groundwater production in the basin, as required by Water Code section 10631(b) (1)-(4).

3.1 Existing Sources of Water Supply

The Santa Cruz water system is comprised of four main production elements: 1) the North Coast sources, 2) the San Lorenzo River, 3) Loch Lomond Reservoir, and 4) the Live Oak Wells. The City's water sources and a diagram of the City's water supply system are shown below Figures 3-1 and 3-2.

Figure 3-1. City Water Sources

Figure 3-2. Santa Cruz Water Supply System



The system relies entirely on rainfall, surface runoff, and groundwater infiltration occurring within watersheds located in Santa Cruz County. No water is purchased from State or Federal sources or imported to the region from outside the Santa Cruz area.

3.1.1 North Coast Creeks and Springs

The North Coast sources consist of surface diversions from three coastal streams and a natural spring located approximately six to eight miles northwest of downtown Santa Cruz. These sources are: Liddell Spring, Laguna Creek, Reggiardo Creek, and Majors Creek. The use of these sources by the City dates back as far as 1890.

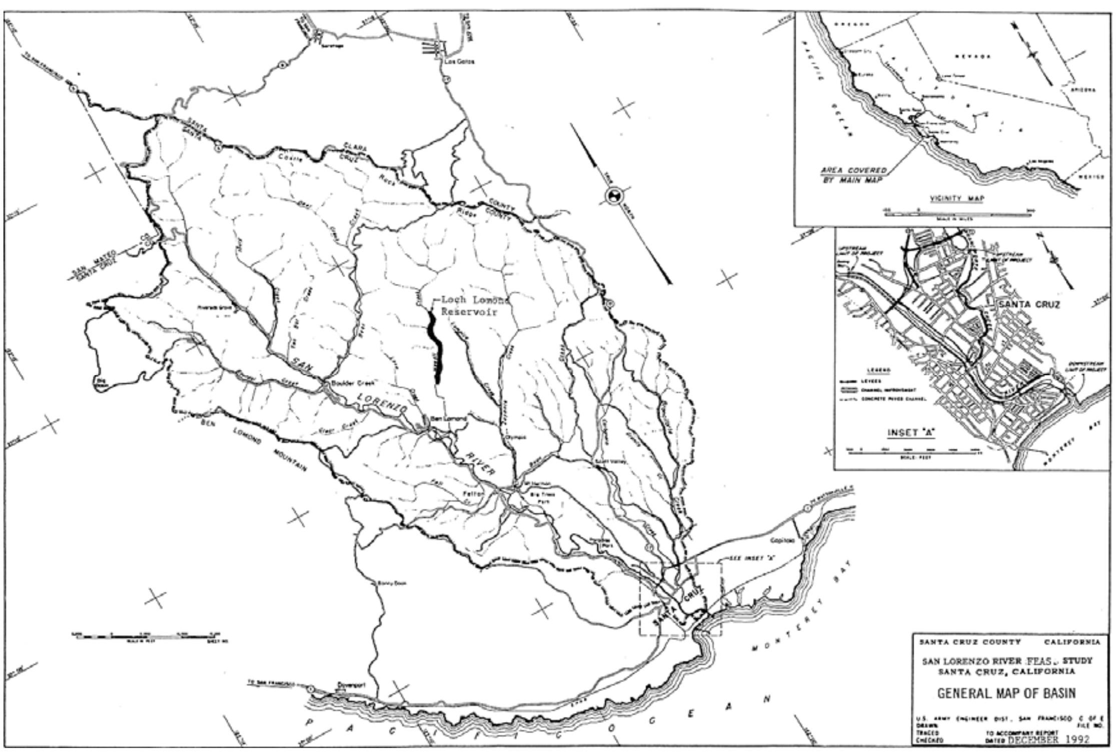
3.1.2 San Lorenzo River

The San Lorenzo River is the City's largest source of water supply. The main surface water diversion is located at Tait Street near the City limits just north of Highway 1 and dates back to the 1920s. The Tait Street Diversion is supplemented by two shallow, auxiliary wells located across the river. These wells are hydraulically connected to the river and tied to the City's appropriative rights for surface diversion. The drainage area above the Tait Street Diversion is 115 square miles.

The other diversion on the San Lorenzo River is Felton Diversion, which is an inflatable dam and intake structure built in 1974, located about six miles upstream from the Tait Street Diversion. Water is pumped from this diversion through the Felton Booster Station to Loch Lomond Reservoir. The facility is used to augment storage in the reservoir during dry years when natural inflow from Newell Creek is low.

A map of the San Lorenzo River watershed is provided in Figure 3-3. While the City is the largest user of water from the San Lorenzo River basin, three other water districts, several private water companies and numerous individual property owners share the San Lorenzo River watershed as their primary source for drinking water supply.

Figure 3-3. San Lorenzo Valley Watershed



3.1.3 Newell Creek and Loch Lomond Reservoir

Loch Lomond Reservoir is located near the town of Ben Lomond in the Santa Cruz Mountains. The reservoir was constructed in 1960 and has a maximum capacity of 2,810 million gallons (mg). In addition to providing surface water storage, the reservoir and surrounding watershed are used for no-body-contact public recreation purposes, including fishing, boating, hiking, and picnicking. The Newell Creek watershed above the reservoir is about nine square miles. In addition to the City, the San Lorenzo Valley Water District is entitled to receive a portion of the water stored in Loch Lomond.

The City's SWRCB license for Newell Creek (License No. 9847) allows for diversion to storage of up to 1,825 mgy. These water rights allow only for diversion to storage and not for direct diversion. Furthermore, based on the historical use of the reservoir, licensed withdrawals from Loch Lomond Reservoir are restricted to 1,042 mgy. Of this total 1,042 mgy, the San Lorenzo Valley Water District ("SLVWD") is entitled to102 mgy (approximately 10%). Although the district has not taken water in recent years, the City has reopened discussions with SLVWD about its entitlement to this water and the City expects that the SLVWD eventually intends to exercise its right to that supply.

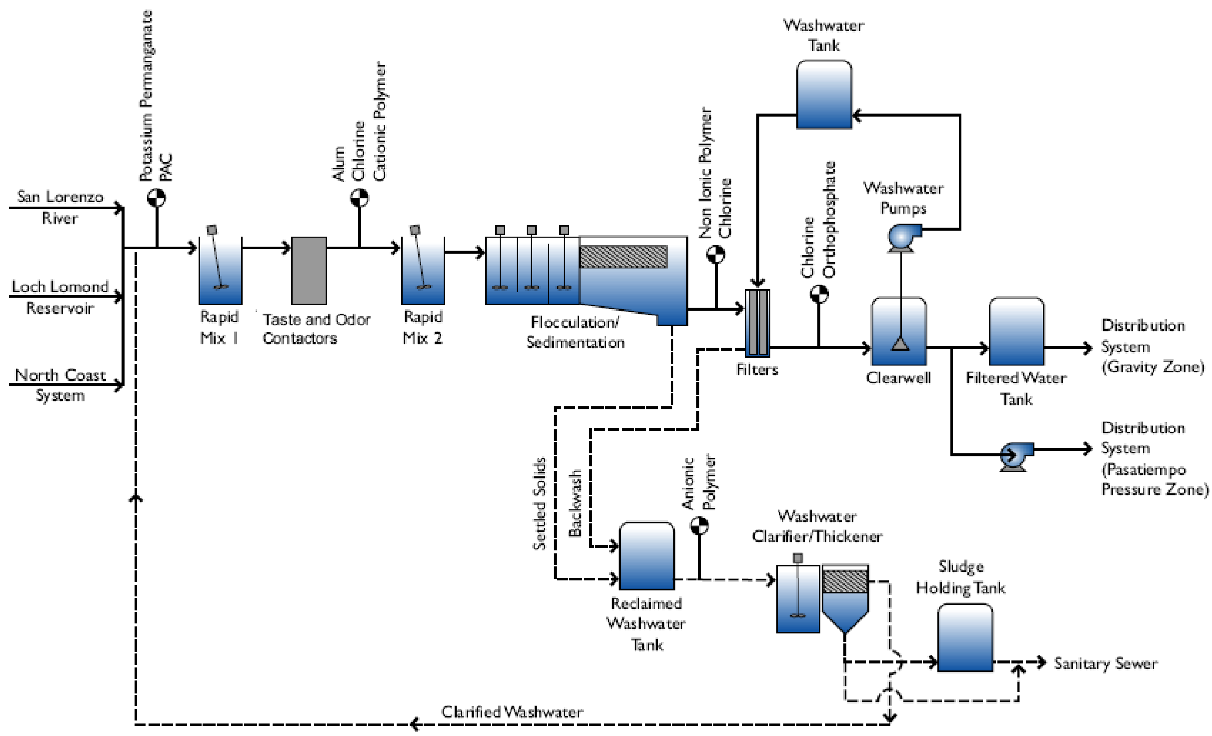
3.1.4 Live Oak Wells

The Live Oak Well system consists of three production wells and a treatment plant located in the southeast portion of the City water service area. The facilities were acquired by the City from the Beltz Water Company in 1964, and are occasionally still referred to as the "Beltz" wells. Wells 8 and 9 were installed in 1998 as replacement wells for Wells 1 and 2, which were damaged in the 1989 Loma Prieta earthquake. Well 7, which began operating in 1974, has been replaced by Well 10. The source of water for these wells is the Purisima Formation, which extends east into the mid-County area and serves as a mutual groundwater resource for 2 other public water agencies, several small water systems, and numerous private wells, of which neighboring Soquel Creek Water District is the single largest user.

3.2 Water Treatment Facilities

The City operates two water treatment facilities. All surface water is treated at the Graham Hill Water Treatment Plant, (GHWTP) which currently has a capacity of about 20 mgd. A process flow diagram of the GHWTP is shown in Figure 3-4. The Live Oak Water Treatment Plant treats groundwater to remove iron and manganese. It has a capacity of 2 mgd.

Figure 3-4. Process Flow Diagram of Graham Hill Water Treatment Plant



Finished water from the GHWTP flows into the distribution system and to the Bay Street Reservoir, some of which is pumped to various elevated pressure zones situated throughout the service area. Treated water from the Live Oak plant is pumped directly into the distribution system.

3.3 Other Key Facilities

Coast Transmission Main The 16-mile long Coast main delivers raw water diverted at the North Coast sources by gravity to the Coast Pump Station, where it is pumped to the GHWTP. The City is in the process of implementing a long-term (10-20 year) rehabilitation and replacement program for the entire North Coast system, including pipeline and diversion structures, to restore its integrity and reduce transmission losses. The system includes five distinct pipeline reaches, much of which is more than 40 years old and prone to leaking. The new pipeline will be replaced partly in its current alignment and partly in a new alignment to avoid sensitive habitats. The first phase between Highway 1 and the Bay Street Reservoir was completed in 2007. The next phase between Highway 1 and the Coast Pump Station began construction in June 2011 and will be completed in March 2012.

Newell Creek Pipeline This 9-mile long, 50-year old pipeline delivers raw water from Loch Lomond Reservoir through Henry Cowell State Park to the GHWTP.

Coast Pump Station The Coast pump station is located next to the Tait Street Diversion and pumps raw water from the North Coast and San Lorenzo River sources up to the GHWTP.

Felton Booster Pump Station This facility is used to move water into and out of Loch Lomond Reservoir. The entire pump station was modernized in 2006.

Treated Water Storage Facilities The City maintains 16 treated water storage reservoirs scattered throughout the service area. The largest is Bay Street Reservoir, which was built in 1924 and is located near the intersection of High and Bay Streets, near the entrance to the University of California, Santa Cruz. Together with the filtered water tank, it provides water pressure to the gravity zone which encompasses the majority of the City water service area (below 182 ft elevation msl), and serves as distribution storage for pumping to elevated zones on the University water system. The reservoir reached the end of its useful life and was deconstructed in 2008. There are currently four 1.5 million gallon temporary storage tanks on the site. These four temporary tanks will be replaced with two 6.0 million gallon permanent tanks between 2011 and 2014.

3.4 Water System Operations

The Water Department follows a variety of policies, procedures, and legal restrictions in operating the water supply system. In general, the system is managed to take advantage of the better quality and least expensive sources as a first priority, and to retain the maximum amount of water possible in Loch Lomond Reservoir to safeguard against future droughts. In addition to considerations for cost, water quality, and storage, legal constraints on the diversion of surface waters contained in the City's water rights govern the operation of the water system. A summary of these water rights is presented below in Table 3-1.

Table 3-1. Summary of Water Rights Held by the City of Santa Cruz

Source	License/ Permit Number	Period	Maximum Diversion Rate (cfs)	Fish Flow Requirement (cfs)	Annual Diversion Limit (mil gal)
North Coast	Pre-1914	Year round	No limit	None	None
San Lorenzo River:					
Tait Street Diversion and Wells	1553, 7200	Year-round	12.2	None	None
Felton Diversion to Loch Lomond Reservoir	16601, 16123	Sept	7.8	10	977
		Oct	20	25	
		Nov-May	20	20	
		Jun-Aug	0	--	
Newell Creek:	9847				
Collection to storage (max amount/year)		Sept-Jun	No limit	--	1,825
Withdrawal		--	--	1	1,042

Water supplies are generally dispatched to meet daily demands in the following order:

1. North Coast
2. San Lorenzo River
3. Live Oak Wells
4. Loch Lomond Reservoir

Due to the excellent water quality and the lowest production cost, the North Coast sources are used to the greatest extent possible. As pre-1914 sources, the City's North Coast diversions are least affected by water rights limitations. Production from these sources is limited by both infrastructure constraints in winter/spring months and by flows in the dry season. Daily production varies seasonally from 5 mgd in spring to 2 mgd in fall.

Additional water needed to meet daily demands is pumped from the San Lorenzo River at Tait Street. Under normal operating conditions, about 7.5 mgd will be produced from the Tait Street Diversion and wells throughout the dry season.

During the summer and fall, when the City's flowing sources are inadequate to meet peak season daily demands, supplemental water is brought in from the Live Oak Wells and from Loch Lomond Reservoir. On a typical summer day the Live Oak Wells contribute about 0.8 mgd. Withdrawals from the reservoir vary between 2 and 4 mgd depending on weather and customer demand. Withdrawals are also made from Loch

Lomond during the winter season when the North Coast and San Lorenzo River sources become untreatable due to excessive turbidity from storm runoff.

The Felton Diversion is operated intermittently as needed. It is normally used in the winter months of dry years, but the diversion dam is inflated every year for maintenance purposes and to facilitate fisheries research.

3.5 In-Stream Flow Releases

In accordance with the requirements of its water rights, the City releases a minimum flow of 1.0 cfs (equal to 0.65 mgd or approximately 20 million gallons per month) from storage in Loch Lomond Reservoir, to support fishery resources beneath the dam.

The City in 2007 voluntarily began releasing in-stream flows from the North Coast system on an interim basis in connection with an ongoing pursuit of an Incidental Take Permit under the Federal Endangered Species Act. Over the last 3 years combined in-stream flow releases on the North Coast system have averaged 0.38 mgd or about 11 million gallons per month to maintain habitat below the diversion points. The City anticipates having to bypass substantially more flow in the future from the North Coast sources and from the San Lorenzo River once an agreement with regulatory agencies has been negotiated.

3.6 Water Production

Total annual water production over the last twenty five years is listed in Table 3-2 and illustrated in Figure 3-5. These numbers represent gross water production, which refers to the total amount of raw water diverted at the source. The figures vary from year to year depending on hydrologic conditions, operations and maintenance, customer demand, and other factors. During this period, gross water production peaked at over 4.4 billion gallons per year in 2000 and has since declined to 3.2 billion gallons per year in 2010. Over the last five years, gross water production has averaged about 3.5 billion gallons per year. The different reasons for the downturn in annual water production observed over the last decade are discussed in Chapter 4.

The percentage of total water supply derived from each source between 2006 and 2010 is illustrated in Figure 3-6. Over the last five years, gross production from the North Coast sources has averaged 1,065 mg, or 30 percent, while the San Lorenzo River supplies (including Tait wells) has averaged 1,889 mg, or about 54 percent of the total annual supply. Together, these flowing sources provide over 80 percent of the City's

Table 3-2. Gross Annual Water Production by Source of Supply (million gallons)

Year	North Coast Streams	San Lorenzo River	Tait Wells (a)	Loch Lomond Reservoir	Live Oak Wells	TOTAL
1985	1,004.4	1,926.7	331.5	793.9	174.7	4,231.2
1986	1,123.3	1,867.5	27.6	1,192.7	33.6	4,244.7
1987	592.5	2,246.5	172.5	971.8	389.6	4,372.9
1988	692.1	2,066.5	294.1	650.4	429.8	4,132.9
1989	872.3	2,187.2	232.3	455.0	298.6	4,045.4
1990	820.6	2,001.2	152.8	187.0	227.4	3,389.0
1991	661.9	1,921.0	251.1	510.1	178.7	3,522.8
1992	633.7	1,807.6	223.1	625.2	264.4	3,554.0
1993	826.1	1,667.2	102.3	1,035.7	135.5	3,766.8
1994	665.6	1,861.0	235.5	931.8	169.1	3,862.9
1995 (b)	1,207.7	1,317.2	256.8	857.2	90.0	3,728.9
1996	1,312.5	1,267.3	9.9	1,389.8	54.7	4,034.2
1997	1,291.6	1,719.6	5.3	1,304.5	79.9	4,400.9
1998	1,484.8	1,527.7	4.8	996.8	99.6	4,113.7
1999	1,580.0	1,966.0	106.1	583.7	92.4	4,328.2
2000	1,417.3	2,073.2	--	797.0	187.0	4,474.5
2001	1,326.5	2,003.0	--	842.4	171.4	4,343.2
2002	1,386.2	1,976.2	--	538.0	143.8	4,044.2
2003	1,297.0	1,917.9	--	748.5	129.7	4,093.0
2004	1,315.4	1,984.4	--	652.6	123.6	4,076.1
2005	1,487.2	1,573.3	--	583.8	84.9	3,729.2
2006	1,603.8	1,610.2	--	467.3	118.5	3,799.8
2007	848.7	2,261.6	--	487.8	178.9	3,777.0
2008	890.2	2,064.9	--	530.4	164.4	3,649.9
2009	814.5	2,037.8	--	197.1	164.4	3,213.9
2010	1,168.1	1,468.5	--	411.0	151.4	3,199.0
1985-2010:						
Average	1,089.4	1,858.5	160.4	720.8	166.8	3,928.0
Percent of Total	27.7	47.3	4.1	18.4	4.2	100.0
Last Five Years:						
Average	1,065.0	1,888.6	--	418.7	155.5	3,527.9
Percent of Total	30.2	53.5	--	11.9	4.4	100.0

Notes:
(a) Tait Wells production is included with the San Lorenzo River beginning in 2000
(b) Coast treated water main placed into service

yearly water needs. Water supplied from Loch Lomond Reservoir averaged 419 million gallons or 12 percent. Groundwater from the Live Oak Wells provided an average of 156 mg or about 4 percent of the City's total annual supply.

Figure 3-5. Gross Annual Water Production 1985-2010

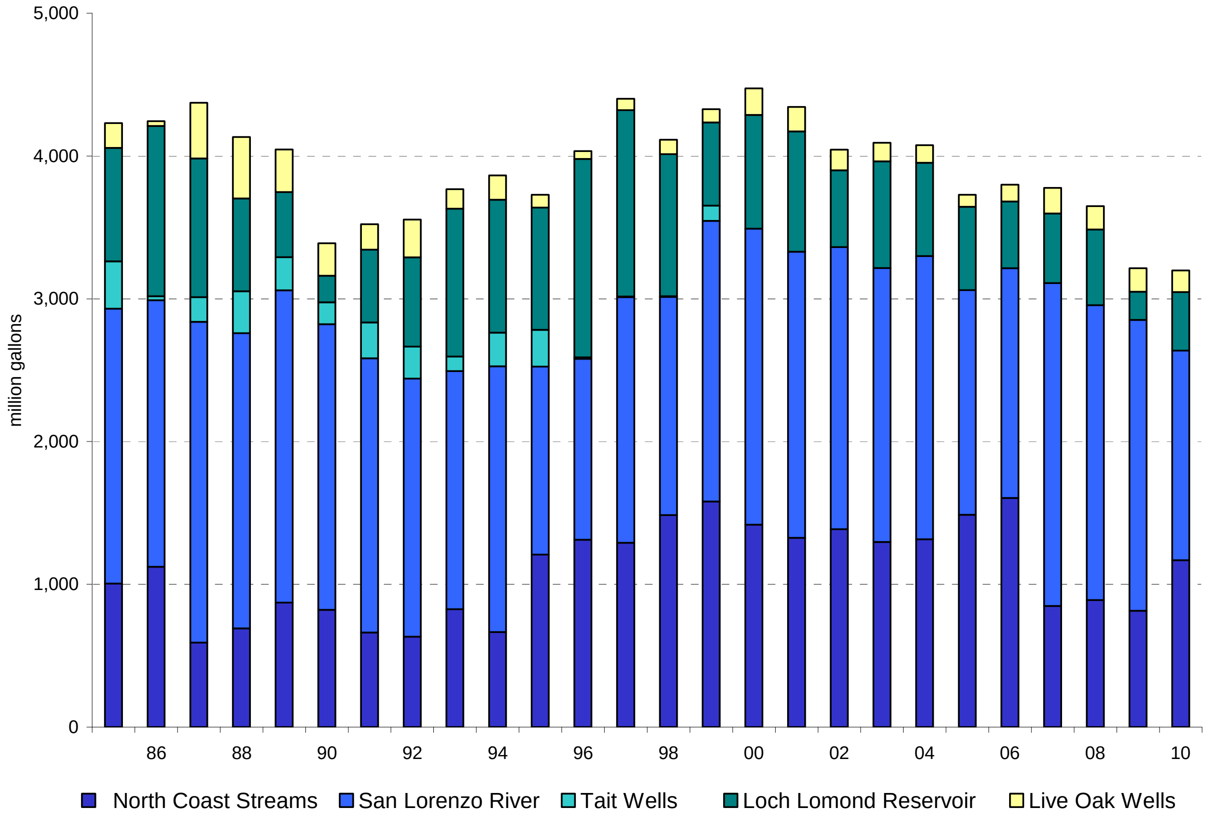
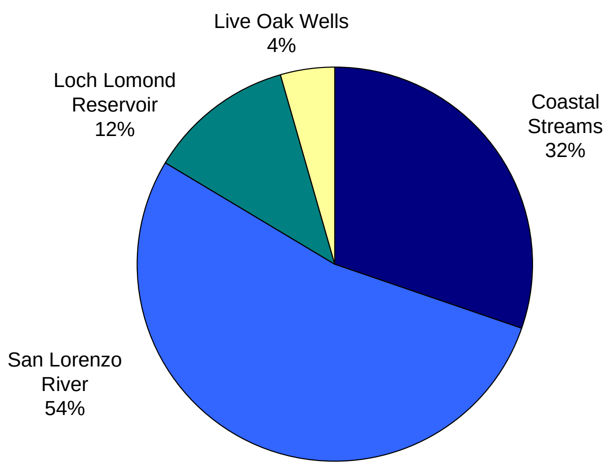


Figure 3.6 Percentage of Total Water Supply by Source, 2006-2010



Net water production, which refers to the amount of treated water produced at the City's two treatment plants entering the distribution system, averages about 4 percent less than gross production. The difference between gross and net production is mainly due to raw water sales, turnouts, maintenance, and losses from leakage on the north coast transmission main. Over the last five years, net water production has averaged 3.4 billion gallons per year.

Treated water production varies seasonally from the low 200 million gallons per month in winter to the upper 300 or low 400 million gallons per month in summer. On a daily basis, water production averages about 10 mgd and ranges between 6 to 8 mgd during the winter season up to 12 or 13 mgd in summer months, with peak days reaching over 14 mgd. Average daily water production today is 1-2 mgd lower it was than 10 years ago, reflecting long-term changes in the amount and pattern of consumer water demand. This trend is consistent with many water utilities across the United States and elsewhere that are experiencing declining water sales (Water Research Foundation, 2010).

3.7 Groundwater

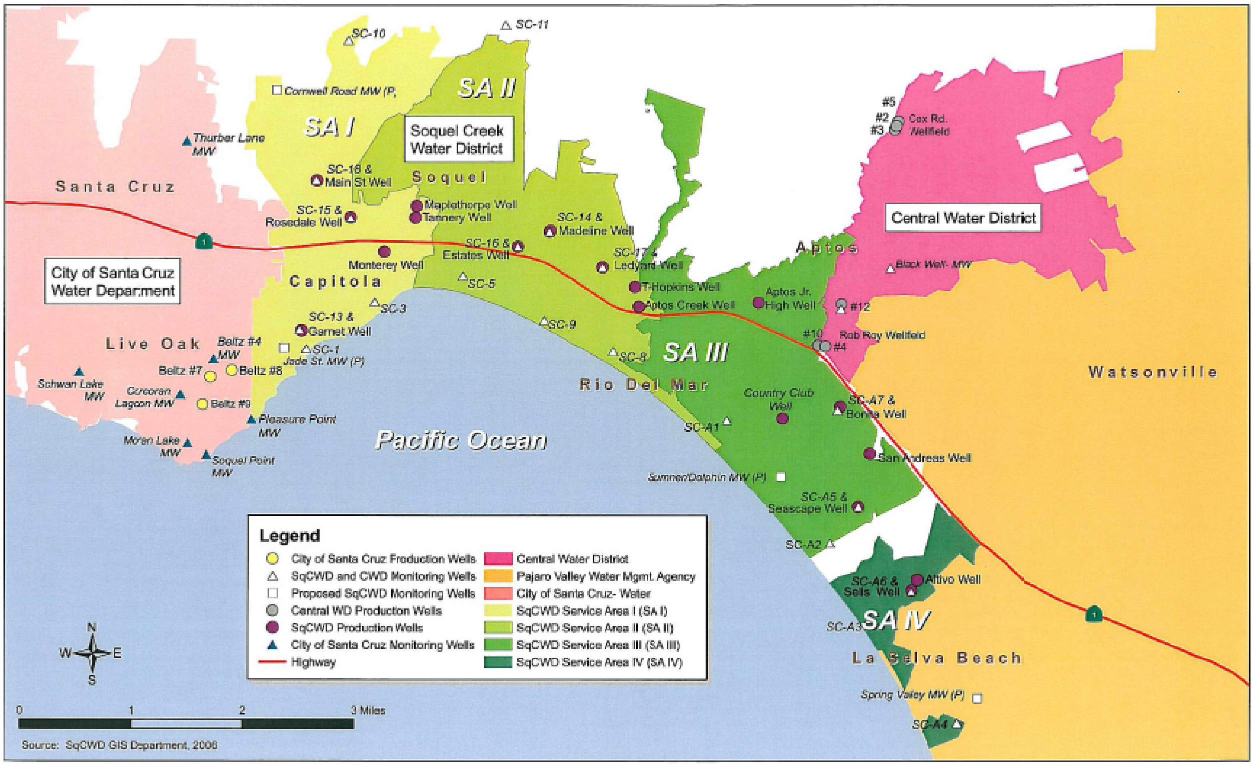
Even though groundwater constitutes only about 4 percent of the entire City water supply on an annual basis, it has been a crucial component of the water system for meeting peak season demands, maintaining pressure in the eastern portion of the distribution system, and for weathering periods of drought since the facilities were acquired from the Beltz Water Company in 1964.

3.7.1 Description of Groundwater Basin

The geographical area from which the City pumps groundwater is technically identified as the *West Santa Cruz Terrace Groundwater Basin* (Basin Number 3-26), whose western and eastern boundaries coincide roughly with the City's water service area (CA DWR, Bulletin 118).

The entire production of the City's Live Oak well field is derived from the Purisima Formation, which is the primary groundwater aquifer underlying entire mid-County region and makes up most of what is commonly referred to elsewhere as the "Soquel-Aptos" basin. Groundwater from the Purisima Formation is used by the City, the Soquel Creek and Central Water Districts, several small water systems, and numerous private rural water wells. A map of the public water system monitoring and production well network is provided in Figure 3-7.

Figure 3-7. Production and Monitoring Wells in the Purisima Formation



The Purisima Formation is a collection of distinct geologic units composed of sandstone interbedded with layers of siltstone and claystone. These units, designated as AA through FF, vary in thickness and hydrogeologic characteristics, with AA being the deepest and oldest unit. The formation is relatively shallow under the City's water service area, but dips southeast, becoming deeper and thicker towards Capitola and Aptos and outcrops at the cliffs along the Monterey Bay shoreline. The A zone is the primary supply for both the City's Live Oak wells and the Soquel Creek Water Districts' Service Area 1 wells and is continuous and connected between these areas of groundwater extraction (Hopkins Groundwater Consultants, 2009). Recharge is thought to occur from deep percolation of rainfall in the upper watersheds and along streambeds of Branciforte Creek, Arana Gulch, Rodeo Creek and Soquel Creek.

3.7.2 Well Operations and Groundwater Production

The City's wells are normally operated 150 to 200 days of the year during the dry season at a steady combined production rate of about 0.8 mgd. Historically, annual groundwater production has varied from less than 100 mgy to as much as 430 mgy, depending on hydrologic conditions and the availability of water from other sources. As indicated above in Table 3-2, groundwater production peaked during the 1987-92 drought. During that period, the system was operated at times at its full 2 mgd design capacity.

Annual water production from the Purisima Formation by the City of Santa Cruz and the Soquel Creek and Central Water Districts over the past five years is presented in Table 3-3 below. In addition, it is estimated that approximately 1,000 +/- private urban, rural, and small water system wells produce an additional 667 mgy from the aquifer (Hydrometrics, 2011).

Table 3-3. Groundwater Production by Public Agencies, 2006-2010 (million gal)

Year	2006	2007	2008	2009	2010
City of Santa Cruz	119	179	164	164	151
Soquel Creek Water District	966	1,027	1,021	934	914
Central Water District	7	4	6	12	7
Total	**1,092**	**1,210**	**1,191**	**1,110**	**1,072**

3.7.3 Groundwater Conditions

At this time, no court or board has adjudicated the right to pump groundwater from the Purisima aquifer, nor has the California Department of Water Resources identified the basin from which the City pumps as overdrafted, or projected that the basin will be overdrafted if present management practices continue.

Even so, the basin long has been recognized locally as being threatened by the problem of overpumping, as evidenced by a decline in static water levels and a broad, persistent trough consistently below sea level surrounding the Soquel Creek Water District's production wells, signaling that cumulative groundwater production exceeds the long-term sustainable yield of the aquifer.

Moreover, there is an ongoing risk of seawater intrusion into productive units of the Purisima Formation due to coastal groundwater levels being below protective elevations that could jeopardize the future production of groundwater by the City. Although all units of the Purisima Formation extend offshore, the westernmost area of the A unit outcrops in the vicinity of Pleasure Point in close proximity to the Live Oak well field. This outcrop provides a pathway for seawater to enter the Unit A aquifer. Even though pumping by the City constitutes a small proportion of the total extraction from the Purisima Formation, because the City's wells are located closest to the shoreline, they would be among the first impacted by seawater intrusion. This potential for seawater intrusion could reduce the City's dry year supply and exacerbate supply shortfalls during extended dry periods.

3.7.4 Monitoring Well Network

To better understand how the Purisima Formation responds to pumping stresses and to detect seawater intrusion, the City has installed and maintains a network of 28 monitoring wells at 13 sites in the Live Oak area. Groundwater levels and water quality, including chlorides, pH, total dissolved solids, general minerals, and other constituents are measured at regular intervals. Several new inland monitoring wells were added in 2009. Data collected from these monitoring wells are shared with adjoining public water agencies.

3.7.5 Cooperative Agreement for Groundwater Management

The City has not prepared a groundwater management plan; however, a groundwater management plan has been prepared by the Soquel Creek and Central Water Districts. This plan was originally prepared by in 1996 and updated in 2007.

In 2005, the City entered into a cooperative agreement with these two water districts and the County of Santa Cruz for groundwater management of the Soquel-Aptos area groundwater (Appendix E). The goals of the agreement are to establish common basin management objectives, undertake joint research projects, and improve interagency coordination to assure the safe production and protect the quality of the underground resource.

There are ongoing discussions between the City and the District about cooperative pumping arrangements that would enable sharing of the western Purisima groundwater resource. Soquel Creek Water District recently prepared a Well Master Plan and an accompanying EIR that calls for adding a new production well at the O'Neill Ranch in Soquel. This new well would allow the District to decrease its pumping near the coast and in the Aromas aquifer to the east, but would intensify pumping in the western Purisima aquifer. The City's concern is that this new well could pose a significant threat to its coastal well field by intercepting groundwater flow. Due to this and other concerns raised during the draft EIR public review period, the District is deferring implementation of the O'Neill Ranch well.

3.7.6 Acknowledgement of Reduced Groundwater Availability

The City has recently been advised by its hydrogeologist that the yield of the Live Oak well field now is substantially less than the 420 mgy that the City had long assumed for water supply planning purposes, and that the dry season pumping rate that can be sustained without causing seawater intrusion in average years appears to be not more than 170 mgy (Hopkins, 2010). Likewise, the Soquel Creek Water District recently has been presented with a reevaluation of the safe yield of the Soquel Aptos basin that is considerable lower than previously thought.

Because of reduced groundwater availability, the City also is looking to relocate pumping facilities further inland, has an option to purchase a parcel of land, and is proceeding toward construction of a new inland well in order to maintain the ability going forward to produce 215 mgy in drought conditions.

This unexpected loss of drought year groundwater yield is emblematic of the continuing change and uncertainty facing the City in its effort to provide a safe, reliable, and adequate municipal water supply.

3.8 Projected Water Sources

Water Code Section 10631(b) requires water suppliers to:

> *"Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier, in five-year increments, to 20 years or as far as data is available."*

Estimates of existing and planned sources of water available to the City are presented below in Table 3-4. The figures for flowing sources (North Coast and San Lorenzo River) were developed using the City's water supply operations model and represent net production averaged over a 73-year hydrologic period based on a demand condition described in Chapter 4 as *Scenario 2*. The model incorporates best available information about future operations beginning 2015 under a yet to be approved Habitat Conservation Plan[1]. This plan assumes more water will be needed for in-stream flows to support anadromous fisheries and aquatic habitat - primarily on the North Coast - and less water will be available for municipal drinking water purposes. The actual amount that will be lost for fisheries and habitat enhancement is unknown at this time, however,

[1] Model runs are based on Tier 2 stream flows, consistent with the draft conservation strategy of the HCP.

and will depend on the outcome of negotiations between the City and regulatory agencies.

Table 3-4. Existing and Planned Water Sources

<table>
<tr><th></th><th>2010</th><th>2015</th><th>2020</th><th>2025</th><th>2030</th></tr>
<tr><td>Water purchased from DWR or USBR</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Water purchased from wholesaler</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Supplier-produced groundwater</td><td>170</td><td>170</td><td>170</td><td>170</td><td>170</td></tr>
<tr><td>Supplier-produced surface water:
- North Coast Sources
- San Lorenzo River
- Loch Lomond Reservoir (a)</td><td>
1,150
1,770
1,040</td><td>
860
1,940
1,040</td><td>
860
1,990
1,040</td><td>
860
2,040
1,040</td><td>
860
2,090
1,040</td></tr>
<tr><td>Transfers in</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Exchanges In</td><td></td><td></td><td colspan="3" rowspan="2">Potential exchange of 30-50 mgy of recycled water from the City of Scotts Valley Wastewater Plant to irrigate Pasatiempo golf course for delivery of 30-50 mgy of treated water to Scotts Valley Water District starting 2020</td></tr>
<tr><td>Recycled Water</td><td></td><td></td></tr>
<tr><td>Desalinated Water</td><td></td><td colspan="4">Potential production of 586 mgy in average water years for transfer to Soquel Creek Water District starting 2016</td></tr>
<tr><td>Other</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Total</td><td>4,130</td><td>4,010</td><td>4,060</td><td>4,110</td><td>4,160</td></tr>
</table>

<u>**Notes:**</u>
(a) 102 mg of the 1040 annual diversion limit from Loch Lomond Reservoir is technically allocated to the San Lorenzo Valley Water District. It could begin using this source sometime within the next 5-10 years.

The basis for these projections is as follows:

<u>Live Oak Wells</u> The 170 mgy figure is based on the City's current understanding of the safe annual, sustainable yield of the City's portion of the groundwater system. This production volume is considered to be representative of both current and future extraction rates.

<u>North Coast</u> The 2010 production volume of 1,150 mgy is based on current operations and infrastructure constraints. This source in all likelihood will not be available at the same level in the future as it has been in the past. It is presently estimated that the average yield of this source will be reduced by some 300 mgy in future years as a result of increased in-stream flows needed to satisfy federal and state endangered species regulations.

San Lorenzo River The 2010 production volume of 1,770 mgy represents the estimated average production from the river under current operations at demand level of 3.5 bgy. The increase in production that occurs between 2010 to 2015 is a direct result of the reduction in yield from the North Coast that is partly compensated for by larger diversions from the river source. Thereafter, increases in river production between 2015 and 2030 reflect changes in annual water demand that are able to be met from this source.

Loch Lomond Reservoir The 1,040 mgy figure represents not modeled production volumes but rather the maximum amount of water that the City may withdraw annually under its current water rights. Of this annual amount, San Lorenzo Valley Water District retains an historical allotment of 102 mgy of raw water from the reservoir for treatment in District owned and operated facilities. The District has discussed the option of purchasing treated water from the City and in 2010 completed a Source Development Study to examine the technical feasibility and establish the costs for utilizing this allotment (SPH Consulting Engineers, 2010). Currently the District has no infrastructure to treat and deliver Loch Lomond water but expects to finance and construct improvements sometime within the next five to ten years to utilize this source (Jim Mueller, 2011).

In total, existing and planned sources of water available to the City over the next twenty years, on average, are estimated to be between 4.01 and 4.16 bgy.

Recycled Water/Exchange As explained more fully in Chapter 7, the City is exploring the concept of a regional water exchange project involving the Scotts Valley Water District and the Pasatiempo Golf Course. The project would use 30 to 50 mgy of recycled water from Scotts Valley and well water to irrigate the golf course during the summer instead of potable water from the City's system. The same volume of potable water then would be provided to the District during the winter when City has some excess supply available. The exchange would not lessen the amount of water produced by the City, but would shift demands from the peak season to non-peak times of the year and lessen summer reservoir withdrawals, beginning around year 2020 (Kennedy/Jenks Consultants, 2011).

Desalination As explained in Chapter 5, the City and Soquel Creek Water District are jointly pursuing the development of a 2.5 mgd seawater desalination plant, which would function as a backup water supply in times of drought for the City and as a supplemental water source for the District in non-drought to restore groundwater levels and prevent seawater intrusion. Under average conditions, the plant would be operated at less than full capacity, estimated at 1.6 mgd, for the benefit of District. Thus no production volumes for the City are shown in Table 3-4. However, the strong possibility exists that loss of surface water due to implementation of endangered species laws could result in operation of the plant for the City during non-drought years in the future. Otherwise, the City will continue to rely on its existing water sources, which total about slightly more than 4.0 billion gallons per year, into the foreseeable future.

Chapter 4

PAST, CURRENT, AND PROJECTED WATER USE

This chapter describes the City's customer classification system and the water use characteristics of the different customer groups, summarizes ongoing trends in water consumption, and presents projections of water use out to the year 2030. This chapter also provides a detailed description and calculations for the City's baseline daily per capita water use and future water use targets, in accordance with technical methods developed by the California Department of Water Resources, as required by Water Code section 10608.

4.1 Customer Classification System

The City divides its water customers into eight major classes and one miscellaneous category, as follows:

Single Family Residential: Individually metered residential units (regardless of housing type).

Multiple Family Residential*:* Any residential account with more than one dwelling unit served by one water meter.

Business: Commercial establishments including restaurants, hotel/motel, retail, medical, schools, offices, churches and mixed-use buildings. This category also includes county and state government accounts.

Industry/UCSC: This category is comprised of one primary customer - the University of California, Santa Cruz - and a small number of manufacturing businesses.

Municipal: These are City-owned and operated facilities such as city offices, parks, police and fire stations, wastewater treatment plant, street medians, and parking lots.

Irrigation: Dedicated water services for landscape irrigation associated with large multiple residential complexes and homeowners associations, or with commercial, industrial, and institutional sites, including schools, churches, parks, etc.

Golf Irrigation: Accounts serving the two golf courses in the service area.

Coast Irrigation: Agricultural accounts receiving untreated water on the north coast.

Other: Miscellaneous uses such as temporary construction accounts, hydrant meters, and bulk water sales.

No water is presently sold to other agencies, or used for groundwater recharge, saline water intrusion barriers, conjunctive use, or any combination thereof.

4.2 Water Use by Customer Category

The number of active water service accounts and annual water consumption volumes from 2000 to 2010 are provided in Tables 4-1 and 4-2, according to customer category. As of calendar year 2010, there are currently 24,341 active, metered service accounts on the City water system. The water system has no unmetered service connections.

Table 4-1. Number of Water Service Accounts

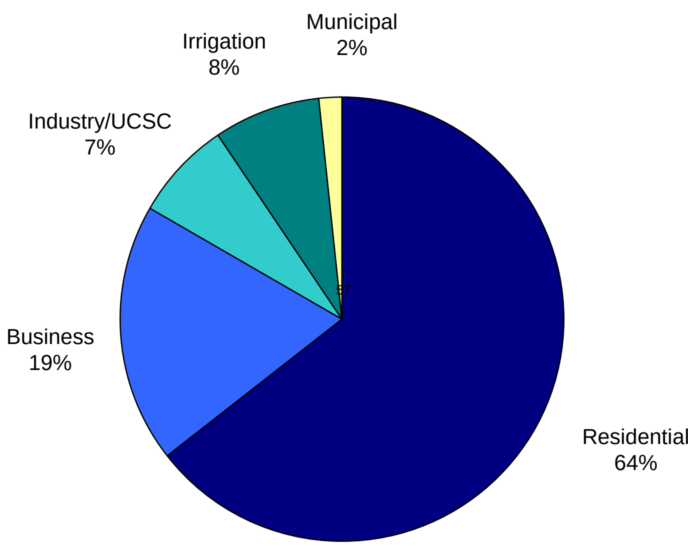
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Single Residential	17,870	17,984	18,182	18,290	18,352	18,443	18,566	18,746	18,759	18,816	18,862
Multiple Residential	2,573	2,584	2,583	2,602	2,636	2,668	2,675	2,697	2,702	2,713	2,726
Business	1,927	1,898	1,891	1,893	1,886	1,881	1,886	1,881	1,878	1,888	1,885
Industrial	60	60	60	57	56	55	52	52	52	52	50
Municipal	217	224	224	229	230	230	229	222	205	227	224
Irrigation	351	358	385	400	412	418	427	432	433	441	444
Golf Course Irrigation	6	6	6	6	6	6	6	6	6	6	6
Coast Irrigation	22	34	31	30	36	30	32	33	29	36	34
Other	144	162	229	217	185	193	223	236	164	131	120
TOTAL	**23,170**	**23,310**	**23,591**	**23,724**	**23,799**	**23,924**	**24,096**	**24,305**	**24,228**	**24,310**	**24,351**

Table 4-2. Water Consumption by Customer Category (million gallons)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Single Residential	1,469	1,486	1,503	1,502	1,521	1,424	1,359	1,357	1,374	1,217	1,185
Multiple Residential	873	859	836	812	815	798	752	728	735	687	691
Business	733	717	696	666	678	671	630	636	610	554	527
Industrial	377	342	233	247	249	229	236	238	240	185	227
Municipal	58	63	60	64	63	55	53	59	66	46	49
Irrigation	121	130	129	132	138	124	118	131	137	91	96
Golf Course Irrigation	94	110	114	108	111	80	83	111	120	91	78
Coast Irrigation	28	48	41	68	81	62	76	26	26	18	21
Other	3	3	4	3	4	5	4	3	4	4	2
TOTAL	3,755	3,757	3,615	3,603	3,660	3,448	3,311	3,287	3,311	2,893	2,875

A breakdown of total water used by these major customer categories, based on an average over the last 5 years, is presented below in Figure 4-1. In this chart, the two residential categories are combined together into one residential sector, as are three irrigation categories to show five principal customer sectors.

Figure 4-1. Percentage of Total Water Use by Customer Category, 2006-2010



The single family residential class is the City's largest customer category in terms of both the number of accounts and total amount of water consumed. This group of customers represents about 41 percent of metered system water use. The multiple family residential category constitutes another 23 percent of system use. Together, residential use accounts for almost two thirds of the total water supplied by the Santa Cruz water system.

The majority of water used in this category is for interior domestic purposes such as showering, bathing, flushing, cooking, cleaning, and clothes washing, as well as for outdoor uses including landscape and garden irrigation, spas and swimming pools, and car washing. Figure 4-2 below provides a breakdown of average residential water use into indoor and outdoor components. The overall proportion of residential water use going to outdoor purposes in single family homes in Santa Cruz - about 25 percent - is considerably lower than the statewide average of about 53 percent due to the City's local maritime climate and other factors (Aquacraft Engineering, 2011). Within individual homes, this breakdown between indoor and outdoor usage, as well as overall water usage, varies widely depending on the number of residents, the type of water using fixtures and appliances, the size of the lot, and type of landscaping.

Figure 4-2. Average Indoor and Outdoor Water Use

The remaining one-third of system water use goes to local businesses and industry, large landscape irrigation, coast agriculture, and municipal water accounts. The University of California currently represents about 6 percent of system demand. The coast irrigation category uses 2 percent for the cultivation of commercial agriculture crops, including Brussels sprouts, strawberries, and organic herbs and vegetables. The municipal category also uses about 2 percent of the City water supply, most of which goes to turf watering and landscape irrigation at the City's 23 regional and neighborhood parks. County parks are included within the irrigation category.

4.3 Annual Trends in Water Consumption

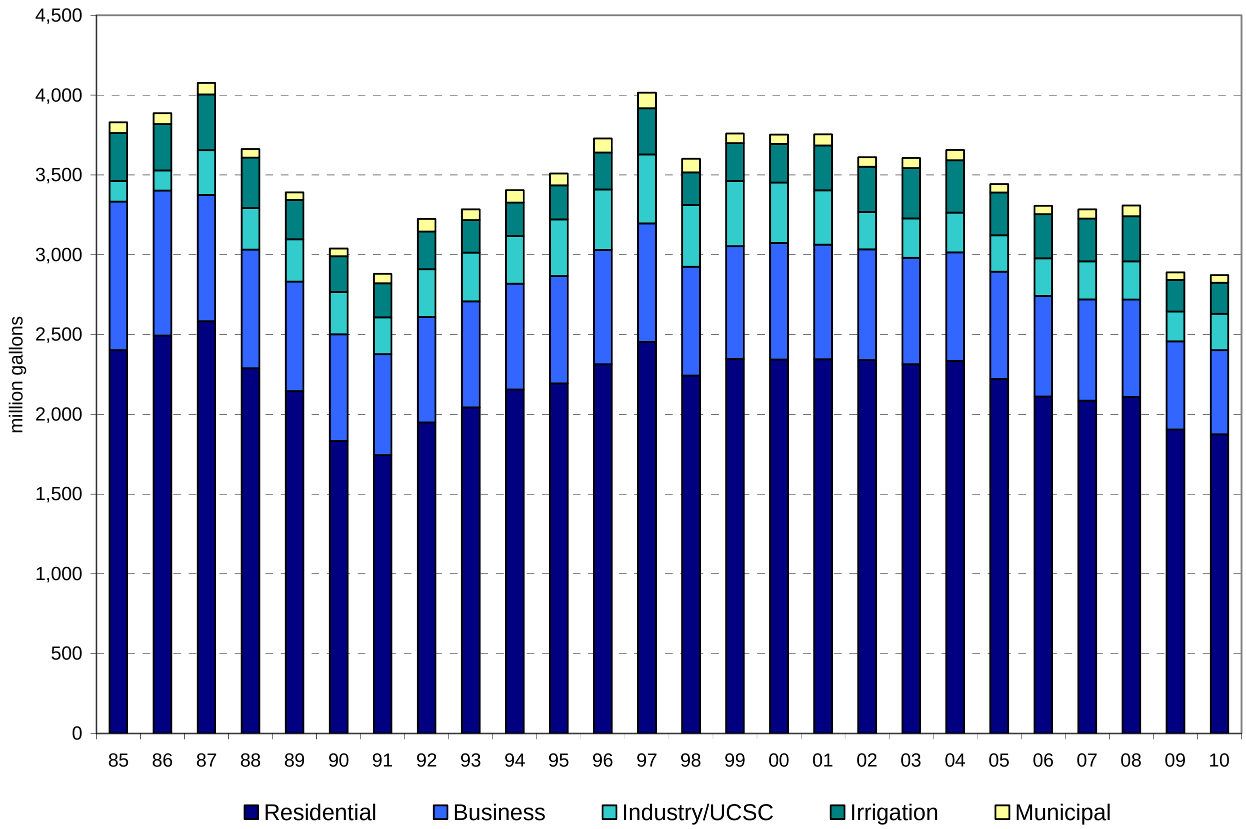
Figure 4-3 shows the trend in total annual metered water use over the last twenty-five years, by major customer category. During this period, water use has fluctuated from a high of 4.1 billion gallons per year (bgy) in 1987 to its current low of 2.9 bgy.

The steep decline in water use from 1987 to 1991 was due to water use restrictions and rationing imposed during the 1987-92 drought. After restrictions ended, water use gradually recovered over a period of several years and then stabilized at a level of about 3.75 bgy at the beginning of the decade. Aside from the slight drop that occurred between 2001 and 2002 resulting from the closure of the Texas Instruments plant, overall water consumption remained remarkably steady during a six-year period from 1999 through 2004.

Since then, total water use has declined, in two distinct steps. The first downturn, which began in 2005, was concurrent with the introduction of a modified rate structure affecting single family and two-unit residential customers, the first of several phased rate increases for all customers, and a transition to monthly from bimonthly billing frequency inside the City. Between 2005 and 2008, total water use declined by about

340 million gallons per year or about 8 percent compared to levels existing in the early 2000s. This decline was broad-based and reflected in almost every major customer category to a varying degree.

Figure 4-3. Annual Water Consumption, by Customer Category (million gallons)



The second recent downturn in overall water consumption occurred in 2009. This drop is mostly attributable to mandatory water restrictions and temporary demand reduction measures imposed as a result of a City-declared Stage 2 water shortage following a third consecutive year of below normal rainfall and runoff. As a result, total annual water use fell below 3.0 bgy in 2009. It remained low through 2010, even though restrictions had been rescinded, reflecting abnormally cool and foggy weather conditions.

Other factors influencing the observed downturn in water consumption since 2000 include ongoing water conservation efforts and effects from both the housing market collapse and recent economic recession. Overall water use in 2010 is almost 900 mgy or 23 percent less than it was in 2000, despite a 6 percent increase in population over that same time. This reduction is greater in magnitude than the total amount of water used by the City's multiple family residential category back in the early 2000s. As occurred after the 1976-77 and 1987-92 droughts, it is expected that water use will eventually recover at least to levels experienced prior to 2009 and reach a new equilibrium with time. How long that may take, however, remains uncertain.

4.4 Unmetered Water Use and System Losses

Total system water demand includes not only metered water sales but also authorized, unmetered uses from fire hydrants such as main flushing, fire fighting, street sweeping, and sewer flushing, as well as losses due to underground leaks. The difference between the amount of water produced at the City's two water treatment plants entering the distribution system and the amount of water consumed, including both metered and unmetered uses, is referred to as system water losses. System losses have two components: physical losses from leaking service lines and water mains, and apparent losses in which actual consumption is underreported due to sales meter inaccuracies and other factors.

The City has conducted audits of the distribution system annually since the late 1990's to account for unmetered water uses and to track how much water is lost to leakage over time. Authorized unmetered uses over the last 10 years have ranged from 21 to 44 mgy and average 33 mgy. Physical losses from underground leakage in service lines, water mains, valves, and distribution system controls have ranged from 124 to 256 mgy and average 200 mgy or 5.6 percent over the last ten years. In addition, it is estimated that another 65 mgy or about 1.8 percent of water entering the distribution system is used but not captured on the billing system due to sales meter underregistration.

The City uses AWWA water balance software to help quantify and track water losses associated with the water distribution system and identify areas for improved efficiency and cost recovery.

4.5 Baseline and Target Per Capita Water Use

Water Code section 10608.20(e) requires water suppliers to:

> *"…include in its urban water management plan …the baseline daily per capital water use, urban water use target, interim water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data."*

4.5.1 Background Information

In February 2008, Governor Schwarzenegger introduced a seven-part comprehensive plan for improving the Sacramento-San Joaquin Delta. As part of this effort, the Governor directed state agencies to develop a plan to reduce statewide per capita water use by 20 percent by the year 2020.

The 20x2020 Water Conservation Plan was designed to address several key questions, including the following:

- What is per capita use?
- How does it vary across the state?
- What is the conservation potential from current measures and new actions?
- Is it feasible to expect a 20 percent reduction in per capita water use?

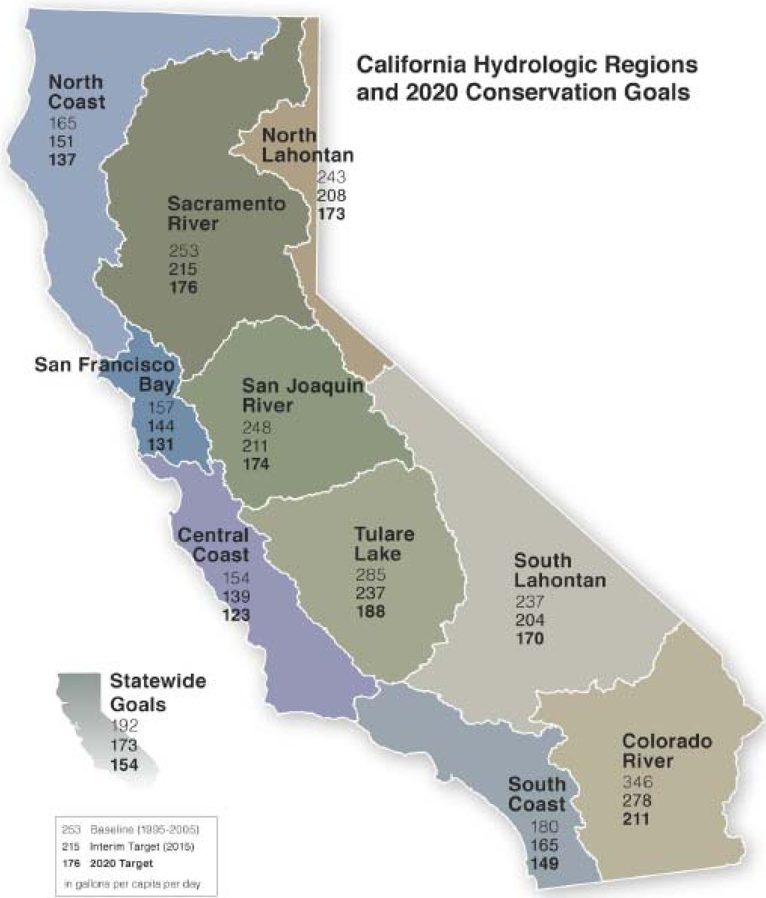
The final 20x2020 Water Conservation Plan was issued February 2010 (DWR, 2010). It reported urban water use currently varies between **152 gpcd** in the Central Coast region (Region 3) to **346 gpcd** in the Colorado River region (Region 10) and averages **192 gpcd** statewide**.** The report concluded that California could achieve a 20 percent reduction in urban per capita water use to an average of **154 gpcd** using current and new conservation actions. It also established for water resources planning purposes baseline values and future water use targets for each of the state's ten hydrologic regions, summarized in Table 4-3 and Figure 4-4.

Table 4-3. Regional Urban Water Use Targets (gallons per capita per day)

	DWR Hydrologic Region									
	1 North Coast	**2** San Francisco Bay	**3** Central Coast	**4** South Coast	**5** Sacra-mento River	**6** San Joaquin River	**7** Tulare Lake	**8** North Lahontan	**9** South Lahontan	**10** Colorado River
Baseline (1995-2005)	165	157	154	180	253	248	285	243	237	346
Interim 2015 Target	151	144	139	165	215	211	237	208	204	278
2020 Target	137	131	123	149	176	174	188	173	170	211

The 20x2020 Water Conservation Plan recognized even within hydrologic regions, there is significant variation in use due to climatic, demographic, or economic factors as well as differing levels of conservation implementation. It also recognized that available data were not complete and accuracy levels vary significantly among water suppliers. Accordingly, it cautioned that the analyses in the report are to be viewed as initial estimates, and that an important step in implementing the plan will be to improve and standardize the data collection process.

Figure 4-4. Regional Urban Water Use Targets



4.5.2 SBx7-7, the Water Conservation Act of 2009

In November 2009, California placed the 20x2020 goal into statute with the enactment of Senate Bill x7-7 as part of an historic package of water reforms. The legislation sets a goal of reducing urban per capita water use by 20 percent by December 31, 2020 and mandates water conservation targets and efficiency improvements for urban water suppliers. A copy of the law is included as Appendix B.

To provide for consistent implementation of the law, suppliers are required to conform to Technical Methodologies prepared by the CA Department of Water Resources, which detail the process that urban water suppliers are to follow and the options available for complying with the legislation (DWR, February 2011). Water suppliers have some flexibility in setting and revising water use targets. For instance, a water supplier may set its water use target and comply individually, or as part of a regional alliance. The City of Santa Cruz is electing to report as an individual retail supplier.

The baseline and target water use development process consists of four basic steps, which are summarized below and detailed in a flow chart in Appendix F.

Step 1: Determine Base Daily Per Capita Water Use
Step 2: Determine Urban Water Use Target
Step 3: Confirm Urban Water Use Target
Step 4: Determine Interim Urban Water Use Target

4.5.3 Step 1 - Determine Base Daily Per Capita Water Use

Under SBx7-7, water suppliers must define two baseline periods. The first is a continuous 10-year baseline period (or 15-year period if more than 10 percent of system water demand is met through recycled water) ending no earlier than December 2004 and no later than December 2010. The City does not provide recycled water service so the 15-year baseline period does not apply. The 10-baseline period selected by the City of Santa Cruz is **2001-2010**.

The second is a five-year baseline period ending no earlier than December 2007 and no later than December 2010. This second baseline period pertains in Step 3. The 5-baseline period selected by the City of Santa Cruz is **2003-2007**.

4.5.3.1 Gross Water Use

The calculation of per capita water use involves two basic factors: 1) the gross amount of water supplied to a distribution system over a specified period of time, and, 2) service area population[1]. Gross water use includes not just residential consumption but all the other uses of water in a community, including schools, parks, and commercial buildings such as restaurants, hotels, and office buildings. It also captures water used for public purposes, such as firefighting and water main flushing, and losses that arise from leaks on the water system.

[1] The terms “gross water use” as used in this chapter and “net water production” used in Chapter 3 mean effectively the same thing; i.e., they both refer to treated water production volumes supplied to the distribution system.

Gross water use within the City of Santa Cruz water service area is presented on a **calendar year basis** for the period 2000 through 2010 in Table 4-4 [2]. Gross water use was determined in a manner that is consistent with the definition in Water Code section 10608.12(g) and the method outlined in the AWWA Manual M36 as part of the City's annual distribution system water audit process. These annual water use figures represent the total amount of treated water entering the distribution system from the City's Graham Hill and Live Oak treatment plants, after corrections have been applied to adjust for both production meter accuracy and net change in distribution system storage at the beginning and end of the year.

Table 4-4. Gross Water Use (a)

Base Period Year:		Million gallons per year (mgy)	Million gallons per day (mgd)	Gallons per day
Sequence Year	Calendar Year			
0	2000	3,987	10.9	10,924,356
1	**2001**	3,962	10.9	10,854,986
2	**2002**	3,909	10.7	10,708,219
3	**2003**	3,898	10.7	10,679,890
4	**2004**	3,895	10.7	10,672,274
5	**2005**	3,567	9.8	9,771,315
6	**2006**	3,570	9.8	9,780,219
7	**2007**	3,590	9.8	9,836,411
8	**2008**	3,565	9.8	9,767,699
9	**2009**	3,169	8.7	8,681,123
10	**2010**	3,103	8.5	8,501,074

Notes:
(a) For the City of Santa Cruz, gross water use is entirely based on volumes from its own sources; no water is imported into or exported out of the service area nor is recycled water used, directly or indirectly, within the service area.

4.5.3.2 Service Area Population

Estimates of the City's water service area population area based on data published by the U.S. Census Bureau and the California Department of Finance (DOF). Because the City's service area boundary does not coincide neatly with census tract or blocks, estimates must be derived using a Geographic Information System. A map showing the City's service area boundary and census tracts is provided in Appendix G.

[2] The 10-year baseline period selected by the City is 2001-2010; however the analysis of per capita water use is extended back to the year 2000 to capture both the 2000 and 2010 US census.

Population data is readily available on an annual and decennial basis only for the City of Santa Cruz as a whole. Outside the City limits, however, in the parts of unincorporated Santa Cruz County and the City Capitola that are served by the City water system, population data are available only every ten years through the census. In such situations, it is standard practice among water utilities to estimate population growth in non-census years by applying a locally derived ratio of persons per residential connection to changes in active single and multi-family residential connections over time. Between 2000 and 2010, approximately 425 residential accounts, mostly single family residential, were added to the system outside the City limits. But because census data indicates that the overall population outside the City actually declined during this period, this approach was not considered to be applicable or appropriate. Therefore, annual estimates of the outside city population were derived simply by interpolating between the 2000 and 2010 census years.

Table 4-5 provides estimated population inside the City of Santa Cruz, outside the City and total service area on an annual basis for the period 2000-2010.

Table 4-5. City of Santa Cruz Water Service Area Population

Base Period Year		**Santa Cruz City Population** (a)	**Outside City Population** (b)	**Service Area Population**
Sequence Year	**Calendar Year**			
0	2000 (c)	54,588	31,609	**86,197**
1	**2001**	54,451	31,583	**86,034**
2	**2002**	54,660	31,556	**86,216**
3	**2003**	55,361	31,530	**86,891**
4	**2004**	56,048	31,503	**87,551**
5	**2005**	56,394	31,477	**87,871**
6	**2006**	56,692	31,451	**88,143**
7	**2007**	57,352	31,424	**88,776**
8	**2008**	58,002	31,398	**89,400**
9	**2009**	59,016	31,371	**90,387**
10	**2010**	59,946	31,345	**91,291**

Notes:

(a) Source: US Census, DOF http://www.dof.ca.gov/research/demographic/reports/estimates/e-4/2001-10/documents/E-4_2010.xls

(b) Source: US Census only, 2000 and 2010

(c) Year 2000 is included for reference purposes only since it was a Census year

4.5.3.3 Base Daily Per Capita Water Use

The calculation of base daily per capita water use combines information provided in Tables 4-4 and 4-5, and is expressed in gallons per capita per day in Table 4-6.

Table 4-6. Base Daily Per Capita Water Use Calculation For Section 10608.20

Base Years	Service Area Population	Gross Water Use (gal per day)	Daily Per Capita Water Use (gpcd)
2001	86,034	10,854,986	**126.2**
2002	86,216	10,708,219	**124.2**
2003	86,891	10,679,890	**122.9**
2004	87,551	10,672,274	**121.9**
2005	87,871	9,771,315	**111.2**
2006	88,143	9,780,219	**111.0**
2007	88,776	9,836,411	**110.8**
2008	89,400	9,767,699	**109.3**
2009	90,387	8,681,123	**96.0**
2010	91,291	8,501,074	**93.1**
		Total of Column (4):	**1126.6**
		Divide Total by Number of Base Years:	**112.7**

Over the last ten year period, per capita water use has declined from about **126 gpcd** in 2001 to **93 gpcd** in 2010. The City's 10-year base daily per capita water use (ending 2010), as determined in accordance with the technical methodologies, is **113 gpcd**. This level of per capita water use is substantially lower than average values of **192 gpcd** for the state as a whole or **154 gpcd** for the Central Coast Region reported in the 20x2020 plan.

Per capita water use and estimated service area population are presented graphically in Figure 4-5. A breakdown of the City's per capita water use by major customer sector is provided in Figure 4-6.

4.5.4 Step 2 - Determine Urban Water Use Target

Under SBx7-7, urban water suppliers must next set a 2020 water use target using one of the following four methods:

Figure 4-5. Per Capita Water Use and Service Area Population

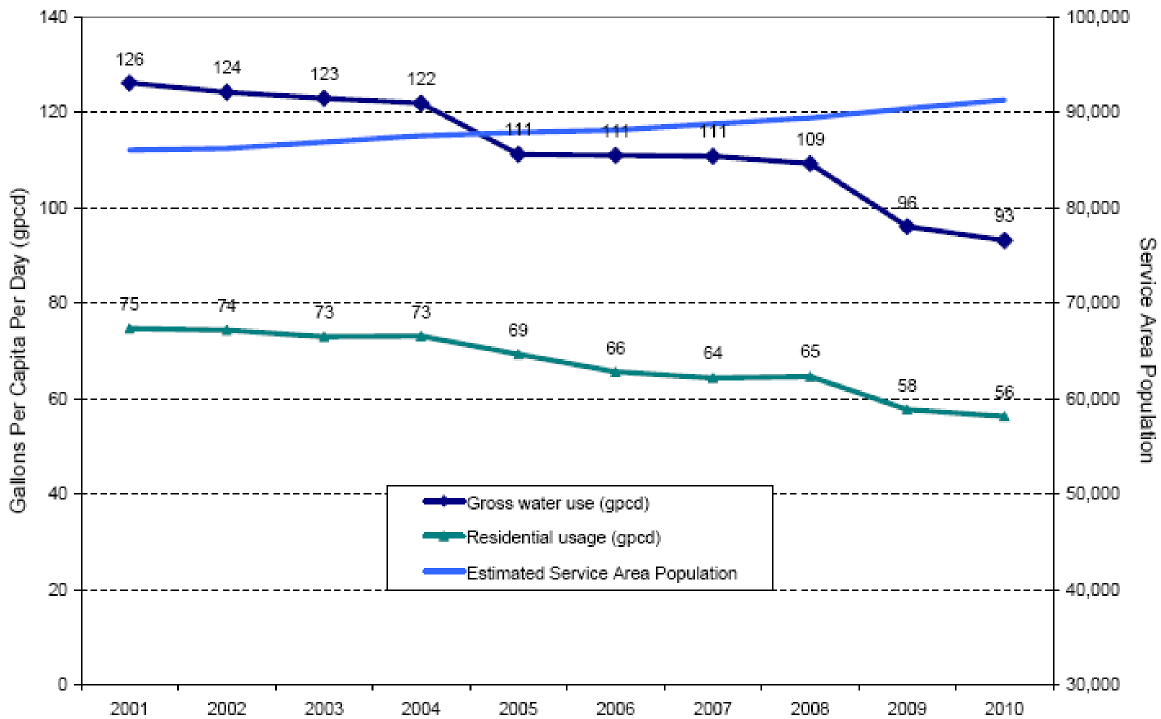
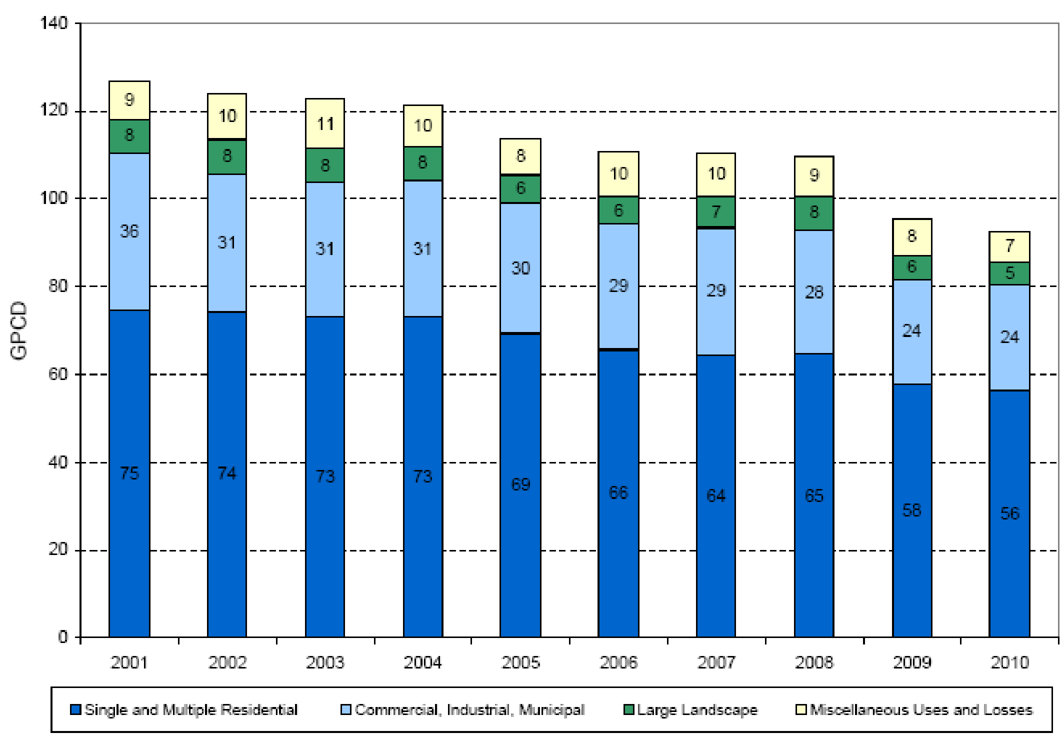


Figure 4-6. Per Capita Water use by Sector



Method 1: Eighty percent of the water supplier's baseline per capita water use.

Method 2: Per capita daily water use estimated using the sum of performance standards applied to indoor residential use; landscaped area water use; and commercial, industrial and institutional water uses.

Method 3: Ninety-five percent of the applicable state hydrologic region target as stated in the States' April 30, 2009, draft 20x2020 Water Conservation Plan (see Table 4-3).

Method 4: A provisional method developed by CA DWR that assumes savings due to metering of unmetered connections and achieving water conservation measures in three water use sectors.

The City of Santa Cruz is opting to use Method 3. Options 2 and 4 were considered and not selected because they require intensive data not currently being collected within the City's service area, and there is no rational basis at this time that the City could achieve another sustainable 20 percent reduction under Option 1 by 2020 given its already low per capita water use.

For the Central Coast Region, 95 percent of the region's 2020 target is **117 gpcd** (0.95 x 123 gpcd = 117 gpcd). Clearly the City has achieved a level of water use that is more efficient than this future target already, since both the City's 10-year baseline use of 113 gpcd and its current level of use of 93 gpcd are already lower than the 2020 target using Method 3.

4.5.5 Step 3 - Confirm Urban Water Use Target

Water Code section 10608.22 requires water suppliers to achieve at least a 5 percent minimum reduction in per capita water use, as compared to a different, 5-year baseline period, as mentioned earlier in section 4.5.3. The 5-year baseline period may end no earlier than December 2007 and no later than December 2010. The 5-year baseline period selected by the City of Santa Cruz is **2003-2007**.

The City's 5-year baseline water use calculates out to be **116 gpcd** (Table 4-7)**.** Accordingly, the City's maximum allowable gpcd target in 2020 (per section 10608.22) is **110 gpcd** (0.95 x 116 gpcd = 110 gpcd).

Table 4-7. Base Daily Per Capita Water Use Calculation For Section 10608.22

Base Years	Service Area Population	Gross Water Use (gal per day)	Daily Per Capita Water Use (gpcd)
2003	86,891	10,679,890	**122.9**
2004	87,551	10,672,274	**121.9**
2005	87,871	9,771,315	**111.2**
2006	88,143	9,780,219	**111.0**
2007	88,776	9,836,411	**110.8**
		Total of Column (4):	**577.8**
		Divide Total by Number of Base Years:	**115.6**

4.5.6 Step 4 - Determine Interim Urban Water Use Target

The last step in complying with SBx7-7 requires calculating an interim urban water use target, meaning the midpoint between the base daily per capita water use and the 2020 target water use for measuring progress in the year 2015. The City's interim urban water use target is:

Interim Urban Water Use Target = (113 gpcd + 110 gpcd)/2 = **111.5 gpcd**

4.5.7 Meeting State Targets for Urban Water Conservation

In summary, the standards for per capita water use for the City of Santa Cruz are as follows:

Table 4.8 Interim and Urban Water Use Targets for the City of Santa Cruz

	Year	Per Capita Water Use (gpcd)
Baseline Daily Per Capita Water Use	2001-10	113
Interim Urban Water Use Target	2015	111.5
Urban Water Use Target	2020	110

What the foregoing calculations mean is that the City of Santa Cruz is not mandated to reduce its per capita water use a full 20 percent by year 2020 because water use is already at a comparatively low level compared to elsewhere in California. It was the intent of the Legislature to recognize and provide credit to water suppliers like the City of Santa Cruz that have already made substantial investments in water conservation. It simply means the City will need to maintain gross water use at a level equivalent to or below 111.5 gpcd in 2015 and 110 gpcd in 2020 to comply with state law. This low level of water use was already reached beginning in 2005. In 2010, the City's water use was 15 percent or 17 gpcd below this future target.

All water suppliers are required to report compliance with their adopted interim and 2020 urban water use targets in the next two Urban Water Management Plan reporting cycles.

4.6 Projected Water Demand

Water Code section 16631(e) (1) requires water suppliers to:

> "…provide water use projections in five year increments to 20 years or as far as data is available."

The last time the City updated its water demand forecast was in 2005, as part of the previous Urban Water Management Plan. There were two "scenarios" developed at the time, one based on a continuation of existing trends at a growth rate of 0.4 percent annually and another, higher forecast reflecting the potential for housing growth contained on local plans involving an 0.8 percent annual growth rate. The forecast horizon extended only to the year 2020, given the fact that the City was operating under a General Plan adopted in 1992 with a planning horizon of 2005. These scenarios suggested that system water demand would hold nearly constant at close to 4.0 bgy or rise to over 4.3 bgy in year 2020. This forecast was later extended to year 2030 and used in developing a Water Supply Assessment for the Sphere of Influence Amendment EIR (Erler and Kalinowski, Inc., 2009). For reasons mentioned above, actual water use in the five year period since then has declined instead of staying level or rising gradually.

As described earlier in Chapter 2, the City of Santa Cruz now is well along in the process of completing a comprehensive update to its General Plan. The new General Plan will extend to 2030, corresponding with the timeline for this Urban Water Management Plan. As part of the process of developing the City's draft General Plan 2030, a "buildout" projection was prepared that provides new information about residential and commercial development potential foreseen in the City over the next 20 years (DC&E, 2009, Appendix H). Given this new information about land use changes and its potential to shape future water demand, and in acknowledgement of changes in water use that have taken place over the past several years, a decision was made to prepare new water demand projections for this reporting cycle. The analysis that follows is meant to help the Water Department plan for the infrastructure and services that will be needed to support community growth and change through 2030.

4.6.1 Forecast Approach

Like the previous Urban Water Management Plan, two possible scenarios were developed, both extending from 2010 to 2030 and presented in five year increments. Each scenario consists of two major components: 1) existing water demand, and 2) potential new water demand. The service area is further broken down into two major geographic components: 1) inside Santa Cruz City and 2) outside the City, which includes unincorporated Santa Cruz County, the City of Capitola, and the north coast. Within these two basic geographic areas, water use is itemized separately for each major customer category.

4.6.1.1 Existing Water Demand

The two future scenarios differ primarily according to assumptions made about the level of water use at existing accounts. Both discount the most recent downturn in water use beginning in 2009 as a temporary condition caused primarily by water restrictions, which is not considered indicative of normal use going forward.

The lower scenario (Scenario 2) is based on average water use for each customer sector (expressed in gallons per account per day) that occurred during the 2007-08 period just prior to the recent water restrictions. The higher scenario (Scenario 1) is based on levels during an earlier period from 1999 through 2004, when overall water consumption was highly stable for many years prior to several changes that took place with regard to weather, water rates, and the economic downturn. Both scenarios represent actual usage levels in the relatively recent past. In both scenarios, the analysis uses data on the number of existing accounts beginning in 2010 obtained from the utility billing system, and average usage in gallons per account per day specific to each customer category and location (inside/outside city) obtained from the Water Demand Modeling and Analysis report/models prepared by Weber Analytical (2010). All data were normalized for weather effects. A detailed breakdown of this of these values is provided in Appendix I.

The first column (2010) in Tables 4-10 and 4-11 represents existing water demands. These volumes are held constant, for planning purposes, throughout the 2030 planning horizon.

4.6.1.2 Potential New Water Demand

Different methods were used inside the City and outside the City to quantify potential new water demand.

- Land use changes envisioned in the General Plan 2030 (not including the University) serve as the basis for water demand projections within the City limits.

- Water demands for UCSC are based on the University's 2005 LRDP, as modified by the final EIR for the 2005 LRDP and the Comprehensive Settlement Agreement resulting from litigation of the EIR.

- Estimates of population growth developed by the AMBAG serve as the basis for water demand projections for the portion of the City's service water area outside the Santa Cruz city limits.

City of Santa Cruz Adoption and implementation of the proposed General Plan 2030 would not directly result in increased new development. However, the draft General Plan includes policies and a land use map that support and accommodate additional development. This potential development could result in development of 3,350 residential units, 3,140,000 square feet of commercial, office and industrial development and 300 new hotel rooms.

Within the City, water duties were developed from the utility billing system for each of the various residential and commercial sectors listed in the General Plan 2030 buildout analysis. These water duties were combined with 2030 land use projections to estimate water demands associated with new development, presented in Table 4-9.

Table 4-9. General Plan 2030 Water Demand

	Buildout Projections (a)	**Water Factor**	**Water Demand (mgy)**
Single Residential (b)	840	194 gal/unit/day	59.6
Multiple Residential (b)	2,510	70 gal/unit/day	64.3
Business/Industry:			
- Commercial Sq Ft	1,087,983	66 gals/ft^2/year	71.8
- Hotel Rooms	311	93 gal/room/day	10.6
- Office Sq Ft	1,273,913	18 gal/ ft^2/year	22.9
- Industrial Sq Ft	776,926	12 gal/ ft^2/year	9.3
Total			**238.5**

Notes:

(a) Source DC&E, 2009

(b) Assumes a breakdown of 75% MFR and 25% SFR for 3,350 new dwelling units

In addition to these uses, it is estimated that water demands in the irrigation and municipal categories would add another 12 mgy by 2030. Thus, the additional incremental water demand in the City associated with development and growth under the proposed General Plan 2030 is estimated to be 251 mgy.

University of California The City of Santa Cruz recently completed a Water Supply Assessment (WSA) and certified an EIR for the City of Santa Cruz Sphere of Influence Amendment ("SOI Amendment EIR," Santa Cruz, 2010). The WSA for the SOI Amendment EIR included an estimate of water demands for UCSC through 2020, based on the University's 2005 LRDP and the Comprehensive Settlement Agreement resulting from litigation of the EIR for the 2005 LRDP (Settlement Agreement, 2008). Total UCSC water demand to 2020 was estimated as 338 mgy. The University's 2005 LRDP extends through 2020, and any further development plans beyond 2020 are unknown. To calculate water demand from 2020 through 2030 for UCSC, the student enrollment growth rate was calculated from historical enrollment at the University, and a demand factor was calculated from historical water usage data from this same time period. Based on the assumed student enrollment growth rate and demand factor, it is estimated that water demand for the UCSC campus will increase by 10 mgy from 2020 to 2030. Total UCSC demand at 2030 would be 348 mgy, which represents a net increase of 136 mgy over existing water use.

Outside the City of Santa Cruz To estimate potential new demand in unincorporated Santa Cruz County and the City of Capitola, existing water demands within the single family residential, multi-family residential and business and industrial, and irrigation customer categories were scaled in proportion with the approximately 8 percent population growth estimated by AMBAG between 2010 and 2030.

Miscellaneous Water Uses and System Losses An additional line was added to account for miscellaneous uses (construction accounts and bulk water use), authorized unmetered uses, and system water losses to develop the total annual water requirements for the entire water service area going forward. These uses and losses are estimated at 7.5 percent of overall treated water production, which represents the average level experienced on the city water system over the past 10 years.

4.6.2 Projected Water Demands

Results of the two water demand forecast scenarios are presented in Tables 4-10 and 4-11, and are illustrated graphically relative to historic water demands in Figure 4-7.

Table 4-10. Water Demand Forecast, Scenario 1 (a)

Location:	Customer Class	2010	2015	2020	2025	2030
City of Santa Cruz	Single Residential	965	980	995	1,010	1,025
	Multiple Residential	472	488	504	520	536
	Business/Industry	448	477	506	535	563
	Municipal	56	56	57	57	58
	Irrigation/Golf	128	131	133	136	138
	UC Santa Cruz	212	276	339	344	349
Inside City Subtotal		**2,281**	**2,407**	**2,534**	**2,601**	**2,669**
Outside City: *County, Capitola, & North Coast Irrigation*	Single Residential	581	593	605	617	629
	Multiple Residential	408	417	425	434	442
	Business/Industry	273	278	284	290	295
	Municipal	-	-	-	-	-
	Irrigation/Golf	146	149	152	155	158
Outside City Subtotal		**1,409**	**1,437**	**1,466**	**1,495**	**1,524**
Other miscellaneous uses including water losses		303	316	328	336	344
Total System Water Demand		**3,993**	**4,161**	**4,329**	**4,433**	**4,537**

Notes:

(a) Assumes existing (2010) water demands recover to previous levels experienced in early 2000s

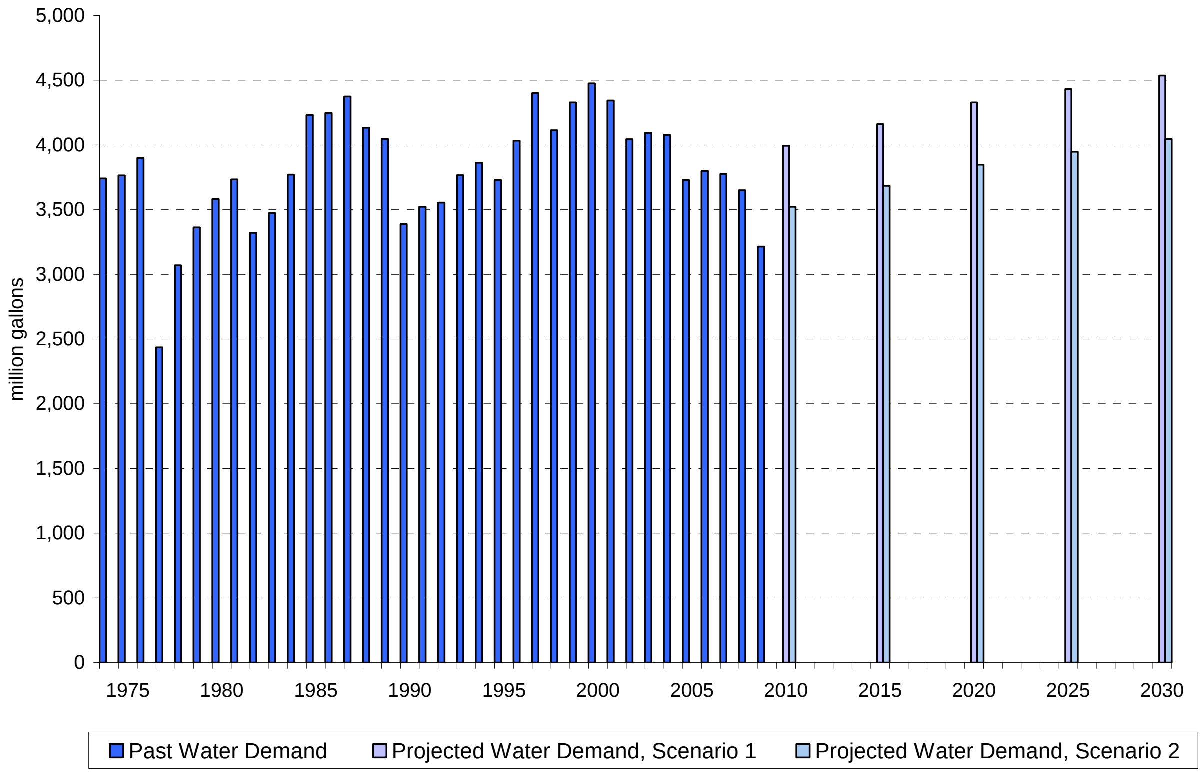
Table 4-11. Water Demand Forecast, Scenario 2 (a)

Location:	Customer Class	2010	2015	2020	2025	2030
City of Santa Cruz	Single Residential	839	854	869	884	899
	Multiple Residential	408	424	440	456	472
	Business/Industry	425	454	483	511	540
	Municipal	54	54	55	55	56
	Irrigation/Golf	115	118	120	122	125
	UC Santa Cruz	212	276	339	344	349
Inside City Subtotal		**2,055**	**2,180**	**2,306**	**2,373**	**2,441**
Outside City: *County, Capitola, & North Coast Irrigation*	Single Residential	502	513	523	533	543
	Multiple Residential	336	343	350	357	364
	Business/Industry	231	236	240	245	250
	Municipal	-	-	-	-	-
	Irrigation/Golf	130	133	135	138	141
Outside City Subtotal		**1,199**	**1,224**	**1,248**	**1,273**	**1,297**
Other miscellaneous uses including water losses		268	280	292	300	307
Total System Water Demand		**3,522**	**3,684**	**3,847**	**3,946**	**4,046**

Notes:

(a) Assumes existing (2010) water demands recover to 2007-08 levels

Figure 4-7. Actual and Projected Water Demand, 1974-2030



As indicated above, the existing water demand for the entire City's water service area is estimated to be 3,993 mgy based on Water Demand Forecast, *Scenario 1*, and 3,522 mgy based on Water Demand Forecast, *Scenario 2*. The projected water demand by 2030 for the entire City's water service area is estimated to be 4,537 mgy based on Water Demand Forecast, *Scenario 1*, and 4,046 mgy based on Water Demand Forecast, *Scenario 2*. In both scenarios, potential new water demand associated with community growth and development over the next 20 years amounts to about 500 mgy.

It is notable that, as illustrated in 4-7, even with anticipated population growth and community development, total system demand under Scenario 1 in year 2030 would be about equal to the level of water demand experienced in year 2000, while under Scenario 2, system demand in 2030 would be roughly equivalent to the level of water demand experienced in the mid 1970's and less than levels seen between 1985 and 2004[3].

It is also possible, perhaps even likely, that these scenarios of future water demand will be inaccurate given the number of assumptions inherent in projecting water demand,

[3] Figure 4-7 is provided for illustrative purposes, but due lack of consistent production reporting, it is not possible to compare past and future water requirements in exactly the same manner. Past water demand is represented by gross water production, whereas future water demand is equivalent to net water production. This discrepancy overstates past water production by a small percent.

the variables affecting water use, and uncertainties about community growth. For example, not all the land use changes envisioned in the City's next General Plan or in the University's LRDP may materialize or they may develop over a longer time frame than presently expected. Likewise, future population growth in the unincorporated area may not track at the same rate predicted by AMBAG, as was the case over the last ten years. Nor do these projections take into account effects on water use from future conservation programs or possible future price-related changes or strategies, which are unknown at this time. One possible outcome, given the recent decline in water consumption and relatively low rate of growth in the service area experienced over the last decade is that water demand may stabilize and drift around a level of 3.5 bgy for the foreseeable future. This outcome assumes that new demands from population growth and community development continue to be compensated for by water use efficiency improvements made by other, existing users, as they have been over the last decade. How long that trend may hold is uncertain.

One way to test the likelihood of these two scenarios is to examine the results expressed on a per capita basis. Table 4-12 below shows projected water use for the two scenarios on a per capita basis, for both gross water use and residential water use. Scenario 1 results in a gross water use ranging between 118 and 122 gpcd, while Scenario 2 results in gross water use ranging between 105 and 109 gpcd. Given the state mandate to comply with a target water use of 110 gpcd in 2020 under SBx7-7, and in recognition of the ongoing trend in low water use, we conclude that Scenario 2 best reflects the most reasonable of the 2 scenarios for the City to use for water management planning purposes going forward.

Table 4-12. Projected Water Use (GPCD)

	2010	2015	2020	2025	2030
Gross Water Use (gpcd):					
Scenario 1	119	118	121	122	122
Scenario 2	105	105	108	108	109
Residential Water Use (gpcd):					
Scenario 1	72	70	71	71	71
Scenario 2	62	61	61	61	61

Estimated water savings achieved through various water conservation programs to date and the process for quantifying remaining water conservation potential are discussed later in Chapter 6. While the City is committed to continuing to implement ongoing water conservation programs and pursuing additional programs that provide a reliable gain in supply, the City does not have an estimate at this time of the likely additional water savings that could be achieved in the next 10 to 20 year time frame. As discussed in Chapter 6, a process is underway to develop such an estimate. The impact of additional long-term water savings would be to lessen future water demand projections presented above by helping compensate for any increase in water demand that does occur going forward to due continuing development and population growth in the service area. To the extent that there is considerable water savings yet to be realized, future water demand could be closer to 3.5 bgy than 4.0 bgy in 2030, but it is speculative to say at this time. Any additional conservation savings would also have the additional effect of tempering the increase in the size and frequency of potential water shortages between 2010 and 2030, discussed in the following chapter.

4.7 Water for Low Income Housing Units

Water Code section 10631.1(a) requires water suppliers to provide the estimated lower income water use projections for single and multifamily housing units identified in the housing elements of the General Plans applicable to the water supplier's service area. Table 2-5 indicates a potential for 436 such low income housing units under current City and County housing elements. Assuming equal numbers of single and multi-family units and using water demand factors in Table 4-9 equates to a total projected water use for low income units of 21 mgy, of which 12.7 mgy potentially would be located in the City of Santa Cruz and 8.3 mgy located in unincorporated Santa Cruz County or the City of Capitola. These demands are included in the projections listed above in Tables 4-10 and 4-11.

The City's written policy concerning water service for affordable housing is included in Appendix J.

Chapter 5

WATER SUPPLY RELIABILITY

This chapter provides an overview of the issues facing the City related to its water supply system reliability. It describes how both supply and demand conditions have changed over time and assesses the ability of the Santa Cruz water supply and delivery system to serve current and future water demands under differing hydrologic conditions in light of these recent changes. The latter portion of this chapter describes the overall approach and the status of programs and projects the City is pursuing to improve its water supply reliability.

5.1 Overview of Water Supply Challenges

The City of Santa Cruz faces two major challenges in meeting its present and future water supply needs. The primary water management problem is the lack of adequate water supply during periods of drought. The second key issue – and one that is not yet fully understood at this time due to pending negotiations with applicable regulatory agencies and to the inherent complexity of the subject – involves ensuring that surface water diversions are operated in a manner that protects the aquatic habitat of threatened and endangered species.

While these two issues present much different water management challenges, they both limit in different ways and times how much water is available to meet the area's water service needs. The following is a brief description of these two fundamental challenges.

5.1.1 Vulnerability to Water Shortage

As explained in Chapter 3, the City water system draws almost exclusively on local surface water sources, whose yield varies from year to year depending on the amount of rainfall received and runoff generated during the winter season.

In normal and wet years, when rainfall and runoff are abundant, the water system is capable of meeting the community's current total annual water requirements. The system is highly vulnerable to shortage, however, in extended dry periods or critically dry years, when the flow in local streams and river sources runs low. Moreover, like other communities on California's central coast, the Santa Cruz water system is physically and geographically isolated. There are no interconnections with other water suppliers in place to transfer water among adjacent water districts or import emergency supplies from outside the region. Ultimately, the only water available to the City is that which originates from rain that falls on the ocean side of the Santa Cruz Mountains.

Water stored in Loch Lomond Reservoir primarily serves as a backup supply to supplement summer demands. Some amount of storage is used each year, mainly in the summer and fall months when the flows in the coast and river sources decline and additional supply is needed to meet higher daily water demands during the peak season.

In single dry years, the system relies more heavily on water stored in Loch Lomond to satisfy demand, which draws down the reservoir level lower than usual and depletes available storage. In multi-year or critical drought conditions, the combination of very low surface flows in the coast and river sources and depleted storage in Loch Lomond reservoir reduces available supply to a level which cannot support average dry season demands. Compounding the situation is the need to retain a certain amount of water in the reservoir in case another dry year follows.

5.1.2 Endangered Species Act Compliance

All of the streams from which the City diverts water currently support steelhead trout. In addition, the San Lorenzo River may potentially support Coho salmon. Both of these fish species are listed under state and federal Endangered Species Acts (ESA) as either “threatened” or “endangered”.

For the past ten years, the City of Santa Cruz has been in the process of developing a Habitat Conservation Plan (HCP), which is a plan prepared under the ESA by nonfederal parties seeking to obtain permits for incidental taking of threatened and endangered species.

Numerous studies undertaken in support of the HCP have evaluated how much water flow is needed in streams, and during what times of the year, to protect the fisheries habitat during all freshwater life phases (migration, spawning, and rearing) over a range of hydrologic year types. These studies show that there is potential ‘take’, or harm to endangered fish, occurring due to the City’s existing operations, and that more water must remain in the streams to protect the fisheries, primarily on the North Coast streams during the dry season. Additional in-stream flows are also indicated to support anadromous salmonid migration and spawning on North Coast streams during the wet season. Moreover, given renewed focus on the San Lorenzo River for Coho salmon recovery, the HCP must also address diversions on the San Lorenzo River and on Newell Creek as well.

The City is proposing a phased conservation 'strategy' that improves in-stream flow for steelhead and salmon by restricting water diversions, while recognizing that the limitations of the existing water supply system does not allow optimal fish flows to be always or consistently achieved. How receptive the regulatory agencies will be to this strategy is unknown at this time.

The process to secure an incidental take permit involves many more steps and is expected to take several more years to complete. While the outcome remains uncertain, it is clear that implementation of endangered species regulation at the state and federal levels will result in less water being available from the City's flowing sources in future years compared to the past. This, in turn, will place greater reliance on water stored in Loch Lomond Reservoir to meet the community's annual water needs and exacerbate the aforementioned problem of water shortage.

5.2 Past Water Supply Deficiencies

The City experienced severe water supply deficiencies in both the 1976-77 and 1987-92 droughts. In 1977, the City imposed severe water rationing in response to a critical shortage of water. During the 1987-92 drought, a water supply emergency was declared and either usage restrictions or rationing was imposed each year for five consecutive years. The 1976-77 event has since been established as the most severe drought of record, and is used by the City as a benchmark for assessing system reliability.

Most recently, the City experienced a moderate water shortage in 2009, as a result of three consecutive years of below normal rainfall and runoff.

5.3 Water Year Classification System

The City uses a water year classification system as an index of water supply conditions for operations studies, to forecast river flows, and to communicate its water supply status to the public. The system is based on total annual runoff in the San Lorenzo River, the City's most important source, measured at the Big Trees gage in Henry Cowell Redwoods State Park.

Annual discharge of the San Lorenzo River was selected as the best individual benchmark of the City's water supply condition for two reasons. First, the river is the city's single largest source of drinking water, providing about half the normal annual supply. Second, about three quarters of all the water used by city water customers is obtained from a flowing source of supply. In general, the higher the volume discharged from the San Lorenzo River means that:

- the local watersheds in the Santa Cruz mountains are more saturated;
- the stream sources will flow at higher levels later into the dry season; and
- there is more water available from all surface water sources, including the reservoir, to meet system demands over the course of the year.

The converse is also generally true: the lower the volume discharged by the San Lorenzo River means less water is available from all surface water sources to meet system demands.

Under this classification system, the water year (October 1- September 30) is designated as one of four types: wet, normal, dry, or critically dry, depending on the total annual river discharge, as follows:

Table 5-1. Water Year Classification System

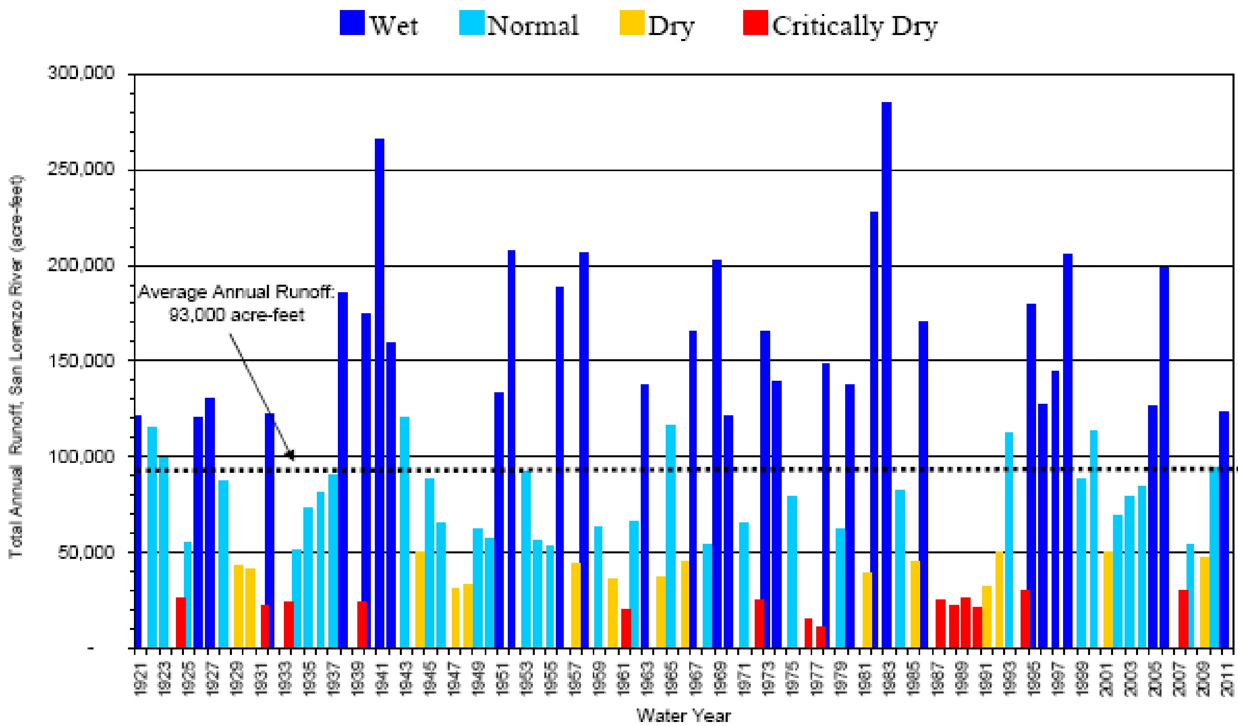
Classification	Runoff (ac-ft)
Wet	> 119,000
Normal	49,000 - 119,000
Dry	29,000 – 49,000
Critically Dry	<29,000

Figure 5-1 below shows the total annual runoff for the San Lorenzo River over the 90-year period from 1921 to 2011 and the classification for each water year[1]. The graph illustrates the dramatic variation in discharge from year to year. Average runoff during this period is about 93,000 acre-feet or 30 billion gallons[2]. The least amount of runoff, 9,500 ac-ft, occurred in the drought of 1977. The maximum recorded discharge was over 280,000 ac-ft in 1983, one of the wettest years on record in California. **This natural variation in the level of runoff available in local streams and rivers, from which the City draws the majority of its supply, is the major factor that results in an inconsistent level of water supply from year to year.**

[1] The actual period of record for the gage on the San Lorenzo River began in 1936, but synthesized flow records generated for earlier modeling studies were used to extend the period of record back to 1921.

[2] One ac-ft equals 325,851 gallons; 3.07 ac-ft equals one million gallons.

Figure 5-1. Total Annual Stream Discharge from the San Lorenzo River (ac-ft)



Ordinarily, one abnormally dry or critically dry year does not create a water shortage in Santa Cruz. Usually there is sufficient storage in Loch Lomond Reservoir, even after a dry winter, to carry the system though the following summer. Based on past experience, however, a shortage is likely to occur when the central coast region experiences two or more dry or critically dry years in a row.

5.4 Plans to Assure a Reliable Water Supply

The City has been pursuing possible new water supplies for the past 25 years to address the problem of periodic imbalances between available supply and demand, and to plan for future growth. Past efforts to augment supplies have made little progress, however, due to stakeholder disagreement on the appropriate course of action.

In 1997, the City initiated an “integrated water planning” approach to consider all practical options for decreasing demand and increasing supply. The project was overseen by a committee consisting of City Council members and Water Commission members, which held public meetings on regular basis and several public workshops throughout the planning process.

The goals of the City's Integrated Water Plan (IWP) were to: 1) reduce near term drought year shortages, and 2) provide a reliable supply that meets long-term needs while ensuring protection of public health and safety.

Through the IWP process, the reliability of the Santa Cruz water system was assessed and alternative strategies to ensure that the system achieves and maintains an acceptable level of reliability in the future were evaluated. At the time, operations modeling showed that if an event similar to one in 1976-77 were to recur, the system would barely be able to meet half the community's normal water requirements in the second year of that drought.

In November 2005, the Santa Cruz City Council unanimously adopted the IWP as the City's long-term water resource strategy, which recommended the following three components:

1. Conservation - Reduce water demand and increase water use efficiency in all years through long-term water conservation measures,

2. Use Curtailment – Further reduce water use, by up to 15 percent, through temporary water restrictions in drought years, and

3. Supplemental Supply – Diversify the City's water supply through the construction of a 2.5 mgd seawater desalination facility (with the ability to expand the plant to 4.5 mgd to meet future needs through 2030).

The Integrated Water Plan envisions satisfying 85 percent of normal water needs during a worst-case scenario like the 1976-77 event, thereby reducing the potential shortfall, then estimated to be almost 50 percent, to no more than 15 percent. This reliability goal was considered to be the best overall balance between ensuring public health and safety, cost, and impact on the environment, given the many public policy tradeoffs involved.

The Santa Cruz City Council also certified the IWP Program Environmental Impact Report and selected a cooperative operational scenario that involved partnering with the Soquel Creek Water District as the preferred alternative.

These 3 components are described briefly below.

5.4.1 Water Conservation

A cornerstone of the IWP is to achieve the maximum practical water use efficiency through conservation. Both state water law and the City's General Plan call for a strong emphasis on water conservation and elimination of water waste to stretch existing sources, minimize the need for new water sources, and protect the environment. A full description of the City's water conservation program is included in Chapter 6.

5.4.2 Use Curtailment

In the process of developing the IWP, the City made a fundamental recommendation to not meet full demand in drought years when surface supplies fall short. Instead the IWP calls for supplying 85 percent of normal demand in critical drought years like the 1976-77 event, and for a corresponding reduction in peak season water use of up to 15 percent. This cutback would be achieved through temporary watering restrictions that target primarily landscape irrigation and other outdoor uses. This temporary reduction in water use would be in addition to the long-term water savings achieved through conservation.

The conservation and curtailment components of the IWP are closely related in that they both involve reducing customer demand to resolve the City's supply deficiency as opposed to increasing the supply of water. There are important distinctions, however, that set them apart:

1. Curtailment is a short-term reduction in water use that is taken in response to extraordinary circumstances that involves some level of customer sacrifice. The conservation component, in contrast, emphasizes measures that people can take to reduce average daily water use without sacrificing their quality of life.

2. Curtailment involves people making behavioral changes, whereas the conservation component features technological improvements such as low consumption toilets and high efficiency clothes washers that increase water use efficiency without relying on conscious changes in behavior to achieve water savings.

3. Curtailment focuses on reducing outdoor uses of water such as landscape irrigation and exterior washing to preserve available supplies for essential domestic, sanitary and fire protection purposes. The conservation component is aimed primarily at reducing interior uses of water.

The IWP carefully considered other possibilities for use curtailment, ranging from no curtailment up to a 25 percent systemwide reduction in water use under worst case drought conditions. The planning decision to select 15 percent was based mainly on the fact that, while there was only a slight difference in overall cost between the 15 and 25 percent strategies, the difference in terms of the impacts and hardship to residential and business customers, as well as the frequency of cutbacks, between these two curtailment levels was much more substantial. The decision also recognized that water use per-capita is already very conservative, and that the ability of customers to make such cutbacks would become more difficult or costly over time because of the increase in efficiency achieved through additional conservation efforts.

The procedures and actions necessary to achieve the up to 15 percent cutback in systemwide demand established in the IWP are described in Chapter 8.

5.4.3 Additional Water Supply

The IWP identified seawater desalination as the preferred alternative for a backup supply of drinking water in times of drought. Several possible options were carefully evaluated, including drilling more wells, upgrades to the north coast system and treatment facilities, and a water transfer involving exchange of groundwater with recycled wastewater for agricultural use on the State park lands north of town. Both the wells and groundwater exchange concept ultimately proved to be infeasible, however, leaving seawater desalination essentially as the only supplemental water supply option available to the City.

The project concept adopted by City Council involves constructing a seawater intake system using an existing, abandoned wastewater outfall, building a new desalination plant with an initial capacity of 2.5 mgd, and installing the associated pipelines and pumping stations for delivering treated water to the distribution system and conveying seawater concentrate to the City's wastewater facilities, where it would be blended with municipal wastewater flows and disposed via a deep ocean outfall (Figure 5-2).

The purpose of this initial increment of desalination capacity is solely for drought protection. Accordingly, the desalination plant would only be used by the City intermittently during the dry seasons of dry and critically dry years when existing supplies fall short.

Figure 5-2. Conceptual 2.5 mgd Desalination Facility

The adopted Integrated Water Plan involves cooperating with the Soquel Creek Water District, which is also looking to secure a long-term supplemental source of water to reduce its reliance on well water and avert the threat of seawater intrusion in local groundwater aquifers. The arrangement calls for the District to use some or all of the future plant's capacity when the City doesn't need it. In return, the District would share in the cost of building and operating the plant. The District's Board in 2006 voted to adopt its own updated Integrated Resource Plan (IRP) that identified this regional desalination plan as its preferred conjunctive use alternative (ESA, 2006).

Since adoption of the IWP in 2005, the City and Soquel Creek Water District have created a joint task force and undertaken numerous technical investigations and projects to explore the possibility of desalination as a new, shared water source to complement the regions' existing surface and groundwater supplies. These activities are described later in this Chapter.

In addition to pursuing desalination, the City remains open to exploring other water supply alternatives that would not be feasible to develop in the short-term, but may be useful to consider over a 20-year or longer time frame. Possibilities include:

- Water recycling
- Regional water transfers
- Groundwater recharge
- Reservoir expansion
- Aquifer storage and recovery
- Off-stream storage

5.5 2011 Integrated Water Plan Model Update

The City continues to evaluate a possible desalination plant and ways to protect anadromous species as it develops an HCP. In the meantime, as explained elsewhere in this report, many of the key assumptions upon which the IWP was based have changed since its adoption in 2005.

To test how these changed assumptions affect the need for a new supply source, the Water Department recently updated the City's water supply operations model and analyzed the effect of HCP options on water supply reliability. The planning horizon covered by this model update is 2010 to 2030, corresponding with the timeline for this Urban Water Management Plan. Key changes are summarized in Table 5-2 below. The details of this analysis are included as Appendix K.

The original IWP model was used to examine and compare alternative water strategies using an adopted set of evaluation criteria that included various metrics for cost, magnitude and frequency of shortages, environmental effects, and many other factors. For the updated model, the analysis focuses on two key metrics that were most relevant to the water system status and consistent with the original analysis. These include:

- Worst case peak season deficiency, expressed as percent shortage, and
- Frequency of occurrence of peak season shortages of various magnitudes

The updated model output also calculates what amount of new water supply capacity is needed to limit peak season shortages to 15 percent. Results are summarized in Tables 5-3 through 5-5 below for the following three cases:

Table 5-2. Updates to IWP Operations Model

Component	Description of Update
Water Demand	Actual water demands have been significantly lower than those forecast in the 2005 IWP. The original IWP included a single demand forecast which increased from 4.8 to 5.3 billion gallons per year between 2010 and 2030. The updated model uses two lower demand forecasts corresponding with the scenarios described in Chapter 4, which range from 2010 to 2030 between approximately 4.0 and 4.5 bgy (demand scenario 1), or between 3.5 and 4.0 bgy (demand scenario 2).
Stream Flow	The hydrologic data that formed the basis of the IWP have been revised and extended through 2009. In addition to updating the "unimpaired" flows of the original IWP, the model incorporates alternative flow bypass scenarios developed through the HCP process to enhance fish habitat[3]. Environmental flow types are categorized as "Tier" 1, 2, and 3, as follows: • **Tier 1** refers to flows that simply maintain current fish habitat levels, as described in Section 3.5. • **Tier 2** refers to the flows that would improve habitat conditions compared to what now exists. • **Tier 3** flows would significantly improve stream flows to provide 80% of optimum flows for fish habitat.
Newell Creek - Loch Lomond Reservoir	The model has been adjusted for revised bathymetry data and reservoir rule curves.
Groundwater Supply	In the original IWP it was assumed there would be 2 mgd of well capacity available to the City during time of drought, with 1 mgd available at other times. As described in section 3.6, the City intends to limit its withdrawal to no more than 170 mgy on average (about 0.8 mgd) and 210 mgy (about 1 mgd) in drought years.
Transmission Losses and Efficiency	The updated IWP assumes lower transmission losses in the North Coast system than originally modeled, based on actual leakage rates and assumed rate of repairs. It also assumes permanent repair of the temporary, flexible segment on the Majors Creek pipeline, increasing raw water transmission efficiency.
Desalination	The model reflects the operations agreement regarding how the capacity of a 2.5 mgd plant would be shared between the City and Soquel Creek Water District.

1. No HCP bypass flows. This case is intended mainly to provide an updated baseline of system reliability without consideration of environmental water needs.

2. Water System Reliability under Tier 2 bypass flows

3. Water System Reliability under Tier 3 bypass flows

[3] Unimpaired flow refers to North Coast stream flows available to the City for diversion without consideration of habitat needs.

Results of the model update indicate that, without any consideration for environmental water needs, the system reliability has improved considerably relative to conditions portrayed in the original IWP (Table 5-3). This improvement is due mainly to lower water demands. Under the lower of the two demand scenarios, the expected worst-case water shortage has been substantially reduced and the amount of new water supply capacity needed over the next 20 years is less than the 2.5 mgd desalination plant currently being evaluated. However, the system still falls short of the reliability objective set by City Council in the long-term, indicating a need for some additional supply.

Table 5-3. Updated Baseline of Water Supply Reliability: No HCP Flows

Demand Scenario	Probability of Water Shortage of 5 Percent or Greater (%)		Worst-Year Peak Season Shortage (%)		Desalination Capacity Needed to Limit Peak Season Shortage to 15%	
	2010	2030	2010	2030	2010	2030
1	10	30	30	37	1.50	3.25
2	1	12	12	23	0.00	0.75

The Tier 2 flow bypass flow scenario represents an increasing degree of habitat protection and therefore a decreasing volume of stream flows available for diversion to meet water demands. Table 5-4 shows with Tier 2 flow releases under all hydrologic conditions, water supply reliability is degraded, both in the near and the long-term. Even under the lesser of the 2 demand scenarios, achieving the reliability goal of no more than 15% water shortage would require 2.25 mgd of additional water supply capacity in the near term, increasing to 2.75 mgd by the end of the 20 year planning timeline.

Table 5-4. Water System Reliability: Tier 2 Flows

Demand Scenario	Probability of Water Shortage of 5 Percent or Greater (%)		Worst-Year Peak Season Shortage (%)		Desalination Capacity Needed to Limit Peak Season Shortage to 15%	
	2010	2030	2010	2030	2010	2030
1	13	82	43	51	3.25	4.25
2	8	11	37	42	2.25	2.75

Of the various flow scenarios examined in the HCP process, Tier 3 leaves the most water in the streams for fish habitat and results in the least amount of flowing water available for diversion. Modeling of Tier 3 environmental flows indicates that, even assuming desalination capacities needed with Tier 2 flows above, the City would experience water shortages much more often (statistically every other year) and would require much greater levels of total new water supply capacity to maintain target levels of reliability than presently is being contemplated (Table 5-5).

Tier 3 flows represent a flow scenario that is 80 percent of the optimum condition for the salmonid species present in the streams from which the City withdraws water. Without the addition of new water supply, the City would be incapable of virtually ever meeting Tier 3 flows, even in wet years. In dry years, and consecutive dry years, without additional supply, providing such flow would leave the City with only about 25 percent of average water supply. For that reason, this report does not consider the operation of the water system under that flow scenario unless and until new supply is developed. What is shown in the following table outlines the impacts of meeting Tier 3 flow with the desalination plant in operation. The far right columns of the table show the needed capacity of a new desalination plant in order to meet Tier 3 flows in multiple dry years in order to limit use curtailment to the designed 15 percent.

Table 5-5. Water System Reliability: Tier 3 Flows

Demand Scenario	Probability of Water Shortage of 5 Percent or Greater (%)		Worst-Year Peak Season Shortage (%)		Desalination Capacity Needed to Limit Peak Season Shortage to 15%	
	2010	2030	2010	2030	2010	2030
1	53	53	57	50	8.75	9.75
2	25	33	48	48	7.50	8.00

5.6 Water Supply and Demand Assessment

The operations modeling results presented above provide one perspective on the City's water supply reliability. Water suppliers also are required to characterize water supply reliability in a manner prescribed by law. Specifically, Section 10635 (a) of the Water Code requires:

> *"Every urban water supplier shall include, as part of its Urban Water Management Plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the total projected water use*

over the next twenty years, in five year increments for a normal water year, a single dry water year, and multiple dry water years."

In the analysis that follows, estimates of supply are given by both individual source and for the total available supply, based on data obtained from the City's updated operations model. The analysis assumes that future diversions, beginning sometime within the next five years (corresponding with year 2015), will be limited according to the Tier 2 flow scenario discussed above. It also assumes groundwater availability will be limited in future years as described in Chapter 3. Estimates for projected demand all assume the lower of the two future demand scenarios described in Chapter 4.

5.6.1 Normal Water Years

This assessment reflects average water supply available to the City modeled over the 73-year period of record (1936-2009), as presented in Table 3-4. Note that beginning 2015, production from the coastal sources is seen to decline reflecting greater environmental in stream bypass flows. This reduction is partly compensated for in normal water years by increased diversion from the San Lorenzo River and partly by greater withdrawals from Loch Lomond Reservoir.

Table 5-6. Supply and Demand Comparison, Normal Water Year (mgy)

	2010	2015	2020	2025	2030
North Coast	1,150	860	860	860	860
San Lorenzo River	1,770	1,940	1,990	2,040	2,090
Live Oak Wells	170	170	170	170	170
Loch Lomond Reservoir	1,040	1,040	1,040	1,040	1,040
Supply Total	4,130	4,010	4,060	4,110	4,160
Demand Total	3,522	3,684	3,847	3,946	4,046
Difference	**608**	**326**	**213**	**164**	**114**
Average Annual Deficit (% of demand)	**--**	**--**	**--**	**--**	**--**

Under normal water years, there is a slight surplus of supply and the City is able to fully meet projected water demand through 2030, even accounting for habitat needs.

5.6.2 Single Dry Water Years

This assessment presents water supply available to the City as reflecting conditions experienced during water year 2007, which was a recent critically dry year. As shown in Table 5-7, water supply during a single dry year is barely sufficient to meet system demand in the near term, and is not sufficient to meet projected demand from 2020 to 2030. The City may experience slight shortages of water under this hydrologic condition, which increases as demand increases over time.

Table 5-7. Supply and Demand Comparison, Single Dry Water Year (mgy)

	2010	2015	2020	2025	2030
North Coast	1,000	690	690	690	690
San Lorenzo River	1,900	2,140	2,187	2,234	2,280
Live Oak Wells	170	170	170	170	170
Loch Lomond Reservoir	500	740	757	774	790
Supply Total	3,570	3,740	3,804	3,868	3,930
Demand Total	3,522	3,684	3,847	3,946	4,046
Difference	**48**	**56**	**(43)**	**(78)**	**(116)**
Average Annual Deficit (% of demand)	**--**	**--**	**-1%**	**-2%**	**-3%**

5.6.3 Multiple Dry Water Years

This assessment presents the estimated water supply available during the second year of a two-year drought sequence similar to 1976-977, which is the most critical drought on record and one used by the City as a worst-case drought sequence for supply planning purposes.

In an extreme two-year drought similar to the 1976-77 event, the estimated water supply available to the City in the second year of that event, according to the updated operations model, ranges from 3,200 mgy under current conditions to between 2,640 and 2,830 mgy when Tier 2 flows are included. This reduction equates to about 23 to 35 percent less water on an annual basis than is available in normal water years. Table 5-8 below shows that there would be a modest (<10%) annual water supply deficit under current demand conditions, which will worsen to between 28 and 30 percent in future years, mostly because less water will be available for diversion from surface sources in the future. Growth in water demand also is a contributing factor.

Table 5-8. Supply and Demand Comparison, Multiple Dry Water Years (mgy)

	2010	2015	2020	2025	2030
North Coast	710	500	500	500	500
San Lorenzo River	1,930	1,760	1,807	1854	1,900
Live Oak Wells	170	170	170	170	170
Loch Lomond Reservoir	390	210	227	244	260
Supply Total	3,200	2,640	2,704	2,768	2,830
Demand Total	3,522	3,684	3,847	3,946	4,046
Difference	**(322)**	**(1,044)**	**(1,143)**	**(1,178)**	**(1,216)**
Average Annual Deficit (% of demand)	**-9%**	**-28%**	**-30%**	**-30%**	**-30%**
Peak Season Deficit (% of demand)	**-12%**	**-37%**	**-39%**	**-41%**	**-43%**

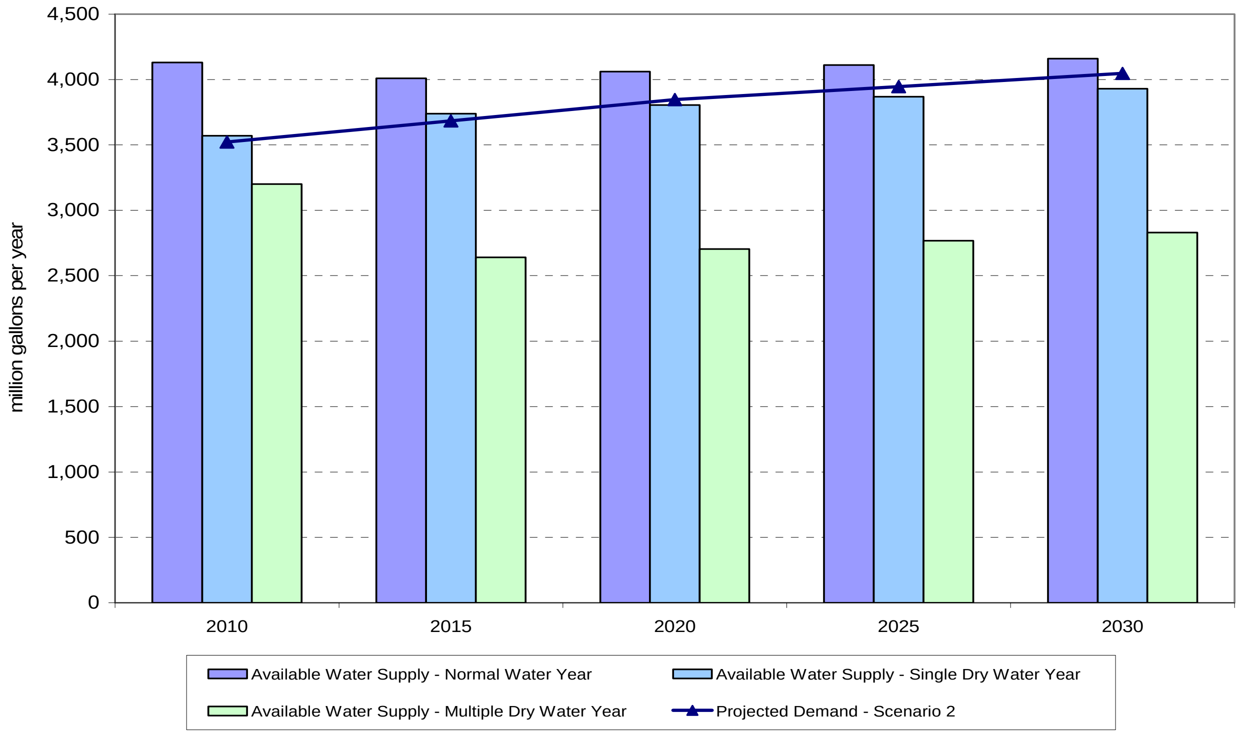
The deficit expressed in Tables 5-7 and 5-8 are expressed as annual average deficits. However, because supplies available to meet demand are reduced mainly during the peak season period between April and October, the actual shortfall that would be experienced is higher. The peak season shortages associated with the extreme two year drought is also presented in Table 5-8, which ranges, once Tier 2 flows are factored in, between 37 percent in 2015 and 43 percent in 2030. A shortage of this magnitude is roughly equivalent in scale to the entire amount of water normally used by the City's single family residential category over a year's time.

5.6.4 Water Supply Reliability Summary

The supply and demand comparisons discussed above are presented graphically in Figure 5-3 below.

Overall, the findings are mixed. The City has sufficient water supply available in normal years to meet its present and future needs. In single dry years, supplies are barely sufficient in the near term but slightly inadequate to meet expected demands by 2020 and beyond. In multiple dry years, available supplies fall substantially short of system demands. The one variable that represents the biggest unknown at this time is the amount of water that will be required from in-stream flow purposes. Should regulatory agencies mandate the City release more water than is represented under Tier 2 flows, these conclusions could change and shortages could be even greater than presented above.

Figure 5-3. Water Supply and Demand Comparison



5.7 Desalinated Water Opportunities

Section 10631 (j) requires water suppliers to:

> *"Describe the opportunities for development of desalinated water, including but not limited to, ocean water brackish water, and groundwater, as a long-term supply."*

5.7.1 Need for the Proposed Seawater Desalination Project

Over the past several years the City has been working closely with the Soquel Creek Water District (District) to investigate the possibility of a shared new water source to complement the region's existing surface and groundwater supplies. Having evaluated many water supply alternatives, both agencies concluded that desalinated seawater, in conjunction with conservation and water-use restrictions during drought, would provide a reliable and flexible water supply to meet long-term needs while providing for public health and safety.

In recent years, the need for a supplemental water supply has been reinforced by new understanding about future availability of existing water supplies for both water agencies. As described above, the amount of surface water that the City will be able to divert from its already limited existing sources is going to be further diminished in order to improve habitat conditions for endangered species. For the District, (and to a lesser extent, the City as well) recent studies have concluded that the estimated sustainable yield of the groundwater basins on which it relies have been too high and either have been, or are in the process of being, revised downward.

5.7.2 Establishment of a Regional Seawater Desalination Cooperative

In response to the City Council's direction to pursue the IWP recommendation, a cooperative was established by the City and the District to evaluate a potential regional desalination plant in Santa Cruz. The cooperative, known as **scwd²**, is responsible for carrying out desalination efforts identified in the IWP and District's IRP.

The **scwd²** Task Force is comprised of two Santa Cruz city council members and two Soquel Creek Water District board members. The **scwd²** Task Force oversees all aspects of the **scwd²** seawater desalination program in monthly public meetings. These meetings provide a forum for public input on the project. The **scwd²** Task Force will determine a governance structure should the decision be made to proceed with a cooperative desalination project.

In April 2010, the Santa Cruz City Council and Soquel Creek Board approved an *"Agreement Endorsing Recommendations of Joint Task Force on Seawater Desalination Facility"* (Appendix L). Key elements of this agreement are a priority system defining when each agency has first right to water produced at the plant, cost sharing for capital and operating costs, how to handle emergency requests for water, and arbitration for disputes over water allocations in emergencies. The City would use up to 2.5 million gallons per day during drought conditions (Priority users: May through October). Soquel Creek Water District would use up to 2.5 million gallons per day (estimated average use approximately 1.5 mgd) during non-drought conditions (Priority users: December through March).

5.7.3 Progress Made by scwd²

Several studies have been completed, are now underway, or are planned that will provide data and recommendations for the regional desalination plant. These include:

- Pilot Plant Program (completed April 2010);
- Watershed Sanitary Survey (completed March 2010);
- Intake Studies:
  - Open Ocean Intake Effects Study (completed December 2010);

- Offshore Geophysical Survey (completed August 2010);
- Intake Technical Feasibility Study (ongoing, completion expected Sept. 2011);

- Energy Minimization and Greenhouse Gas Reduction Study (ongoing);
- Environment Impact Report (ongoing);
- Seawater Reverse Osmosis ("SWRO") Desalination Facility Design (ongoing);
- SWRO Intake Facility Design (completion of preliminary design expected spring 2013); and
- SWRO Infrastructure Design (RFP tentatively planned for spring 2013).

The pilot plant program was implemented using funds provided by the City, the District, and DWR Proposition 50 grant money. Grant funding received for these studies totals over $2.5 million, with approximately $2 million awarded by DWR for the pilot plant program and $611,000 awarded by the State Water Resources Control Board for the intake studies.

Pilot Desalination Plant Test Program

From March 2008 through April 2009, ***scwd²*** *conducted a comprehensive pilot plant test program to evaluate alternative treatment systems for a seawater reverse osmosis (SWRO) desalination plant. The goals of the test program were to: 1) to demonstrate to the California Department of Public Health that seawater from the northern Monterey Bay area can be successfully desalinated to produce potable water, 2) test any special treatment needs, and 3) to provide water quality data for regulatory approval and permitting for a potential full-scale plant.*

The pilot plant treated 50 gallons per minute of seawater supplied from the UC Santa Cruz Long Marine Laboratory's existing open ocean intakes and focused on four primary areas of study: pretreatment, reverse osmosis, post-treatment, and solids handling. The study evaluated the ability of various treatment technologies to meet existing and anticipated drinking water quality regulations and then further evaluated the technologies in terms of energy, cost, chemical use, and footprint requirements. The desalination pilot plant demonstrated that seawater desalination will be a safe and reliable source of water supply for residents served by the City and the Soquel creek Water District. Results of the program will be used in designing a full-scale facility that meets Department of Public Health regulations and reduces costs.

5.7.4 Public Outreach Activities

The City and District have collaboratively undertaken extensive public outreach and education activities in connection with the desalination project. Such activities have included:

- Dedicated regional seawater desalination program website: www.scwd2desal.org
- Monthly project email updates
- Newsletters, handouts, fact sheets, and white papers
- Scores of community and public meetings
- Educational display boards
- Open house and monthly tours during the pilot plant operation
- Taste test event
- Individual listening sessions
- Telephone polls
- Group presentations

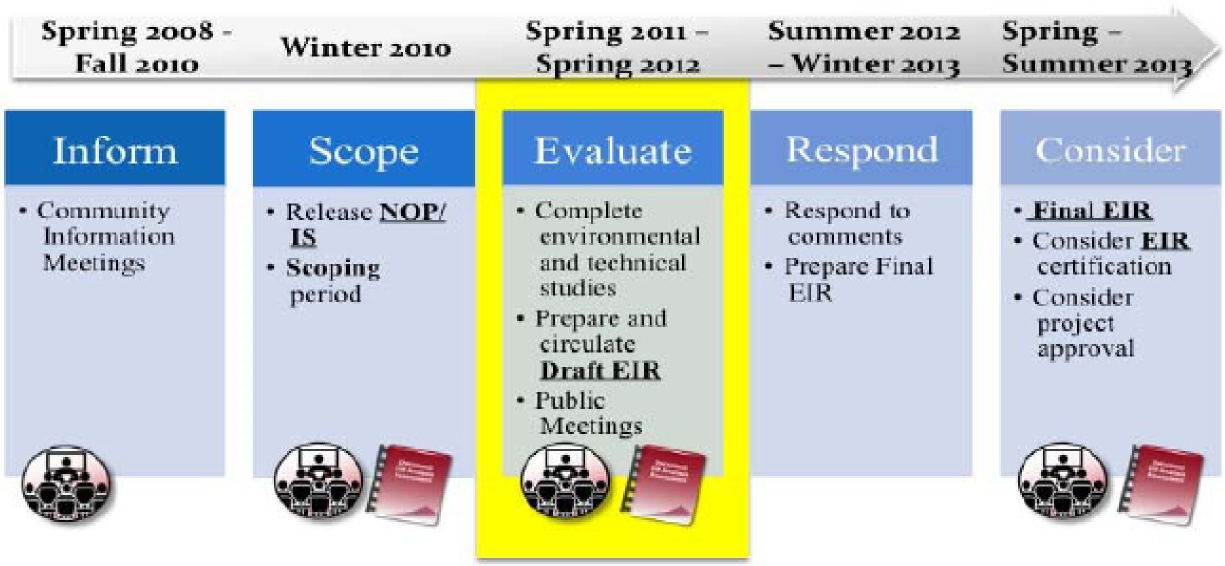
5.7.5 Anticipated Permits and Environmental Review

The proposed project will require a number of potential permits, authorizations, and consultations from federal, state, and local agencies. A list of the anticipated permits required for the desalination plant is provided in Appendix M.

Before any final decisions are made, the City of Santa Cruz and Soquel Creek Water District (scwd2) Regional Seawater Desalination Project will undergo a thorough environmental review in compliance with the California Environmental Quality Act (CEQA). The environmental review process underway is summarized in Figure 5-4.

No decision has yet been made on the actual construction of the proposed project. The environmental review process, currently underway, will include detailed information about the effects that the proposed desalination plant is likely to have on the environment, and ways in which these environmental effects might be minimized. This will ensure that the governing bodies and permitting agencies consider any potential environmental impacts when deciding whether to approve the project. The environmental review process provides ample opportunities for the public to provide input on the project.

Figure 5-4. Key Steps in Environmental Review Process



5.7.6 Anticipated Schedule

The City is currently under contract for the design of a regional desalination plant. Scoping sessions were held in December 2010 to discuss environmental issues related to the plant and the scope of the EIR to be prepared. Environmental review for the full-scale plant is expected to extend through 2012 and plant construction could begin thereafter. Major design and construction tasks, with the anticipated preparation dates shown in parentheses, are listed below:

- Intake Design (2011-2013)
- Intake Construction (2013-2015)
- Plant Design (2010-2012)
- Plant Construction (2012-2015)
- Infrastructure Design (2011-2012)
- Infrastructure Construction (2013-2014)

The City acknowledges some uncertainty related to the approval and timing of the permanent desalination plant construction and operation. The likelihood of construction of a permanent plant is currently uncertain as design plans have not been completed, and it cannot be predicted at this time whether the Coastal Commission and other agencies would issue the necessary approvals. Nonetheless, the City has identified a desalination plant as its best option to alleviate supply shortages in drought conditions, and therefore has committed to pursuing this option with the intent of working diligently with the other agencies with regulatory and/or permitting authority over the plant to obtain all necessary approvals. Thus, the future desalination facility, which is planned and being pursued, is considered to be the most likely future water source, although it nonetheless remains somewhat uncertain until design, environmental review, and regulatory approvals are completed, and the project is given the go-ahead by the City and the District.

The desalination project is the subject of some community debate and discussion with some community members appealing to the City to seek alternatives to this project. Objections include:

- Its energy requirements
- Potential impacts on marine life
- Its cost
- The fact that there has been an overall decline in system water demand

Those seeking alternatives are urging the City to focus more on aggressive water conservation, mandating such things as drip irrigation, composting toilets, and rainwater catchment, in addition to a Water Demand Offset Program and water exchanges with neighboring water districts. The controversy over this project could end up on a ballot, which, along with regulatory hurdles that must be cleared, adds some uncertainty to this project.

5.7.7 Estimated Cost and Funding for a Regional Desalination Plant

The current estimated cost for design, permitting, property acquisition, and construction of the regional desalination plant between 2010 and 2018 is approximately $116 million. The City anticipates that these costs will be shared with the District. City funds are expected to come from the sale of bonds, rates, or a combination of these sources. The City also will evaluate the potential for future grants from the state for part of the construction of the regional plant; however, at present, no grant funding has been obtained for the plant.

5.8 Opportunities for Exchanges or Transfers of Water

Section 10631(d) of the Water Code requires water suppliers to:

"Describe the opportunities for exchanges or transfers of water on a long-term or short-tern basis".

The City presently has no means to exchange or transfer water from neighboring water systems or from the State or federal water projects. Emergency interties exist between the City system and the Scotts Valley and Soquel Creek Water District that serve the urbanized areas north and east of the City water system. These connections, however, were set up to feed water from the City system to the adjacent Districts for short-term emergency purposes. The interties are not intended for, nor are the adjacent systems currently capable of, transferring or exchanging water with the City.

5.8.1 Conceptual Conjunctive Use and Water Transfer Concept

Many years ago, in its 1989 Water Master Plan, the City considered a conjunctive use arrangement between the City and the Soquel Creek Water District (City of Santa Cruz, 1989). The arrangement, intended to stretch the north County region's surface and groundwater supplies, called for the City delivering water from its surface water sources to the District during the winter months to allow the District to rest its wells and add to basin storage. The District, in turn, would deliver stored groundwater back to the City in drought conditions. The concept eventually was shelved after the master plan concluded based on further investigation that there was little potential for such a two-way, conjunctive use arrangement between the City and the District.

Renewed interest in this idea came about in recent years through a Proposition 50 Integrated Regional Water Management Program grant being led by the County of Santa Cruz. With assistance form Kennedy/Jenks Consultants, the County has been exploring various sources and methods for increasing groundwater storage in Scotts Valley area. Over time, the project scope was expanded to evaluate using surplus winter stream flow from the San Lorenzo River to reduce groundwater pumping and increase storage in both the Scotts Valley and Soquel areas.

The operational approach being considered by the County involves diverting excess winter flows from the San Lorenzo River, treating it at the City's Graham Hill Water Treatment Plant, and delivering it to Scotts Valley and Soquel for direct use. Intertie pipelines would need to be constructed or enlarged. The plan would primarily benefit the neighboring water districts and does not represent a substitute for or alternative to desalination. It may be possible, though not certain, that sometime in the future if and when the basin is restored, the Soquel Creek Water District might be able to send some amount of water back to the City in drought conditions.

The potential benefits, considerations, and challenges were outlined in a 2011 status report to the County Board of Supervisors. The County intends to seek additional grant funds to develop operational details, address legal and regulatory requirements, and complete engineering designs and cost estimates.

The Santa Cruz City Council recently expressed its interest in pursuing this water transfer project with the County and neighboring water districts, with the understanding that there is little upside potential that the City water system would be supplemented by such a project, and the caveat that Water Department staff carefully examine whether the project could negatively impact the City's water system by relinquishing any of the City's water rights, diminishing the system flexibility, or complicating the City's pursuit of an incidental take permit.

5.8.2 Other Opportunities for Exchanges or Transfers of Water

The regional desalination project described above essentially is a form of transfer project in that, once the plant becomes operational, water would be delivered from the City system to the District system in most years.

The other opportunity the City is exploring includes a recycled water and potable water exchange that involves Pasatiempo Golf Club and the Scotts Valley Water District, described in section 7.5.4.

5.9 Minimizing the Need to Import Water

Section 10620(f) of the Water Code requires water suppliers to

> *"describe the water management tools and options that maximize resources and minimize the need to import water from other regions".*

In adding this requirement, the Legislature declared that California will best be served by meeting the municipal and other water needs of each hydrologic region to the maximum extent practical without interbasin transfers that diminish the resources of other regions.

The City of Santa Cruz does not now, nor does it plan to, import water, either from outside the Central Coast hydrologic region, or outside the Santa Cruz County boundaries. All of its water resources are obtained entirely from local sources.

Refer to Chapter 6 for a description of the water conservation activities the City is pursuing that are intended to maximize the beneficial use of existing resources.

5.10 Influence of Water Quality on Water Supply Reliability

Section 10634 of the Water Code requires water suppliers to:

> *"include information on the manner in which water quality affects water management strategies and supply reliability".*

In adopting this requirement, the Legislature recognized that water quality regulations are becoming an increasingly important factor in water agencies' selection of raw water sources, treatment alternatives, and modifications to existing treatment facilities. It further acknowledged that changes in drinking water quality standards may also impact the usefulness of water supplies and may ultimately impact supply reliability.

The City's Graham Hill Water Treatment Plant (GHWTP) currently complies with all drinking water standards set by the US Environmental Protection Agency (EPA) and the California Department of Public Health (DPH). These regulations require monitoring of water sources, watershed protection, treatment techniques, and extensive monitoring of treated water quality throughout the distribution system.

As a predominantly surface water supplier, the City has a strong interest in watershed protection of the lands upstream of its diversions and outside its corporate boundaries. The Water Resources section of the Water Department has responsibility for monitoring timber harvests, land development, road maintenance and other human activities to avoid contamination and pollution from occurring in the City's water supply watersheds. Water Resources staff works with state, county, and local agencies, and private property owners to ensure land use and development in the City's watersheds are compatible with the goals to maintain water quality in local streams for municipal drinking water purposes. The Water Resources section also has responsibility for updating the City's Watershed Sanitary Survey and Source Water Assessments required by the State Department of Public Health. An update of Watershed Sanitary Survey is planned for late 2011-12.

The primary issues with respect to water quality are the reliability of the treatment plant itself and treatment challenges posed by future changes in our source water mix due to habitat conservation. The GHWTP is a conventional surface water treatment plant that was commissioned in 1960 as a 12 mgd plant and has undergone an expansion and a number of improvements over the last 40 years. Except for groundwater from the Live Oak wells, all water delivered through the City system is treated at this plant. In other words, it must operate properly 100 percent of the time to maintain water service throughout the entire system. This is even more crucial since 2008 when the Bay Street Reservoir was taken out of service. The system presently has very limited treated water storage.

Figure 5-5. Graham Hill Water Treatment Plant

Since the early 2000s, the City has been evaluating additional process improvements to accommodate a variety of changing conditions such as potential higher daily plant output, changing water quality regulations, and future changes in our source water mix. As additional information has become available from various studies such as the Initial Distribution System Evaluation, water quality testing, and work on the HCP has progressed, the focus on treatment plant improvements has narrowed to:

- Enhance reliability. The plant can be made more reliable by adding redundancy and constructing upgrades to the both the filters and filtered water tank.

- Reduce the formation of Disinfection Byproducts. One of the added challenges the City faces with respect to drinking water quality involves the interrelationship between source water quality and future in-stream flow requirements, which will reduce the volume of flow available from the North Coast and San Lorenzo River. The North Coast streams and springs are the City's purest source of water supply. In addition to the loss of supply, one consequence of a reduced North Coast flow is a greater reliance on water from Loch Lomond Reservoir. Lake water has a higher total organic carbon concentration, and hence a higher disinfection byproduct formation potential. The full implications of greater in-stream flow requirements on the City's drinking water quality are yet to be determined.

The City just completed a major electrical project, including the installation of a larger electrical service, new power control equipment, and a new backup generator to provide for future plant process changes. Over the next decade, the City plans to invest upwards of $15 million in upgrades to the plant to enhance water quality and increase overall system reliability.

5.11 Reliability Issues Associated with Water Rights and Entitlements

Other uncertainties exist with regards to a water rights conformance proposal to the State Water Resources Control Board (SWRCB) related to Newell Creek diversions, and an application to extend water rights diversions from the Felton Diversion along the San Lorenzo River. These uncertainties also have the potential to reduce the City's water supply, as discussed below.

5.11.1 Water Rights Conformance Proposal

City is in the process of developing and submitting filings to the SWRCB to rectify a historical deficiency in the City's water rights on Newell Creek. For example, SWRCB does not allow the City to divert water from Newell Creek directly to the Graham Hill Water Treatment Plant. Instead, a 30-day "last-in-first-out" restriction prohibits the withdrawal of water from Loch Lomond Reservoir until 30 days following the most recent diversion into the reservoir from the same source (Gary Fiske & Associates, 2003). Based upon the original filings, which were thought to be adequate due to the anticipated use of Loch Lomond Reservoir, these water rights allow only for diversion to storage and not for direct diversion, (i.e., into the City's water supply distribution system). This circumstance makes the water supply technically unavailable as a source for City use during times when, for example, the reservoir is receiving more inflow from Newell Creek than is released downstream. The water rights filings by the City are intended to correct this historical deficiency and bring the water rights and current operations into conformance. The proposed direct diversion rights are limited to the same volume of water, purposes and places of use as the existing rights such that they match the existing rights to the extent possible while allowing direct diversion, consistent with historic practice.

5.11.2 Felton Diversion Water Rights Time Extension Project

Pursuant to the City's permits to divert water at Felton for storage in Loch Lomond Reservoir, the City must put all of its approximately 980 mgy entitlement to full beneficial use by December 2006, in order to maintain its appropriative rights to the water. While the City has been diligently putting water from the Felton Diversion to beneficial use over the years, to date the City has used just over half the permitted amount on an annual basis. In the future, however, the City expects to need the full 980 mgy and, therefore, has filed timely petitions with the SWRCB to extend the time allowed for putting the full 980 mgy to beneficial use. The water supplied from the Felton Diversion is considered critical to meeting the City's projected future demand, in particular during operational outages, changes in operations in response to environmental concerns, and during dry years. The City has been granted two other such extensions of time – in the mid-1980s and again in the mid-1990s after negotiations with California DFG and execution of a Memorandum of Agreement that modified the manner in which the City operated the facility. This petition is currently pending while the City works with the California Department of Fish and Game and NOAA Fisheries on completion of the HCP and a Section 10 permit.

Either of these water rights challenges could lead to some loss of existing water supply capacity and system flexibility that would, in turn, affect system reliability and influence the need for additional water supply.

As indicated in the foregoing sections, there are many complex challenges and uncertainties that the City faces in its effort to maintain a safe, adequate, and reliable water supply. These include hydrologic, environmental, water quality, and legal factors. The City is pursing a balanced approach to meet these challenges that includes both demand reduction and a phased, flexible addition to diversify the City's and the regions' existing water supply sources. One additional challenge not mentioned above, and one that underscores the need for a phased and flexible response, is the concern about global climate change. This topic, and the steps being taken by the City to plan for climate change, are discussed in Chapter 9.

Chapter 6

WATER DEMAND MANAGEMENT PROGRAM

The City of Santa Cruz has had a long-standing commitment to water conservation and offers a variety of programs, informational materials, and incentives to help city water customers become more water-efficient. This section describes the water demand management measures (DMMs) currently being implemented by the City and discusses the planning process underway to guide water conservation activities over the next ten years.

6.1 Overview

The City of Santa Cruz has long recognized the importance of conserving water as a responsible water management strategy to help protect the area's natural resources, to stretch existing water supplies, to help downsize and/or delay the need for costly additional water supply, treatment, and distribution upgrades, and to fulfill the City's overall goal of ensuring a safe, reliable, and adequate water supply. Water conservation represents one of three basic components of the City's Integrated Water Plan. In essence, water conservation involves making or inducing changes to many small end uses that individually have minimal effect on overall water use, but that collectively can constitute significant aggregate reductions in system demand.

The Water Conservation section is responsible for promoting efficient water use and implementing management practices that reduce customer demand for water. Its responsibilities and major activities fall into the following four general categories:

Public Awareness and Education: to promote public awareness and education about the City's water resources and the importance of water conservation; and to provide timely and accurate information to utility customers and the general public about conservation practices and technologies, as well as the City's conservation programs and policies.

Water Demand Monitoring: to monitor water production, consumption and system water losses; to track weather and population data; to evaluate trends in per capita water use; to track demand associated with new service connections; to compare actual water demand with projected use by customer category; and to develop and maintain water demand forecasts for the water service area for use in supply planning.

Long-Term Water Conservation Programs: to develop and implement various conservation projects and programs that result in a sustained reduction in customer water demand; to track water savings from ongoing conservation programs; and to evaluate the need for program modifications to improve efficiency, customer service, and water savings in keeping with conservation goals.

Planning and Emergency Management: to periodically update and implement the City's Water Shortage Contingency Plan and the Urban Water Management Plan, and to assist in Departmental and City-wide emergency planning and management activities.

Over the last decade, the Water Conservation section's priorities and work plan have been guided by two principal documents: 1) *Memorandum of Understanding Regarding Urban Water Conservation in California* (MOU), and 2) the Department's Long-Term Water Conservation Plan.

In June 2001, the City of Santa Cruz became a signatory to the MOU and joined the California Urban Water Conservation Council (CUWCC) in promoting water conservation locally and statewide. By becoming a signatory, the City committed to implementing all 14 urban water conservation Best Management Practices (BMPs) contained in the MOU deemed to be locally cost-effective and to periodically report progress made to the CUWCC.

The other guiding document was a 10-year, Long-Term Water Conservation Plan adopted by the City in 2000 (Gary Fiske & Assoc. 2000). The Long-Term Water Conservation Plan identified 17 demand reduction programs (some of which overlapped with those contained in the MOU) to implement over a period of ten years, including:

- Toilet, urinal replacement (residential, commercial)
- High efficiency clothes washers
- Showerhead, faucet aerator distribution program
- Plumbing fixture retrofit regulations
- Residential, commercial water audits
- Large landscape water audits, budget-based rates

It was estimated that, when fully implemented in 2010, the plan would lessen water demand on an ongoing basis by approximately 282 million gallons per year, equal to about 0.8 mgd, and that residential water use per capita would be reduced from 76 to 65 gpcd. Actual savings achieved though long-term conservation measures was closer to 251 million gallons, almost 90 percent of the City's goal. Residential per capita water use in 2010, though, measured 56 gpcd, 14 percent lower than anticipated at the end of the 10-year timeline. The planning horizon for the Department's current Long-Term Water Conservation Plan has recently ended and is in the process of being reevaluated. Effectively, the City's demand management program addresses every major end use of water in every major customer sector (residential, commercial, and landscape), with emphasis on measures that: 1) are quantifiable, 2) make a lasting reduction in average daily water use, 3) provide the greatest water savings, 4) are socially acceptable, and 5), have widespread appeal to the City's water customers.

The City's water conservation program is funded by a combination of water rates, system development charges, and miscellaneous service fees.

In 2008, the City received statewide recognition for its water conservation activities in being selected for the *Llana Sherman Excellence Award for Local/Community Innovations* from the California Urban Water Conservation Council.

6.2 Recent Accomplishments

The Water Conservation Office continues to build upon a range of services promoting water use efficiency. Since completion of the 2005 Urban Water Management Plan, accomplishments of the Water Conservation Office include:

- Developed and implemented the H_2ome Water Survey program for residential customers;
- Initiated landscape water conservation programs including large landscape water budgets and water use reports, turf removal rebates, and rain barrel sales;
- Developed a Water-Smart Gardening database, website, and cd in collaboration with other area water agencies;
- Updated the City's Water Efficient Landscape Ordinance with stricter standards;
- Completed water demand modeling and analysis study to determine impacts of weather, rates and rate structure, and conservation on consumption trends;
- Developed and implemented a Meter Testing, Repair, and Replacement Policy;
- Implemented commercial water audits through the Monterey Bay Area Green Business program;
- Participated in a statewide water conservation rebate program for commercial, industrial, and institutional customers;
- Distributed free water conservation cards to all local hotels and restaurants;
- Implemented and enforced outdoor water use restrictions in 2007 and 2009;

- Installed new software to track water waste and water restriction violations;
- Undertook a comprehensive review and update of the City's Water Shortage Contingency Plan;
- Developed and codified Santa Cruz Municipal City Code Chapter 16.01, Water Shortage Regulations and Restrictions Ordinance;
- Amended the Santa Cruz Municipal Code to facilitate graywater use; and
- Participated in a comprehensive water audit of the University campus and assisted the University in implementing selected high priority water conservation projects.

6.3 Description of Demand Management Measures

Water Code section 10631(f) (1) requires water suppliers to:

> *"Provide a description of each water demand management measure that is currently being implemented, or scheduled for implementation."*

The Water Code then lists a series of fourteen DMMs for the supplier to address in the order in which they formerly were organized as BMPs in the MOU.

As a signatory to MOU, the Water Conservation Office operates water conservation programs in accordance with the BMPs. The MOU and BMPs were revised and restructured by the CUWCC in 2008. The 14 BMPs are now organized into five categories. Two categories, Utility Operations and Education Programs are considered "Foundational" BMPs because they are considered to be essential water conservation activities by any utility. The remaining BMPs are designated as "Programmatic BMPs" and are organized into Residential, Commercial, Industrial, and Institutional (CII), and Landscape categories. The relationship between the BMPS as organized by the CUWCC and the DMMs listed in the Water Code is shown in Table 6-1.

A detailed description of each DMM that the City is currently implementing follows, in the order that they are listed in the MOU.

6.4 Utility Operations Programs

6.4.1 Operations Practices

This BMP encompasses three elements that utilities take to facilitate conservation program implementation, supplement incentives with regulation, and, where applicable, develop programs with their wholesaler agency's assistance.

Table 6-1. Comparison of California Urban Water Conservation Council BMPs and the Urban Water Management Plan DMMs

CUWCC BMP Organization and Names (2010 MOU)				UWMP DMMs	
Type	**Category**	**BMP #**	**BMP Name**	**DMM #**	**DMM Name**
Foundational	Utility Operations Programs	1.1.1	Conservation Coordinator	L	Water conservation coordinator
		1.1.2	Water Waste Prevention	M	Water waste prohibition
		1.1.3	Wholesale Agency Assistance Programs	J	Wholesale agency programs
		1.2	Water Loss Control	C	System water audits, leak detection, and repair
		1.3	Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections	D	Metering with commodity rates for all new connections and retrofit of existing connections
		1.4	Retail Conservation Pricing	K	Conservation pricing
	Education Programs	2.1	Public Information Programs	G	Public information programs
		2.2	School Education Programs	H	School education programs
Programmatic	Residential	3.1	Residential assistance programs	A	Water survey programs for single-family residential and multifamily residential customers[1]
				B	Residential plumbing retrofit
		3.2	Landscape water survey	A	Water survey programs for single-family residential and multifamily residential customers[1]
		3.3	High-Efficiency Clothes Washing Machine Financial Incentive Programs	F	High-efficiency washing machine rebate programs
		3.4	WaterSense Specification (WSS) toilets	N	Residential ultra-low-flush toilet replacement programs
	Commercial, Industrial, and Institutional	4	Commercial, Industrial, and Institutional	I	Conservation programs for commercial, industrial, and institutional accounts
	Landscape	5	Landscape	E	Large landscape conservation programs and incentives

[1] Components of DMM A (Water survey programs for single-family residential and multifamily residential customers) applies to both BMP 3.1 (Residential assistance program) and BMP 3.2 (Landscape water survey)

6.4.1.1 Water Conservation Coordinator

The City of Santa Cruz has employed a full-time water conservation coordinator since 1986. The current Water Conservation Manager is responsible for planning, organizing, and directing the operations of the Water Conservation section and for reporting on BMP implementation.

The Water Conservation Manager meets regularly with the Water Director and senior managers to coordinate conservation activities with the administration, engineering, production, distribution, and customer service sections.

The Water Conservation section is staffed with one Environmental Projects Analyst, and two Water Conservation Representatives who operate existing programs and assist with new program development.

6.4.1.2 Water Waste Prevention

Under the MOU, water waste prevention consists of enacting, enforcing, or supporting legislation, regulations, ordinances, or terms of service that prohibit water waste in new development and by existing users, or that facilitate implementation of water shortage response measures.

The City's water conservation ordinance (Santa Cruz Municipal Code 16.02) has been in operation since 1981 and was updated in 2003. Under the ordinance it is unlawful for any person to use water for any of the following:

- unauthorized use of water from a fire hydrant,
- watering of landscaping in a manner or to an extent that allows excess water running off the property,
- once notified, allowing plumbing leaks to go unrepaired,
- outdoor washing of structures, vehicles, or surfaces without the use of an automatic shut-off nozzle, and
- operation of a fountain unless water is recycled

An example of excess water running to waste from landscape irrigation system

Provisions of the ordinance regulating new development include prohibitions on:

- The use of water in new ice-making machines and any other new mechanical equipment that utilizes a single pass cooling system to remove and discharge heat to the sanitary sewer,
- washing of vehicles at a commercial car wash unless the facility utilizes water recycling equipment
- the use of water for new non-recirculating industrial clothes wash systems, and
- the use of potable water for dust control or soil compaction purposes in construction activities where there is a reasonably available source of reclaimed water appropriate for such use

The ordinance is in effect at all times. However, during mandatory water restrictions, violating the water waste ordinance is punishable by a fine levied on the utility bill. During curtailment, an increased number of staff patrol and enforce restrictions, including water waste violations, seven days per week.

The Water Conservation Office has a designated phone number for customers to report water waste (831-420-LEAK). Customers may also submit an online form found on our website. When water waste is observed, site visits, in-person customer contact, phone, and/or mail correspondence is used to resolve the issue. Field staff will increase drive-by checks of sites receiving water waste complaints to help ensure the issue was resolved. New software was acquired in 2009 to help document, track and manage water waste complaints, including the photo evidence of water waste incidents.

In addition, the City has a comprehensive landscape water conservation ordinance (Santa Cruz Municipal Code 16.16) to ensure landscapes and irrigation systems in new and renovated development are designed to avoid runoff, overspray, low-head drainage and other similar conditions where water flows off site onto adjacent property.

Refer to Chapter 8 for a discussion of the City's water shortage response measures.

6.4.1.3 Wholesale Agency Assistance Programs

The City of Santa Cruz currently is not a wholesale water supplier nor does it receive water from a wholesale agency. This demand management measure does not apply.

6.4.2 Water Loss Control

As mentioned in section 4.4, the Water Conservation Office has conducted an annual water audit of the City's water distribution system since 1997 using the approach described in the AWWA M36 "Manual of Water Supply Practices". The purpose of the audit is to quantify how much water and revenue is lost through physical leaks and apparent losses and to identify steps to minimize system losses and improve the operational efficiency of the water system. Beginning in 2006, the City also began to use the water balance approach developed through the International Water Association (IWA), now advocated by AWWA, to better characterize water losses in the distribution system.

Water distribution crews working on system leak repair

Water audit results indicate average system water loss from 2001 to 2010 is approximately 7.5 percent of total water production. Of this amount, it is estimated that 5 to 6 percent is lost due to physical leakage in the distribution system, and another 1 to 2 percent is not physically lost but goes uncaptured on the billing system due to sales meter inaccuracies. In 2010, the Water Department adopted a new Meter Testing, Repair, and Replacement Policy that accelerates large meter replacement and should help improve overall meter accuracy.

To address physical leakage, service line repairs, leak repairs, and line replacements occur on an ongoing basis. The City has a multi-year service line replacement program to eliminate all polybutylene service lines, which was a widely used material between the early 1970s and the late 1980s until it was found to be defective. To date, 5,442 or over half of all polybutylene service lines on the system have been replaced with copper lines.

Although a formal leak detection program is currently not in place, the Water Department uses sonic leak detection equipment to locate and repair leaks in the water system. In addition, the Department monitors for leaks on the customer's side of the meter by reviewing exception reports for high meter readings. Customers are notified so they can take appropriate action to repair leaks, even before they receive their water bills. In 2010, the City's top irrigation customers began receiving Water Use Reports in which customers, property managers and landscapers can see their irrigation usage including unexpected spikes due to leaks. Because these reports are sent to vested multiple parties for each property, there is an increased opportunity and incentive to notice and repair outdoor leaks in a timely manner.

6.4.3 Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections

All of the City's 24,351 water connections are fully metered with Automated Meter Reading (AMR) technology. Water meters are required for all new service connections. In addition, a separate, dedicated irrigation meter is required for all new and renovated multi-family and commercial landscape projects with over 5,000 square feet of landscaped area.

All customers are billed according to the volume of water consumed. Inside-City customers, large volume accounts, and irrigation accounts now are all billed on a monthly basis[1]. Monthly billing was instituted in 2005 mainly to facilitate rising rates for all City utilities, but it also serves to aid in leak detection and allows for more accurate monitoring of individual account usage and categorical water consumption. Most outside City customers are still billed on a bimonthly basis.

In 2010, the Water Conservation Office also initiated an effort to examine the feasibility of retrofitting mixed-use commercial accounts that have substantial irrigation demands with their own dedicated landscape meter. In all, almost 1,900 commercial properties were analyzed, resulting in 152 potential commercial candidates for retrofitting. This effort is expected to take another year or two to complete.

6.4.4 Retail Conservation Pricing

The Customer Service section, also referred to as "Santa Cruz Municipal Utilities" provides customer service and handles utility billing for water, sewer, refuse, and recycling services to the residents and businesses of the City of Santa Cruz, and services for water only to the unincorporated surrounding areas and part of the City of Capitola. The water portion of the City's utility bill consists of three components: 1) a fixed monthly "readiness-to-serve" charge, 2) a volumetric charge, and 3) for customers

[1] Monthly billing was instituted for all inside City customers beginning in 2005 and for all outside City irrigation customers in 2010.

residing in elevated pressure zones, an elevation charge applies. The readiness to serve charge varies by meter size and location (Table 6-2).

Table 6-2. Readiness to Serve Charges (2011)

Meter Size	Inside City Monthly	Outside City bimonthly
5/8 and 3/4”	$17.41	$44.40
1”	$43.52	$111.00
1.5”	$87.05	$221.96
2”	$139.27	$355.14
3”	$261.14	$665.90
4”	$435.23	$1,109.84
6”	$870.46	$2,219.66
8”	$2,002.05	$5,106.68
10”	$2,472.09	$6,303.84

For the volumetric charges, the City has had a multi-block, inclining rate structure in place for single family residential customers since 1995. In 2004, following a comprehensive water rate study, a new, five-tier rate structure was adopted that applies to residential accounts with either one or two dwelling units. This new rate structure was intended to encourage more efficient use by single family residential and two-unit customers during the peak summer season, when the system relies more heavily on reservoir storage to meet daily demands. The rates effective January 2011 are listed in Table 6-3. For all other customers, including multi-family (3 or more dwelling units), business, industrial, municipal, and irrigation customers, water is billed at a uniform rate corresponding with Block 2.

Table 6-3. Single Family and Two-Unit Residential Water Rate Structure (2011)

Block	Category	Inside City monthly		Outside City bimonthly	
		Units (ccf)	Rate	Units (ccf)	Rate
5	Inefficient or excessive use	over 18	$8.79	over 36	$11.21
4	High use	15-18	$7.05	29-36	$8.98
3	Average outdoor needs	10-14	$5.14	19-28	$6.55
2	Average indoor needs	5-9	$4.00	9-18	$5.10
1	Essential needs	1-4	$1.57	1-8	$2.00

In addition to changing the rate structure, the overall cost of water service was increased annually for all customers over a period of six years beginning in mid-2004[2]. The primary purpose of this phased rate increase was to fund over $100 million in capital improvements that were identified in the rate study to maintain and enhance the integrity of the water system. All utility rates are established by resolution of the City Council.

6.4.4.1 Impact of Rate and Rate Structure Changes on Water use

Over a three year period from 2006 though 2008, after the change to the new five-tier rate structure and as the annual rate increases were being phased in, overall water consumption steadily declined. The City later contracted with Weber Analytical to update its water demand models and to explore the recent trends to understand how much of the observed decline was due to weather effects, pricing changes, or other conservation influences. The modeling showed, after controlling for weather influences, an overall reduction in water use of 1.1 mgd or 12 percent was experienced as compared to the 5-year period from 1999-2004, when consumption was relatively steady. The decline was seen in every customer category, to varying degrees. The overall decline was strongly related to the combined price impact from the five-tier structure and the sharply higher rates for water service and by 2008 had reached a new equilibrium. Future price increases are expected to be more in line with inflation and should have smaller effects on sales volume.

6.4.4.2 Conservation Pricing Redefined

In 2007, the CUWCC amended the BMP for retail conservation pricing. The current definition states that *"conservation pricing provides economic incentives (a price signal) to customers to use water efficiently"* and sets as one option a minimum percentage of water sales revenue from volumetric rates of 70 percent. Rather than focus on the type of rate design, such as uniform, tiered, seasonal, or allocation-based, all of which are considered potentially consistent with the above definition, emphasis was placed on minimizing fixed charges and maximizing the amount of water sales revenue from volumetric rates.

In both 2007 and 2008, the City's ratio of volumetric revenue to total revenue was 71 percent, consistent with the CUWCC's new definition. Ironically, the water restrictions implemented in 2009 led to a decline in both sales volume and volumetric revenue such

[2] The final 5% rate increase originally scheduled to be effective January 2009 was deferred until January 2011.

that the City conserved its way out of compliance with BMP 11. So even though the current rate structure and accompanying rate levels clearly achieved one of the City goals to encourage more efficient use and initially met the City's commitment under the MOU, the level of volumetric revenue over the last few years (67 to 68% of total revenue) technically does not satisfy the requirements in the MOU regarding retail water conservation pricing.

6.4.4.3 Budget–Based Rates for Large Landscape Accounts

The City's Long-Term Water Conservation Plan included moving to budget-based rates for large landscape customers. While water budgets have been developed for large landscape customers, utility billing system constraints have precluded implementing budget-based billing for the time being. The City still intends to pursue budget-based water rates for large landscape customers, including parks, golf courses, business and residential irrigation accounts in the future.

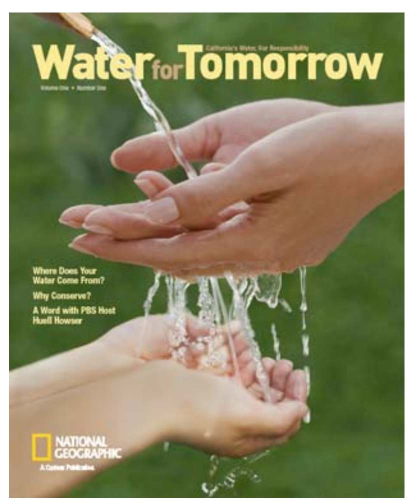
6.5 Education Programs

6.5.1 Public Information Programs

The City of Santa Cruz Water Department actively promotes public awareness and education about the City's water resources and the importance of water conservation. The Water Department regularly makes contact with the public through the news media, in addition to keeping its website continuously updated.

Specifically, public information is disseminated using the following media and methods:

Free literature available from the Water Department



- Utility Newsletter, called the "SCMU Review", which includes news and information on water conservation topics;
- Water Conservation website;
- Public meetings and speaking events to community organizations, industry and homeowners associations, and service groups;
- Tabling at local fairs, farmers markets, and events;
- Distribution of free water conservation brochures and literature;

New logo reflects City's water conservation ethic:

- Paid advertising in local newspapers;
- Opinion page coverage
- Bill inserts;
- Messages and information on customer's bills showing use in gallons per day and a graph charting monthly/bimonthly water use for the entire year;
- Distribution of free conservation devices, including showerheads, faucet aerators, leak detection tablets, shower and hose timers, hose nozzles, gardening cds, and literature;
- Water supply tours;
- Marketing and advertising of EPA's "Fix a Leak Week";
- Television and radio news interviews and community television programs;
- Participation in regional water forums;
- Participation with other local water agencies in local events and sponsorships of water conservation-related activities;
- Subsidized sale of rain barrels;
- Free workshops on irrigation efficiency, new irrigation technologies, and water conservation strategies for the landscape; and
- Financial support to the Green Gardener Program, California Water Awareness Campaign, Water-Smart Gardening Faire, Green Business Program, and the Water Education Foundation.

The Water Conservation Office also issues a formal water supply outlook three times a year between late winter and spring to update the public on local water conditions and to provide information water supply availability for the year ahead. Weekly updates of water conditions, including rainfall, runoff, and reservoir levels are posted on the City's website throughout the year.

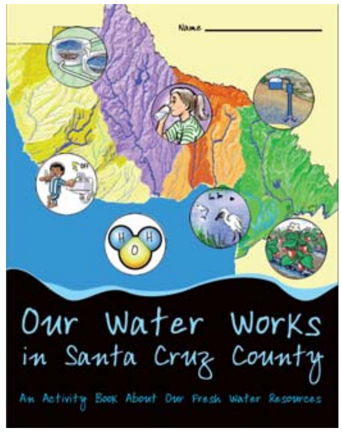
Refer to section 5.7.4 for a description of public outreach activities related to the City's desalination program.

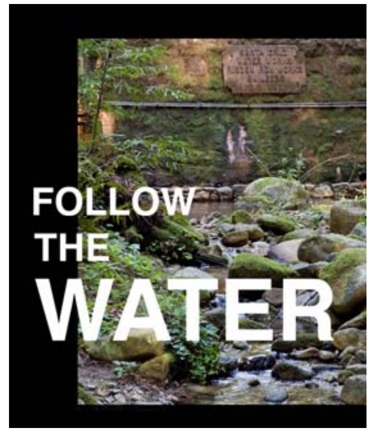
6.5.2 School Education Programs

The City offers school education activities for students ranging from upper elementary age children up to the University level. The program gives students an opportunity to learn about the City's water supply system and water conservation. School educational activities include:

- Field trips and ranger presentations at Loch Lomond Reservoir;
- Distribution of age and grade level appropriate curriculum and educational materials, including a water education booklet specially developed for Santa Cruz County students;
- Classroom presentations; and
- High School Watershed Academy program;

Examples of water education materials for local schools:





Implementing school educational programs has become more challenging in recent years. Education budget cuts have made it difficult for schools to arrange for bus transportation and increased demands in mandated curriculum requirements have left little room for additional lesson plans and extracurricular activities.

6.6 Residential Programs

Residential water use comprises almost two thirds of system consumption and therefore is a main focal point of the City's water conservation efforts.

6.6.1 Residential Assistance Programs

This BMP, as it is currently written in the MOU, focuses on indoor residential water use efficiency and consists of leak detection assistance, water efficiency suggestions, an inspection, and providing showerheads and aerators meeting WaterSense specifications.

The City currently offers a **H$_2$ome Water Survey** program to both single-family and multi-family customers. As part of the survey, Water Conservation staff reviews water consumption and billing information with the customer; teaches how to read the meter and how to use it to detect household leaks, inspects home plumbing fixtures, and offers free showerheads and aerators. The primary emphasis of the City's H$_2$ome Water Survey program is in assessing outdoor water use and providing water saving recommendations through a landscape water survey (See Section 6.6.2, below). Many of the materials provided during the survey, however, including a meter reading log, handouts on leak detection and repair, and leak detection tablets are intended to assist residential customers consistent with this BMP.

The City previously implemented, as part of its Long-Term Water Conservation Plan, a one-time Water Conservation Kit Distribution Program to all of its roughly 18,000 single family residential customers. This program involved door-to door distribution of low-flow showerheads, faucet aerators, a garden hose nozzles and leak detection tablets, along with instructions, conservation literature, and toilet and washer rebate brochures to encourage further action and water savings. Funds remaining at the end of the program were used to offer the same materials to multifamily households on request.

Currently, the Water Conservation Office stocks and offers free 2.0 gpm showerheads, 1.5 gpm lavatory faucet aerators, kitchen aerators, hose nozzles, toilet dye tablets, and hose timers on request to any interested water customer. In addition, the City offers leak detection gel to large building managers such as property management companies, motels, and apartment owners to assist them in detecting and repairing leaks in toilets and urinals.

Refer to section 6.6.4 below for the City's retrofit requirements for showerheads at time of sale.

6.6.2 Landscape Water Survey

The City's H_2ome Water Survey program was begun in 2006 to provide site-specific assistance to residential customers with large landscaped areas and high outdoor water demands. These customers tend to have automatic irrigation systems and their summer usage often extends into the top billing tiers.

With the property owner present, a conservation representative analyzes the customer's utility bill, evaluates the existing landscaped area, design, and the types of plant materials in place, and checks the irrigation system. Each irrigation station is run and evaluated for flow rate, coverage, and problems such as runoff, overspray, uneven distribution, and broken or leaking equipment. For turf areas, a catch can test is run to determine sprinkler output and uniformity. The customer receives a list of site-specific recommendations to help conserve water both inside and outside the home. An irrigation schedule tailored to the customer's landscape is also provided. Customers are given training on how to operate their irrigation controllers, including the use of water-saving features and scheduling strategies to reduce runoff. Water saving devices including hose nozzles and hose timers are offered at no cost. Any applicable rebate information and water conservation literature is also provided.

The H_2ome Water Survey program is voluntary and made available to all interested residential customers. The program is marketed, however, mainly to the top 20 percent of all residential users. Customers with unusually high summer water use and high water bill referrals from customer service are also invited to participate in a survey. Marketing methods include direct mail, brochures, and promotion in the utility newsletter and website. On average, the City performs about 100 surveys a year, primarily during the summer months, but participation varies widely from year to year depending on customer interest level and staff availability.

6.6.3 High Efficiency Clothes Washers

High efficiency clothes washer

Clothes washing is one of the major end uses of water in the residential sector. It is also one where there is very significant water conservation potential in terms of the opportunity to reduce per capita water use on a long-term basis. To this end, the City offers its residential customers a $100 rebate for purchasing an Energy Star labeled, High-Efficiency Clothes Washer (HECW), and processes between 500 and 700 HECW rebates annually. Over 6,200 clothes washers rebates have been issued since the program began in 2000. Over time, the average water factor (gallons of water per load per cubic foot of capacity) of appliances on the market has steadily declined and the equipment become increasingly more water efficient. In 2010, the average water factor of the 710 HECWs rebated by the City was less than 4.0. As water factors continue to decrease, future water savings from HECW installations will continue to improve.

The City works with local appliance retailers to promote the program at local retail outlets in coordination with residential clothes washer rebates concurrently offered by PG&E. The Water Conservation Office also markets the HECW program through newspaper ads, the City's website, the utility newsletter, and the H_2ome Water Survey program.

6.6.4 WaterSense Specification Toilets[3]

Toilets are another area where there is a significant potential for long-term reduction in per capita water use in the residential sector. The City's residential toilet replacement program has two components: a rebate program and a plumbing fixture retrofit regulation.

The City has operated a rebate program to promote the installation of ultra-low-flush (ULF) toilets in residential accounts since 1995. The program originally featured a $75 rebate as a financial incentive for customers to remove their, older, higher-volume toilets and replace them with 1.6 gallon per flush toilets. In 2007, the City began to also offer a $150 rebate for 1.28 gallon per flush toilets, also referred to as High Efficiency Toilets (HETs). The $75 rebate was discontinued in 2010. The City now only rebates toilets meeting WaterSense specifications with a maximum flush volume of 1.28 gallons. Over 11,000 residential toilets have been replaced under this rebate program.

In 2003, the City adopted a plumbing fixture retrofit ordinance. This regulation requires that all residential, commercial, and industrial properties be retrofitted with low consumption showerheads, toilets, and urinals when real estate is sold. As part of the initial program implementation, the City worked closely with the County of Santa Cruz and the City of Capitola to have similar ordinances passed in these other jurisdictions. As a result, the retrofit regulation applies uniformly throughout the entire water service area, regardless of jurisdiction. This ordinance implements the City's Long-Term Water Conservation Plan and fulfills the City's obligation under the MOU to carry out a toilet replacement program that is "at least as effective as requiring toilet replacement at time of resale."

Under the law, the seller of the property is responsible for retrofitting any older toilets, urinals, and showerheads on the property with low consumption fixtures, and for obtaining a water conservation certificate from the Water Department. There is an option in the ordinance that allows the responsibility for retrofitting to be transferred from the seller to the buyer, if both parties agree. In either case, the City tracks real estate sales and requires every property to be inspected to verify that the plumbing fixtures on the property being sold meet the low consumption standards. A custom database program was developed by a consultant to manage property sales data on local properties and retrofitting records, as well as follow-up enforcement of the ordinance.

[3] The WaterSense specification refers to toilets that use 20 percent less water than the current federal standard and are certified by independent laboratory testing to meet rigorous criteria for both performance and efficiency.

Since 2003, the City has processed, inspected, and certified almost 6,500 individual properties, 95 percent of which are single or multi-family residential accounts, and verified over 12,900 residential toilets and almost 11,300 showerheads meet low consumption standards. However, since 2008, inspection and enforcement activity has been less than half it was in the first several years, reflecting depressed housing turnover both locally and nationally.

The flush volume standard for the retrofit ordinances continues to be 1.6 gpf. However, many subject to these ordinances are now choosing to install HETs instead of 1.6 gpf fixtures because of their widespread availability on the market and superior performance. By 2014, only HETs will be available for sale under California law.

6.7 Commercial, Industrial and Institutional (CII) Programs

The City provides water to over 1,900 commercial and industrial accounts within the service area, which together represents about 26 percent of total system water use. The City offers several programs to encourage commercial customers to become more water efficient by using water-saving technology. These include

- Smart Rebates Program
- Monterey Bay Area Green Business Program
- City-administered Rebates
- Plumbing Fixture Retrofit Regulations

Smart Rebates is a statewide, one-stop program administered by the California Urban Water Conservation Council that offers a wide-ranging list of measures for conservation product and appliance rebates. The program is funded jointly with a statewide Proposition 50 grant and with participating water agency contributions. The City partnered in 2007 with the CUWCC to offer a variety of rebate options to CII customers. They are:

- High-Efficiency Clothes Washer: $400
- High-Efficiency Toilet: $200
- High-Efficiency Urinal: $300
- Pressurized Waterbroom: $50
- X-Ray Film Processor Re-Circulation System: $2,000
- Cooling Tower Conductivity Controller: $1,200

The Water Conservation Office markets the Smart Rebates program on the website, during CII surveys, and to CII customers that stop by the counter. Customers may opt to participate in City administered rebate programs, although the City rebate amounts are not as high. Major participants in this program have included the Santa Cruz Beach Boardwalk, the University, and various hotels and restaurants.

The Monterey Bay Area Green Business Program This program is a partnership of environmental agencies, utilities, and nonprofit organizations that assist, recognize and promote businesses that volunteer to operate in a more environmentally responsible manner. To be certified "green," participants must be in compliance with all regulations and meet program standards for conserving water and energy, preventing pollution, and minimizing waste. The City became a participant in the program in 2006. It is coordinated through the City Public Works Department.

Businesses must meet a set of indoor and outdoor water conservation standards as part of achieving their Green Business Certification. All businesses are required to meet basic, mandatory measures (i.e. low consumption fixtures and fittings) as well as a minimum number of elective requirements from several categories (e.g. cleaning, landscape irrigation). Customers are also required to meet additional measures specific to their type of business (i.e. low flow spray rinse valves for restaurants).

A Water Conservation Representative meets with Green Business applicants and inspects the site's water using apparatuses, checks for leaks, discusses the water meter, and interviews the applicants to determine if the water conservation measures have been met. When needed, customers are provided with water saving devices and rebate application information to meet compliance with the Green Business standards. Businesses who do not meet the requirements during the initial inspection receive follow up inspections once they have implemented necessary changes.

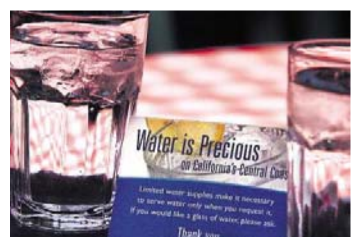
The Water Conservation Office has conducted 129 commercial water audits as part of the program, including a diverse list of businesses ranging from auto repair establishments, office buildings, hotels, restaurants, and hospitality services, medical facilities, retail outlets, construction companies, churches, landscape contractors, and Laundromats.

City-administered Rebates The City offers similar rebates for commercial customers as it does for residential customers. These include rebates for high efficiency flush valve toilets and urinals or waterless urinals.

Plumbing Fixture Retrofit Regulations The City's retrofit regulations described above apply to commercial and industrial property in addition to residential property, and any older toilets, showerheads, and urinals are required to be replaced with low consumption fixtures and fittings at the time of sale. Although commercial properties do not turn over at the same rate as do residential properties, over time this ordinance has triggered the complete retrofit of some of the largest commercial properties in the water service area, including Chaminade Resort & Spa, the Dream Inn, and the University Inn and Conference Center, as well as numerous smaller commercial buildings.

The City has operated other commercial water conservation programs in the past which have been completed and are no longer active. In 2005 the City facilitated an energy and water saving project carried out by Ecology Action that replaced existing kitchen spray valves in local restaurants, cafeterias, and food service facilities with new high performance spray valves. The City also participated in a statewide program known as *LightWash* to promote high efficiency clothes washers to institutional and multi-family customers with common area laundry facilities, commercial Laundromats, and other businesses with on–site laundry facilities from 2003 to 2005.

As mentioned early in this chapter, the City has in the past also distributed free bed linen/bathroom water conservation cards to all local hotels, and drinking water upon request table tents to all local restaurants, and continues to makes them available upon request.



6.8 Landscape Programs

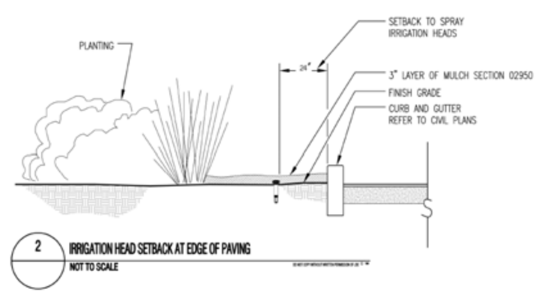
6.8.1 Water Efficient Landscape Ordinance

The City of Santa Cruz first adopted an ordinance establishing landscape water conservation regulations for major development projects situated in the City's service area in 1993 (Santa Cruz Municipal Code Chapter 16.16). The ordinance was rewritten in 2001, and revised again in 2010 in response to AB 1881, the Water Conservation in Landscaping Act of 2006. Its overall purpose is to ensure that the City's limited water supply is used efficiently and effectively in new landscapes within the City's water service area and to avoid certain landscape and irrigation design aspects that have the potential to result in water waste. During the most recent revision, the City led an inter-agency effort to promote a regional framework and consistent standards among the various land use jurisdictions and public water suppliers within Santa Cruz County.

The City's ordinance applies throughout the entire water service area as a condition of receiving water service. It covers all new and renovated, commercial, industrial, and public projects, new single-family and multifamily development projects resulting in three or more dwelling units where: 1) the landscape is installed by the developer, and 2) the total landscape area of the project is 2,500 square feet or more, and new single family and two-unit residential development projects on properties equal to or larger than 10,000 square feet. Certain provisions also apply to pre-existing landscapes over one acre in size. The ordinance contains provisions for:

- Dedicated irrigation meters for new landscapes or expansion of existing landscapes over 5,000 square feet in area;
- Landscape water budget based on 70 percent of reference evapotranspiration;
- Limits on the portion of the landscape devoted to turf and other water intensive uses; avoiding use of turf in narrow and sloping areas.
- Requiring very low to moderate water using plant materials, grouping plants with similar water needs
- Irrigation design to avoid conditions that lead to runoff and overspray
- Appropriate irrigation equipment, including requiring weather-based irrigation controllers to maximize water efficiency
- Soil preparation and mulching
- Storm water management
- Alternative water sources

Landscape and irrigation plans are checked to ensure water efficiency in new development



A complete landscape plan must be submitted and found to satisfy the standards before a building permit can be issued. Water Conservation staff reviews the landscape plans for compliance with the ordinance, coordinates plan review with Water Engineering and other City Departments and jurisdictions, and once installed, performs final inspections of the completed landscape. The largest project to come under the City's landscape plan review process was the recent Highway 1/17 interchange landscaping. Other recent projects have included the live-work development at 2120 Delaware Avenue, Safeway renovation on Mission Street, and Tannery Arts complex on River Street.

6.8.2 Large Landscape Water Budgets

In July, 2010, the City launched a new program for customers with large landscapes and dedicated irrigation accounts. After converting all dedicated irrigation accounts to monthly meter reading, the City contracted with a consultant, WaterFluence LLC, to map landscape areas using aerial imagery, to develop irrigation budgets for the City's 110 largest irrigation customers, and to distribute the information through monthly Landscape Water Use Reports. The reports provide a site-specific irrigation budget based on landscape size and plantings, type of irrigation, and real-time local weather conditions that is obtained from the CIMIS station located at the DeLaveaga golf course. Customers receive monthly reports via mail or email comparing their actual consumption to the irrigation budget over a three-year period. The reports convert water use over budget into a dollar figure so that customers see how much money was lost to inefficient irrigation practices over various time intervals (previous month, previous year, etc). These reports are sent to the water customer as well as those with a vested interest in the property such as the landscape contractor, HOA Board Members, and Property Managers. Appendix N includes an example of a public site receiving a Water Use Report, the aerial imagery used to measure its landscaped area to develop the water budget, and a map of the service area showing the location of all properties where budgets have been developed.

Large landscapes and parks offer open spaces for community use and recreation

In 2011, additional irrigation accounts and selected large CII and multifamily residential properties with mixed meters were added to the program. The expanded program now covers a total of 181 individual sites, 235 accounts, and over 14.1 million square feet of landscaping. Properties include parks, golf courses, hotels, schools, commercial lots, homeowner associations, government facilities, multi-family residential common areas, industrial properties, and medical facilities. Total water consumption for the accounts under active management exceeds 200 million gallons per year, some 6 percent of the system total.

As part of this program, a professional irrigation audit service is made available to large landscape customers through the contract with WaterFluence. The audits include an assessment of irrigation efficiency, notation of irrigation issues (scheduling, tilted nozzles, leaks, breaks, pressure, overspray etc.), and a confirmation of the landscape area measurements. Customers receive a detailed report with site photos noting irrigation problems, a sprinkler condition analysis, cost-effective recommendations, scheduling suggestions, and a list of water management essentials.

The Water Conservation Office selected properties for this program based on annual water consumption, landscape size, previous history of water waste and/or water restrictions violations, and recommendations from local landscape contractors. After initial program implementation, staff conducted an informal marketing campaign and met with local landscape contractors, property managers, and parks staff to raise awareness of the program's value, encourage active participation, and solicit irrigation audits. Water Conservation Staff maintains contact information records and actively seeks to increase report distribution to relevant parties. The site mapping, water budget calculations, report distribution, and professional water audits are managed by the consultant. Data to calculate water savings and analyze trends will be available at the end of 2011, when a full year's data is available.

6.8.3 Turf Removal Rebate

The Water Conservation Office has just begun offering a rebate program to promote turf removal to encourage and expand landscape water conservation opportunities for customers and to provide an option for customers seeking to mitigate high utility bills.

The rebate offer is $0.50 per square foot of lawn removed. This amount is comparable to other rebate programs the City offers, in terms of dollars per avoided gallon per day of water use, and in line with what other water utilities that offer this type of program commonly pay. Single-family customers are eligible to receive up to a $250 rebate (equal to 500 square feet) and multi-family and commercial customers may receive up to $1,000 (equal to 2,000 square feet). To qualify, customers must:

- Have green lawn that is watered with an in-ground irrigation system,
- Remove or cap their overhead spray system in the area to be converted,
- Replace lawn with very low or low water use plants and mulch (with or without low volume drip irrigation) or install no water use permeable hardscape options,
- Agree to pre and post inspections to take measurements and ensure eligibility requirements have been met, and
- Complete the landscape conversion within 120 days of pre-approval.

Lawn removal rebates will be marketed to water customers, landscape contractors, and property managers. The program will be evaluated after one year and examine its effectiveness and to reconsider the rebate amount and program parameters.

6.9 Other Water Conservation Initiatives

The City has been active in implementing other water conservation measures beyond the BMPs listed in the MOU and the programs identified in the Long-Term Water Conservation Plan. These include a Rain Barrel program and leading an effort to facilitate graywater use in the City.

On a trial basis, the City operated a subsidized rain barrel distribution program during the 2010 winter season. The goals of this pilot program were to promote consumer education about various methods to conserve water in their landscape, to complement other outdoor water saving measures the City promotes, to develop information about consumer interest and satisfaction with rain harvesting systems, and, as secondary objective, to help the City meet its environmental stewardship goals and storm water management requirements.

Rain barrels proved to be a popular item with City water customers

The Water Conservation Office purchased two shipments of 65-gallon MOBY rain barrels and made them available at a reduced cost to City water customers. A display model was set up in the customer service lobby, where interested customers could purchase one or more barrels at the Customer Service counter. Water Distribution personnel delivered the barrels. Barrel placement and installation was the responsibility of the consumer. This program was very popular with the public. Almost 200 barrels were quickly sold and a waiting list generated. The program will be offered again in the 2011 winter season.

The City also amended its Sewer System Ordinance (Santa Cruz Municipal Code Chapter 16.08) in 2011 to enable gray water systems to be constructed and operated in the City in conformance with Chapter 16A of the California Plumbing Code. Previously, City ordinance prohibited discharge of wastewater to other than the public sewer. The amended ordinance now allows residents to legally build a “Laundry to Landscape” type graywater system without a permit, and for other types of graywater systems to be developed, consistent with the Plumbing Code, with appropriate permits and oversight[4].

[4] The City does require an Installation and Maintenance Agreement to ensure notification of the location of Laundry to Landscape systems is given to the City and graywater users abide by certain guidelines.

6.10 Schedule of Implementation

Water Code Section 10631f(2) requires water suppliers to

> *"Provide a schedule of implementation for all water demand management measures proposed or described under the plan."*

Table 6-4 below summarizes the year each program was originally implemented and the status of all the demand management measures. Except in cases where certain projects were completed or specific programs ended as noted in the foregoing descriptions, all programs are currently active and ongoing. Where two or more years are noted, it means a major addition or modification was made to the program.

Table 6-4. Demand Management Measure Implementation Schedule and Status

BMP #	DMM	BMP Name	Year Implemented	Status
1.1.1	L	Conservation Coordinator	1986	Ongoing
1.1.2	M	Water Waste Prevention	1981	Ongoing
1.1.3	J	Wholesale Agency Programs	Not applicable	
1.2	C	Water Loss Control	1997	Ongoing
1.3	D	Metering w/ Commodity Rates	--	Ongoing
1.4	K	Retail Conservation Pricing	1995, 2004	Ongoing
2.1	G	Public Information Programs	1986	Ongoing
2.2	H	School Education Programs	1986	Ongoing
3.1	A,B	Residential Assistance	2001	Ongoing
3.2	A	Landscape Water Survey	2006	Ongoing
3.3	F	High Efficiency Clothes Washer Program	2000	Ongoing
3.4	N	WaterSense Specification Toilets	1995, 2003, 2010	Ongoing
4	I	CII programs	2001, 2007	Ongoing
5	E	Landscape	1993, 2001,2010	Ongoing

6.11 Methods to Evaluate Effectiveness

Water Code Section 10631f(3) requires water suppliers to

> *"Provide a description of the methods, if any, that the water supplier will use to evaluate the effectiveness of water demand management measures implemented or described under the plan."*

A variety of methods are used to evaluate the effectiveness of the water conservation programs. These methods include customer participation and satisfaction surveys, data analysis (both in-house and by consultants), tracking water consumption (in categorical classes and/or individual accounts participating in a program), annual reports, and materials review and updates. The methods used to evaluate effectiveness for each demand management measure are summarized in Table 6-5 below.

Table 6-5. Methods Used to Evaluate Effectiveness

BMP #	DMM	BMP Name	Surveys	Data Analysis	Track Consumption	Annual Reports	Material Review	Not Applicable
1.1.1	L	Conservation Coordinator						✓
1.1.2	M	Water Waste Prevention	✓	✓				
1.1.3	J	Wholesale Agency Programs						✓
1.2	C	Water Loss Control		✓	✓	✓		
1.3	D	Metering w/ Commodity Rates						✓
1.4	K	Retail Conservation Pricing		✓	✓	✓		
2.1	G	Public Information Programs					✓	
2.2	H	School Education Programs					✓	
3.1	A,B	Residential Assistance	✓	✓			✓	
3.2	A	Landscape Water Survey	✓	✓	✓	✓		
3.3	F	High Efficiency Clothes Washer Program	✓	✓	✓			
3.4	N	WaterSense Specification Toilets	✓	✓	✓			
4	I	CII programs	✓	✓	✓			
5	E	Landscape	✓	✓	✓	✓		

6.12 Estimated Water Conservation Savings

Water Code Section 10631f(4) requires water suppliers to

> *"Provide an estimate, if available, of existing conservation savings on water use within the supplier's service area and the effect of savings on the supplier's ability to further reduce water demand".*

Table 6-6 below provides an estimate of long-term water conservation savings achieved via the various programs for which the City quantifies results.

Table 6-6. Estimated Conservation Savings by Program (million gallons per year)

Sector/Program Name	Prior to 2006	2006-2010	Cumulative Savings
Residential:			
• Home Water Survey	--	9.1	9.1
• Conservation Kit Distribution	18.7	--	18.7
• Toilet Rebate	65.3	20.4	85.7
• Plumbing Fixture Retrofit	26.4	19.1	45.5
• Clothes Washer Rebate	18.8	23.3	42.1
CII:			
• Pre-Rinse Spray Valve	10.6	0.8	11.1
• Toilet Rebate	3.8	3.2	7.0
• Plumbing Fixture Retrofit	1.9	3.0	4.9
• Clothes Washer Rebate/LightWash	1.7	0.8	2.5
• Green Business	--	0.7	0.7
• Smart Rebate	--	8.9	8.9
Landscape:			
• Large Landscape Water Budget	--	*Pending analysis*	--
• Water Efficient Landscape Ordinance	11.2	3.3	14.5
Total	**158.4**	**92.6**	**251.0**

In addition, as mentioned in section 6.4.4.1 very significant water savings, on the order of 400 million gallons per year was achieved over the 2005-2008 period that was strongly related to the combined impact from the implementation of a five-tier structure and the sharply higher rates for water service. The extent to which programmatic water savings over the past five years overlaps with rate-related demand reduction at the same time is not known and cannot be isolated. It should also be noted that additional short-term water savings on the order of 300 million gallons per years was achieved through water restrictions imposed in 2009 due to water shortage. Together, these different factors account for the downturn in overall water consumption of almost 900 million gallons per year and 26 percent decrease in per capita water use since over the past decade discussed in Chapter 4.

The question of what effect water savings already achieved will have on the City's ability to further reduce water use is unclear. The City's Long-Term Water Conservation Plan was intended to target mainly indoor plumbing fixtures and appliances, which it did. The declining rate of water savings in toilet replacement programs (and overall savings) over time suggests that the residential and commercial market may be moving toward the saturation point, after which future savings due to ongoing replacement with the next generation of high efficiency toilets will be substantially diminished. In certain sectors, such as hotels for example, it is known that most buildings in the service area are already completely retrofit. On the other hand, the extent to which high efficiency clothes washers have made inroads in the residential sector is probably far less than toilets and the technology continues to improve. This is one major end use of water where substantial water conservation savings likely exists.

The degree to which water savings already achieved will reduce the City's ability to obtain short-term water savings during a shortage is also unclear. The distinction between the City's long-term water conservation efforts and short-term curtailment is covered in Chapter 5. The experience of 2009 suggests that short term cutbacks can still be achieved through restrictions on outdoor watering at relatively low cost and sacrifice by the customer, up to a point. However, water shortage events can also induce customers making long-term changes that then are no longer available in future shortages. This is an area of concern that is voiced by many City business customers who have already made substantial and costly efforts over time to ensure their operations are water efficient and are leery that they could be punished in some future shortage by having to curtail their use even more. Moreover, as City's water conservation program shifts more towards outdoor water use, opportunities to cutback may gradually decline.

6.13 Quantifying Remaining Water Conservation Potential

To help address these questions and to help plan for the future, the City has engaged a consultant to carry out a Residential and Commercial Water Use Baseline Survey. The goal of this project is to develop an accurate estimate of the current saturation or market penetration of water-conserving fixtures, devices, equipment, and features within residential and commercial properties, to take stock of existing conditions, and to assess progress following implementation of the Long-Term Water Conservation Plan. It involves obtaining various property owners' consent to perform a physical inspection and take inventory of indoor and outdoor water-using equipment at a sample of randomly selected properties within the residential and CII sectors. This project is expected to be complete in early 2012.

The data acquired through this Baseline Survey project will then inform a separate, technical analysis of possible water-saving technologies, programs, and services that will reduce future water demand, and their associated costs, to identify remaining long–term water conservation potential across the service area and to fashion a similar water conservation plan for the City for the next ten-year period. The project is scheduled to begin in early 2012. When completed, the Water Conservation Plan will provide a long range road map for future, and further, water efficiency efforts. The results will be use to help inform the City's water demand projections and will be factored into overall water supply planning efforts.

One of the concerns voiced by the public in the review of this document was the role that water conservation might play in tempering ongoing growth in water demand forecast between 2010 and 2030, and the relationship between the city's system development charges and water conservation that is intended to compensate for the impact of new water demands on the system.

As mentioned in section 6.1, the City's water conservation program is funded by a combination of water rates, system development charges, and miscellaneous service fees. The collection and use of system development charges is set forth in Section 16.04.041 of the Santa Cruz Municipal Code. This charge is collected on any new connections and upon expansion of water service for existing connections, and are held in a separate and special fund (715). These revenues are used exclusively for the following purposes:

1. To pay for the City's future construction of facilities or to reimburse the water fund for those described or listed facilities constructed by the water fund with funds advanced to the water fund from other sources, or

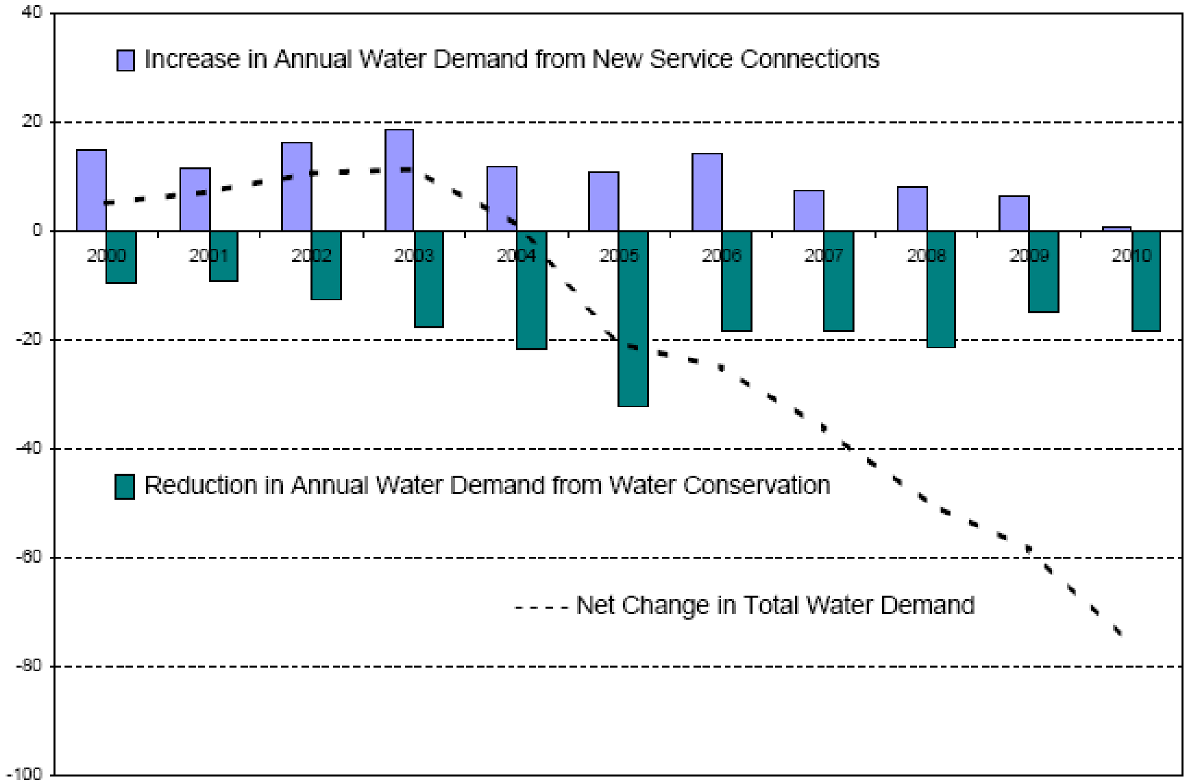
2. To reimburse developers who have been required or permitted to install such listed facilities which are oversized with supplemental size, length, or capacity beyond that needed for the certain development and are subject to the terms of a reimbursement agreement with the city,

3. To pay for water conservation programs which have the net effect of increasing the amount of water supply available for allocation to new connections.

With regard to water conservation, revenues from system development charges are used primarily for various rebate programs, including residential and commercial toilets, urinals, clothes washers, Smart Rebates, and more recently, lawn removal rebates, which account for the majority of long-term water savings generated each year. The amount collected annually from system development charges has always been adequate to fully fund water conservation programs, and has never presented a barrier to program implementation.

A comparison of annual growth in water demand attributable to new connections over the last decade with the reduction in water demand accomplished through water conservation savings is provided in Figure 6-1.

Figure 6-1. Impact of Water Conservation on Mitigating Growth in Water Demand from New Water Service Connections, 2000-2010



As the chart shows, there has been larger reduction in water use from water conservation programs than there has been an increase in water use by new connections, with a net decrease over the last ten years of almost 80 million gallons per year[5]. This fact demonstrates that the City's approach of using system development charges to help fund long-term water conservation programs has been successful in compensating for the impacts of new water demands on the system in recent years. How long this trend may hold into the future, though, is uncertain and depends on both the rate/type of new development and remaining long-term water conservation potential going forward.

In the meantime, the City will continue to implement BMPs as outlined in the MOU and to pursue new opportunities and methods to maximize water use efficiency throughout the City for the foreseeable future.

[5]Data on annual water demand for new connections established in calendar year 2010 is incomplete and will be available in 2012

Chapter 7

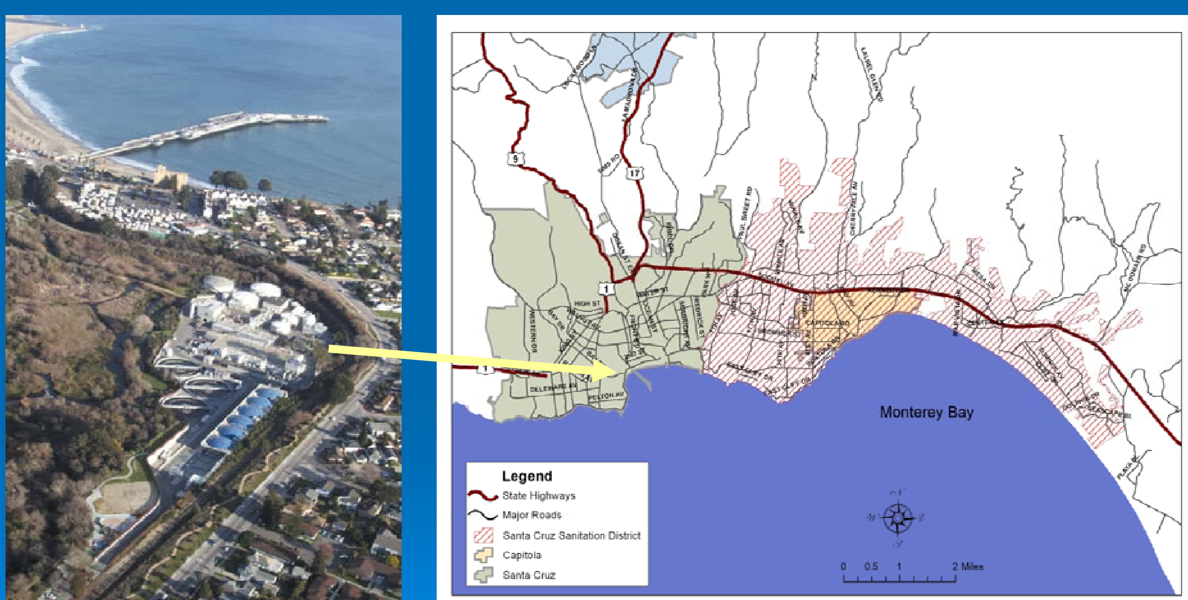
WATER RECYCLING

This chapter describes the City's wastewater collection, treatment, and disposal system. It also presents information on recycled water and its potential for use as a supplemental water source in the City's service area.

7.1 Wastewater Facility Description

The City of Santa Cruz owns and operates a regional wastewater collection, treatment, and disposal facility providing service to a population of approximately 120,000 in the cities of Santa Cruz and Capitola and parts of unincorporated Santa Cruz County. The treatment plant is located next to Neary Lagoon, just inland from the City's main beach. The wastewater treatment plant and service area are shown in Figure 7-1.

Figure 7-1. Wastewater Treatment Plant and Service Area



Municipal wastewater generated within the Santa Cruz City limits is delivered to the treatment plant through a collection system consisting of 160 miles of gravity mains, 1 mile of force main, and 21 pumping stations. The City's collection system, treatment plan and ocean disposal system are managed and operated by the City's Public Works Department.

The Santa Cruz County Sanitation District, a special district operated through the Santa Cruz County Public Works Department, collects wastewater from the Live Oak, Capitola, Soquel, Aptos, and Seacliff areas through a system consisting of 188 miles of gravity main, 13.8 miles of force main, and 34 pump stations. It transports wastewater from a central pumping facility in Live Oak to the Santa Cruz plant for treatment and disposal.

The City's wastewater plant also receives wastewater from two small County Service Areas serving the Woods Cove and Rolling Woods residential subdivisions north of Santa Cruz, receives septage from unsewered areas, and treats dry weather flows from Neary Lagoon to help protect water quality at local beaches for public health and recreation.

The City of Scotts Valley treats its wastewater separately and transports its effluent to Santa Cruz for combined disposal through the City's ocean outfall. Current average dry weather wastewater inflow is approximately 0.85 mgd. In 2002, Scotts Valley upgraded its wastewater facility by adding a tertiary treatment plant with a capacity of 1.0 mgd and began delivering recycled water for landscape irrigation purposes. The recycled water system, which is operated by the Scotts Valley Water District, currently serves 45 customers and delivers about 48 mgy of recycled water to parks, schools, multi-family residential and commercial landscapes (Kennedy Jenks Engineers, 2011)

The City's treatment plant was modernized in the late 1990's from the advanced primary level to provide full secondary treatment in order to meet State and Federal waste discharge requirements. The treatment process consists of a series of steps, including screening, aerated grit removal, primary sedimentation, trickling filter treatment, solids contact stabilization, secondary clarification, and ultraviolet disinfection.

Treated wastewater is discharged to Monterey Bay through a deep water outfall extending 12,250 feet on the ocean bottom and terminating one mile offshore at a depth of approximately 110 feet below sea level. A 2,100 foot diffuser at the end of the pipe provides a minimum initial dilution of 139 parts seawater to one part wastewater.

The City's wastewater facility is regulated under a waste discharge permit issued by the California Regional Water Quality Control Board, Central Coast Region (Order No. R3 - 2010 - 0043). Monterey Bay, into which the region's wastewater is disposed, was designated in 1992 as a National Marine Sanctuary and is widely recognized for its unique and diverse biological characteristics and physical features. To protect receiving water quality and sanctuary resources, the wastewater influent and effluent characteristics are carefully monitored for compliance with state water quality requirements. The City also performs receiving water monitoring and participates in a regional monitoring program with other dischargers in the Monterey Bay area, known as Central Coast Long-Term Environmental Assessment Network (CCLEAN).

7.2 Wastewater Plant Capacity and Flow Levels

The City's wastewater treatment plan plant is designed to treat an average dry weather flow of 17 million gallons per day (mgd) and can accommodate peak wet weather flows of up to 81 mgd.

Average wastewater inflows over the last five years are presented in Table 7-1. Inflows vary from year to year depending on weather but overall have changed little over time.

Table 7-1. Wastewater Treatment Plant Inflows, 2006 - 2010

	2006	2007	2008	2009	2010	Average
Average Influent Flow (mgd)	11.0	9.0	9.7	9.2	10.5	9.9
Dry Season Influent Flow (mgd) (a)	8.8	8.6	8.8	8.5	8.6	8.7
Average City Influent (mgd)	6.1	4.6	5.2	4.5	6.0	5.3
Average District Influent (mgd)	4.9	4.4	4.5	4.3	4.5	4.5

Notes:
(a) June through September

Overall, the City contributes approximately 5.3 mgd or 54 percent and the County Sanitation District contributes about 4.5 mgd or 46 percent of the total inflow to the plant.

The amount of wastewater generated in the City and the Sanitation District's service areas is estimated to increase by between 1.4 and 1.9 mgd by year 2030 (City of Santa Cruz, 2011). This would mean the total wastewater flow in twenty years could range between 11.3 and 11.8 mgd, well below the plant's 17 mgd capacity.

7.3 Recycled Water Currently Being Used

Water Code section 10633 (c) requires water suppliers to provide:

> *"A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use:*

The production, discharge, distribution, and use of recycled water are subject to federal, state, and local regulations, the primary objectives of which are to protect public health. In the State of California, recycled water requirements are administered by the State Water Resources Control Board, individual Regional water Quality Control Boards, and the California Department of Public Health.

The City's wastewater plant does not now, nor is it permitted to, produce recycled water for offsite use. With the commissioning of the new plant in 1998, however, 0.15 to 0.2 mgd of treated wastewater has been recycled for use within the plant to meet its major process water needs, including chemical mixing, contact and non-contact cooling water, equipment washing, and heating. Upgrading of the plant reduced potable water demand by about 90 percent or about 70 million gallons per year. It now operates using only 3 to 4 million gallons per year for sanitary, irrigation, and other miscellaneous onsite uses.

Table 7-2. Recycled Water Currently Being Used

Treatment Level	Type of Use	Place of Use	Quantity of Use
Disinfected Secondary – 2.2	Industrial Process	Wastewater Plant	70 mgy

No other recycled water is currently being produced or used in the City's water service area.

7.4 Potential Uses and Limitations of Recycled Water

Recycled water is defined as wastewater treated to a specified quality in order to be used for a specified purpose. Currently, recycled water is not approved or permitted for discharge directly into a potable water distribution system. A summary of the allowed uses of recycled water in California corresponding with the degree of treatment is presented in Table 7-3 (California Code of Regulations, Title 22, Sections 60301-60355).

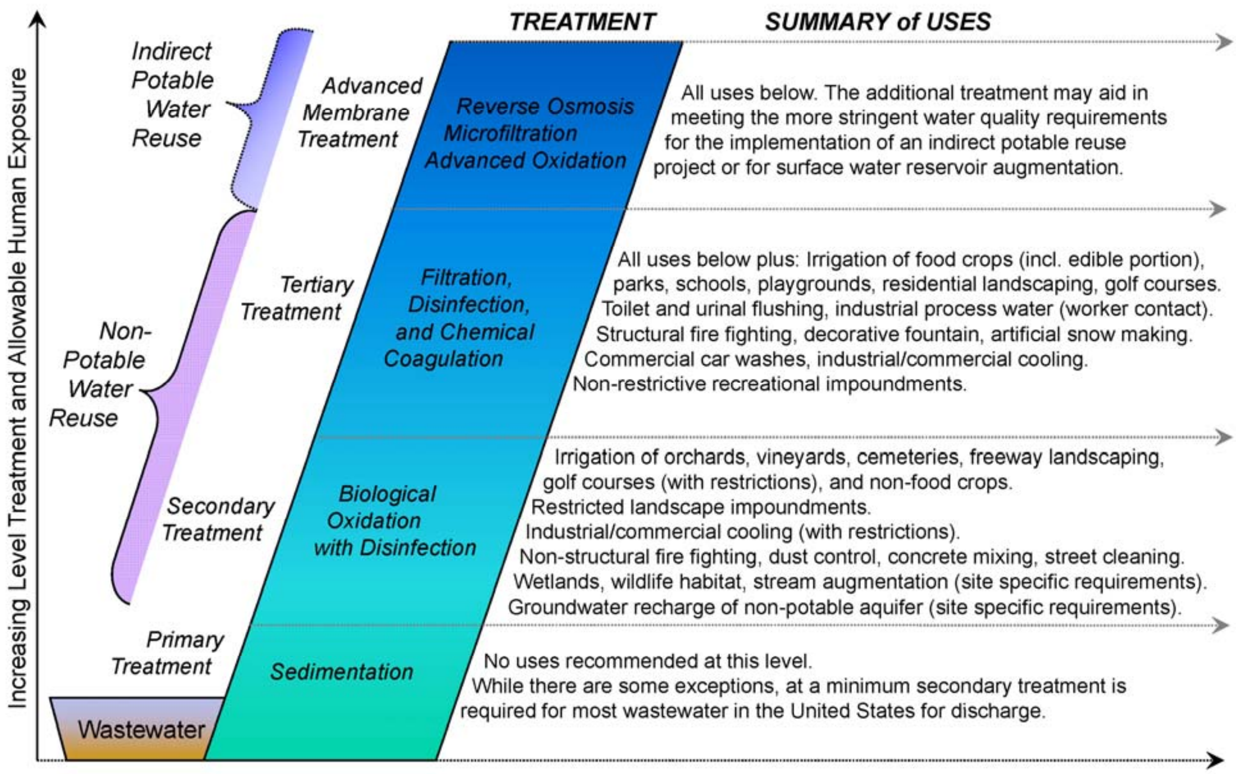
Table 7-3. Recycled Water Criteria (Title 22 CCR)

Treatment Level (a)	**Allowed Uses of Recycled Water**
Undisinfected Secondary	**Surface Irrigation:** Vineyards –no contact with edible portion of crop Orchards – no contact with edible portion of crop Pasture for Animals – not producing milk for human consumption Seed crops – not for human consumption Ornamental Nursery Stock Sod farms and Christmas trees Fodder and Fiber Crops **Other:** Flushing Sanitary Sewers
Disinfected Secondary – 23	**Irrigation:** Cemeteries Freeway Landscaping Restricted Access Golf Courses Ornamental Nursery Stock Sod Farms Pasture for Livestock Producing Milk for Human Consumption, Nonedible Vegetation Where Access is Controlled – cannot be used for school yards, playgrounds, and parks. **Impoundments:** Landscape impoundments not utilizing decorative fountains. **Cooling:** Industrial/Commercial cooling that does not use cooling towers, evaporative condensers or spraying. **Other:** Industrial Boilers Nonstructural Fire Fighting, Backfill Soil Compaction Mixing Concrete Dust Control Cleaning Roads and Sidewalks Industrial processes where it does not come in contact with workers
Disinfected Secondary – 2.2	**Irrigation:** Food Crops - Edible Portion Above Ground and not Contacted with Recycled Water **Impoundments:** Fish Hatcheries Restricted Recreational
Disinfected Tertiary	**Irrigation:** Food Crops Parks and Playgrounds School Yards Residential Landscaping Unrestricted Access Golf Courses. **Impoundments:** Nonrestricted Recreational **Cooling:** Cooling Towers Evaporative Condensers Spraying or Mist Cooling. **Other:** Flushing Toilets/Urinals Industrial Processes Structural Fire Fighting Decorative Fountains Commercial Laundries Commercial Car Washes – where public is excluded from process Consolidation of backfill around potable water pipelines Artificial snowmaking for commercial outdoor use

Notes:
The numbers 23 and 2.2 refer to the upper limit of median concentration of coliform bacteria in the disinfected effluent, in MPN

Figure 7-2 graphically summarizes the generally recommended uses for recycled water based on the level of treatment (EPA, 2004). Because state regulations and groundwater management plans may have site-specific treatment requirements, the approved uses for recycled water must always be evaluated on a case by case basis.

Figure 7-2. Suggested Uses of Recycled Water Based on Level of Treatment



The quality of wastewater produced at the City's treatment plant currently would be best classified under the Title 22 criteria as "Undisinfected Secondary". Even though the wastewater plant provides ultraviolet disinfection, and the City consistently meets its receiving water limitations contained in its NPDES permit for bacteriological objectives, the treated effluent would not meet the water quality criteria for "Disinfected Secondary – 23".[1]

The City's treated wastewater is therefore potentially suitable for only very limited agricultural applications and for flushing sanitary sewers according to the standards in Title 22. No such agricultural uses for water of this quality are known to occur in the City

[1] To meet Title 22 criteria for Disinfected Secondary – 23, the median total coliform count must not exceed 23 MPN and the monthly maximum must not exceed 240 MPN.

service area. The only allowed use would be for sewer system flushing, which totals less than 1 mgy.

The present level of wastewater treatment is not sufficient for the water to be used for unrestricted use on playgrounds, parks, schoolyards, construction, cooling and other non-contact industrial processes, or general landscape irrigation. Additional treatment above that currently provided would be needed to meet the state public health and safety requirements. In addition to the treatment upgrades, a separate distribution system, including pumps, storage facilities, and piping would be required to convey recycled water to potential customers.

7.5 Recycled Water Opportunities

The City of Santa Cruz investigated the potential for using recycled water as a supplemental water source in two studies: *Alternative Water Supply Study* (Carollo Engineers, 2000) and *Evaluation of Regional Water Supply Alternatives* (Carollo Engineers, 2002). The applications evaluated in these studies include the following:

- urban landscape irrigation
- agricultural irrigation on the North Coast
- groundwater recharge (indirect potable reuse)
- direct potable reuse
- use of recycled water from Scotts Valley

More recently, the City and Soquel Creek Water District in 2010 jointly prepared a white paper on “Opportunities and Limitations for Recycled Water Use”, which is included as Appendix O (Kennedy/Jenks Consultants, 2010).

A summary of the findings on the potential for recycled water use is presented below.

7.5.1 Direct Potable Reuse

As stated above, recycled water, regardless of the level of treatment provided, is not currently approved or permitted for discharge into a potable water distribution system. This is not to say that the regulations will not change in the future. Should regulations change and allow for direct potable reuse following treatment, a seawater desalination facility could be modified to treat effluent from a wastewater treatment facility.

7.5.2 Urban Landscape Irrigation

Using recycled water for landscape irrigation is considered technically feasible. The option of using recycled water for landscape irrigation was considered and then later dropped due to the high costs associated with upgrading the treatment plant and installing a separate, dedicated distribution infrastructure, the relatively small volumes of water of water delivered for appropriate use, and its limited potential to serve as a stand-alone supply alternative in the service area. Because the City is an urban area that is already largely developed and the larger irrigation demands like parks and schools are spread out across a large geographic area, it would be prohibitively expensive to install a dedicated distribution system. In spite of this decision, recycled water for landscape irrigation remains a viable alternative that could be pursued as a partial solution in the future.

7.5.3 Agricultural Application for the North Coast

The strategy of using recycled water for agricultural irrigation was developed further and considered alongside desalination in the City's 2003 Integrated Water Plan. The general concept involved an exchange in which the City would provide recycled water to North Coast growers, and in return, the City would obtain access to the grower's coastal groundwater basin to use as a reserve supply in drought years. It required building a 4 to 7 mgd tertiary wastewater treatment plant and installing 45,000 feet of pipe and associated facilities to deliver recycled water up the coast. In addition, it required new wells and transmission facilities to extract and deliver groundwater to the City water system. Initial estimates of the groundwater yield based on review of coastal hydrogeology ranged from 500 to 700 million gallons per year. That estimate later was reduced to less that 400 mgy based on a subsequent investigation of agricultural water sources along the north coast.

Upon evaluation, several major (if not fatal) flaws emerged with this recycled water concept, including 1) uncertainty about the yield in a multi-year drought, 2) disinclination of CA Department of Parks and Recreation to support the project and opposition voiced by local organic growers. Specifically, the California Department of Parks and Recreation, which is the major landowner above the groundwater basin being used by the coastal growers, expressed its opposition to the reclamation project. In a letter dated September 11, 2002, it stated that the exchange was felt to involve "uncharted legal and complex policy issues having serious long-term implications of statewide consequence" and that "the use of reclaimed water at Wilder Ranch could result in potential adverse impacts to sensitive natural resources, place possible constraints on recreational usage and adversely impact organic agricultural leasing operations at Wilder Ranch State Park." The project was also opposed by local organic growers over concerns related to food safety, suitability of recycled water for organic crops, certification, and marketing if recycled water was brought up the coast. Ultimately, the State's unwillingness to consider the groundwater exchange represented a major, if not insurmountable, barrier to moving forward with the reclamation strategy. And although the IWP committee discussed bringing legislative pressure to challenge the Department's position, it decided against taking that approach for the time being, given the doubts about the groundwater yield and the potential for lengthy delay.

Desalination ultimately was selected as the city's preferred water supply alternative and therefore this project was dropped from further consideration.

7.5.4 Recycled Water Exchange with Scotts Valley Water District

More recently, the City has been exploring a long-term recycled water and potable water exchange that involves Pasatiempo Golf Club and the Scotts Valley Water District. This project, initiated by Scotts Valley Water District, would provide the District with potable water from the City of Santa Cruz during the winter non-peak period, when the City has some excess surface water available, in exchange for the District providing recycled water for irrigating the Pasatiempo golf course, one of the City's largest customizers.

In order to facilitate this exchange, 14,800 linear feet of 10" intertie pipeline and a booster pump station would need to be constructed to connect the District's water system with the City system at an estimated cost of $5.5 million. It would also involve intercepting flow in the outfall pipe that conveys secondary treated effluent from the Scotts Valley Wastewater Treatment Plant and piping it to a site near the golf course for treatment and storage at an estimated cost of $3.3 million. The 200,000 gallons per day of recycled water would be supplemented by local groundwater. The alternative of extending the existing recycled water system in Scotts Valley to Pasatiempo was initially considered but because of the high cost of the pipeline and additional level of treatment needed, this alternative was not selected. Through this exchange, the Scotts Valley Water District would provide about 40 mgy of recycled water to the golf club beginning in 2020 (Kennedy/Jenks Consultants, 2011). For the District, it would reduce groundwater demand

Scotts Valley Water District has prepared an engineering feasibility report that identifies the needed pumping, storage, piping and advanced water treatment facilities, project

costs estimates, and permitting issues (Kennedy/Jenks Consultants, 2010). It considers the project to be technically feasible and economically viable if Pasatiempo agrees to use a minimum amount of recycled water and the District assures Pasatiempo of a minimum quantity of secondary effluent to the satellite treatment plant.
Such an arrangement would benefit the City by effectively shifting some of the peak summer demand to the winter season when the City is not drawing from surface storage, and benefit the District by lessening groundwater extraction. It would also establish a link between the two water agencies that does not now exist for mutual benefit in case of a water emergency and make more efficient use of regional water supplies. The City in 2007 adopted a resolution declaring its interest in pursuing this recycled/potable water exchange arrangement and it continues to work with the parties to negotiate a Memorandum of Agreement that would set forth the conditions for this project to proceed (Appendix P).

7.5.5 Groundwater Recharge with Recycled Water (Indirect Potable Reuse)

Another option for reuse of recycled wastewater is groundwater recharge. In this situation, advance treated recycled water is injected into a groundwater basin for future extraction, followed by treatment and potable use. This concept was reviewed for its feasibility for both the City and Soquel Creek Water District but was found not to be a practical approach for either agency due to numerous geological, financial, regulatory and operational constraints (Kennedy/Jenks Consultants, 2010). The reasons cited include the following:

- Local geology is not conducive to large, high capacity injection wells. To meet the average annual and drought year demand, numerous wells would be required to inject a sufficient quantity of recycled water to meet average and drought year demands.
- Locating injection wells to meet the physical and travel time separation requirements would be very challenging due to the large number of public and private wells in the region.
- The requirement that recycled water be blended with up to 50% of another water source puts additional demand on already limited resources.

7.6 Projected Use of Recycled Water

Recycled water use at the City’s wastewater plant is projected to remain constant at current levels from 0.15 to 0.2 mgd (up to 70 million gallons per year) through the next 20 years.

As mentioned above, using recycled water for landscape irrigation remains a viable option for the City, but currently it is not the City's preferred water supply strategy. Using recycled water for irrigation can free up high quality potable water used for irrigation, making more potable water supply available on a year-in, year-out basis. The City's General Plan 2030 contains policy language to pursue the potential for tertiary treatment and recycling wastewater for water supply purposes (City of Santa Cruz, 2009).

7.7 Description of Actions to Encourage and Optimize Recycled Water Use

Currently the City does not produce recycled water for use outside its wastewater treatment plant, therefore actions to encourage the use, including financial incentives, and development of a plan to optimize the use of recycled water in the City's service area do not apply at this time. The steps and actions to encourage and optimize recycled water will be defined in the future if and when recycling is selected and pursued to diversify the City's water supply portfolio.

Chapter 8

WATER SHORTAGE CONTINGENCY PLAN

This chapter presents information about how the City of Santa Cruz manages the water system during a water shortage emergency that arises as a result of drought. It also describes actions that would be undertaken in response to a catastrophic interruption of water supplies, including a regional power outage, earthquake, or other emergency situation.

8.1 Background

In 2009, the City of Santa Cruz completed a comprehensive update of its Water Shortage Contingency Plan. The project was an outgrowth of the City's 2005 Urban Water Management Plan, which recognized the many changes in regional conditions and local water supply planning that had taken place over the previous decade, and identified the need to better prepare for the possibility of future water shortages in advance of the next major drought.

One of those changes was the adoption of the Integrated Water Plan, a key component of which involved cutting back or curtailing system water demand by 15 percent in dry years when water is in short supply. Now, instead of treating any shortage as a water supply emergency situation and responding reactively, as it did in the past, the City has effectively accepted the risk of incurring relatively modest shortages every so often, which drove the need for having a fully developed contingency plan and well-defined, measured responses in place.

8.2 Purpose and Goals

The City's Water Shortage Contingency Plan describes the conditions which constitute a water shortage and provides guidelines, actions, and procedures for managing water supply and demands during a declared water shortage. The primary focus of the plan is on measures that reduce customer demand for water, but it also covers actions that can be implemented to stretch or increase the water supply.

This plan was developed to fulfill two fundamental purposes:

1. To establish the procedures and actions necessary to achieve the up to 15 percent cutback in system-wide demand established in the City's Integrated Water Plan, and

2. To describe how the City would respond if faced with much larger shortages in water supply ranging as high as 50 percent.

There are several reasons why it was necessary to consider and plan for shortfalls larger than 15 percent. First, the City remains vulnerable in the near term to a critical water shortage of that scale until it secures an additional source of supply for drought protection. As describe in previous chapters, the City is currently implementing a broad set of water conservation programs and is investigating the possibility of desalination as a new source of water supply. Commissioning of a desalination plant, though, remains years away and is by no means a certainty. Much planning remains to be done and project approvals have yet to be secured. In the meantime, the City is potentially at risk of experiencing a major water shortage, as demonstrated by the recent three years of below normal rainfall and runoff beginning in 2007 that resulted in the Governor's declaration of a statewide drought in 2008 and the declaration by the City of a local water shortage during 2009. Second, the Urban Water Management Planning Act requires all public water suppliers to develop contingency plans for situations of up to a 50 percent shortage in water supply. Finally, the City's long range water supply planning is predicated on past hydrologic records which focused on the two year, 1976-77 event as a worst case scenario. No one can predict how the future will unfold, especially in light of the emerging science of global climate change, which some predict could bring more frequent, longer, or more intense water shortages across the state, and which compounds the uncertainty and risk going forward at the local government level.

Whatever magnitude of shortfall the City may experience, the overarching goals of this plan are as follows:

1. to conserve the water supply of the City for the greatest public benefit,

2. to mitigate the effects of a water supply shortage on public health and safety, economic activity, and customer lifestyle, and

3. to budget water use so that a reliable and sustainable minimum supply will be available for the most essential purposes for the entire duration of the water shortage.

8.3 Planning Process and Water Shortage Management Principles

Development of the City's Water Shortage Contingency Plan was a collaborative effort among the City Water Department staff, the City's Water Commission, City Council, and the public over a three year period beginning in 2006. Research involved reviewing state regulations and legal requirements (Water Code section 350 et seq.) and the water shortage plans of 21 other urban water utilities from throughout California, and from selected cities in the western United States and across the country. The Water Commission provided its input and recommendations throughout the process.

The subject that generated the most public interest, input, and debate was how to allocate the available water when supplies run short. The issue was discussed before City Council and negotiated with several large customers before reaching a final recommendation.

The plan is based on lessons learned here and from other water agencies during past droughts. Nevertheless, it is important to note that every drought will evolve differently and that it is not practical to develop a set of hard and fast rules that apply to all situations. The plan should be thought of as a general framework that will need to be adjusted and refined based on actual conditions.

Early in the planning process, staff and the Water Commission developed a set of principles to guide the water shortage planning process. These principles are as follows:

- **Shared contribution.** All customers will be asked to save their share in order to meet necessary reduction goals during water shortages.

- **Reduce non-essential uses first.** The plan concentrates on the elimination of non-essential water uses and on outdoor reductions, and gives the highest priority to essential health and safety uses.

- **Preserve jobs and protect the local economy.** The plan minimizes actions that would have substantial impact on the community's economy and provides large users the flexibility to determine their own reduction strategies within a water budget.

- **Existing conservation measures recognized.** Customers that have already implemented water conservation measures are acknowledged to have less potential for reduction and should not be penalized for conserving.

- **Communication at every stage.** A public information campaign at every level of shortage is essential for customer preparation and will encourage confidence in the City's ability to respond to water shortages.

- **Public participation.** Public participation in the development and implementation of the plan will help to ensure fairness, encourage cooperation, and facilitate implementation and with demand reduction measures in times of shortage.

The final Water Shortage Contingency Plan was adopted by resolution of the City Council of the City of Santa Cruz in March 2009 as an amendment to the City's Urban Water Management Plan (Appendix Q), and is adopted herein by reference. Subsequently, the City Council adopted an ordinance implementing the water shortage regulations and restrictions contained in the plan (Santa Cruz Municipal Code Chapter 16.01, Appendix R).

Portions of the City's Water Shortage Contingency Plan have since been published and highlighted by the American Water Works Association as an example of a model staged demand reduction program in its new Manual of Water Supply Practices, M60: *Drought Preparedness and Response* (AWWA, 2011).

8.4 Assessing Water Supply and Demand

Rainfall, runoff, reservoir storage, and water year classification are the key hydrologic indicators used by the City to evaluate water conditions. This section of the plan describes these factors affecting the City's water supply and discusses the forecasting process and management considerations used in dry years to determine whether a water shortage is expected for the year ahead and how much water use must be cut back systemwide in response.

In Santa Cruz, a water shortage occurs when the combination of low surface flows in the coast and river sources and depleted surface water storage in Loch Lomond Reservoir reduces the available supply to a level that cannot support existing demand.

After an unusually dry winter or period of consecutive dry years, when a lack of supply appears possible, the Water Department undertakes an analysis to determine whether water supplies will be deficient relative to estimated water needs for the coming dry season. This analysis involves first comparing projected water supply and demand on a monthly basis, assuming no restriction on water use, to forecast the end of season water level and storage volume in Loch Lomond Reservoir. The Department then evaluates whether the amount of carryover storage in Loch Lomond at the end of the year will be sufficient to meet essential health and safety needs in case the dry weather pattern continues into the following year. If this analysis shows that Loch Lomond Reservoir would be depleted to a dangerously low level, then a decision is made regarding how much reservoir water is available to use in the current year and how much should be banked as a safeguard against the possibility of another dry year. The amount of cutback in demand needed to reduce the rate of reservoir depletion and end the year at a safer level of storage is then determined. If necessary, cutbacks would go into effect in late April/early May and span the entire dry season through late October. A hypothetical situation is provided in the full plan to illustrate this decision-making process.

There is no one single criterion, trigger, or definition that is used to determine if a water shortage exists. The determination of a shortfall involves consideration of all the parameters mentioned previously, as well as expected system demand.

The degree of shortage is normally defined as the supply deficiency in relation to normal water use over a given period of time, and expressed as a percentage. For example, a 25 percent shortage means the City has one-quarter less water supply available than what is normally used during the seven-month long dry season.

8.5 Five Stage Water Shortage Plan

The updated Water Shortage Contingency Plan uses a staged approach that classifies a shortage event into one of five levels spanning a range from less than 5 percent up to 50 percent (Table 8-2).

Table 8-2. Five Stage Structure to Water Shortage Contingency Plan

Stage	Magnitude of Water Shortage	Stage Title
1	0-5%	Water Shortage Alert
2	5-15%	Water Shortage Warning
3	15-25%	Water Shortage Emergency
4	25-35%	Severe Water Shortage Emergency
5	35-50%	Critical Water Shortage Emergency

The overall concept is that water shortages of different magnitudes require different measures to overcome the deficiency. Because there is so little the City can do in the short run to increase the supply of water, the focus of this plan is primarily on measures that reduce demand. Each stage includes a set of demand reduction measures that become progressively more stringent as the shortage condition escalates. Normally, only one of these five stages would be put into effect early in the year at the recommendation of the Water Director and remain in force for the entire dry season.

There is an important distinction between Stages 1 and 2, designated above in shades of yellow, and the upper three stages. The lower two stages represent a level of curtailment that is envisioned as being necessary to balance water supply and demand from time to time under the City's Integrated Water Plan. Shortages of 15 percent or less, while inconvenient, do not directly threaten public safety or pose undue economic impact. The upper three stages (3-5) are characterized as emergency water shortages since they result in more widespread hardships being felt throughout the community, may threaten public health and welfare, and cause more economic harm. The intent of the City's Integrated Water Plan, however, is to limit future water shortages to no more than more than 15 percent.

8.6 Demand Reduction Program

The City's strategy for dealing with water shortages of all levels involves the following four interrelated components:

1. An allocation system to establish reduction goals for different customer groups
2. Demand reduction measures
3. Publicity and communications
4. Operating actions

These four components are summarized below.

8.6.1 Allocation System

A fundamental issue any water supplier faces in managing a water shortage involves the allocation of water and how to distribute the available supply among customer categories when supplies fall short. In the process of updating this plan, various options and alternatives were reviewed and a priority-based allocation system was selected. This allocation system produces specific demand reduction goals for each major customer category at various levels of shortfall based on the unique usage characteristics of each customer category.

Customer reduction goals for all but the first stage were developed by evaluating the composition of demand for each major group and dividing it into three usage priorities. These priorities are, from highest to lowest, 1) health/safety, i.e., all domestic and sanitary uses, 2) business and industrial uses and, 3) irrigation and other outdoor uses). Normal demands were then scaled back in accordance with the schedule presented in Table 8-3.

Table 8-3. Reduction in Water Delivery by Usage Priority
(Percent of normal deliveries)

Stage	Magnitude of Water Shortage:	Health/Safety	Business	Irrigation
2	15%	95	95	64
3	25%	95	90	34
4	35%	90	85	12
5	50%	75	67	0

In essence, this allocation system strives to balance available supplies in times of drought as much as possible through cutbacks in outdoor water use. At each level of shortfall, public health and sanitation usage is afforded the highest priority by cutting back on interior usage the least. The importance of water in protecting the City's employment base is also acknowledged through proportionately modest cutbacks to the commercial sector as compared to the overall system shortfall. Irrigation and other outdoor uses are cut back the most. The larger the water shortage, the greater the cutbacks, but this same order of priorities is maintained throughout the range of potential shortages.

The heavy reliance on outdoor use reductions makes sense, both from a water system perspective because it reduces peak demands, which is important to preserving storage in Loch Lomond Reservoir, and from a public health and welfare perspective, because irrigation and other outdoor uses are the most discretionary of all uses when drinking water is in short supply. It also makes sense from an operational perspective because outdoor water use cutback can be achieved relatively quickly. From a legal perspective, this allocation system is consistent with the priorities and requirements of Water Code section 354. The resulting water supply allocation and customer reduction goals are presented in Table 8-4.

Table 8-4. Water Supply Allocation and Customer Reduction Goals

	No Deficiency		**Stage 2 15% Deficiency**		**Stage 3 25% Deficiency**		**Stage 4 35% Deficiency**		**Stage 5 50% Deficiency**	
	Delivery		Delivery		Delivery		Delivery		Delivery	
Normal Peak Season Demand = 2,473 mil gal	%	Volume (mil gal)	%	Volume (mil gal)	%	Volume (mil gal)	%	Volume (mil gal)	%	Volume (mil gal)
Single Family Residential	100	1,031	84%	864	73%	753	62%	639	48%	495
Multiple Residential	100	524	87%	454	78%	411	69%	361	55%	287
Business	100	438	95%	416	92%	402	87%	381	70%	307
UC Santa Cruz	100	132	85%	113	76%	100	66%	87	52%	68
Other Industrial	100	23	95%	22	90%	21	85%	20	67%	15
Municipal	100	48	76%	36	57%	27	41%	20	28%	14
Irrigation	100	110	64%	70	34%	37	12%	13	0%	0
Golf Course Irrigation	100	106	73%	78	51%	54	34%	36	20%	21
Coast Agriculture	100	59	95%	56	90%	53	85%	50	67%	40
Other	100	2	95%	2	90%	2	50%	1	50%	1
Total	**100**	**2,473**	**85%**	**2,111**	**75%**	**1,861**	**65%**	**1,607**	**50%**	**1,247**
Demand Reduction %, Million gallons	**0**	**0**	**15%**	**-362**	**25%**	**-612**	**35%**	**-866**	**50%**	**-1,226**

8.6.2 Demand Reduction Measures/Mandatory Prohibitions

The City's Water Shortage Contingency Plan uses a combination of voluntary and mandatory demand reduction measures, which vary depending on level of cutback. As mentioned earlier, the regulations against water waste are in effect in Santa Cruz on a permanent basis. Once a water shortage is declared, however, enforcement of this ordinance is increased and enhanced by the use of fines.

The primary demand reduction measures used in **Stage 1** are to restrict all landscape irrigation to certain hours of the day and to prohibit uses defined as non-essential.

The main approach to reducing water use in **Stage 2** involves expanding mandatory water restrictions and limiting landscape irrigation to specified days, times, and durations. Large landscape users are required to adhere to water budgets.

A **Stage 3** water shortage constitutes an emergency situation. The three primary measures to meet this emergency reduction goal are 1) residential water rationing, 2) mandatory water shortage signage in all commercial buildings, and 3) reduced water budgets for large landscapes. Single family residential customers are rationed using a hybrid approach that provides a base allocation for a family of four and an additional amount per person for larger households. Multi-family residential accounts are rationed based on the number of dwelling units at an account.

A **Stage 4** water shortage requires expanding water rationing to cover all water customers, including business, and reducing residential allocations. At this severe level of shortage, only minimal water is available for outdoor purposes.

Stage 5 represents an extraordinary crisis threatening health, safety, and security of the community. It would involve reduced rationing levels for all customers and a ban on outdoor uses to cut back normal water use by half.

A summary of the demand reduction methods and mandatory prohibitions against specific water use practices is provided in Table 8-5.

8.6.3 Publicity and Communications

Effective communication is essential to the success of any water shortage contingency plan in achieving the desired water use reductions. All customers need to be adequately informed about water supply conditions, understand the need to conserve, and know what actions they are being requested or required to take to mitigate the shortage. The full Water Shortage Contingency Plan articulates the City's communications strategy, identifies the main customers and groups that need to be kept updated, advised, and informed, and outlines various communication and public outreach measures to employ in a water shortage. The plan also provides prepared public statements for each of the 5 stages that are intended to help communications stay on message and set the tone for subsequent communications through the duration of the incident.

8.6.4 Operating Actions

The City's Water Shortage Contingency Plan outlines the added responsibilities and internal actions taken Water Department when a water shortage arises. Many represent increased costs to the Department for additional personnel, services, and supplies. An important initial step is to designate a working group consisting of the Water Director and senior staff to lead and manage the Department's internal and external water shortage response. The Water Department then must mobilize the necessary personnel, resources, and equipment to undertake the various activities that are critical to implementing an effective response. These initial actions may include, among other things:

- Establishing water production budgets
- Coordinating with other city departments and affected public agencies
- Establishing a public communications program to publicize use restrictions and to engage and involve the community and key water-using sectors in curtailing their demand
- Ensuring adequate staff and training to effectively respond to customer inquiries and enforce water shortage regulations
- Adapting utility billing format and database capabilities
- Expanding water conservation assistance, outreach, and education
- Instituting a system for processing exception requests and appeals
- Addressing policy issues and updating status with decision makers
- Implementing monitoring mechanisms to track actual usage and measure performance

A summary of these key operating and communications actions is provided in Table 8-5.

Table 8-6. Summary of Demand Reduction Actions and Measures

Water Shortage Condition	Key Water Department Communication and Operating Actions	Customer Demand Reduction Measures
Stage 1: Water Shortage Alert (0-5%)	• Initiate public information and advertising campaign • Publicize suggestions and requirements to reduce water use • Adopt water shortage ordinance prohibiting nonessential uses • Step up enforcement of water waste • Coordinate conservation actions with other City Departments, green industry	• Voluntary water conservation requested of all customers • Adhere to water waste ordinance • Landscape irrigation restricted to early morning and evening • Non-essential water uses banned • Shutoff nozzles on all hoses used for any purpose • Encourage conversion to drip, low volume irrigation
Stage 2: Water Shortage Warning (5-15%)	• Intensify public information campaign • Send direct notices to all customers • Establish conservation hotline • Conduct workshops on large landscape requirements • Optimize existing water sources; intensify system leak detection and repair; suspend flushing • Increase water waste patrol • Convene and staff appeals board	• Continue all Stage 1 measures • Landscape irrigation restricted to designated watering days and times • Require large landscapes to adhere to water budgets • Prohibit exterior washing of structures • Require large users to audit premises and repair leaks • Encourage regular household meter reading and leak detection
Stage 3: Emergency Water Shortage (15-25%)	• Expand, intensify public information campaign • Provide regular media briefings; publish weekly consumption reports • Modify utility billing system and bill format to accommodate residential rationing, add penalty rates • Convert outside-City customers to monthly billing • Hire additional temporary staff in customer service, conservation, and water distribution • Give advance notice of possible moratorium on new connections if shortage continues	• Institute water rationing for residential customers • Reduce water budgets for large landscapes • Require all commercial customers to prominently display “save water” signage and develop conservation plans • Maintain restrictions on exterior washing • Continue to promote regular household meter reading and leak detection
Stage 4: Severe Water Shortage Emergency (25-35%)	• Contract with advertising agency to carry out major publicity campaign • Continue to provide regular media briefings • Open centralized drought information center • Promote gray water use to save landscaping • Scale up appeals staff and frequency of hearings • Expand water waste enforcement to 24/7 • Develop strategy to mitigate revenue losses and plan for continuing/escalating shortage	• Reduce residential water allocations • Institute water rationing for commercial customers • Minimal water budgets for large landscape customers • Prohibit turf irrigation, installation in new development • Prohibition on on-site vehicle washing • Rescind hydrant and bulk water permits
Stage 5: Critical Water Shortage Emergency (35-50%)	• Continue all previous actions • Implement crisis communications plan and campaign • Activate emergency notification lists • Coordinate with CA Department of Public Health regarding water quality, public health issues and with law enforcement and other emergency response agencies to address enforcement challenges • Continue water waster enforcement 24/7	• Further reduce residential water allocations • Reduce commercial water allocations • Prohibit outdoor irrigation • No water for recreational purposes, close pools • Continue all measures initiated in prior stages as appropriate

8.6.5 Enforcement, Exceptions, and Appeals

The City's water shortage regulations and restrictions ordinance contains provisions for enforcing water use rules and regulations, and processes for issuing exceptions and hearing appeals. Administrative enforcement methods include the following:

Administrative Penalties These penalties are for failure to comply with water waste prohibitions and mandatory water use restrictions and are applied to the customer's next utility bill. The object of imposing increasingly significant penalties is to assure compliance by creating a meaningful disincentive to commit future code violations. When a violation occurs, the Water Department first provides a written notice and give the customer an opportunity to correct the situation. Additional violations are penalized as follows:

2nd Violation	$100
3rd Violation	$250
4th Violation	$500

Large users (defined as using over a million gallons per year) are penalized at triple the amounts listed above.

Excess Water Use Penalties These penalties are assessed when a customer uses more water in a given billing cycle that their rationing allocation provides. Excess use penalties are in addition to ordinary water consumption charges, as follows

1% to 10% over customer rationing allotment:	$25.00/CCF
More than 10% over customer rationing allotment:	$50.00/CCF

In addition to any administrative penalties and excess water use penalties, a flow restrictor and/or discontinuation of service may be ordered for willful violations of the City's water shortage regulations and restrictions ordinance.

The ordinance contains an exception process and that allows the Water Department, upon making specified findings, to provide for special or exceptional circumstances that otherwise would create undue hardship for an individual customer or class of customers. It also allows any water service customer who considers an enforcement action to have been erroneously undertaken to appeal their case before a City Council appointed ad hoc Drought Appeals Board. The Appeals Board considers the evidence presented by the customer and decides whether to uphold the enforcement action or to provide relief.

8.7 Implementation

The final section of the City's Water Shortage Contingency Plan describes the process and issues associated with implementing the plan. The reader is referred to the full plan for a complete discussion of these issues. The most important subjects are covered briefly below.

8.7.1 Timeline for Declaring Water Shortage

The timeline showing when the City evaluates water supply conditions and, if necessary, declares a water shortage is presented in Table 8-1 below.

Table 8-6. Calendar for Declaring Water Shortage

Target Date	Action
Months of Oct -Dec	Monitor rainfall, reservoir level, and runoff amounts
Late January	Prepare written status report on water supply conditions
Early February	Present initial estimate of water supply availability for year ahead
Early March	Present revised estimate of water supply availability for year ahead
Mid-March	SCWD announces existence of water shortage (if applicable)
Mid to late March	SCWD determines monthly water production budget and need for voluntary or mandatory response.
Early April	Present shortage response recommendation to Water Commission; notice of public hearing published
Mid-April	City Council formally declares a water shortage, adopts emergency ordinance
Mid to late April	Water shortage regulations become effective

8.7.2 Process for Declaring Water Shortage

Once the water shortage condition has been defined (as soon as reasonably certain), recommendations regarding water shortage rules and regulations consistent with this contingency plan are discussed with the City Water Commission. Monthly Water Commission meetings serve as a public forum for discussing water conditions and for hearing issues associated with implementation of the water shortage ordinance throughout the entire duration of the water shortage event.

Following consideration by the Water Commission, a declaration of water shortage is made by a resolution of the City Council. The legal requirements for such action are covered in Section 350 et seq. of the California Water Code. The code requires the following process be followed:

- That City Council hold a public hearing on the matter;
- That the public hearing be properly noticed (minimum of publishing once in newspaper at least seven days prior to the date of the hearing);
- Upon determining and declaring the existence of a water shortage, City Council may then adopt regulations and restrictions governing the use and delivery of water.

In accordance with Municipal Code section 16.04.480, rules adopted by the City Council establishing water use regulations become effective immediately after their publication in a newspaper of general circulation published in the City of Santa Cruz.

8.7.3 Effect of Water Shortages on Revenues and Expenditures

One of the negative consequences of using demand reduction to deal with water shortages is the corresponding reduction in revenue that occurs to the City's Water Fund as a result of reduced water sales. The full plan provides an analysis of the magnitude of revenue losses that the Water Fund might experience for each of the five stages, based on 2007 revenues of just over $22 million, which is comparable to revenues received in the most recent 2011 fiscal year.

The analysis assumes the "ready-to-serve" or fixed monthly service charge that is based on meter size would remain unaffected while the volumetric portion of the Department's revenue derived from water sales would vary by customer class in accordance with the allocation presented in Table 8-4 over the seven month period in which water shortage regulations are likely to be in effect.

The analysis shows revenue losses ranging from just under $0.6 million in a 5 percent water shortage situation to almost $5.8 million in a critical 50 percent water shortage. Compared to 2007 revenues of just over $22 million, the Department's net revenue would be reduced to approximately $21.5 million in Stage 1 to less than $16.4 million in Stage 5. These estimates of losses were considered ballpark figures only and probably underestimate the problem. Actual losses would be different for the following reasons:

- The spreadsheet did not model the effect of tiered pricing in the single family residential category, which would exacerbate revenue losses from this group;

- It is unlikely that system water use would immediately recover to normal levels in the months following a period of curtailment as modeled, thereby further depressing income;

- The table above does not include added operating costs of staff, equipment, and materials related to the water shortage response.

On the other hand, the time of year in which regulations would take effect includes parts of two fiscal years, so the full effect of revenue losses would not impact the Department's annual budget to such a large degree. In addition, there would be relatively minor cost savings associated with reduced power and chemical usage at the Graham Hill water treatment plant, ranging from <$0.1 million in Stage 1 to about $0.4 million in Stage 5. Finally, some of the revenue loss would be offset by penalty and/or excess use fees.

Whatever the situation, one element of implementing this Water Shortage Contingency plan involves examining the Water Department's proposed budget for the coming year and recommending action(s) to lessen or overcome the revenue shortfall. Options include the following:

- Tapping into the Department's Rate Stabilization Fund (currently $2.4 million)
- Deferring planned capital improvements
- Drawing down the available Water Fund balance
- Considering possible rate adjustments or surcharges

On the expenditure side, the major expense of implementing the water shortage plan identified was for added personnel costs for temporary filed and office positions, which were estimated to range from approximately $100,000 in Stage 1 to $600,000 in Stage 5.

8.7.4 Mechanism for Determining Actual Reductions

Under normal water supply conditions, water production and gross consumption are recorded daily and monthly by treatment plant operators and reported to the Production Superintendent. Metered water consumption is reported on a monthly basis through automated sales reports generated by the utility billing system.

During a water shortage, a monthly production forecast and budget are developed for each source of supply. Actual production and the lake level are closely monitored on a daily and weekly basis to verify that the budgeted goals are being met. Consumption by large users is monitored and reported on a frequent basis. In severe stages of a water shortage, production and consumption data would be evaluated daily and the status reported to the Water Director's office. If the trend in consumption is such that the rate of drawdown at Loch Lomond is greater than anticipated, the City Manager and Council are notified so that corrective action (such as increased publicity and enforcement or consideration of declaring the next higher stage) can be taken.

8.8 Documentation of 2009 Water Shortage

In the two years preceding the development of the City's Water Shortage Contingency Plan, water conditions throughout the state of California had fallen below average, and water resources in some areas were already stressed by drought. Then, in 2009, after a third consecutive year of below normal rainfall and runoff, it became necessary to put the contingency plan into immediate effect after its review and adoption by City Council.

As it turned out, the water shortage of 2009 was equal to the 15 percent water reduction goal envisioned in the City's Integrated Water Plan. Accordingly, the 2009 water shortage was important not only as an enactment of the newly created Water Shortage Contingency Plan, but also as a test of a core idea underpinning the City's Integrated Water Plan, namely that the community could achieve and would tolerate periodic cutbacks in water use by up to 15 percent.

In many ways, the effort to reduce customer water use during 2009 can be considered a success. Consumption reduction goals were achieved. The overwhelming majority of the City's customer complied with water restrictions. Reservoir storage was preserved. Little if any, lasting damage to public and private landscapes was done. In the end, water conditions improved substantially in 2010. But had it not, the water saved from restrictions enacted in 2009 would have meant a good deal less hardship dealing with a potentially 4th dry year.

A key ingredient to this success was the public's understanding, awareness, and belief that the City was confronted with a true water shortage problem. Media coverage of water problems across California reinforced the situation. Without that sense of a real and imminent problem, it's likely the level of cooperation and willingness demonstrated by the community in making changes they did would have been considerably lower.

Much progress was made with putting enforcement systems, procedures, and tools in place that were not in place prior to 2009 and will help in future events. Even so, there were numerous lessons learned from this experience and several areas where improvements could be made to better manage water shortages in the future.

Afterwards, Water Department staff prepared a report to document the response and compile records for future reference. This report, entitled: The 2009 Water Shortage: An Evaluation of Water Management Strategies, Actions, and Results evaluates which aspects of the plan succeeded and which didn't, and why, and makes recommendations and refinements to the plan for the next time a water shortage occurs.

8.9 Estimate of Minimum Supply for Next Three Years

Water Code section 10632 (b) requires water suppliers to provide:

> *"An estimate of the minimum water supply available during each of the next three years based on the driest three year sequence for the agency's water supply."*

The City's operations model was used to develop two hypothetical scenarios for the next three water years, 2012 through 2014. The hydrologic sequence assumes that conditions for water year 2012 are similar to that experienced in 2007, a recent critically dry year. For 2013 and 2014, water conditions were assumed to similar to those experienced in the 1976-77 drought. The demand condition in both scenarios was set at approximately 3.5 billion gallons per year. Each scenario assumes that Loch Lomond Reservoir begins at full capacity on April 1, 2012. The difference between the two scenarios is that one model run is operated with no HCP in-stream flow requirements. The other is operated assuming Tier 2 in-stream flow requirements. Scenarios were run both ways because, while there is no agreement at this time about necessary releases, Tier 2 flows could be required in the not too distant future. Results for minimum water supply volumes available during each of the next three years as determined by the model, and corresponding peak season water shortages, are presented in Table 8-7.

Table 8-7. Estimate of Minimum Supply for Next Three Years

Water Year	2012		2013		2104	
Hydrologic Year	2007		1976		1977	
In-Stream Flow Requirement	No HCP	Tier 2	No HCP	Tier 2	No HCP	Tier 2
Total Water Available - net (mgy)	3,500	3,520	3,320	3,110	3,280	2,870
Peak Season water Shortage (%)	0%	0%	5%	19%	13%	33%
End of Season Lake Level (bil gal)	2.3	2.3	1.8	1.7	1.1	1.1

While modeled results reflect an operating logic for the system, the model cannot reflect the human judgment and decisions that would actually be made in the face of uncertain and evolving dry weather conditions. Primarily, they reveal the effect in-stream flow releases could have on system reliability, under relatively low, near–term demand conditions. In all likelihood, were the City to face a second dry year like 1976 following a year like 2007, the Department would call for earlier and deeper cutbacks to preserve storage in case of subsequent dry years, as is described in the full Water Shortage Contingency Plan. In fact, the equivalent of Stage 1 water restrictions actually were invoked by the Department in 2007 as a precautionary measure under similar demand conditions, even though the model technically does not detect or produce a water shortage in the first year.

8.10 Catastrophic Interruption of Water Supplies

Water Code section 10632 (c) requires water suppliers to:

> *"Describe the actions to be undertaken to prepare for, and implement during, a catastrophic interruption of water supplies, including, but not limited to a regional power outage,, an earthquake, or other disaster."*

The City plans for and responds to emergency incidents, including floods, earthquakes, fires, and hazardous materials incidents in accordance with the Santa Cruz County Operational Area Memorandum of Understanding (MOU). The MOU ratifies local government agreements to follow the Standardized Emergency Management System or SEMS, as mandated under California law. The City maintains an Emergency Management Plan, which defines and describes the emergency management organization and guides the response of appropriate personnel to a major emergency. The City Manager, functioning as the City's Director of Emergency Services, would coordinate the emergency response to maintain water delivery and/or restore service as necessary. The Emergency Management Plan also addresses the integration and coordination with other government agencies and levels when required.

The Water Department maintains a mutual assistance agreement with other water agencies through the Water/Wastewater Agency Response Network (WARN) to share equipment, personnel, and supplies in times of an emergency. The City is a within the California Office of Emergency Services Coastal Region II, which includes the counties in the San Francisco Bay region and northern California coast.

The Water Department has it own **General Emergency Plan and Emergency Response Plan for Terrorist Activity and Natural Disasters** in accordance with state and federal laws. This document sets forth the primary objectives of the Department in an emergency as follows:

- Maintain water service for domestic and firefighting purposes,
- Protect the water supply form possible contamination,
- Control the loss of water, and
- Keep the public informed

The plan outlines the roles responsibilities of key Departmental personnel during an emergency at both the City Emergency Operations Center and Water Department Operations Center. It also describes general actions to be taken to 1) assess situation status and extent of damage to the water system, 2) prevent contamination and loss of water, and 3) restore water service in response to the following types of emergencies:

- Earthquake
- Tsunami
- Flood
- Fire
- Suspected Contamination of Water Supply
- Civil Disorder
- Power Outage
- Treatment Plant Failure
- Damage to Distribution Storage Reservoirs or Booster Pumping Station
- Telecommunications Failure

The plan contains an emergency water rationing plan intended to preserve treated water supplies in the event a catastrophe results in impairment of the water system. The emergency rationing plan has two stages, which are defined as follows:

Serious shortage: This condition exists when the system is unable to meet normal demand, but can supply enough water for basic public health and safely needs. In this situation, not taking swift action to ration water could jeopardize available water in storage, or could leave the City vulnerable in the event of further outages.

Critical shortage: This condition exists when production facilities are rendered incapable of meeting 50% or less of normal daily production levels and the current rate of consumption poses an immediate threat of draining Bay Street reservoir or other storage tank.

The restrictions that would be instituted in a serious or critical shortage are summarized in Table 8-8.

Table 8-8. Emergency Water Rationing Plan

Serious Shortage	
Prohibited Uses:	*Permitted Uses:*
1. Watering lawns, gardens or landscaping 2. Washing cars, boats, building exteriors 3. Washing sidewalks, driveways, or any exterior surfaces 4. No outdoor use for any reason 5. Car washes closed 6. Watering plants at nurseries, garden centers 7. Filling of swimming pools, hot tubs, decorative pools, or fountains (must be turned off) 8. Public showers closed	1. Normal domestic uses: drinking, cooking (paper plates and plastic utensils requested) 2. Toilet flushing, only when necessary 3. Limit showers to three minutes 4. Bathing only if absolutely necessary (no more than half full) 5. Minimize clothes and dish washing
Critical Shortage	
Prohibited Uses:	*Permitted Uses:*
1. Outdoor water use for any reason (garden, landscape, car washing, cleaning, maintenance) 2. Clothes washing and commercial laundering, except for health reasons 3. Janitorial cleaning 4. Businesses and institutions that use water in their operations may be forced to close or restrict operations: - Restaurants, bars, and coffee shops - Laundromats - Public and Private Schools - Manufacturing - Gyms and health spas - Beauty salons and barber shops 5. No water for construction 6. No water for crop irrigation	1. Water limited to health and safety only: drinking and cooking (paper plates and plastic utensils required) 2. Toilet flushing for solid waste only 3. Shower/bathing should be limited to every other day 4. Use water only when absolutely necessary

The City has four portable auxiliary generators to run booster pumps in case of an extended power outage. In addition, the treatment plant and major pump stations have stationary electrical generators as a stand-by source of power in case of a local or regional power outage.

A separate Emergency Response and Public Notification Plan was developed in 2007 in anticipation of the deconstruction of Bay Street Reservoir. As part of this plan, communication and standard public notification procedures were put in place in the event a water emergency arose. This plan included developing the capability to trigger an automated call-out notification system (Reverse 911) to rapidly disseminate a generalized water emergency warning throughout the Santa Cruz water service area.

Finally, Water Department has separate earthquake response procedures that outline responsibilities for inspection and reporting the status of critical structures, including Newell Creek Dam, Bay Street Reservoir, and other major water production facilities following an earthquake.

Chapter 9

PLANNING FOR CLIMATE CHANGE

The Urban Water Management Planning Act does not require water suppliers to address climate change in their Urban Water Management Plans and a full discussion of this subject is beyond the scope of this report. Nevertheless, evidence continues to accumulate that climate change associated with rising global surface temperatures may have significant effects on California's water resources. Furthermore, these effects may be felt locally within the 20-year time frame of this plan, adding uncertainty and hydrologic variability to an already unpredictable and variable future.

9.1 Potential Climate Change Effects Statewide

A summary of the major expected effects of climate change that pose a threat to the state's water resources is provided in Table 9-1 (DWR, 2006).

Table 9-1. Summary of Potential Impacts and Consequences of Climate Change on California's Water Resources

Potential Impact	Expected Consequence
Reduction of the State's average annual snow pack	• Potential loss of water storage • Challenges for reservoir management in balancing flood protection and water supply
Changes in the timing, intensity, location, amount, form, and variability of precipitation	• Potential increased storm intensity and increased potential for flooding • Possible increased potential for droughts
Long-term changes in watershed vegetation and increased incidence of wildfires	• Changes in the intensity and timing of runoff • Possible increased incidence of flooding and increased sedimentation
Sea level rise	• Inundation of coastal areas • Increased salinity intrusion into coastal groundwater aquifers
Increased water temperatures	• Changes in aquatic ecosystems • Potential adverse changes in water quality • Increased environmental water demand
Changes in evapotranspiration rates	• Increased irrigation and domestic water demands (bathing, drinking, recreation)

These changes could have profound effects on both ecological and water resource systems of the state.

Even though the City is not connected to the major water storage and conveyance systems in California such as the State Water Project or the Central Valley Project, it benefits from the same winter weather systems that provide the annual precipitation on which much of the state relies for its water supply. It is also vulnerable to many of the same threats, including rising sea level, storms of increasing intensity, and alternating periods of more severe floods and drought.

As a coastal community, the City of Santa Cruz recognizes the significance of climate change to the City's economic well-being, public health, and environment, and has begun taking steps as a local agency to respond. Activities fall into two general categories. *Mitigation* refers actions that reduce greenhouse gas emissions contributing to climate change and expand the use of clean energy sources. *Adaptation* refers to efforts designed to improve the community's ability to cope with a changing climate. These activities are summarized briefly below:

9.2 Mitigation Response

In 2007, the City of Santa Cruz established a Climate Action Program to create and implement a comprehensive plan to meet the City's community-wide greenhouse gas reduction goals and State land use requirements pertaining to climate change.

Among other steps, the City has prepared a draft Climate Action Plan as part of the City's General Plan update. This plan quantifies greenhouse gas emissions from various community sources and outlines the actions the City may take in the areas of energy use, transportation, land use, water and wastewater to reduce greenhouse gas emissions 30 percent as compared to 1996 levels by year 2020. In this report, it is estimated that the energy consumed to operate the City water system represents 15 percent of emissions generated by the municipal sector, but less that one percent community-wide emissions. Still, water use efficiency is identified as an important strategy to accomplish greenhouse gas reduction goals. The plan is scheduled to be considered by the Santa Cruz City Council in late 2011.

9.3 Climate Adaptation Planning

The City's current climate adaptation planning effort is an outgrowth of its first Local Hazard Mitigation Plan (LHMP), developed in 2007. The Federal Disaster Mitigation Act of 2000 requires local governments to develop and submit LHMPs for FEMA approval as a condition of receiving mitigation grant funding. The Climate Adaptation Plan is a continuation of that commitment through an analysis of the steps necessary to reduce the potential impacts of climate change, creating a more climate resilient community.

The City first engaged University of California at Santa Cruz (UCSC) scientists Gary Griggs and Brent Haddad to undertake a vulnerability study to identify risks and recommend potential actions throughout the City to prepare for climate change impacts. The Vulnerability Study (January 2011) provides an assessment of potential effects of climate change specifically for the City of Santa Cruz with an emphasis on how anticipated climate change may affect the people, infrastructure, property and development, economy, environmental resources, and environmental health. The report provides an analysis, risk assessment, and recommendations relative to the following key impact areas:

- Vulnerability of the Santa Cruz coastline to sea level rise
- Coastal storm damage and cliff erosion
- Changes in precipitation, flood potential and water availability
- Changing temperatures
- Natural resource impacts

Over the next 40 years, the two highest risks to the City identified by the researchers will come from:

1. Water shortages due to the combination of increasing temperatures and changes in precipitation patterns, and

2. Rise in water table on buildings and infrastructure beneath the downtown portion of the City, including the wastewater treatment plant

Based on this study, the City has developed goals, objectives and a range of potential actions that will build adaptive capacity into City policies, programs and infrastructure. These goals and actions along with the Vulnerability Study forms the City's Adaptation Plan that creates a framework for long-range planning decisions.

In all, over 30 action items involving various City departments were identified and prioritized. Those items involving the Water Department include:

- Diversify water portfolio

- Prepare for water emergency supply for climate related events
- Protect watershed land and vegetation
- Monitor open space/watershed
- Protect coastline and water system infrastructure
- Conserve and curtail water usage
- Reduce creek and/or river flooding
- Minimize risks from dam failure
- Prepare for potential changes in water quality due to climate change
- Prepare for climate-change related short-term water shortage

The Vulnerability Study, goals and proposed actions were presented to various City Commissions and will be reviewed by City Council late 2011. After the document has been reviewed by FEMA it will go back to City Council for approval and adoption in winter 2011-12.

9.4 Long-term Average Temperature and Precipitation Change

The National Climatic Data Center maintains temperature and precipitation records for the nation and provides 30-year monthly and annual averages referred to as long-term “normal” figures. These normal temperature and rainfall figures are updated every 10 years.

As shown in Figure 9-1, a recent comparison of 1981-2010 normals with the previous, 1971- 2000 period, for major cities across California suggests that, as temperature rises inland, California’s coastal regions appear to be getting slightly cooler by between 0.1 to 1.0 degrees F (Golden Gate Weather Services, 2011). The cooling is attributed to stronger sea breezes. Average rainfall was also seen to increase slightly across the state.

Normal temperature and precipitation for the City of Santa Cruz for three averaging periods is present in Table 9-1. The trend for temperature in Santa Cruz did not track with findings elsewhere along the coast, showing a slight warming trend of 1.1 degrees F between the two averaging periods ending in 2000 and 2010. Average annual rainfall in Santa Cruz does show a slight increase of 0.68 inches, or 2.2 percent, corresponding with observations elsewhere. The analyst cautioned against drawing conclusions about rainfall trends, suggesting that the increase in rainfall may just be the randomness of climate as opposed to signaling a larger scale trend. It was noted that the earlier, 1971-2000 period contained some exceptionally dry years (1976-77) that were dropped off in the succeeding averaging period.

Figure 9-1. Comparison of Mean Annual Temperature and Rainfall for Selected California Cities

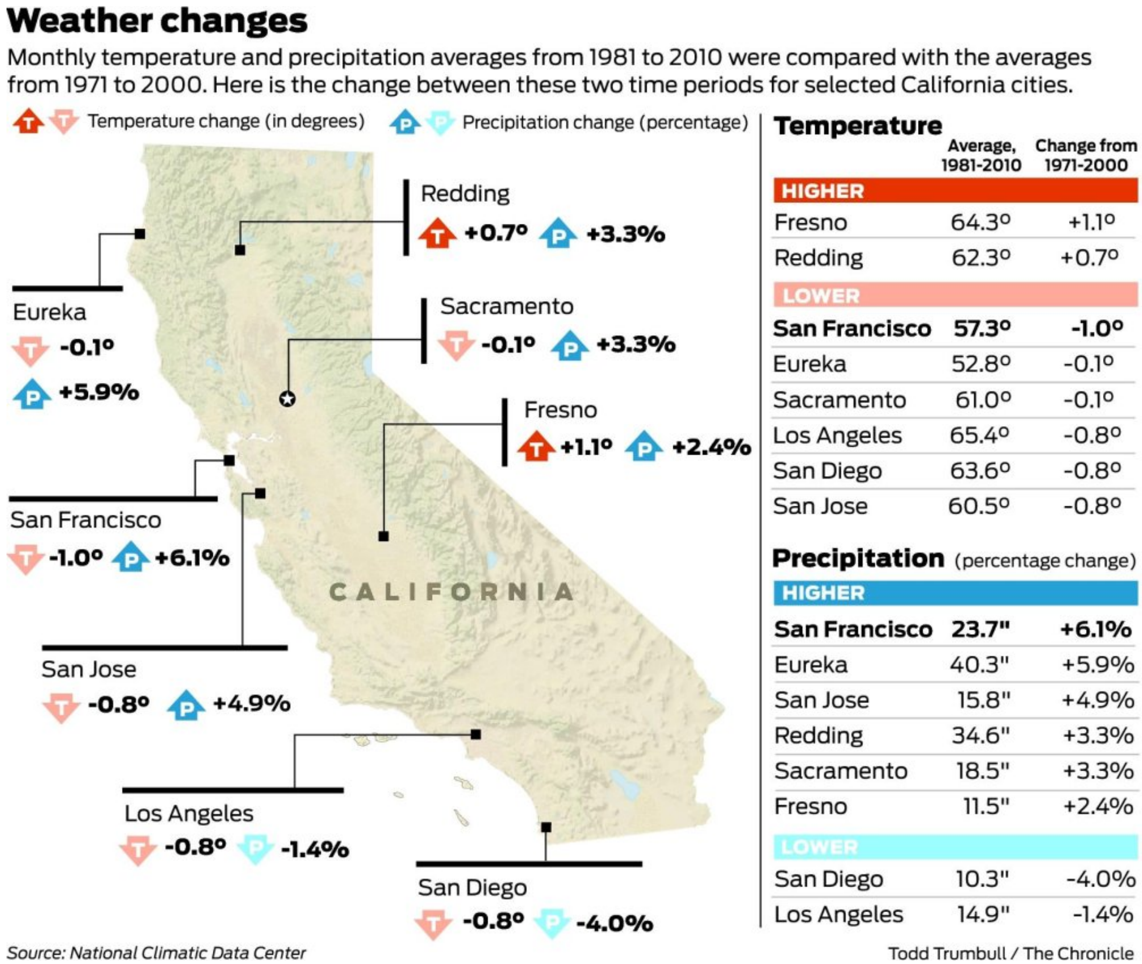


Table 9-1. Comparison of Mean Annual Temperature and Precipitation, Santa Cruz, CA

	1961-1990	1971-2000	1981-2010
Mean Annual Temperature (F)	57.3	57.7	58.8
Precipitation (inches)	28.99	30.67	31.35

The issues identified above regarding the potential effects of climate change are a matter of fundamental concern to the City because of the economic, social, or environmental consequences, particularly when it involves extreme weather events like a flood disaster. Some processes, like sea level rise, will be comparatively gradual, occurring over a long time frame, and could pose a threat to the viability of the City's groundwater resources. From a water management standpoint, it still remains the short to intermediate-term natural variations of weather, however - which can be impossible to distinguish from the influence of climate change - that present the greater challenge. For a predominantly surface water system like Santa Cruz, these small incremental changes in average temperature and in rainfall do matter, but short-term weather anomalies like persistent high pressure causing back to back dry years, or a damaging flood matter much more. And while the science of ocean and atmospheric dynamics and long-term weather predictions continue to improve, reliable weather forecasts are still good only for a week or two into the future, at best. Thus, there will always be uncertainty about what the weather will be, how much rain the coming year will bring, and whether the City's water supplies will be adequate, irrespective of the longer-term trends.

Chapter 10

GOALS AND POLICES FOR MANAGING THE SANTA CRUZ WATER SYSTEM

The foregoing Chapters have highlighted the water management challenges facing the City of Santa Cruz and described the direction and the steps the City is currently taking to address these challenges. This final chapter presents long-term goals, polices, and actions that will serve to guide management of the water system through the year 2030 and ensure that the water supply system – one of the City's most vital services – continues to meet the needs of the community well into the future.

The goals, policies, and actions referenced below were developed though two separate but related processes: 1) the City's General Plan Update 2030, and 2) City Council Three Year Strategic Plan.

10.1 General Plan Update 2030

As mentioned in Chapter 2, the City is well along towards completing a comprehensive update to its existing General Plan. The new General Plan will extend to 2030, corresponding with the timeline for this Urban Water Management Plan. Public review of the draft General Plan and its accompanying Environmental Impact Report (EIR) is scheduled for the latter half of 2011, followed by consideration and adoption by City Council, expected in early 2012.

The City's General Plan 2030 is built around a series of goals, policies, and actions. In the context of the General Plan, a goal is a general, overall and ultimate purpose aim or end toward which the City will direct effort during the timeframe of the General Plan. A policy is a specific statement of principle or guidance that implies clear commitment; the direction the City intends to follow. An action is a program, activity, or strategy carried out in response to adopted policy to achieve a specific goal.

The draft General Plan addresses community facilities and services, including water, wastewater, solid waste, and other public services, in Chapter 7, CIVIC AND COMMUNITY FACILITIES. The opening principle of the Plan states that the City "… will highlight and protect … the sustainable use of our precious natural resources." This chapter follows that principle by a call for improving and maintaining the public infrastructure, among other things. The CIVIC AND COMMUNITY FACILITIES chapter includes one overarching goal with 11 associated policies and nearly 50 accompanying actions that address water service. The City's General Plan goal for water supply is expressed as follows:

Goal CC 3 A safe, reliable, and adequate water supply

Policy CC3.1 supports implementation of the City's Integrated Water Plan, and its three accompanying actions support reduction in long-term demand with conservation, periodic updates of the City's Water Shortage Contingency Plan, and development of a 2.5 mgd desalination plant for drought protection with the potential for incremental expansion to 4.5 mgd. Other proposed policies address water demand and conservation, water management, protection of water supplies, including groundwater supplies, development of new water sources and provision of adequate water facilities. Several policies and actions in other chapters of the proposed General Plan also pertain to the City's water supplies and/or demand. Water conservation and audits at park facilities are supported (NRC1.1.3), as well as water conservation education related to creeks and wetlands (NRC1.1.5).

The draft General Plan proposes the following policies (designated in italics) and actions with regard to water service that will support and promote the City's general goal of achieving a safe, reliable, and adequate water supply. These policy statements thus form the basis for the Water Department's annual strategic planning and budgeting processes:

CC3.1 *Implement the City's Integrated Water Plan.*

CC3.1.1 Implement the City's Long-Term Water Conservation Plan to reduce average daily water demand and maximize the use of existing water resources.

CC3.1.2 Periodically update the City's Water Shortage Contingency Plan to prepare for responding to future water shortages.

CC3.1.3 Develop a desalination plant of 2.5 mgd for drought protection, with the potential for incremental expansion to 4.5 mgd, if it is environmentally acceptable and financially feasible.

CC3.2 *Meet or exceed all regulatory drinking water standards.*

CC3.2.1 Regularly and comprehensively evaluate the water system relative to federal and State water quality regulations and standards, and develop recommendations and an action plan to address findings.

CC3.2.2 Develop, maintain, and update sampling and analysis programs, and laboratory procedures for the treated water distribution system and storage facilities.

CC3.2.3 Maintain required federal and State laboratory certification.

CC3.2.4 Prepare and submit compliance reports to all regulatory agencies.

CC3.2.5 Regularly sample and analyze finished water in accordance with approved methods and parameters identified by the State, U.S. Environmental Protection Agency, and the City.

CC3.2.6 Monitor the quality of water from all sources.

CC3.2.7 Provide annual drinking water quality reports to all consumers of city water.

CC3.3 Safeguard existing surface and groundwater sources.

CC3.3.1 Manage City watershed lands relative to protecting the sources of drinking water.

CC3.3.2 Maintain compliance with all applicable drinking water source protection-related regulations.

CC3.3.3 Secure and maintain all City water rights to existing and future water supplies to provide certainty and operational flexibility for the water system.

CC3.3.4 Review and comment on new State Water Resources Control Board water rights applications and timber harvest plans on City drinking water source watersheds.

CC3.3.5 Pursue appropriate regulatory enforcement of environmental violations committed by other watershed stakeholders.

CC3.3.6 Conduct hydrologic and biotic monitoring throughout drinking water source watersheds to protect water supplies and habitat. Cf. CD4.3.3 and NRC2.1, 2.2, 2.4, and 6.3.

CC3.3.7 Ensure that fisheries conservation strategies address and protect water storage, drinking water source quality, and water system flexibility, as well as protect the environmental resource.

CC3.3.8 Provide adequate pumping, treatment, and distribution facilities for peak season production of groundwater of 170 mgy in normal years and 215 mgy during droughts.

CC3.3.9 Monitor groundwater levels and quality.

CC3.3.10 Participate with the Soquel-Aptos Groundwater Management Alliance in cooperative efforts to assure the quality and production of groundwater resources.

CC3.4 Maintain and improve the integrity of the water system.

CC3.4.1 Maintain and improve water facilities to meet pressure and fire flow requirements and ensure customer delivery. Cf. HZ1.4.3.

CC3.4.2 Modernize City water treatment plants.

CC3.4.3 Optimize storage, transmission, and distribution capacities and efficiencies.

CC3.4.4 Evaluate and improve the water system so as to minimize water outages due to emergencies and disasters.

CC3.5 Promote maximum water use efficiency.

CC3.5.1 Implement 14 urban water conservation “best management practices” and meet reporting requirements in the Memorandum of Understating Regarding Urban Water Conservation in California.

CC3.5.2 Promote public education and awareness about the City’s water resources and the importance of water conservation.

CC3.5.3 Offer water audit programs and technical assistance for homes, businesses, and large landscapes to help customers reduce their average daily water use and control their utility bills.

CC3.5.4 Provide financial incentives to City water customers for installing high efficiency plumbing fixtures, appliances, and equipment.

CC3.5.5 Provide public information regarding onsite water catchment systems.

CC3.5.6 Administer and enforce water waste regulations, plumbing fixture retrofit requirements, and water efficient landscape standards for new development.

CC3.5.7 Explore and consider promoting or requiring new opportunities and technologies for more efficient use of water and energy.

CC3.5.8 Evaluate water use by residential, commercial, industrial and other customer categories and trends per capita.

CC3.5.9 Regularly audit the water distribution system and implement programs to minimize system losses and underground leaks.

CC3.5.10 Participate in regional water conservation partnerships, events, and opportunities.

CC3.5.11 Play a leadership role in supporting research, policy development, standards, and legislation aimed at furthering water use efficiency across the state.

CC3.5.12 Implement additional water conservation programs that provide a reliable gain in supply and can be justified in terms of their cost.

CC3.6 Coordinate major land use planning decisions in all three jurisdictions served by the City water system based on water supply availability.

CC3.6.1 Implement the City's Urban Water Management Plan and update it periodically as required by State law.

CC3.6.2 Provide annual updates to the city council on the status of remaining water supply.

CC3.6.3 Confirm or adjust the estimate of remaining supply to avoid oversubscribing the water system.

CC3.6.4 Consider developing criteria for determining significance of environmental impacts of development projects on the City water system to streamline the environmental review process.

CC3.7 Allow extension of the Water Service Area only if an application is approved by city council and/or LAFCO

CC3.8 Prohibit additional connections to the North Coast water system, in accordance with City Council Resolutions NS-17372 and NS-21056.

CC3.9 Sustain long-term fiscal stability.

CC3.9.1 Maintain a rate schedule based on cost of service and designed to provide an economic incentive for conservation.

CC3.9.2 Collect sufficient revenues to assure adequate maintenance of the water system infrastructure.

CC3.9.3 Maintain a Water Rate Stabilization Fund to protect against unanticipated emergencies, and Operating Reserves as needed for cash flow.

CC3.9.4 Confine long-term borrowing to major capital improvements.

CC3.9.5 Develop and implement a long-term Capital Improvements Plan for prioritizing and financing major projects.

CC3.10 Investigate new supply options to meet planned growth.

CC3.10.1 Explore opportunities to use recycled water for future water supply.

CC3.11 Conserve water resources. Cf. NRC1.3.1 and 3.1.

CC3.11.1 Promote water conservation.

CC3.11.2 Regularly update guidelines and standards for new landscaping that emphasizes xeriscaping, climate-appropriate landscape design, and other water-conserving practices.

CC3.11.3 Conduct a landscape irrigation audit program and target large water consumers to reduce consumption. Examples of large consumers are large turf customers, large commercial and industrial customers, and property management firms.

This document recognizes that City Council has yet to adopt the proposed General Plan 2030. Thus, there may be some differences between the draft policies listed above and actions and language that are ultimately adopted. It also recognizes that General Plans are dynamic and that changes may and do occur over time due to periodic amendments and updates.

10.2 City Council Three Year Strategic Plan

Early in 2011, the City Council undertook a process to develop a Three Year Strategic Plan. This process was intended to serve two basic purposes: 1) to focus attention on the most critical action items facing the City to be completed in the next three years, and 2) to engage the community and communicate achievements and progress on a regular basis.

Through this process, the City Council identified the following five major goals:

- Enhance Environmental Sustainability and Resources
- Enhance Community Safety
- Attract and Retain Businesses and Jobs
- Achieve Financial Stability and Sustainability
- Improve and Maintain the Infrastructure and Facilities

Under the category of Enhancing Environmental Sustainability and Resources, three strategic objectives directly involving the Water Department were identified and ultimately adopted by City Council. These include:

- Continuing planning for and implementation of drought protection project (Desalination Project) in conjunction with the Soquel Creek Water District, including certification of EIR;
- Develop and implement the next level water conservation programs; and
- Complete endangered species permitting and Habitat Conservation Plan for North Coast streams

These strategic objectives thus form part of City Council approved strategic plan that represent priority items to be addressed over the 2012-2014 time period. Progress toward completing these objectives will be the subject of annual reports to the Santa Cruz community and the next (2015) reporting cycle for the City's Urban Water Management Plan.

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Section K: California Water Code, Division 6, Part 2.6: Urban Water Management Planning

The following sections of California Water Code Division 6, Part 2.6, are available online at http://www.leginfo.ca.gov/calaw.html.

Chapter 1. General Declaration and Policy

10610. This part shall be known and may be cited as the “Urban Water Management Planning Act.”

10610.2.

(a) The Legislature finds and declares all of the following:

(1) The waters of the state are a limited and renewable resource subject to ever-increasing demands.

(2) The conservation and efficient use of urban water supplies are of statewide concern; however, the planning for that use and the implementation of those plans can best be accomplished at the local level.

(3) A long-term, reliable supply of water is essential to protect the productivity of California's businesses and economic climate.

(4) As part of its long-range planning activities, every urban water supplier should make every effort to ensure the appropriate level of reliability in its water service sufficient to meet the needs of its various categories of customers during normal, dry, and multiple dry water years.

(5) Public health issues have been raised over a number of contaminants that have been identified in certain local and imported water supplies.

(6) Implementing effective water management strategies, including groundwater storage projects and recycled water projects, may require specific water quality and salinity targets for meeting groundwater basins water quality objectives and promoting beneficial use of recycled water.

(7) Water quality regulations are becoming an increasingly important factor in water agencies' selection of raw water sources, treatment alternatives, and modifications to existing treatment facilities.

(8) Changes in drinking water quality standards may also impact the usefulness of water supplies and may ultimately impact supply reliability.

(9) The quality of source supplies can have a significant impact on water management strategies and supply reliability.

(b) This part is intended to provide assistance to water agencies in carrying out their long-term resource planning responsibilities to ensure adequate water supplies to meet existing and future demands for water.

10610.4. The Legislature finds and declares that it is the policy of the state as follows:

(a) The management of urban water demands and efficient use of water shall be actively pursued to protect both the people of the state and their water resources.

(b) The management of urban water demands and efficient use of urban water supplies shall be a guiding criterion in public decisions.

(c) Urban water suppliers shall be required to develop water management plans to actively pursue the efficient use of available supplies.

Chapter 2. Definitions

10611. Unless the context otherwise requires, the definitions of this chapter govern the construction of this part.

10611.5. “Demand management” means those water conservation measures, programs, and incentives that prevent the waste of water and promote the reasonable and efficient use and reuse of available supplies.

10612. “Customer” means a purchaser of water from a water supplier who uses the water for municipal purposes, including residential, commercial, governmental, and industrial uses.

10613. “Efficient use” means those management measures that result in the most effective use of water so as to prevent its waste or unreasonable use or unreasonable method of use.

10614. “Person” means any individual, firm, association, organization, partnership, business, trust, corporation, company, public agency, or any agency of such an entity.

10615. “Plan” means an urban water management plan prepared pursuant to this part. A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, reclamation and demand management activities. The components of the plan may vary according to an individual community or area's characteristics and its capabilities to efficiently use and conserve water. The plan shall address measures for residential, commercial, governmental, and industrial water demand management as set forth in Article 2 (commencing with Section 10630) of Chapter 3. In addition, a strategy and time schedule for implementation shall be included in the plan.

10616. “Public agency” means any board, commission, county, city and county, city, regional agency, district, or other public entity.

10616.5. “Recycled water” means the reclamation and reuse of wastewater for beneficial use.

10617. “Urban water supplier” means a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually. An urban water supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells for ultimate resale to customers. This part applies only to water supplied from public water systems subject to Chapter 4 (commencing with Section 116275) of Part 12 of Division 104 of the Health and Safety Code.

Chapter 3. Urban Water Management Plans

Article 1. General Provisions

10620.

(a) Every urban water supplier shall prepare and adopt an urban water management plan in the manner set forth in Article 3 (commencing with Section 10640).

(b) Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.

(c) An urban water supplier indirectly providing water shall not include planning elements in its water management plan as provided in Article 2 (commencing with Section 10630) that would be applicable to urban water suppliers or public agencies directly providing water, or to their customers, without the consent of those suppliers or public agencies.

(d) (1) An urban water supplier may satisfy the requirements of this part by participation in areawide, regional, watershed, or basinwide urban water management planning where those plans will reduce preparation costs and contribute to the achievement of conservation and efficient water use.

(2) Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.

(e) The urban water supplier may prepare the plan with its own staff, by contract, or in cooperation with other governmental agencies.

(f) An urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions.

10621.

(a) Each urban water supplier shall update its plan at least once every five years on or before December 31, in years ending in five and zero.

(b) Every urban water supplier required to prepare a plan pursuant to this part shall, at least 60 days prior to the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. The urban water supplier may consult with, and obtain comments from, any city or county that receives notice pursuant to this subdivision.

(c) The amendments to, or changes in, the plan shall be adopted and filed in the manner set forth in Article 3 (commencing with Section 10640).

Article 2. Contents of Plans

10630. It is the intention of the Legislature, in enacting this part, to permit levels of water management planning commensurate with the numbers of customers served and the volume of water supplied.

10631. A plan shall be adopted in accordance with this chapter that shall do all of the following:

(a) Describe the service area of the supplier, including current and projected population, climate, and other demographic factors affecting the supplier's water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available.

(b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a). If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information shall be included in the plan:

(1) A copy of any groundwater management plan adopted by the urban water supplier, including plans adopted pursuant to Part 2.75 (commencing with Section 10750), or any other specific authorization for groundwater management.

(2) A description of any groundwater basin or basins from which the urban water supplier pumps groundwater. For those basins for which a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree. For basins that have not been adjudicated, information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to eliminate the long-term overdraft condition.

(3) A detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(4) A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the urban water supplier. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(c) (1) Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable, and provide data for each of the following:

(A) An average water year.

(B) A single dry water year.

(C) Multiple dry water years.

(2) For any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, describe plans to supplement or replace that source with alternative sources or water demand management measures, to the extent practicable.

(d) Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.

(e) (1) Quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, identifying the uses among water use sectors, including, but not necessarily limited to, all of the following uses:

(A) Single-family residential.

(B) Multifamily.

(C) Commercial.

(D) Industrial.

(E) Institutional and governmental.

(F) Landscape.

(G) Sales to other agencies.

(H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof.

(I) Agricultural.

(2) The water use projections shall be in the same five-year increments described in subdivision (a).

(f) Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1) A description of each water demand management measure that is currently being implemented, or scheduled for implementation, including the steps necessary to implement any proposed measures, including, but not limited to, all of the following:

(A) Water survey programs for single-family residential and multifamily residential customers.

(B) Residential plumbing retrofit.

(C) System water audits, leak detection, and repair.

(D) Metering with commodity rates for all new connections and retrofit of existing connections.

(E) Large landscape conservation programs and incentives.

(F) High-efficiency washing machine rebate programs.

(G) Public information programs.

(H) School education programs.

(I) Conservation programs for commercial, industrial, and institutional accounts.

(J) Wholesale agency programs.

(K) Conservation pricing.

(L) Water conservation coordinator.

(M) Water waste prohibition.

(N) Residential ultra-low-flush toilet replacement programs.

(2) A schedule of implementation for all water demand management measures proposed or described in the plan.

(3) A description of the methods, if any, that the supplier will use to evaluate the effectiveness of water demand management measures implemented or described under the plan.

(4) An estimate, if available, of existing conservation savings on water use within the supplier's service area, and the effect of the savings on the supplier's ability to further reduce demand.

(g) An evaluation of each water demand management measure listed in paragraph (1) of subdivision (f) that is not currently being implemented or scheduled for implementation. In the course of the evaluation, first consideration shall be given to water demand management measures, or combination of measures, that offer lower incremental costs than expanded or additional water supplies. This evaluation shall do all of the following:

(1) Take into account economic and noneconomic factors, including environmental, social, health, customer impact, and technological factors.

(2) Include a cost-benefit analysis, identifying total benefits and total costs.

(3) Include a description of funding available to implement any planned water supply project that would provide water at a higher unit cost.

(4) Include a description of the water supplier's legal authority to implement the measure and efforts to work with other relevant agencies to ensure the implementation of the measure and to share the cost of implementation.

(h) Include a description of all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water use as established pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs, other than the demand management programs identified pursuant to paragraph (1) of subdivision (f), that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in average, single-dry, and multiple-dry water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.

(i) Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.

(j) For purposes of this part, urban water suppliers that are members of the California Urban Water Conservation Council shall be deemed in compliance with the requirements of subdivisions (f) and (g) by complying with all the provisions of the “Memorandum of Understanding Regarding Urban Water Conservation in California,” dated December 10, 2008, as it may be amended, and by submitting the annual reports required by Section 6.2 of that memorandum.

(k) Urban water suppliers that rely upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (c). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (c).

10631.1.

(a) The water use projections required by Section 10631 shall include projected water use for single-family and multifamily residential housing needed for lower income households, as defined in Section 50079.5 of the Health and Safety Code, as identified in the housing element of any city, county, or city and county in the service area of the supplier.

(b) It is the intent of the Legislature that the identification of projected water use for single-family and multifamily residential housing for lower income households will assist a supplier in complying with the requirement under Section 65589.7 of the Government Code to grant a priority for the provision of service to housing units affordable to lower income households.

10631.5.

(a) (1) Beginning January 1, 2009, the terms of, and eligibility for, a water management grant or loan made to an urban water supplier and awarded or administered by the department, state board, or California Bay-Delta Authority or its successor agency shall be conditioned on the implementation of the water demand management measures described in Section 10631, as determined by the department pursuant to subdivision (b).

(2) For the purposes of this section, water management grants and loans include funding for programs and projects for surface water or groundwater storage, recycling, desalination, water conservation, water supply reliability, and water supply augmentation. This section does not apply to water management projects funded by the federal American Recovery and Reinvestment Act of 2009 (Public Law 111-5).

(3) Notwithstanding paragraph (1), the department shall determine that an urban water supplier is eligible for a water management grant or loan even though the supplier is not implementing all of the water demand management measures described in Section 10631, if the urban water supplier has submitted to the department for approval a schedule, financing plan, and budget, to be included in the grant or loan agreement, for implementation of the water demand management measures. The supplier may request grant or loan funds to implement the water demand management measures to the extent the request is consistent with the eligibility requirements applicable to the water management funds.

(4) (A) Notwithstanding paragraph (1), the department shall determine that an urban water supplier is eligible for a water management grant or loan even though the supplier is not implementing all of the water demand management measures described in Section 10631, if an urban water supplier submits to the department for approval documentation demonstrating that a water demand management measure is not locally cost effective. If the department determines that the documentation submitted by the urban water supplier fails to demonstrate that a water demand management measure is not locally cost effective, the

department shall notify the urban water supplier and the agency administering the grant or loan program within 120 days that the documentation does not satisfy the requirements for an exemption, and include in that notification a detailed statement to support the determination.

(B) For purposes of this paragraph, "not locally cost effective" means that the present value of the local benefits of implementing a water demand management measure is less than the present value of the local costs of implementing that measure.

(b) (1) The department, in consultation with the state board and the California Bay-Delta Authority or its successor agency, and after soliciting public comment regarding eligibility requirements, shall develop eligibility requirements to implement the requirement of paragraph (1) of subdivision (a). In establishing these eligibility requirements, the department shall do both of the following:

(A) Consider the conservation measures described in the Memorandum of Understanding Regarding Urban Water Conservation in California, and alternative conservation approaches that provide equal or greater water savings.

(B) Recognize the different legal, technical, fiscal, and practical roles and responsibilities of wholesale water suppliers and retail water suppliers.

(2) (A) For the purposes of this section, the department shall determine whether an urban water supplier is implementing all of the water demand management measures described in Section 10631 based on either, or a combination, of the following:

(i) Compliance on an individual basis.

(ii) Compliance on a regional basis. Regional compliance shall require participation in a regional conservation program consisting of two or more urban water suppliers that achieves the level of conservation or water efficiency savings equivalent to the amount of conservation or savings achieved if each of the participating urban water suppliers implemented the water demand management measures. The urban water supplier administering the regional program shall provide participating urban water suppliers and the department with data to demonstrate that the regional program is consistent with this clause. The department shall review the data to determine whether the urban water suppliers in the regional program are meeting the eligibility requirements.

(B) The department may require additional information for any determination pursuant to this section.

(3) The department shall not deny eligibility to an urban water supplier in compliance with the requirements of this section that is participating in a multiagency water project, or an integrated regional water management plan, developed pursuant to Section 75026 of the Public Resources Code, solely on the basis that one or more of the agencies participating in the project or plan is not implementing all of the water demand management measures described in Section 10631.

(c) In establishing guidelines pursuant to the specific funding authorization for any water management grant or loan program subject to this section, the agency administering the grant or loan program shall include in the guidelines the eligibility requirements developed by the department pursuant to subdivision (b).

(d) Upon receipt of a water management grant or loan application by an agency administering a grant and loan program subject to this section, the agency shall request an eligibility determination from the department with respect to the requirements of this section. The department shall respond to the request within 60 days of the request.

(e) The urban water supplier may submit to the department copies of its annual reports and other relevant documents to assist the department in determining whether the urban water supplier is implementing or scheduling the implementation of water demand management activities. In addition, for urban water suppliers that are signatories to the Memorandum of Understanding Regarding Urban Water Conservation in California and submit annual reports to the California Urban Water Conservation Council in accordance with the memorandum, the department may use these reports to assist in tracking the implementation of water demand management measures.

(f) This section shall remain in effect only until July 1, 2016, and as of that date is repealed, unless a later enacted statute, that is enacted before July 1, 2016, deletes or extends that date.

10631.7. The department, in consultation with the California Urban Water Conservation Council, shall convene an independent technical panel to provide information and recommendations to the department and the Legislature on new demand management measures, technologies, and approaches. The panel shall consist of no more than seven members, who shall be selected by the department to reflect a balanced representation of experts. The panel shall have at least one, but no more than two, representatives from each of the following: retail water suppliers, environmental organizations, the business community, wholesale water suppliers, and academia. The panel shall be convened by January 1, 2009, and shall report to the

Legislature no later than January 1, 2010, and every five years thereafter. The department shall review the panel report and include in the final report to the Legislature the department's recommendations and comments regarding the panel process and the panel's recommendations.

10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:

(a) Stages of action to be undertaken by the urban water supplier in response to water supply shortages, including up to a 50 percent reduction in water supply, and an outline of specific water supply conditions which are applicable to each stage.

(b) An estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply.

(c) Actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster.

(d) Additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.

(e) Consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.

(f) Penalties or charges for excessive use, where applicable.

(g) An analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments.

(h) A draft water shortage contingency resolution or ordinance.

(i) A mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.

10633. The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area, and shall include all of the following:

(a) A description of the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.

(b) A description of the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.

(c) A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.

(d) A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, indirect potable reuse, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.

(e) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.

(f) A description of actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.

(g) A plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.

10634. The plan shall include information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments as described in subdivision (a) of Section 10631, and the manner in which water quality affects water management strategies and supply reliability.

Article 2.5. Water Service Reliability

10635.

(a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.

(b) The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies no later than 60 days after the submission of its urban water management plan.

(c) Nothing in this article is intended to create a right or entitlement to water service or any specific level of water service.

(d) Nothing in this article is intended to change existing law concerning an urban water supplier's obligation to provide water service to its existing customers or to any potential future customers.

Article 3. Adoption and Implementation of Plans

10640. Every urban water supplier required to prepare a plan pursuant to this part shall prepare its plan pursuant to Article 2 (commencing with Section 10630).

The supplier shall likewise periodically review the plan as required by Section 10621, and any amendments or changes required as a result of that review shall be adopted pursuant to this article.

10641. An urban water supplier required to prepare a plan may consult with, and obtain comments from, any public agency or state agency or any person who has special expertise with respect to water demand management methods and techniques.

10642. Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan. Prior to adopting a plan, the urban water supplier shall make the plan available for public inspection and shall hold a public hearing thereon. Prior to the hearing, notice of the time and place of hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code. The urban water supplier shall provide notice of the time and place of hearing to any city or county within which the supplier provides water supplies. A privately owned water supplier shall provide an equivalent notice within its service area. After the hearing, the plan shall be adopted as prepared or as modified after the hearing.

10643. An urban water supplier shall implement its plan adopted pursuant to this chapter in accordance with the schedule set forth in its plan.

10644.

(a) An urban water supplier shall submit to the department, the California State Library, and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption. Copies of amendments or changes to the plans shall be submitted to the department, the California State Library, and any city or county within which the supplier provides water supplies within 30 days after adoption.

(b) The department shall prepare and submit to the Legislature, on or before December 31, in the years ending in six and one, a report summarizing the status of the plans adopted pursuant to this part. The report prepared by the department shall identify the exemplary elements of the individual plans. The department shall provide a copy of the report to each urban water supplier that has submitted its plan to the department. The department shall also prepare reports and provide data for any legislative hearings designed to consider the effectiveness of plans submitted pursuant to this part.

(c) (1) For the purpose of identifying the exemplary elements of the individual plans, the department shall identify in the report those water demand management measures adopted and implemented by specific urban water suppliers, and identified pursuant to Section 10631, that achieve water savings significantly above the levels established by the department to meet the requirements of Section 10631.5.

(2) The department shall distribute to the panel convened pursuant to Section 10631.7 the results achieved by the implementation of those water demand management measures described in paragraph (1).

(3) The department shall make available to the public the standard the department will use to identify exemplary water demand management measures.

10645. Not later than 30 days after filing a copy of its plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

Chapter 4. Miscellaneous Provisions

10650. Any actions or proceedings to attack, review, set aside, void, or annul the acts or decisions of an urban water supplier on the grounds of noncompliance with this part shall be commenced as follows:

(a) An action or proceeding alleging failure to adopt a plan shall be commenced within 18 months after that adoption is required by this part.

(b) Any action or proceeding alleging that a plan, or action taken pursuant to the plan, does not comply with this part shall be commenced within 90 days after filing of the plan or amendment thereto pursuant to Section 10644 or the taking of that action.

10651. In any action or proceeding to attack, review, set aside, void, or annul a plan, or an action taken pursuant to the plan by an urban water supplier on the grounds of noncompliance with this part, the inquiry shall extend only to whether there was a prejudicial abuse of discretion. Abuse of discretion is established if the supplier has not proceeded in a manner required by law or if the action by the water supplier is not supported by substantial evidence.

10652. The California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) does not apply to the preparation and adoption of plans pursuant to this part or to the implementation of actions taken pursuant to Section 10632. Nothing in this part shall be interpreted as exempting from the California Environmental Quality Act any project that would significantly affect water supplies for fish and wildlife, or any project for implementation of the plan, other than projects implementing Section 10632, or any project for expanded or additional water supplies.

10653. The adoption of a plan shall satisfy any requirements of state law, regulation, or order, including those of the State Water Resources Control Board and the Public Utilities Commission, for the preparation of water management plans or conservation plans; provided, that if the State Water Resources Control Board or the Public Utilities Commission requires additional information concerning water conservation to implement its existing authority, nothing in this part shall be deemed to limit the board or the commission in obtaining that information. The requirements of this part shall be satisfied by any urban water demand management plan prepared to meet federal laws or regulations after the effective date of this part, and which substantially meets the requirements of this part, or by any existing urban water management plan which includes the contents of a plan required under this part.

10654. An urban water supplier may recover in its rates the costs incurred in preparing its plan and implementing the reasonable water conservation measures included in the plan. Any best water management practice that is included in the plan that is identified in the “Memorandum of Understanding Regarding Urban Water Conservation in California” is deemed to be reasonable for the purposes of this section.

10655. If any provision of this part or the application thereof to any person or circumstances is held invalid, that invalidity shall not affect other provisions or applications of this part which can be given effect without the invalid provision or application thereof, and to this end the provisions of this part are severable.

10656. An urban water supplier that does not prepare, adopt, and submit its urban water management plan to the department in accordance with this part, is ineligible to receive funding pursuant to Division 24 (commencing with Section 78500) or Division 26 (commencing with Section 79000), or receive drought assistance from the state until the urban water management plan is submitted pursuant to this article.

Section L: California Water Code, Division 6, Part 2.55: Water Conservation

The following sections of California Water Code Division 6, Part 2.55, are available online at http://www.leginfo.ca.gov/calaw.html.

Chapter 1. General Declarations and Policy	§10608-10608.8
Chapter 2. Definitions	§10608.12
Chapter 3. Urban Retail Water Suppliers	§10608.16-10608.44

Legislative Counsel's Digest

Senate Bill No. 7
Chapter 4

An act to amend and repeal Section 10631.5 of, to add Part 2.55 (commencing with Section 10608) to Division 6 of, and to repeal and add Part 2.8 (commencing with Section 10800) of Division 6 of, the Water Code, relating to water.

[Approved by Governor November 10, 2009. Filed with Secretary of State November 10, 2009.]

Legislative Counsel's Digest

SB 7, Steinberg. Water conservation.

(1) Existing law requires the Department of Water Resources to convene an independent technical panel to provide information to the department and the Legislature on new demand management measures, technologies, and approaches. "Demand management measures" means those water conservation measures, programs, and incentives that prevent the waste of water and promote the reasonable and efficient use and reuse of available supplies.

This bill would require the state to achieve a 20% reduction in urban per capita water use in California by December 31, 2020. The state would be required to make incremental progress towards this goal by reducing per capita water use by at least 10% on or before December 31, 2015. The bill would require each urban retail water supplier to develop urban water use targets and an interim urban water use target, in accordance with specified requirements. The bill would require agricultural water suppliers to implement efficient water management practices. The bill would require the department, in consultation with other state agencies, to develop a single standardized water use reporting form. The bill, with certain exceptions, would provide that urban retail water suppliers, on and after July 1, 2016, and agricultural water suppliers, on and after July 1, 2013, are not eligible for state water grants or loans unless they comply with the water conservation requirements established by the bill. The bill would repeal, on July 1, 2016, an existing requirement that conditions eligibility for certain water management grants or loans to an urban water supplier on the implementation of certain water demand management measures.

(2) Existing law, until January 1, 1993, and thereafter only as specified, requires certain agricultural water suppliers to prepare and adopt water management plans.

This bill would revise existing law relating to agricultural water management planning to require agricultural water suppliers to prepare and adopt agricultural water management plans with specified components on or before December 31, 2012, and update those plans on or before December 31, 2015, and on or before December 31 every 5 years thereafter. An agricultural water supplier that becomes an agricultural water supplier after December 31, 2012, would be required to prepare and adopt an agricultural water management plan within one year after becoming an agricultural water supplier. The agricultural water supplier would be required to notify each city or county within which the supplier provides water supplies with regard to the preparation or review of the plan. The bill would require the agricultural water supplier to submit copies of the plan to the department and other specified entities. The bill would provide that an agricultural water supplier is not eligible for state water grants or loans unless the supplier complies with the water management planning requirements established by the bill.

(3) The bill would take effect only if SB 1 and SB 6 of the 2009–10 7th Extraordinary Session of the Legislature are enacted and become effective.

The people of the State of California do enact as follows:

SECTION 1. Part 2.55 (commencing with Section 10608) is added to Division 6 of the Water Code, to read:

Part 2.55. Sustainable Water Use and Demand Reduction

Chapter 1. General Declarations and Policy

10608. The Legislature finds and declares all of the following:

(a) Water is a public resource that the California Constitution protects against waste and unreasonable use.

(b) Growing population, climate change, and the need to protect and grow California's economy while protecting and restoring our fish and wildlife habitats make it essential that the state manage its water resources as efficiently as possible.

(c) Diverse regional water supply portfolios will increase water supply reliability and reduce dependence on the Delta.

(d) Reduced water use through conservation provides significant energy and environmental benefits, and can help protect water quality, improve streamflows, and reduce greenhouse gas emissions.

(e) The success of state and local water conservation programs to increase efficiency of water use is best determined on the basis of measurable outcomes related to water use or efficiency.

(f) Improvements in technology and management practices offer the potential for increasing water efficiency in California over time, providing an essential water management tool to meet the need for water for urban, agricultural, and environmental uses.

(g) The Governor has called for a 20 percent per capita reduction in urban water use statewide by 2020.

(h) The factors used to formulate water use efficiency targets can vary significantly from location to location based on factors including weather, patterns of urban and suburban development, and past efforts to enhance water use efficiency.

(i) Per capita water use is a valid measure of a water provider's efforts to reduce urban water use within its service area. However, per capita water use is less useful for measuring relative water use efficiency between different water providers. Differences in weather, historical patterns of urban and suburban development, and density of housing in a particular location need to be considered when assessing per capita water use as a measure of efficiency.

10608.4. It is the intent of the Legislature, by the enactment of this part, to do all of the following:

(a) Require all water suppliers to increase the efficiency of use of this essential resource.

(b) Establish a framework to meet the state targets for urban water conservation identified in this part and called for by the Governor.

(c) Measure increased efficiency of urban water use on a per capita basis.

(d) Establish a method or methods for urban retail water suppliers to determine targets for achieving increased water use efficiency by the year 2020, in accordance with the Governor's goal of a 20-percent reduction.

(e) Establish consistent water use efficiency planning and implementation standards for urban water suppliers and agricultural water suppliers.

(f) Promote urban water conservation standards that are consistent with the California Urban Water Conservation Council's adopted best management practices and the requirements for demand management in Section 10631.

(g) Establish standards that recognize and provide credit to water suppliers that made substantial capital investments in urban water conservation since the drought of the early 1990s.

(h) Recognize and account for the investment of urban retail water suppliers in providing recycled water for beneficial uses.

(i) Require implementation of specified efficient water management practices for agricultural water suppliers.

(j) Support the economic productivity of California's agricultural, commercial, and industrial sectors.

(k) Advance regional water resources management.

10608.8.

(a) (1) Water use efficiency measures adopted and implemented pursuant to this part or Part 2.8 (commencing with Section 10800) are water conservation measures subject to the protections provided under Section 1011.

(2) Because an urban agency is not required to meet its urban water use target until 2020 pursuant to subdivision (b) of Section 10608.24, an urban retail water supplier's failure to meet those targets shall not establish a violation of law for purposes of any state administrative or judicial proceeding prior to January 1, 2021. Nothing in this paragraph limits the use of data reported to the department or the board in litigation or an administrative proceeding. This paragraph shall become inoperative on January 1, 2021.

(3) To the extent feasible, the department and the board shall provide for the use of water conservation reports required under this part to meet the requirements of Section 1011 for water conservation reporting.

(b) This part does not limit or otherwise affect the application of Chapter 3.5 (commencing with Section 11340), Chapter 4 (commencing with Section 11370), Chapter 4.5 (commencing with Section 11400), and Chapter 5 (commencing with Section 11500) of Part 1 of Division 3 of Title 2 of the Government Code.

(c) This part does not require a reduction in the total water used in the agricultural or urban sectors, because other factors, including, but not limited to, changes in agricultural economics or population growth may have greater effects on water use. This part does not limit the economic productivity of California's agricultural, commercial, or industrial sectors.

(d) The requirements of this part do not apply to an agricultural water supplier that is a party to the Quantification Settlement Agreement, as defined in subdivision (a) of Section 1 of Chapter 617 of the Statutes of 2002, during the period within which the Quantification Settlement Agreement remains in effect. After the expiration of the Quantification Settlement Agreement, to the extent conservation water projects implemented as part of the Quantification Settlement Agreement remain in effect, the conserved water created as part of those projects shall be credited against the obligations of the agricultural water supplier pursuant to this part.

Chapter 2. Definitions

10608.12. Unless the context otherwise requires, the following definitions govern the construction of this part:

(a) "Agricultural water supplier" means a water supplier, either publicly or privately owned, providing water to 10,000 or more irrigated acres, excluding recycled water. "Agricultural water supplier" includes a supplier or contractor for water, regardless of the basis of right, that distributes or sells water for ultimate resale to customers. "Agricultural water supplier" does not include the department.

(b) "Base daily per capita water use" means any of the following:

(1) The urban retail water supplier's estimate of its average gross water use, reported in gallons per capita per day and calculated over a continuous 10-year period ending no earlier than December 31, 2004, and no later than December 31, 2010.

(2) For an urban retail water supplier that meets at least 10 percent of its 2008 measured retail water demand through recycled water that is delivered within the service area of an urban retail water supplier or its urban wholesale water supplier, the urban retail water supplier may extend the calculation described in paragraph (1) up to an additional five years to a maximum of a continuous 15-year period ending no earlier than December 31, 2004, and no later than December 31, 2010.

(3) For the purposes of Section 10608.22, the urban retail water supplier's estimate of its average gross water use, reported in gallons per capita per day and calculated over a continuous five-year period ending no earlier than December 31, 2007, and no later than December 31, 2010.

(c) "Baseline commercial, industrial, and institutional water use" means an urban retail water supplier's base daily per capita water use for commercial, industrial, and institutional users.

(d) "Commercial water user" means a water user that provides or distributes a product or service.

(e) "Compliance daily per capita water use" means the gross water use during the final year of the reporting period, reported in gallons per capita per day.

(f) "Disadvantaged community" means a community with an annual median household income that is less than 80 percent of the statewide annual median household income.

(g) "Gross water use" means the total volume of water, whether treated or untreated, entering the distribution system of an urban retail water supplier, excluding all of the following:

(1) Recycled water that is delivered within the service area of an urban retail water supplier or its urban wholesale water supplier.

(2) The net volume of water that the urban retail water supplier places into long-term storage.

(3) The volume of water the urban retail water supplier conveys for use by another urban water supplier.

(4) The volume of water delivered for agricultural use, except as otherwise provided in subdivision (f) of Section 10608.24.

(h) "Industrial water user" means a water user that is primarily a manufacturer or processor of materials as defined by the North American Industry Classification System code sectors 31 to 33, inclusive, or an entity that is a water user primarily engaged in research and development.

(i) "Institutional water user" means a water user dedicated to public service. This type of user includes, among other users, higher education institutions, schools, courts, churches, hospitals, government facilities, and nonprofit research institutions.

(j) "Interim urban water use target" means the midpoint between the urban retail water supplier's base daily per capita water use and the urban retail water supplier's urban water use target for 2020.

(k) “Locally cost effective” means that the present value of the local benefits of implementing an agricultural efficiency water management practice is greater than or equal to the present value of the local cost of implementing that measure.

(l) “Process water” means water used for producing a product or product content or water used for research and development, including, but not limited to, continuous manufacturing processes, water used for testing and maintaining equipment used in producing a product or product content, and water used in combined heat and power facilities used in producing a product or product content. Process water does not mean incidental water uses not related to the production of a product or product content, including, but not limited to, water used for restrooms, landscaping, air conditioning, heating, kitchens, and laundry.

(m) “Recycled water” means recycled water, as defined in subdivision (n) of Section 13050, that is used to offset potable demand, including recycled water supplied for direct use and indirect potable reuse, that meets the following requirements, where applicable:

(1) For groundwater recharge, including recharge through spreading basins, water supplies that are all of the following:

(A) Metered.

(B) Developed through planned investment by the urban water supplier or a wastewater treatment agency.

(C) Treated to a minimum tertiary level.

(D) Delivered within the service area of an urban retail water supplier or its urban wholesale water supplier that helps an urban retail water supplier meet its urban water use target.

(2) For reservoir augmentation, water supplies that meet the criteria of paragraph (1) and are conveyed through a distribution system constructed specifically for recycled water.

(n) “Regional water resources management” means sources of supply resulting from watershed-based planning for sustainable local water reliability or any of the following alternative sources of water:

(1) The capture and reuse of stormwater or rainwater.

(2) The use of recycled water.

(3) The desalination of brackish groundwater.

(4) The conjunctive use of surface water and groundwater in a manner that is consistent with the safe yield of the groundwater basin.

(o) "Reporting period" means the years for which an urban retail water supplier reports compliance with the urban water use targets.

(p) "Urban retail water supplier" means a water supplier, either publicly or privately owned, that directly provides potable municipal water to more than 3,000 end users or that supplies more than 3,000 acre-feet of potable water annually at retail for municipal purposes.

(q) "Urban water use target" means the urban retail water supplier's targeted future daily per capita water use.

(r) "Urban wholesale water supplier," means a water supplier, either publicly or privately owned, that provides more than 3,000 acre-feet of water annually at wholesale for potable municipal purposes.

Chapter 3. Urban Retail Water Suppliers

10608.16.

(a) The state shall achieve a 20-percent reduction in urban per capita water use in California on or before December 31, 2020.

(b) The state shall make incremental progress towards the state target specified in subdivision (a) by reducing urban per capita water use by at least 10 percent on or before December 31, 2015.

10608.20.

(a) (1) Each urban retail water supplier shall develop urban water use targets and an interim urban water use target by July 1, 2011. Urban retail water suppliers may elect to determine and report progress toward achieving these targets on an individual or regional basis, as provided in subdivision (a) of Section 10608.28, and may determine the targets on a fiscal year or calendar year basis.

(2) It is the intent of the Legislature that the urban water use targets described in subdivision (a) cumulatively result in a 20-percent reduction from the baseline daily per capita water use by December 31, 2020.

(b) An urban retail water supplier shall adopt one of the following methods for determining its urban water use target pursuant to subdivision (a):

(1) Eighty percent of the urban retail water supplier's baseline per capita daily water use.

(2) The per capita daily water use that is estimated using the sum of the following performance standards:

(A) For indoor residential water use, 55 gallons per capita daily water use as a provisional standard. Upon completion of the department's 2016 report to the Legislature pursuant to Section 10608.42, this standard may be adjusted by the Legislature by statute.

(B) For landscape irrigated through dedicated or residential meters or connections, water efficiency equivalent to the standards of the Model Water Efficient Landscape Ordinance set forth in Chapter 2.7 (commencing with Section 490) of Division 2 of Title 23 of the California Code of Regulations, as in effect the later of the year of the landscape's installation or 1992. An urban retail water supplier using the approach specified in this subparagraph shall use satellite imagery, site visits, or other best available technology to develop an accurate estimate of landscaped areas.

(C) For commercial, industrial, and institutional uses, a 10-percent reduction in water use from the baseline commercial, industrial, and institutional water use by 2020.

(3) Ninety-five percent of the applicable state hydrologic region target, as set forth in the state's draft 20x2020 Water Conservation Plan (dated April 30, 2009). If the service area of an urban water supplier includes more than one hydrologic region, the supplier shall apportion its service area to each region based on population or area.

(4) A method that shall be identified and developed by the department, through a public process, and reported to the Legislature no later than December 31, 2010. The method developed by the department shall identify per capita targets that cumulatively result in a statewide 20-percent reduction in urban daily per capita water use by December 31, 2020. In developing urban daily per capita water use targets, the department shall do all of the following:

(A) Consider climatic differences within the state.

(B) Consider population density differences within the state.

(C) Provide flexibility to communities and regions in meeting the targets.

(D) Consider different levels of per capita water use according to plant water needs in different regions.

(E) Consider different levels of commercial, industrial, and institutional water use in different regions of the state.

(F) Avoid placing an undue hardship on communities that have implemented conservation measures or taken actions to keep per capita water use low.

(c) If the department adopts a regulation pursuant to paragraph (4) of subdivision (b) that results in a requirement that an urban retail water supplier achieve a reduction in daily per capita water use that is greater than 20 percent by December 31, 2020, an urban retail water supplier that adopted the method described in paragraph (4) of subdivision (b) may limit its urban water use target to a reduction of not more than 20 percent by December 31, 2020, by adopting the method described in paragraph (1) of subdivision (b).

(d) The department shall update the method described in paragraph (4) of subdivision (b) and report to the Legislature by December 31, 2014. An urban retail water supplier that adopted the method described in paragraph (4) of subdivision (b) may adopt a new urban daily per capita water use target pursuant to this updated method.

(e) An urban retail water supplier shall include in its urban water management plan required pursuant to Part 2.6 (commencing with Section 10610) due in 2010 the baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.

(f) When calculating per capita values for the purposes of this chapter, an urban retail water supplier shall determine population using federal, state, and local population reports and projections.

(g) An urban retail water supplier may update its 2020 urban water use target in its 2015 urban water management plan required pursuant to Part 2.6 (commencing with Section 10610).

(h) (1) The department, through a public process and in consultation with the California Urban Water Conservation Council, shall develop technical methodologies and criteria for the consistent implementation of this part, including, but not limited to, both of the following:

(A) Methodologies for calculating base daily per capita water use, baseline commercial, industrial, and institutional water use, compliance daily per capita water use, gross water use, service area population, indoor residential water use, and landscaped area water use.

(B) Criteria for adjustments pursuant to subdivisions (d) and (e) of Section 10608.24.

(2) The department shall post the methodologies and criteria developed pursuant to this subdivision on its Internet Web site, and make written copies

available, by October 1, 2010. An urban retail water supplier shall use the methods developed by the department in compliance with this part.

(i) (1) The department shall adopt regulations for implementation of the provisions relating to process water in accordance with subdivision (l) of Section 10608.12, subdivision (e) of Section 10608.24, and subdivision (d) of Section 10608.26.

(2) The initial adoption of a regulation authorized by this subdivision is deemed to address an emergency, for purposes of Sections 11346.1 and 11349.6 of the Government Code, and the department is hereby exempted for that purpose from the requirements of subdivision (b) of Section 11346.1 of the Government Code. After the initial adoption of an emergency regulation pursuant to this subdivision, the department shall not request approval from the Office of Administrative Law to readopt the regulation as an emergency regulation pursuant to Section 11346.1 of the Government Code.

(j) An urban retail water supplier shall be granted an extension to July 1, 2011, for adoption of an urban water management plan pursuant to Part 2.6 (commencing with Section 10610) due in 2010 to allow use of technical methodologies developed by the department pursuant to paragraph (4) of subdivision (b) and subdivision (h). An urban retail water supplier that adopts an urban water management plan due in 2010 that does not use the methodologies developed by the department pursuant to subdivision (h) shall amend the plan by July 1, 2011, to comply with this part.

10608.22. Notwithstanding the method adopted by an urban retail water supplier pursuant to Section 10608.20, an urban retail water supplier's per capita daily water use reduction shall be no less than 5 percent of base daily per capita water use as defined in paragraph (3) of subdivision (b) of Section 10608.12. This section does not apply to an urban retail water supplier with a base daily per capita water use at or below 100 gallons per capita per day.

10608.24.

(a) Each urban retail water supplier shall meet its interim urban water use target by December 31, 2015.

(b) Each urban retail water supplier shall meet its urban water use target by December 31, 2020.

(c) An urban retail water supplier's compliance daily per capita water use shall be the measure of progress toward achievement of its urban water use target.

(d) (1) When determining compliance daily per capita water use, an urban retail water supplier may consider the following factors:

(A) Differences in evapotranspiration and rainfall in the baseline period compared to the compliance reporting period.

(B) Substantial changes to commercial or industrial water use resulting from increased business output and economic development that have occurred during the reporting period.

(C) Substantial changes to institutional water use resulting from fire suppression services or other extraordinary events, or from new or expanded operations, that have occurred during the reporting period.

(2) If the urban retail water supplier elects to adjust its estimate of compliance daily per capita water use due to one or more of the factors described in paragraph (1), it shall provide the basis for, and data supporting, the adjustment in the report required by Section 10608.40.

(e) When developing the urban water use target pursuant to Section 10608.20, an urban retail water supplier that has a substantial percentage of industrial water use in its service area, may exclude process water from the calculation of gross water use to avoid a disproportionate burden on another customer sector.

(f) (1) An urban retail water supplier that includes agricultural water use in an urban water management plan pursuant to Part 2.6 (commencing with Section 10610) may include the agricultural water use in determining gross water use. An urban retail water supplier that includes agricultural water use in determining gross water use and develops its urban water use target pursuant to paragraph (2) of subdivision (b) of Section 10608.20 shall use a water efficient standard for agricultural irrigation of 100 percent of reference evapotranspiration multiplied by the crop coefficient for irrigated acres.

(2) An urban retail water supplier, that is also an agricultural water supplier, is not subject to the requirements of Chapter 4 (commencing with Section 10608.48), if the agricultural water use is incorporated into its urban water use target pursuant to paragraph (1).

10608.26.

(a) In complying with this part, an urban retail water supplier shall conduct at least one public hearing to accomplish all of the following:

(1) Allow community input regarding the urban retail water supplier's implementation plan for complying with this part.

(2) Consider the economic impacts of the urban retail water supplier's implementation plan for complying with this part.

(3) Adopt a method, pursuant to subdivision (b) of Section 10608.20, for determining its urban water use target.

(b) In complying with this part, an urban retail water supplier may meet its urban water use target through efficiency improvements in any combination among its customer sectors. An urban retail water supplier shall avoid placing a disproportionate burden on any customer sector.

(c) For an urban retail water supplier that supplies water to a United States Department of Defense military installation, the urban retail water supplier's implementation plan for complying with this part shall consider the United States Department of Defense military installation's requirements under federal Executive Order 13423.

(d) (1) Any ordinance or resolution adopted by an urban retail water supplier after the effective date of this section shall not require existing customers as of the effective date of this section, to undertake changes in product formulation, operations, or equipment that would reduce process water use, but may provide technical assistance and financial incentives to those customers to implement efficiency measures for process water. This section shall not limit an ordinance or resolution adopted pursuant to a declaration of drought emergency by an urban retail water supplier.

(2) This part shall not be construed or enforced so as to interfere with the requirements of Chapter 4 (commencing with Section 113980) to Chapter 13 (commencing with Section 114380), inclusive, of Part 7 of Division 104 of the Health and Safety Code, or any requirement or standard for the protection of public health, public safety, or worker safety established by federal, state, or local government or recommended by recognized standard setting organizations or trade associations.

10608.28.

(a) An urban retail water supplier may meet its urban water use target within its retail service area, or through mutual agreement, by any of the following:

(1) Through an urban wholesale water supplier.

(2) Through a regional agency authorized to plan and implement water conservation, including, but not limited to, an agency established under the Bay Area Water Supply and Conservation Agency Act (Division 31 (commencing with Section 81300)).

(3) Through a regional water management group as defined in Section 10537.

(4) By an integrated regional water management funding area.

(5) By hydrologic region.

(6) Through other appropriate geographic scales for which computation methods have been developed by the department.

(b) A regional water management group, with the written consent of its member agencies, may undertake any or all planning, reporting, and implementation functions under this chapter for the member agencies that consent to those activities. Any data or reports shall provide information both for the regional water management group and separately for each consenting urban retail water supplier and urban wholesale water supplier.

10608.32. All costs incurred pursuant to this part by a water utility regulated by the Public Utilities Commission may be recoverable in rates subject to review and approval by the Public Utilities Commission, and may be recorded in a memorandum account and reviewed for reasonableness by the Public Utilities Commission.

10608.36. Urban wholesale water suppliers shall include in the urban water management plans required pursuant to Part 2.6 (commencing with Section 10610) an assessment of their present and proposed future measures, programs, and policies to help achieve the water use reductions required by this part.

10608.40. Urban water retail suppliers shall report to the department on their progress in meeting their urban water use targets as part of their urban water management plans submitted pursuant to Section 10631. The data shall be reported using a standardized form developed pursuant to Section 10608.52.

10608.42. The department shall review the 2015 urban water management plans and report to the Legislature by December 31, 2016, on progress towards achieving a 20-percent reduction in urban water use by December 31, 2020. The report shall include recommendations on changes to water efficiency standards or urban water use targets in order to achieve the 20-percent reduction and to reflect updated efficiency information and technology changes.

10608.43. The department, in conjunction with the California Urban Water Conservation Council, by April 1, 2010, shall convene a representative task force consisting of academic experts, urban retail water suppliers, environmental organizations, commercial water users, industrial water users, and institutional water users to develop alternative best management practices for commercial, industrial, and institutional users and an assessment of the potential statewide water use efficiency improvement in the commercial, industrial, and institutional sectors that would result from implementation of these best management practices. The taskforce, in conjunction with the department, shall submit a report to the Legislature by April 1, 2012, that shall include a review of multiple sectors within commercial, industrial, and institutional users and that shall recommend water use efficiency standards for commercial, industrial, and institutional users among various sectors of water use. The report shall include, but not be limited to, the following:

(a) Appropriate metrics for evaluating commercial, industrial, and institutional water use.

(b) Evaluation of water demands for manufacturing processes, goods, and cooling.

(c) Evaluation of public infrastructure necessary for delivery of recycled water to the commercial, industrial, and institutional sectors.

(d) Evaluation of institutional and economic barriers to increased recycled water use within the commercial, industrial, and institutional sectors.

(e) Identification of technical feasibility and cost of the best management practices to achieve more efficient water use statewide in the commercial, industrial, and institutional sectors that is consistent with the public interest and reflects past investments in water use efficiency.

10608.44. Each state agency shall reduce water use on facilities it operates to support urban retail water suppliers in meeting the target identified in Section 10608.16.

Appendix C
Reserved for City Council Resolution

2010 URBAN WATER MANAGEMENT PLAN
WRITTEN COMMENTS SUMMARY

Commenter:	Ch. 3 Water Supply System	Ch. 4 Past, Current, and Projected Water Use	Ch. 5 Water Supply Reliability	Other	Response
Agencies:					
CA Dept of Fish and Game			• Revise water supply analysis to include Tier 3 scenario.	• Delay UWMP until after evaluation of City's diversion operations	Part of an ongoing negotiation; No reason to delay moving forward with UWMP
County of Santa Cruz John Ricker		• Add a third future demand scenario with increased conservation; drop Scenario 1 • Further conservation should be planned for	• Requests more detail in body of report about frequency of different size shortages, and flows at different tiers in Appendix K. • Update information on water transfers	• Offers to provide information on climate change and local recharge rates when available	Chapter 4 was expanded to include a qualitative discussion on the effect additional water conservation would have in balancing supply and demand. Details of shortages are more appropriate for the appendix; Further analysis of flow rule tables in Appendix K is beyond scope of this report.
Organizations:					
Desal Alternatives, Rick Longinotti				• Advocates for water -neutral growth policy, water transfers, reservoir management, optimizing use of existing sources, more conservation	Refer to previous October 3 Water Department response to Water Commission
League of Women Voters, Jan Karwin			• Take into consideration the HCP presented to City council in April • Urges City to cooperate with	•	The effect of HCP has been taken into consideration in projecting future supply. City Council has since expressed its intent in pursuing water transfers on a cooperative basis with other agencies, under

			County on water transfer/exchange projects • Support and expand water conservation measures, pricing policies, water neutral development policy • Change drought strategy to adopt a more conservative policy and rethink customer willingness to accept curtailment • Discuss potential for savings from leaks on North Coast		certain conditions. Many ideas proposed concerning conservation are being implemented; additional measures will be considered as outlined at end of Chapter 6. Drought strategy has recently been updated and is explained in detail in separate document. Rethinking customer curtailment is beyond scope of this report. Assumption about transmission losses on coast main were incorporated into water supply operations model update in Chapter 5.
Individuals:					
Jan Bentley	• Various technical suggestions, corrections to text and tables • Seeks more information about surface water availability to support interagency water transfers • Additional emails requesting clarification/follow up on earlier comments		• Seeks to revisit evaluation of north coast upgrades as part of IWP update considering lower demands • Clarify City's position on desalination project	• Process for challenging report if not changed as requested	Edits will be made to pages 1-5, 3-4,5,6,7,16, and Table 3-2. Section 3-6 represents the City's historic system water production going back to the mid 1980s, when UMWPs were first required, and to capture the 1987-92 drought period. This section is intended to generally describe the water system. It is neither the purpose nor the place to be performing detailed supply alternative investigations of surface water availability as the commenter wishes. The County of Santa Cruz is leading the current investigation of interagency transfer

					opportunities. The basis for figures used in Table 3-4 are well described in the report. Net water production was chosen intentionally since it is used later in the report in the supply/demand assessment. We see no contradiction in the City's position on the desalination project - it has not been approved. The contract for design is to facilitate environmental review. Water code section 10650 in Appendix A describes actions and timelines available for noncompliance.
Paul Gratz		• Wants to know basis for statement about evolving water use trends • Forecasting methodologies • Second letter asks about basis for various statements in Chapter 4		•	The basis for our statement is the fact that following both the 1970s and 1980/90s droughts water use gradually rebounded over time and we expect a similar response following the 2009 shortage. Forecasting methodologies are documented in Appendix I The basis for statements about post water shortage recovery is local experience after last 2 droughts. Changes in water use do take into account industrial closures, but not county policy about water neutral development, since none has yet been approved or put into effect.
Scott McGilvray				• Advocates for water transfers, expanding conservation, recycled water and optimizing existing sources	No response needed; decision about preferred supply option was selected by IWP committee and approved by City Council. Urban Water Management Plan update is not the process to reconsider IWP.

				in lieu of desalination • Provided PowerPoint presentation reviewing past water supply evaluation criteria arguing against desalination as preferred option	
Andy Schiffrin				• Various comments, questions, and observations throughout report	Refer to detailed responses
Don Stevens			• Requests more analysis of increased bypass flows for fish • Don't assume 3rd time extension will result in increased water right at Felton	• Cumulative impacts of growth inducement	Some modeling analysis of Tier 3 is provided in Table 5-5. For the water supply and demand assessment in Section 5-6, Tier 2 was selected because it is considered to be the most likely future scenario. It is acknowledged on page 5-17 that acceptable fish releases are a major variable that is uncertain, and shortages could be larger. Modeling does assume that the time extension will be granted and that full water right at Felton is available

***EDMUND G. BROWN JR.**, Governor*
***CHARLTON H. BONHAM,** Director*

November 1, 2011

Mr. Toby Goddard
Water Conservation Manager
City of Santa Cruz
809 Center Street, Room 107
Santa Cruz, California 95060
tgoddard@cityofsantacruz.com

Dear Mr. Goddard:

Subject: City of Santa Cruz's Urban Water Management Plan and Water Supply Assessment for General Plan 2030

The Department of Fish and Game (DFG) has reviewed the Urban Water Management Plan (UWMP) and the Water Supply Assessment in addition to other supporting documents as they pertain to water availability for the Sphere of Influence Amendment and Habitat Conservation Plan for the City of Santa Cruz's (City) diversions. DFG, as a Trustee Agency, is responsible for the conservation, protection and management of the State's biological resources. DFG is providing these comments to assist the City in its long-term planning efforts and to better coordinate our efforts to analyze and minimize impacts from increased demands on the City's water supply system on sensitive biological resources.

As stated in Section 5.1.2 of the UWMP, DFG, National Marine Fisheries Service (NMFS) and the City are currently in the process of developing a Habitat Conservation Plan (HCP) and California Endangered Species Act Incidental Take Permit in order for the City to comply with state and federal Endangered Species Acts for coho salmon and Central California Coast Distinct Population Segment steelhead. As such, the City, in consultation with NMFS and DFG, is evaluating the effect of the diversions on steelhead and coho salmon, with the expectation that the City shall obtain from DFG an Incidental Take Permit and a Streambed Alteration Agreement for diversion of water.

DFG is concerned that the Water Supply Analysis does not accurately consider the amount of flow needed to maintain fisheries resources below the points of diversion. It is likely that the City will need to release additional water to maintain fisheries habitat in good condition and the amount of water needed for those releases should be considered in the Water Supply Analysis. The City has recently drafted a Conservation Strategy to support the HCP that relies on a three-tiered system for instream flows. Current operations (similar to Tier 1) at the City's existing facilities are not favorable for most life history stages of salmonids at the current demand level and do not provide adequate stream flow conditions for fish.

Minimum bypass flows proposed under Tier II will not provide sufficient flow for several life history stages of salmonids in many years. However, Tier III flows, as proposed, will provide at least 80% of the instream habitat value that would exist in the absence of the City's diversions. As such, any Water Supply Analysis should consider the amount of water needed to maintain Tier III releases with the understanding that further consultation will provide more specific flow recommendations.

DFG is recommending that the UWMP be delayed until after the City, NMFS and DFG complete their evaluation of the City's diversion operations on fisheries resources. The Water Supply Analysis should be revised to include release of sufficient flow needed to maintain instream resources which should be available upon completion of the HCP and issuance of DFG's Streambed Alteration Agreements and ITP. If the UWMP cannot be delayed, then the UWMP should be revised to include a scenario for release of Tier III flows in order to provide a more accurate estimate of the amount of water that may be required to maintain fisheries resources.

If you have any questions, please contact Ms. Corinne Gray, Staff Environmental Scientist, at (707) 944-5526 or cgray@dfg.ca.gov; or Mr. Scott Wilson, Environmental Program Manager, at (707) 944-5584.

Sincerely,

Scott Wilson FOR

Carl Wilcox
Regional Manager
Bay Delta Region

cc: Devin Best, National Marine Fisheries Service
devin.best@noaa.gov

Patrick McCormick, Santa Cruz Local Agency Formation Commission
pat@santacruzlafco.org

Comments on City Of Santa Cruz Draft 2010 Urban Water Management Plan
Submitted by John Ricker, County Water Resources Division Director
November 15, 2011

The draft UWMP has a tremendous amount of information that is generally clear and well presented. It is a great resource for understanding the City water system.

I would encourage the City to build on its very successful and effective conservation programs and put more future conversation in the Plan. Currently the two demand scenarios appear to assume that there will be no additional conservation. In fact scenario 1 seems to be based on the assumption that current water users will go back to using as much as they did in 2004 before the current rates and conservation measures were in place. I would suggest dropping Scenario 1 and adding a third scenario that assumes future additional conservation savings. Estimates of future savings should be based on a declared policy of further reducing future per capita water use, tempered by an assessment of what can be realistically achieved, Finalizing these targets will probably have to wait until the City completes its baseline study, but some tentative conservation targets should be put into a demand scenario now. A third scenario of increased conservation is alluded to on page 4-22, but it should be quantified and brought into the analysis.

It would be helpful to have in one place a discussion of how different factors can push the demand up or down in any given year. Such as the fact that a foggy summer can reduce usage by 300 mgy. How much does that reduce the peak daily demand? I would concur that for planning purposes it makes sense to start from the base of 2008 rather than 2009 or 2010, but I firmly believe that further conservation should be planned for.

The assessment of frequency of peak period shortages in Table 5-3 and Appendix K is helpful, but it would be helpful to have presentation of additional breakpoints: what is the likelihood of a shortage of 15% and 20%? Bring those forward from Appendix K into the body of the plan. It would also be better to have the information reflect a true statistical analysis of the historic record to determine probabilities of a shortage occurring as opposed to just counting the number of years that a shortage would have occurred under the historic record. For example, in Table 4 of Appendix K, it doesn't make statistical sense that a 5-15% shortage would have a 2% chance of occurring while a 15-25% shortage would have 4% chance of occurring.

It would be helpful in analyzing the effects of Tier 2 and 3 fish flows in Appendix C of Appendix K to see what the unimpaired flows are at the different exceedence intervals.

The information regarding water transfers on page 5-23 should be updated: The County has received grant funds to further develop and pursue the transfer effort and the Soquel Board has offered to negotiate priding some water back to the City during droughts prior to full recovery of the basin.

With regard to climate change, preliminary findings in a study of local conditions funded by the County suggest that recharge rates could be reduced by as much as 30%, which could result in a comparable reduction in stream baseflow. We will make the information available to the City as soon as it is completed.

Santa Cruz Desal Alternatives
DesalAlerntatives.org

Santa Cruz Water Commission
c/o City of Santa Cruz Water Department

September 30, 2011

Dear Water Commissioners,

I urge you to refer the Draft Urban Water Management Plan back to Water Department staff for revisions. The Draft was released to the public on the afternoon of September 29, leaving just four days for the public to digest before the hearing on the Draft at your October 3rd meeting. Moreover, I urge you to recommend the revisions in the Draft that I mention below.

The Draft reports important information on how changes in our water supply and demand situation impact our drought risk. It estimates how much water we will have in the event of a worst-case drought:

> *"In an extreme two-year drought similar to the 1976-77 event, the estimated water supply available to the City in the second year of that event, according to the updated operations model… [is] 3200 mgy under current conditions."*[1]

This is extraordinarily good news. The previous Urban Water Management Plan estimated supply in the second year of drought as 2700 mgy[2], a figure that SC Desal Alternatives has questioned, since it conflicts with the 3363 mgy that consultant, Gary Fiske, determined was the City's worst-case drought supply just two years before.[3]

Coincidently, 3200 mgy is the total water production in 2010. That means if we experienced a worst-case drought now, we would not suffer any shortfall at all, so long as our demand stays at 2010 levels.

Assuming zero growth in water demand, what will our drought risk be with the reduction in flows available to the City due to fish habitat needs? Not much different, according to the Draft UWMP and the City's draft *Conservation Strategy*[4] . The *Conservation Strategy* calls for adherence to "Tier 2" or "Tier 3" water flows for fish habitat except under dry conditions, when doing so would cause a peak-season shortfall of over 5%. So in a worst-case drought year, the City plans revert to Tier 1 flow levels, which results in a total water supply of 3200 mgy.

Of course, the fisheries agencies may not accept the City proposal to revert to Tier 1 flows in critical drought years. What if the fisheries agencies require Tier 2 flows in critical drought years? According to Table 4 on page K-6 of the Draft, adherence to Tier

[1] Draft UWMP, page 5-15
[2] *2005 Urban Water Management Plan,* p 5-3
[3] *Integrated Water Plan* (2003) Table II-1
[4] http://www.cityofsantacruz.com/Modules/ShowDocument.aspx?documentid=21748

157 Trescony St., Santa Cruz, Ca. 95060 longinotti@baymoon.com

2 flows in drought years would result in 1 year out of 73 in which peak season curtailment would be greater than 25%.

You may recall that in preparing the *Integrated Water Plan*, the Water Commission determined that "the highest level of worst peak-season shortage that is tolerable for Santa Cruz water customers is 25%.".[5] I urge you to consider whether Santa Cruz residents would support the construction of a desalination plant for a 1 in 73 year event.

I conclude that the only remaining rationale for building a desalination plant is to accommodate growth in water demand. Fortunately, there is exists another way to accommodate new development: a water neutral development policy, discussed below.

Despite the fact that drought risk has been reduced to a level where a desalination plant is clearly unwarranted, action needs to be taken to reduce the City's perennial overdraft of streams. As the April 5 HCP Update reports: *"Tier 3 flows...are not currently possible in almost any hydrologic condition due to water supply limitations."*

The Draft needs to be revised to incorporate many measures recommended in an 18 page document submitted by Santa Cruz Desal Alternatives, Surfrider Foundation, WILPF, and Ecological Landscaping Association in July of this year. Available at http://desalalternatives.org/?page_id=425

Below is a summary of those strategies that I urge you to include in the 5-year Plan:

Water-Neutral Growth Policy

The Draft UWMP does not once mention the option of implementing a *water-neutral growth policy*, that would prevent water demand from rising as new development is built. Soquel Creek Water District has a water-neutral policy requiring developers to fund conservation measures to offset increased demand. That District's Urban Water Management Plan projects a *reduction* in water demand between 2015 and 2030 of 8%, due to their conservation policies. In contrast, Santa Cruz projects an *increase* in water demand of 14% by 2030. Why can't Santa Cruz match the conservation performance of our neighboring district?

Even without a water-neutral policy, the Draft's estimate that demand will rise by 500 million gallons by 2030 is inaccurate. It does not take into account the adoption of a policy by LAFCO of February, 2011, that water service extensions in areas of aquifer and stream overdraft must result in a net water demand reduction in the system. As a result of that policy, the UCSC application to LAFCO for water service extension will need to be revised so that campus growth will not result in increased demand on Santa Cruz's already over-taxed water supply system. This means that the Draft's estimated increase in UCSC demand of 136 million gallons a year by 2020 should be revised to zero.

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[5] *Integrated Water Plan* (2003) p ES-6

The Draft's estimate for increased future water demand is further in error because it does not take into account conservation savings due to the City's conservation program. The Draft credits the City's Conservation Plan, adopted in 2000, for saving 251 million gallons a year by 2010. However, the City's future demand estimate assumes zero savings from conservation.

The effect of an inflated estimate for future demand is to make a desalination plant appear necessary. We should learn from the fact that Santa Cruz's previous demand projections have been grossly inaccurate. The *Integrated Water Plan* (2003), that conclude desalination was needed, projected 2010 water demand would be 4.5 billion gallons. Actual water production in 2010 was 3.2 billion gallons. If we had accurate demand projections in 2003, it is highly unlikely the City Council would have embarked on the desal project.

It would be most helpful if a revised Draft would present information on our drought risk using two additional scenarios:

1. Future water demand remains at the 2009-2010 level (This could be achieved if the City enacted a policy of water-neutral development.)
2. Water demand declines by 8% by 2030. (matching Soquel Creek's projections)

Water Transfers Between Districts

The Draft contains an important error in discussing the potential of water transfers with Soquel Creek Water District. "It may be possible, though not certain, that sometime in the future, if and when the basin is restored, the Soquel Creek Water District may be able to send some amount of water back to Santa Cruz in drought conditions…There is little upside potential that the City water system would be supplemented by such a project."[6] The assumption that the groundwater basin needs to be restored before Soquel Creek Water District would send water back to Santa Cruz in drought conditions cannot be substantiated. Soquel Creek District Board members have indicated a willingness to send water back to Santa Cruz during critical drought years (average one in seven in the historical record) so long as they are able to purchase water from Santa Cruz that would be available in most winters.[7]

The Draft fails to analyze the potential of water transfers with Scotts Valley District other than the water swap for Pasatiempo irrigation. Scotts Valley has the potential to return water to Santa Cruz during droughts that should be investigated.

I urge you to contact our neighboring water districts in order to include in a revised Draft a fuller description of the potential for water transfers between districts. I also urge you to include in a revised Draft a calculation of quantities of water in winter months that would be available for sale to neighboring districts, including amounts available if Santa Cruz developed the ability to pre-treat turbid water.

[6] Page 5-23
[7] author's discussion with Soquel Creek Board members

Reservoir management for drought protection
Water production practices that prioritize high levels of water in Loch Lomond at the end of the dry season provide insurance for future drought years. Perhaps the most effective policy would be to initiate a vigorous water savings/curtailment program in the event of a first critically dry year, resulting in high reservoir levels at the end of that year. This is not the policy indicated in the Draft, which assumes a goal of minimizing curtailment in a first dry year.[8] The result is that only 213 million gallons of Loch Lomond water remain available in the event of a second critically dry year. This results in higher than necessary curtailment in the second year. I urge your to include in a revised draft a calculation of second year drought risk if more vigorous conservation occurs in normal and dry years.

Optimizing Use of Existing Resources
Carollo Engineers in the *Water Supply Alternatives Study* (2000) recommended a series of measures including pre-treatment of turbid water from the N. Coast and River that could provide up to 600 million gallons a year during drought years[9]. The Draft UWMP includes a portion of Carollo's recommendations: pumping improvements and pipeline replacement for N. Coast sources. The Draft reports that pipeline leakage averages 8%. However, the Draft lists the completion date of the pipeline as 2031, a ten year delay from the scheduled completion set by the *Integrated Water Plan* (2003). I surmise that the large expense of desalination has precluded the City's ability to finance needed infrastructure projects.
I urge you to include in a revised draft a calculation of water supply availability with implementation of the Carollo recommendations.

Conservation Measures
Please refer to our 18 page list of recommendations for a list conservation strategies to include in a revised Draft. A few of those measures are:

- Conservation Pricing

Our recommendations include a proposal that the policy of charging Block 2 rates for non-residential customers, including large landscape accounts, need to be re-evaluated. The Draft reports that the City is currently out of compliance with BMP 11, an indication that restructuring of pricing needs to be conducted that provides greater incentives for lower water use.

- Turf replacement

It is encouraging that the City has initiated a turf-replacement program. Our recommendations include providing a rebate of $1-2 per square feet of turf replaced. It is of concern that the City's turf replacement rebate ($.50/sq ft and $250 limit for residential customers) may be too little to effectively motivate property owners.

- Mandating plumbing fixture replacement in rental housing at no cost to property owners.
- Rebates for graywater and rainwater harvesting systems

[8] see Appendix K-32, chart for 2010, Low Demand
[9] Carollo Engineers, *Water Supply Alternatives Study* (2000), Technical Memorandum 5, p 5-15

Fund Community Organizing to Achieve Sustainable Use

Our recommendations include contracting with community organizations to conduct a campaign to achieve water use that is consistent with sustainable levels of stream flow for fish habitat and reservoir storage sufficient for drought protection. This recommendation is preferable to the alternative of relying on punitive measures to curtail water consumption.

Thank you for considering these requests.

Rick Longinotti

LEAGUE OF WOMEN VOTERS
OF SANTA CRUZ COUNTY

July 7, 2011

Mayor Ryan Coonerty
Santa Cruz City Council
809 Center Street
Santa Cruz, CA 95060

Subject: Urban Water Management Plan Update

Dear Mayor Coonerty and Members of the City Council:

The League of Women Voters of Santa Cruz County would like to offer input on the update of the City's Urban Water Management Plan. The UWMP provides city and county decision makers with assessments of long-term water supplies in order for them to make findings to verify that adequate water supplies are available before development may proceed. We understand the update is currently underway and due to be presented to Council sometime after August of this year.

The League supports the management and development of water resources in ways that are beneficial to the environment with emphasis on conservation and high standards of water quality that are appropriate for the intended use. Because of the highly controversial nature of the proposed regional seawater desalination project and the potential environmental and economic impacts, we strongly urge the City of Santa Cruz to give further consideration to alternative water supply options such as conjunctive use of surface and groundwater, water transfers between water districts, use of recycled water, and additional conservation measures that have yet to be thoroughly explored.

We recommend that the UWMP update take into consideration the Habitat Conservation Plan presented by staff and reviewed by the Council at its April 5, 2011 meeting. Implementation of the HCP is likely to result in a reduction of the water supply available to city water customers and it is important to put all the information on potential water supply into one document for decision makers and the public.

Conjunctive Use and Water Transfers
Engineering studies since 1985 have recommended water exchanges between adjacent water districts as a solution to drought and aquifer overdraft. The County Water Resources Department is currently studying the potential for water exchanges between Soquel Creek, Santa Cruz and Scotts Valley water districts. Phase I of the technical studies (recently completed) evaluated the feasibility of large-scale water exchanges and aquifer recharge to mitigate the water management problems in the region, as well as the potential for interties among local water agencies. Phase II will build upon Phase I to identify specific in-lieu and recharge projects, develop preliminary designs, and address legal and regulatory constraints for each strategy.

We urge the City to cooperate with the County in its effort to complete these studies to more fully inform the public on the potential for water exchanges as a solution to the challenges of drought and groundwater overdraft.

Under the topic "Opportunities for Exchanges or Transfers of Water," The 2005 UWMP said, "The City presently has no means to exchange or transfer water from neighboring water systems or from the State or federal water projects." The UWMP update should provide more information. Please include a thorough exploration of the infrastructure, costs, and benefits of a system to exchange or transfer water with Soquel Creek and/or Scotts Valley water districts in the UWMP update.

Additional Conservation Measures
The League supports measures that encourage conservation by all categories of water users through pricing policies, technical assistance, metering, and education.

To date, the Santa Cruz Municipal Water District has implemented conservation measures aimed at indoor use but little has been done to reduce outdoor use of water. The League recommends that the following measures be implemented in order to fully realize the benefits of conservation: Make permanent those outdoor conservation measures put into effect in April 2009 and resulted in water savings of 14%.

Expand conservation efforts to include incentives and technical assistance for gray water systems and rain water catchment systems, replacement of turf with drought-tolerant landscaping, and purchase of smart irrigation controllers.

Review water use rates and establish pricing policies that more strongly discourage outdoor water use. Continue to protect low or fixed income water users by lifeline rates for essential water needs. Review water rates for landscape irrigation, agricultural irrigation and golf courses and establish rates that encourage conservation and use of recycled water.

The City should consider adopting a water-neutral development policy similar to the policy currently in force within the Soquel Creek Water District. That policy requires developers to offset 120% of water demand from new projects by funding water-conserving retrofits in existing buildings.

Conservation to Avoid Extreme Water Shortages
Water Code section 10632 (b) requires water suppliers to estimate the minimum water supply available during a hypothetical drought. The estimates cover each of the next three years based on the driest three-year historic sequence for their agency's water supply. In the hypothetical scenario outlined in the 2005 UWMP, water restrictions were not implemented in the first year even though there was no rain that year. In the second year, available water supplies were reduced by 500 million gallons, resulting in peak season shortage of 18 percent. In the third year, available water supplies were reduced by 1.3 billion gallons, resulting in a severe peak season shortfall of 48 percent.

It seems the City's ability to meet the needs of its customers during multiple dry years could be improved by changing the drought strategy. Current City policy, according to the 2009 Water Shortage Contingency Plan, is to take no action to curtail water use over the summer if the reservoir is predicted to remain above 64% capacity at the end of the dry season. Consider adopting a more conservative policy that would reserve a greater capacity at the reservoir in case of continuing drought conditions. In this hypothetical estimate, implementing conservation and/or curtailment efforts in the first dry year would help avoid severe peak season shortfall in the third dry year.

Consider Increasing Conservation Goals
The City has underestimated water demand elasticity and customer willingness and ability to conserve water and accept curtailment in times of drought. The City's 2005 Integrated Water Plan includes provisions for temporary curtailment of service to 85% of normal demand when a shortage occurs. As we understand it, Santa Cruz Water Department policy is that temporary water curtailments over 85% of normal demand are not acceptable to customers. Consideration should be given to temporary curtailments greater than 85% of normal demand. Keep in mind that outdoor water conservation measures put into effect for the 2009 season resulted in water savings of 14%.

We have heard Water Department officials and elected representatives say that businesses will fail if stricter curtailment measures are put in place. However, the City's 2009 Water Shortage Contingency Plan, recognizing the importance of water in protecting the City's employment base, specifies that business water rationing will not occur in drought stages 1-3 and rationing in stages 4 and 5 for businesses will be 87% and 70% of normal use, respectively. We believe the business community would accept this curtailment should a severe drought occur. To the best of our knowledge, no businesses failed as a result of conservation measures in the drought of 1976-77, the most critical on record.

Leak Detection and Repair of the North Coast Raw Water Pipeline
Water Code section 10631 requires water suppliers to describe and provide a schedule of implementation for system water audits, leak detection and repair. Discuss the potential for water savings that could be realized by repairing the City's North Coast raw water pipeline. Discuss the timeline for making this repair.

Potential for Use of Recycled Water
Water Code section 10633 requires water suppliers to provide information on potential for use of recycled water. Explore the costs and benefits of recycled water and dedicated delivery pipes for landscape only accounts (including municipal parks), golf courses, and North Coast agricultural accounts.

We hope that you find our comments and suggestions helpful to your important task of updating the City's Urban Water Management Plan.

Sincerely,

Jan Karwin, President
League of Women Voters of Santa Cruz County

cc: Robert Mazurek, Chair, City of Santa Cruz Water Commission
Bill Kocher, Director, City of Santa Cruz Water Department
Toby Goddard, Water Conservation Manager, City of Santa Cruz Water Department

From: James (Jan) Bentley
718 Pacheco Ave.
Santa Cruz, Ca.
831-334-9496

Comments on the City of Santa Cruz Draft 2010 Urban Water Management Plan

Keeping in mind the following excerpt from the Draft UWMP, which clearly emphasizes the regional impact of the UWMP, there are a number of items I believe are inaccurate or misleading, which follow the excerpt:

1.3 Uses of an Urban water Management Plan

Urban Water management Plans serve a variety of purposes and are intended to be consistent with and support other local, regional, and statewide plans and processes. Information about water use and supplies reported by water agencies is collected and used by the state in updating the California Water Plan every five years, next scheduled for 2013. They provide a common basis for cooperative water resource management through preparation of Integrated Regional Water Management Programs, such as one now being implemented in Santa Cruz County, of which the City of Santa Cruz is a project partner. Land use agencies rely on a water agency's Urban Water Management Plan as a long-range planning document to aid in updating city and county General Plans and for preparation of environmental documents under the California Environmental Quality Act (CEQA). They also serve as a detailed source of information to coordinate local water supply availability and certain land use decisions made by cities and counties under Senate Bills 610 and 221 of 2001.

Comments:

Page 1-3: Factors that changed since the 2005 IWP,

- How is the occurrence of a low rainfall year pertinent to the UWMP in regards to changes that have come about in the past 5 years? Occasional years of low rainfall have been the crux of the water supply planning process, which is based on significantly dry seasons in 1976-1977 and also references moderately dry years from 1987-1992. How is one dry year in 2009 a surprise? Consider revising this statement or eliminating it.

- Aging of the North Coast System is not notable in the last 5 years. It has been deteriorated for many years and was noted as such in the IWP on page I-5 as was the fact that the water department had suspended or delayed rehabilitation or replacement of key facilities. Consider revising this statement or eliminating it.

Page 3-5: The document states that finished water from the GHWTP flows to the Bay St. Res. and into the distribution system. This could mislead the reader into thinking that all GHWTP water passes through Bay St. first; this is not the case and should be clarified.

Page 3-6: Treated Water Storage Facilities. Does Bay St. Reservoir serve as a direct source of supply to UCSC or can and does UCSC also get water from the GHWTP gravity zone by way of Univ. 2 Pump Station? This should be clarified. Also, Bay St. does provide water to the gravity zone but the GHWTP, which is at a higher elevation, is the primary source of pressure for the gravity zone. This should be clarified.

Page 3-7: The second paragraph states that diversion from the coastal sources is primarily limited by flows when, in fact, due to pipe line hydraulic deficiencies the system is not capable of transferring all the flow that is available. The source at Majors is a case in point in that this source cannot provide water in the winter while Liddell and Laguna are in service due to the hydraulic inadequacies of the delivery pipe. Pipeline limitations also affect Liddell and Laguna to a lessor extent, but still results in the inability to use the available winter flow. This needs to be clarified.

Page 3-8: Beginning on page 3-8 paragraph 3.6 Water Production, there are a number of facts presented, and there is a significant over cite, that causes a misrepresentation of the water system resources which I believe requires full revision of the pertinent sections of the Draft UWMP.

The over cite concerns the lack of any statistical information about the actual water resources available to the City of Santa Cruz based on their water rights, or the capacity of the City' s treatment plant to produce more water then it currently has demand for. Table 3-1 on Page 3-7 provides a description of the rights, but there is no statistical analysis that would support conjunctive use as discussed in 5.8.1., or quantify the system's ability to mitigate the need to operate a desalination plant. Examples of data that would be valuable include;

- Total monthly treatable water available from the North Coast and the San Lorenzo River verses what was actually treated for the past 20 to 30 years.

- Total monthly water available from the North Coast and the San Lorenzo River based on water rights verses what was actually treated for the past 20-30 years.

Some of the related issues are noted as follows:

- Page 3-8: Possibly the most misleading aspect in this and subsequent sections begins at 3.6 when the author presents gross water production figures and then switches to net production for the Coast and San Lorenzo River sources throughout the remaining document. Neither gross or net production as presented here represents the resources available to the system, but only what the system is capable of using based on demand. A thorough representation of gross resources based on water rights is needed to guide regional policy decision such as interagency water transfers. And the term gross production as it is used in this document should be clearly defined as resource that is based on demand only.

- Page 3-9: Table 3-2 is a misrepresentation of average gross water supplies (as gross water supply is being used in this document) available to the system and should be amended. The North Coast System operating conditions changed significantly in 1995 when a new finished water line installed to the coast customers ended the use of the coast sources as potable water, making a larger volume of source water available to the system. Gross flows prior to 1995 skew the long-term average source production downward and therefore should not be used in the table.

- Also, the average for the last 5 years needs to be qualified because 1. This period includes a low rainfall year and does not reflect a long-term average and 2. This period also includes coastal source fish releases started in 2007.

- Page 3-15: Projected Water Sources. Water Code Section 10631 (b) requires water suppliers to: "Identify and quantify …the existing and planned water available to the supplier…" which the draft plan provides in Table 3-4 using **net** production for the Coast and San Lorenzo River. This under represents the source water available to the water supplier and the value it could have to conjunctive use with neighboring water systems.

- Page 3-16: Last Paragraph. The Draft document compares 2010 Coast production in Table 3-4 with long-term average production from Table 3-2, which is not a fair comparison. As already noted, Table 3-2 needs to be revised based on current operating conditions and Table 3-4 uses net production while Table 3-2 uses misleading gross production.

- It also appears that from 2015 on, Table 3-4 accounts for the estimated Coast yield reduction of 300 MGY for fish release by subtracting 300 MGY from 2010's 1,150 MGY average net production projection which is unfair because that figure includes 132 MGY already being released for fish at the Coast sources. How this number is derived should be explained for purposes of clarity and to insure that the 132 MGY is not counted twice.

- Page 3-5: The last paragraph mentions the long-term (10-20) plan to rehabilitate the Coast System. Based on this rehabilitation the City's revised water supply model uses adjusted "system loss" figures of 8% in 2011 declining to 3% by 2031. But neither the revised model nor the Draft UWMP projects any gain in "new/formally unavailable" supply from the coast sources upon rehabilitation. The Draft UWMP needs to address whether the rehabilitation will result in gains (i.e., would Majors be available in the winter following rehabilitation and would the new pipe be designed to accommodate all the flow available from each source, for example) for the coastal sources. While gains from these sources may not be useful to the City, they could have great value to neighboring water systems that may wish to assume the extra cost to fully rehabilitate the coast system for this purpose.

- Once again, by only citing net production from these sources, the Draft UWMP discounts, or fails to report the actual gross resource available, which inhibits coordination of local/regional water supply availability. It also may jeopardize the City's water rights as it relates to California Water Code Section 1241 which states;

"When the person entitled to the use of water fails to use beneficially all or any part of the water claimed by him, for which a right of use has vested, for the purpose for which it was appropriated or adjudicated, for a period of five years, such unused water may revert to the public and shall, if reverted, be regarded as unappropriated public water. Such reversion shall occur upon a finding by the board following notice to the permittee and a public hearing if requested by the permittee."

Page 5-8: 5.4.3 1st paragraph says several possible options were **carefully** evaluated, including… upgrades to the North Coast System and treatment facilities… This is not a fair statement because this option (which Carollo Engineer's Alternative Supply Study estimated would add 600 MGY of available supply) was eliminated by the IWP Committee early in the IWP process and was not given the full IWP evaluation. This statement needs to be revised and should state that the IWP committee eliminated this option from the IWP process based on modeling data that concluded these actions would not have a significant impact on curtailment. This data is no longer available and should be re-generated as part of the IWP update since, "Instead of stabilizing and rising gradually overtime as projected five years ago, water use in the City's service area dropped off substantially compared to prior years." (Draft UWMP P. 1-4, first bullet) and the impact of this option could now be significant.

Page 5-14: 5.6.1 Normal Water Years. The assessment made in this section begins by referencing data from Table 3-4 which, as I explained earlier in these comments, should be considered for revision, especially as it regards the North Coast and San Lorenzo River projections that represent net supply and not gross supply. Therefore projections in this section should be considered for revision as it may be flawed.

The following 3 citations contradict the forth:

- Page 5-17: last paragraph. A cooperative was established by the City and the District to evaluate a **potential** regional desalination plant…

- Page 5-20: last sentence. No decision has yet been made on the actual construction of the proposed project.

- Page 8-2 main paragraph. Commissioning of a desalination plant, though, remains years away and is by no means a certainty.

- Page 5-21, 5.7.6 The City is currently under contract for the design of a regional desalination plant.

The UWMP should clarify the City's position on the desalination project. Regardless of the many hurdles, has the City Council, in fact, made a decision to build a desalination plant? If not, than the UWMP should explain how the City justifies using enterprise funds (derived from rate payer fees) for a potential or future service. An action which is prohibited by California Constitution Article 13D, Sec. 6.b.4 which states, "Fees or charges based on potential or future use of a service are not permitted".

Page 5-22, 5.7.7 This section discusses the estimated cost and funding of the regional desalination plant. There is no mention of the planned use of solar power to offset the power use of the desalination plant. Are the costs for installing solar power included in the estimate of $116 Million? If the cost was not included because there is no estimate available, please indicate so.

Page 5-26: Top of page. Since it is even more crucial that the GHWTP operate 100% of the time due to the Bay St. Res. being taken out of service in 2008, than it seems appropriate that the UWMP explain why 2 million gallons of available storage in the existing De Laveaga Tanks has not been used for about the same period of time.

Page 8-17: Are the figures in Table 8-7 based on net or gross production? Thus, is the data in this table subject to the same revision I have recommended for Table 3-2, 3-4, and 5-6? If so, revise.

Finally, the UWMP should include information on the process, if one exists, for challenging the conclusions of the report should Council approve it without clarifying or revising the document as requested by outside parties.

From: Jan +/or Carla Bentley [mailto:bentley410@yahoo.com]
Sent: Wednesday, November 02, 2011 9:27 PM
To: Toby Goddard
Cc: Bill Kocher;
Subject: comment/question concerning 2010 Draft UWMP

Mr. Goddard:

I have the following additional comments/questions about the City's Draft 2010 UWMP

1. On page 3-18, did you mean Table 3-4 or Table 4-3?

2. As currently conceived, Soquel will use the proposed desalination plant year round in non-drought years, receiving water from Santa Cruz's surface sources while the desalination plant pumps and equal amount into the City's distribution system on the west side, i.e., a water exchange. Apparently, this exchange is not expected to exceed the excess capacity of the surface sources based on the City's projections for how much of these sources they will need into the future. However, Loch Lomond is a discrete source having only 1042 MG of allowed use per year and it is primarily emergency reserve storage. Yet Santa Cruz will be using this source to "exchange water" with Soquel during periods of high turbidity in the Coast and River sources. Does the Draft 2010 UWMP account for the projected average annual amount of water taken from the reservoir for this purpose and the subsequent depletion of storage? If so, where would I find that? If not, this data should be provided to give the reader an understanding of how often the desalination plant will need to run to recover/offset depleted reservoir storage (essentially running "twice") when the city is faced with drought conditions.

Jim Bentley 831-334-9496

From: Jan +/or Carla Bentley [mailto:bentley410@yahoo.com]
Sent: Tuesday, November 08, 2011 9:58 PM
To: Bill Kocher
Cc: Toby Goddard
Subject: 2010 Draft Urban Water Management Plan (UWMP)

Mr. Kocher:

As part of the Nov. 7, 2011 Water Commission agenda Water Conservation Manager Toby Godard prepared a summary of comments and general responses to comments and recommendations submitted to the 2010 Draft UWMP. Included in the summary was reference to a number of edits Mr. Goddard intends to make to the Draft based on the noted input. The Water Commission also requested several changes. When will the revised document be available for review. Specifically, will the revised document be available soon enough to allow adequate time for appeal of the Commission's actions, regarding the Draft UWMP, to the Santa Cruz City Council, for which there is a 10 calendar day window allowed?

I am willing to accept the general nature of Mr. Goddard's responses as long as the edits he describes provide the clarification I was seeking. Furthermore it is not clear from his summary that he has provided response to several of my comments as follows:

Under my Page 3-16 comments there were two bullets, one asking for clarification of how the 2015-and-on Coast yield was derived, which Mr. Goddard generally states is described throughout the draft. Perhaps he plans to provide more explanation as part of his edits If not, the information as presented appears inaccurate.

I referenced Page 3-5 in two separate parts of my comments. Once to note a simple edit on where GHWTP water flows and once asking specifically if there will be any change in available supply from the coast sources once that system is rehabilitated. Is the answer no? If not, then what will the change be?

There appears to be no response, general or specific, to my Page 8-17 comment, "Are the figures in Table 8-7 based on net or gross production?"

Again, it is important that the document revisions are available as soon as possible.

Jim Bentley

Paul Gratz
501 Prospect Hts.
Santa Cruz, CA 95065

October 31, 2011

Bill Kocher, Manager
City of Santa Cruz Water Department
212 Locust St.
Santa Cruz, CA 95060

Mr. Kocher,

My name is Paul Gratz a resident of Santa Cruz since 1982. Today, I am writing this letter to provide you with my comments and questions with regard to the public review process underway for the draft 2010 Urban Water Management Plan (UWMP).

With a bachelor degree in political science and urban planning and a masters degree in health policy, planning and education, I have nearly 40 years of private and public sector experience in population-based planning, feasibility determination analysis, infrastructure development, community relations, and marketing management and research.

As a health educator with the County of Santa Cruz, I provided extensive technical assistance from 1989-1998 to the City towards the planning and development of its:

- Alcohol Outlet Zoning Ordinance
- Police Departments Alcohol Education, Monitoring and Compliance Program
- Alcohol Sales Permit Fee Ordinance

At this time, I want to share the following concerns I have with several sections in the UWMP Chapter 4: Past, Current, and Projected Water Use.

> pp. 4-5: "As occurred after the 1976-77 and 1987-92 droughts, it is expected that water use will eventually recover at least to levels experience prior to 2009 and reach a new equilibrium with time. How long that may take, however, remains uncertain."
>
> As the decade-long dramatic downtrend in water use is a local, regional, and statewide occurrence, what is the rational basis for this stated expectation and how will it be determined when a "new equilibrium" is reached?
>
> p. 16: "…in acknowledgement of changes in water use that have taken place over the past several years, a decision was made to prepare new water demand projections for this reporting cycle."
>
> Do the "changes in water use" take into account the closures of Wrigley's, Texas Instruments, and the Salz Tannery plants as well as the County's adoption of a Water Neutral Development Policy for the unincorporated area where the city provides water service to 8531 existing customer accounts?

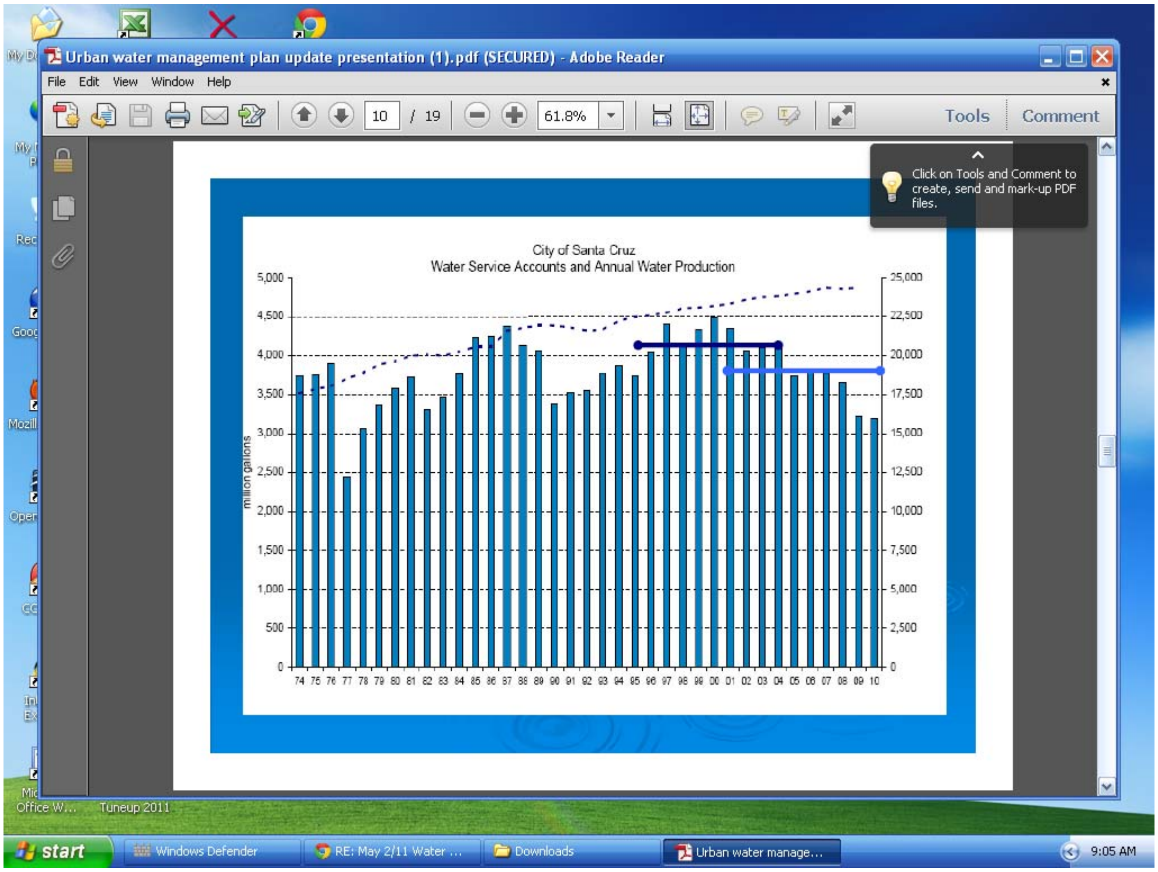
pp.21-22: In “Figure 4-7. Actual and Projected Water Demand, 1974-2030” the project demand graph line is omitted for the 1974-2009 period. However, it was included as a dotted trend line in a similar chart (see attached file) presented by water department staff at the May 2, 2011 meeting of the Water Commission. What past and current forecasting methodologies are used to project demand? What is the historical record of performance reliability for the demand projection methodologies applied by the water department and incorporated into a vast array of policy, planning, evaluation, rate setting, and budgeting assumptions that are the primary drivers for the entire water supply and management decision-making process? What other water demand forecasting methodologies are available that meet best practices management standards and requisite reliability levels.

If I can be of further assistance or should you have any questions, please contact me.

Warmly,

Paul Gratz

Attachments
cc: Water Commissioner
City Council
Santa Cruz LAFCO
NOAA Fisheries
News Media


Urban water management plan update presentation (1).pdf (SECURED) - Adobe Reader
City of Santa Cruz
Water Service Accounts and Annual Water Production
million gallons
Click on Tools and Comment to create, send and mark-up PDF files.
Tools
Comment

Mr. Toby Goddard
October 28, 2011
Santa Cruz Water Department

Re: Comments on Draft Santa Cruz Urban Water Management Plan, 2010

Dear Mr. Goddard

The proposed Santa Cruz desalination plant will cost $130 million to build and $3 million per year to operate before we add interest expense and inflation. The water produced by this plant will be a maximum of 900 million gallons per year. In order to get any water from a desalination effort, we have to spend the entire amount of money to build the plant.

There are several other means of providing additional potable water to Santa Cruz and environs that are less costly and more incremental in nature. First are the excess winter flows down the San Lorenzo River to the sea. Second is the opportunity to recycle treated effluent which is produced at the Santa Cruz Regional Sewage treatment plant. Third are declining water demand and conservation.

More about the San Lorenzo River: Mr. John Ricker of the Santa Cruz County Health Services agency has studied winter flows in the San Lorenzo River. His report demonstrates that these untapped flows averaged over 800 million gallons per year for the past 35 years. If the pumping capacity and water rights were increased, the total available water could exceed 1.4 billion gallons per year.

More about Recycling: The Santa Cruz Regional Sewage treatment plant, located at Neary Lagoon treats and pumps 2.8 billion gallons per year of secondary treated effluent into the ocean off Lighthouse Point. According to the Water Reuse Foundation in a September, 2011 study, treatment of secondary effluent to potable water standards requires less than 50% of the cost and energy of sea water desalination.

Declining Water demand and Conservation: While the effect of conservation efforts is unknown, it is clear that annual water demand has declined 922 million gallons in the Santa Cruz Water Department service area in the last 10 years. In the Soquel Creek Water District service area annual water demand has declined by 664 million gallons in the last 10 years. There has been a consistent effort by all California water districts to promote water conservation over the past 10 years. As a result of implementing conservation rate structures (tiered rates), rebate programs and education of the populace, consumption per capita has dropped all over California. Los Angeles, Orange County and Santa Clara Valley have all seen declines in water use over the past 10 years. These declines statewide may indicate a new base level of urban water demand.

Additional Water for Fish: It appears that summer water pumping from the San Lorenzo River may be restricted to benefit fish. How much is not clear. This new unknown demand increases the need to harvest the winter flows from the river and recycle our sewage treatment effluent.

I have been involved in state wide water conservation since 1990, when I was appointed by then Governor Duekmejian as a member of the task force which wrote the legislation that became the Model Water Efficient Landscape Ordinance, AB 325. .   My experience convinces me that there is additional water to be obtained by water transfers, expanding the rebate programs, grey water recycling and higher conservation awareness and practices. Desalination makes sense in Saudi Arabia. It should be the last method considered in Santa Cruz County where we have substantial uncollected water to which we are already entitled.   Excess winter flows and recycled water could be harvested and stored in the Soquel Creek and Scotts Valley aquifers or at a reservoir constructed at an abandoned quarry site in the county, of which we have many.

Scott McGilvray
Live Oak.

Water Study session

(continued from 11/1/11)

Scott McGilvray

Live Oak resident

November 7, 2011

I live in Live Oak. I wish to address the Water Supply issue in the Santa Cruz Urban Water Management Plan, 2010. Chapter 5, section 5.4 of the plan states:

"IN NOVEMBER 2005, THE SANTA CRUZ CITY COUNCIL UNANIMOUSLY ADOPTED THE IWP AS THE CITY'S LONG-TERM WATER RESOURCE STRATEGY, WHICH RECOMMENDED THE FOLLOWING THREE COMPONENTS:

1. CONSERVATION -
2. USE CURTAILMENT –
3. SUPPLEMENTAL SUPPLY – DIVERSIFY THROUGH THE CONSTRUCTION OF A 2.5 MGD SEAWATER DESALINATION FACILITY. "

On November 1st we heard during a 4 hour study session a recap of why Santa Cruz Water Dept. recommends desalination as the supply alternative. Lynette Almond, Assist. Director of the Santa Cruz Water Department gave a 59 slide summary that explained why we are pursuing a desalination plant. Two slides, # 10 and # 7 explain the problem.

" **We have a lack of adequate water supply during periods of drought."**

Two other slides, # 30 and # 36 explain why desalination is the preferred source of additional supply.

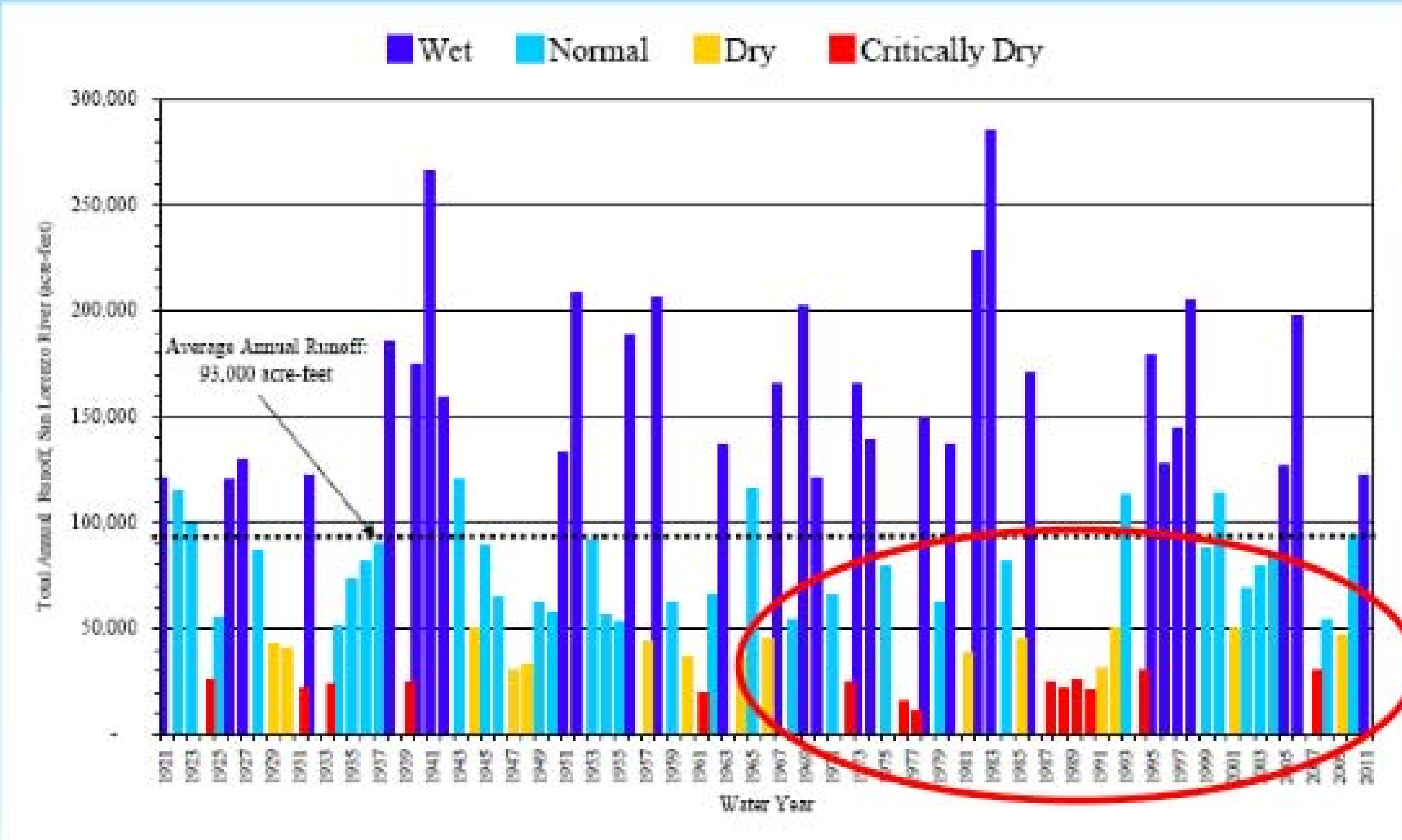
At the end of 4 hours of hearings, Mayor Coonerty charged us all with determining the facts correctly before we proceed any further. I have taken slides # 30 and # 26 and placed the relevant facts beside them into a Matrix which will allow us to see the facts and evaluate the best course to develop the needed additional water supply source. I suggest that a listing of facts and an evaluation of those facts will lead us to a conclusion that a desalination plant is not the best of available alternatives.

Sincerely yours,

Scott McGilvray
Live Oak

The City's primary water management problem is a **lack of adequate water supply during periods of drought**

Water Availability



7

Why was desalination the preferred supply option?

- Diversifies water supply portfolio
- Shared with SqCWD/ provides groundwater benefit
- Flexible/ responsive to needs
- Provides some redundancy in treatment facilities
- Flexibility for an uncertain future

Criteria

- Maximize Water Supply Reliability
- Minimize Cost
- Minimize Energy Consumption
- Minimize Environmental Impacts
- Minimize Impacts to Purisima
- Minimize Vulnerability to Catastrophic Events
- Maximize Ease of Implementation

Why Was Desalination the preferred supply option

Water Supply Option	Desalination	Reclaimed	5 yr. Winter S.Lorenzo	5 yr. Winter S. Lorenzo improved	North Coast Ag./Reclaimed Swap
Diversifies Water supply Portfolio	900 Mgal	2.8 Bgal	788 Mgal	1.3 Bgal	700 Mgal
Shared with Soquel Creek WD /provides groundwater benefit	Same	Same	Same	Same	Same
Flexible/Responsive to needs	$130 Million				
Provides some redundancy in treatment facilities	Same	Same	Same	Same	Same
Flexibility for uncertain future		1			
Ranking, 1 = best, 5 = worst.					

Criteria

Water Supply Option	Desalination	Reclaimed	5 yr. Winter S.Lorenzo	5 yr. Winter S. Lorenzo improved	North Coast Ag./Reclaimed Swap
Maximize Water Supply Reliability		1			
Minimize cost	$130 Million				
Minimize Energy Consumption	5				
Minimize Environmental Impacts	5				
Minimize Impacts to Purisima	Same	Same	Same	Same	Same
Minimize Vulnerability to Catastrophic Events	Same	Same	Same	Same	Same
Maximize Ease of Implementation					

2010 URBAN WATER MANAGEMENT PLAN
COMMENTS, QUESTIONS, RECOMMENDATIONS
OCTOBER 3, 2011

- Page 2-4 – Climate Data – Figure 2-3 shows the annual rainfall in Santa Cruz over the years. Since the rainfall in the watershed is more important in terms of the City's water supply than the rainfall in the City, shouldn't the watershed averages be shown?

The purpose of Figure 2-3 is to show the considerable variation in annual rainfall from year to year in our area. Rainfall amounts are higher in the mountains, but the pattern is similar. Santa Cruz rainfall is the best local index for annual rainfall because there is an official climate observation location with a long history available.

- Page 2-10 – Service Area Boundary – The Plan describes the role of LAFCO in approving boundary changes. Shouldn't this section mention the current UCSC application at LAFCO?

We'll add a statement to that effect.

- Page 3-4 – Loch Lomond – The Plan states that the City's license allows diversion to storage of up to 1,825 mgy to Loch Lomond. However, based on historical uses the diversions are restricted to 1,042 mgy. As part of the HCP process, why couldn't the City seek to have the diversions allowed increased to the original level? What effect would this have on the City's overall drought supply?

Historically, withdrawal limit has not been a problem. Modeling says removing the limit wouldn't help. Opening this up is no longer a water right amendment but a new water right, a longer and dangerous process.

- Page 3-6 – When will the next stage of the Coast Pipeline upgrade (from Highway 1 and the Coast Pump station) be completed?

March 2012

- With the Bay Street Reservoir project, when will the first permanent tank be built?

Construction of the first tank should start in 2012 and be completed in 2013.

- Page 3-13 – Groundwater Conditions – Why hasn't the State recognized the Purisima aquifer as being overdrafted since there appears to be so much evidence that this is the case? A major justification for the desalination plant is the need to correct the overdraft in this aquifer and prevent seawater intrusion. If the State doesn't see a problem with the aquifer, is the concern really justified?

According to DWR Bulletin 118 (2003), a comprehensive assessment of overdraft in the State's groundwater basins has not been conducted since 1980, and funding was not sufficient to evaluate additional basins in 2003.

Yes, the concern really is justified. We've already been impacted with the loss of half of half our groundwater supply.

- Page 3-15 – New Groundwater Well – How does the proposed new well relate to the Soquel District's new well at O'Neill Ranch?

That question is best answered Beltz 12 well EIR, available online.

- Why is the City's proposed new well only going to produce 215 mgy rather than 470 mgy?

It is all City groundwater pumping, not the new well that is limited to 215 in drought conditions. This lower amount was the result of a recent evaluation by the City's groundwater consultant and the result of negotiations with SqCWD over operations of the proposed new wells.

- Page 3-16 – Table 3-4 estimates supply from existing and planned water sources. I assume this is for normal, not drought years? Are drought year supplies not included because they are in a separate chapter? This should be made clear.

These figures are described on the preceding page 3-15. They represent the average amount of water available based in the existing hydrologic record of 73 years, and under the specified demand condition. Water availability in drought conditions is covered in Chapter 5.

- What if Loch Lomond diversions could increase to 1,800 mgy?

There is no change proposed to modify the water rights to increase lake withdrawals at this time, but modeling says it wouldn't help.

- Page 3-17 – San Lorenzo River – The Plan assumes future reductions in diversions on the North Coast streams as a result of the need to protect fish but no reductions are anticipated for the San Lorenzo River. Won't the regulators want to reduce the River's diversions as well?

Yes, but it appears the biggest impact of future instream flow restrictions will be felt on the North Coast streams. The biggest issue of the San Lorenzo River system is lagoon management and in-out migration flows on Newell Creek.

- Page 4-2 – Water Consumption – Table 4-2 indicates that industrial water consumption has decreased by about 40% over the last ten years. Is this mainly the result of the industrial facilities closing?

Yes, principally Texas Instruments, in 2002, but also Wrigley's, Lipton and the Salz tannery.

- The total consumption in 2009 and 2010 is below 2,900 mgy. Isn't this less than the worst case drought supply? Are we able to weather the most severe drought now through a 15% curtailment even with some limited restrictions on North Coast stream diversions?

First, the figure in Table 4-2 reflects metered water consumption, and is less than total system water use, since it does not include losses and unmetered uses. Total system water use is the important figure in these two years was between 3.2 and 3.1 bgy.

The ability to weather the most severe droughts is presented in Chapter 5. It assumes that total system water use will gradually rebound and stabilize around 3.5 bgy. At that level, drought risk without consideration of environmental needs is considerably reduced, but once higher fish releases are factored in, the worst-case shortage according the model ranges between 37% and 42% over the next 20 years (Table 5-4).

- Shouldn't there be figures showing water consumption and supply during the peak season?

This section of the report simply reports annual trends, by customer category. Peak season is important for calculating deficiencies, which is presented in Chapter 5.

- Page 4-12 – Doesn't the State's per capita requirements punish districts with high water use industries?

The state has adopted emergency regulations regarding industrial process water. According to these regulations, an urban retail water supplier that has a substantial percentage of industrial water use in its service area is eligible to exclude the process water use of existing industrial water customers from the calculation of its gross water use to avoid a disproportionate burden on another customer sector.

- Page 4-17 – The last paragraph in section 4.6.1.1, Existing Water Demand, is unclear. What column for year 2010 is being referred to and are the volumes being held constant the per capita demand.

The text refers to columns in Tables 4-10 and 4-11. We'll clarify that.

- Page 4-19 – The Plan estimates that UCSC water demand between 2020 and 2030 is 10 mgy. This seems unrealistically low given that the estimated growth in demand between 2010 and 2020 is 126 mgy. What is the justification for this estimate?

The justification is described in Appendix I, page 3. The following is taken from an email from the City's environmental consultant regarding UCSC Growth 2020-2030:

"The City's CEQA attorneys have advised that some level of growth be assumed for UCSC. After much discussion, it was decided to assume a conservative average annual enrollment growth rate of 1.8% between 2020 and 2030 or approximately 350 students/year. This is consistent with UCSC's request in the GP EIR NOP response (320-350 students per year) and is also consistent with a historic 1.8% average annual growth between 1990 and 2000. "

- Page 4-21 – Figure 4-7 seems to show 2009 water demand as about 3,200 mgy. However, the total consumption on page 4-2 is given as 2,893 mgy and the gross water use on page 4-10 is shown as 3,103 mgy. Is the water demand on 4-21 referring to gross water use?

Yes, the projection is for total system water demand (see bottom row in Table 4-10 and 4-11, which is virtually synonymous with gross water use. The gross water use for 2009 is 3,169 mgy similar to the chart. There are slight differences that arise as a result out of corrections being made to calculate gross water use in this report that were not made in the historical production record, but the trends are similar. We'll check the numbers in Figure 4-21.

- Page 4-22 – The Plan indicates that water demand may be stabilizing at 3.5 bgy, which is actually somewhat higher than the demand in the last two years. Won't a 15% curtailment allow the district to meet demand even during the worst case drought?

It gets us close, but when one factors in instream flow requirements, the model shows large deficiencies, as indicated in Chapter 5.

- Is this why the HCP has taken center stage in the justification for continuing to pursue desal?

Yes

- Page 5-3 – Endangered Species Act Compliance – I think the Plan should state that the North Coast streams will need more water during drought periods than normal rain years.

That is not exactly true. It's just that in wet years, enough flow goes past the dam to satisfy some of the required releases.

- Page 5-5 – Plans to Assure a Reliable Water Supply – The Plan states that the City has been pursuing new supplies to address the problem of water shortage. However, low supplies don't necessarily mean that there is a shortage. It depends on the level of demand. I would add "relative to demand" after "water shortage" in the first sentence.

It's both. Whether or not a shortage occurs depends as much on available supply as it does on the level of demand. We'll add a note to mention the imbalance between supply and demand.

- Page 5-11 – Table 5-2, Updates to IWP Operations Model – Under Stream Flow, the Plan indicates that "unimpaired" flows on the North Coast streams have been updated. What changed that necessitated this?

There's been a lot of modeling done on the HCP project using the Confluence model since the IWP was completed that has resulted in modifications of the flow records used on the North Coast streams. Also, the records have been extended by several years.

- Under Loch Lomond, what are "bathymetry data and reservoir rule curves"?

The volume of water in Loch Lomond at a given elevation was changed slightly after the latest USGS survey. A rule curve refers to how the lake water is utilized in the by the model to meet daily demand that simulates how the lake is operated in practice and budgeted in drought years.

- Page 5- 12 – Table 5-3 – Water Supply Reliability: No HCP Flows – Does "no HCP flows" refer to the current restrictions on diversions or to no restrictions?

No restrictions. This case was developed to enable the results to be compared directly with the results in the IWP, to show how the decrease in demand has affected supply reliability. The reality is though that the current Tier 1 restrictions are now in place, but it is expected that Tier 2 will be the operative condition in the not too distant future.

- Why is the desal capacity in 2030 so different between scenario's 1 and 2 compared to other years?

The answer is: the model indicates that the system is sensitive to differences in water demand. The relationship is not linear. The higher the demand, the more desal capacity is needed to limit shortages to 15 percent.

- Page 5-14 – Table 5-6 – Supply and Demand Comparison – Does the 860 mgy diversions from the North Coast assume Tier 2 or Tier 3?

Tier 2. As indicated on page 5-13, the analysis assumes that Tier 2 will begin sometime in the next 5 years.

- Page 5-15 – Table 5-8 – Supply and Demand Comparison, Multiple Dry Years – This is probably the most critical table in the Plan as it provides the justification for desal by showing the deficit under the worst case drought with North Coast stream protections incorporated.

Agreed. Especially when viewed in combination with the following statement on the next page:

"The deficits expressed in Tables 5-7 and 5-8 are expressed as annual average deficits. However, because supplies available to meet demand are reduced mainly during the peak season period between April and October, the actual shortfall that would be experienced is higher. Peak season shortages associated with this extreme two year drought multiple dry years, as presented in Table 5-4 would range between 37 and 43 percent."

- Why is the supply total shown as increasing between 2015 and 2030 (from 2,640 to 2,830 mgy)?

Mainly because even in drought years, there are several months of the year in which supplies are adequate to meet off-peak season demand there is no water shortage. The gradually rising annual volumes reflect increased demand for water over time in these off-peak months.

- The table assumes demand will increase from 3,522 average in 2010 (less than the actual 2010 3,100 mgy) to 4,046 mgy in 2030. What assumptions are made about the future impact of additional conservation measures? If they are as successful in the future as they have been recently and demand remains stable, it appears as if the City could endure a worst case drought with less than a 15% curtailment. Is this correct?

First, there is no assumption, other than continuing low per capita water use, for future conservation in this table since it is yet to be determined.

If demand were to remain stable at 3.5 bgy due to ongoing conservation, as was postulated it could in Chapter 4, the condition would appear in future years as it does under year 2015, which equates to a 28 percent annual deficit or 37 percent peak season deficit for the foreseeable future. It does not mean the City could endure a worst case drought with less than 15 percent curtailment; the difference being future instream flow requirements.

- Page 5-16 – The Plan states that while the tables show deficits on an annual basis, the supply and demand problem really occurs during the peak season. Tables should be provided showing the estimated deficits during these periods.

Agreed, we'll add a line to Table 5-8.

- Page 5-17 – The Plan indicates the uncertainty regarding the amount of water that will be required from in-stream purposes. While I can understand the City proposing the HCP approach that it did, I am doubtful that the regulators will find it sufficient and, in my view, additional restrictions on diversions will be necessary.

Noted

- Page 5-27 – Water Rights – The Plan discusses the City's attempt to amend its water rights to provide additional flexibility to the City in taking water from the reservoir. Why isn't the City also attempting to increase its take?

Again this is the difference between an amendment or a new water right. A new water right is more complicated and longer, and could result in loss due to increased fish release, lost days, etc.

- Page 6-7 – The Plan indicates that the City's water conservation ordinance prohibits using equipment that discharges heat to the sanitary sewers. What is this about?

Using a continuous flow of water to discharge heat from mechanical equipment, ice machines, and other heat sources is called "once-through" cooling, and is essentially a waste of potable water. City ordinance requires that when water is used to discharge heat in new construction, it be recirculated, much as a radiator does in a car.

- Page 6-8 – Why doesn't the City have a formal leak detection program?

The Distribution Superintendant feels that it is a better use of the City work force to allocate resources doing preventive work replacing plastic service lines than just continuously expend labor on leak detection. Also, water audits have shown the City's overall water losses to be low.

- Page 6-9 – Is there information on the potential savings from retrofitting mixed-use commercial accounts with substantial irrigation demands?

The California Urban Water Conservation Council estimates meter retrofits of mixed accounts and volumetric rates will result in a 20 percent reduction in demand for retrofitted accounts. Since these accounts are already billed for water by volume, lower savings should be expected, but it allows for both improved irrigation management, more equitable sewer charges, and the ability to manage outdoor use separately in drought conditions.

- Page 6-11 – The Plan seems to indicate that future rate increases will be tied more closely to inflation and, therefore, have a smaller impact on sales volume. What is the basis for this assumption given the extensive capital needs of the system and the potential rate increases that will be needed to fund them, as well as desal?

It's a matter of more timely project or inflation based rates rather than the 100 percent plus overall rate increase that took place from 2004-2011.

- Page 6-12 – Budget Based Rates – How would budget based rates work and why is it difficult to implement them?

Budget based rates work as follows. Every landscape has a different size and plant material makeup. First you have to measure the area and identify the plant materials. Then, you set a budget for that specific landscape based on local real time weather conditions, which changes every month. This budget represents the theoretical amount of water needed to maintain the landscape in good condition, given the changing seasons and plant water requirements. That is the work we have accomplished for many irrigation accounts so far.

Budget based rates are where the charges for water are tied to actual performance compared to the assigned budget, usually on a tiered system. So a well managed landscape that uses 100 percent or less of its budget might be billed at our going rate, but a landscape that wastes water and uses 150 percent of its budgeted amount might be billed at a higher rate over the budget amount. The idea is to use pricing to attain greater efficiency over time.
It is difficult to implement because the billing system the City uses is an off the shelf software system that is extremely difficult to customize, and is nowhere near set up or presently capable of handling the many data inputs needed to calculate this type of rate.

- Page 6-18 – Flush Standard for new toilets – Even though the State law requiring a lower flush volume standard will go into effect in 2014, why don't we change our ordinance now?

Mostly it is a matter of priority. There is relatively little to be gained compared to the time and effort required to amend 3 ordinances, reeducating the real estate industry rewrite and reprint forms and informational materials. Many toilets purchased now are already HETs, and in 2 years, that is all that will be available by state law.

- Smart Rebates – How much has been spent over the last year on these rebates? In total?

The whole program, since 2007 is in the $108,000 range. In 2010, expenditures totaled 51,478. Roughly half the funds are from the City; the other portion is funded from a DWR grant.

- Page 6-23 – Large Landscape Water Budgets – The Plan indicates that data on water savings from this program will be available at the end of the year. The Water Commission should get a report in early 2012 on this.

- Page 6-24 – How much water has been saved as a result of the rain barrel program?

We don't attribute water savings to this program. Rather we see it as an educational program. We sold 196 barrels last year. Each is 65 gallons. Assuming they were filled and used on average three times, that would yield 38,220 gallons. It works out on average to about 0.5 gallons a day, not enough to impact anyone's utility bill.

- Page 6-27 – The fact that water conservation is saving 900 mgy, a 26% decrease in demand, is a pretty amazing accomplishment.

Our long-term conservation savings really amounts only to 251 mgy. The rest was a result of a pricing response, economic downturn, and short-term curtailment.

- Page 6-28 – Is there any water saving potential from dishwashers?

On a per capita basis, dishwashers account for 1 to 2 gpcd. New federal energy/water standards went into effect in 2010, but since dishwashers use relatively low amounts of water, the water saving potential is small, less than 1 gpcd.

- Remaining Water Conservation Potential – What is the status of the report on the conservation plan implementation?

We'll come back to the Commission sometime in early 2012.

- Page 7-9 – Recycled Water Exchange with Scotts Valley – What percentage of dry season demand does the potential 40 mgy of recycled water represent?

Dry season demand ordinarily ranges between 2.5 and 2.6 bgy, so 40 mgy represents between 1.5 and 1.6 percent.

- Page 7-10 – What is the status of the negotiations with Scotts Valley on the recycled water project?

Still in process; delays are between the Scotts Valley WD and the Pasatiempo golf club.

- Page 9-5 – Climate Change impacts – Table 9-1 compares mean annual temperature and precipitation since 1961 in 20 year increments. Are the changes statistically significant? Also, the data clearly doesn't provide any evidence that we're heading for a water shortage. In fact, the mean rainfall has increased. Again, though, is the increase statistically significant?

No information was included in the report as to whether the change in long-term rainfall amounts and temperature are statistically significant.

- Page 10-2 – General Plan action CC3.1.1 – I don't think this policy on desalination accurately reflects the intention of the IWP. I would put a comma at the end of the proposed policy and add the following: "if it is environmentally acceptable and financially feasible."

- Page 10-3 – General Plan policy CC3.3 – Safeguard existing surface and groundwater sources – I would like to add the following action: "Seek amendment of the City's water rights to provide increased flexibility in the use of permitted water while assuring environmental safeguards."

- Page 10-4 – General Plan action CC3.3.7 – In referring to fisheries conservation, this action should include concern for the environmental resources as well as the City's water supply. I would add the following at the end of the sentence: ", as well as protect the environmental resource."

- Page 10-5 – General Plan policy CC3.5 – Promote maximum water use efficiency – Add the following action: "Implement additional water conservation programs that provide a reliable gain in supply and can be justified in terms of their cost."

- General Plan action CC3.6.4 – This action simply directs that the City "consider" developing significance criteria for the water supply impacts of proposed development projects. Given all the work that has already been done on this issue, the policy should contain a specific significance threshold determination.

We'll leave the policy recommendations to the entire Water Commission to discuss

Andy Schiffrin

October 31, 2011

Toby Goddard
Water Conservation Manager
Santa Cruz Water Department
City of Santa Cruz
809 Center Street
Santa Cruz, CA 95060

Dear Mr. Goddard,

I appreciate the opportunity to submit comments on the draft 2010 Urban Water Management Plan for the City of Santa Cruz.

My main concern about the draft 2010 UWMP is the lack of thorough analysis and hence accuracy of Section 5: Water Supply Reliability. Increased bypass flows for the survival of coho salmon and steelhead trout will be required in a Habitat Conservation Plan the City is developing. The San Lorenzo River watershed has been identified as a priority in the draft CCC coho salmon recovery plan. In Table 5-2, Udates to IWP Operations Model, alternative flow bypass models developed through the HCP process to enhance fish habitat are discussed and described as Tier 1, Tier 2, and Tier 3 flows. In Section 5.6, it is stated that analysis of future supply will be limited according to the Tier 2 flow scenario. However, even Tier 3 flows will only provide an estimated 80% of optimal flows for fish habitat. Therefore, the analysis should not have been limited to Tier 2 flows. It should have included, at least, Tier 3 flows, because it is quite possible that Tier 3 flows, or even greater flows, will be required for the HCP.

A thorough analysis should also have been conducted and clearly presented which would assume both Tier 3 flows and that a desalination plant is not constructed to augment supplies, since it is uncertain whether or when a desalination plant will be constructed.

Also of concern is the City's petition with the SWRCB to extend the time allowed for putting to beneficial use the full 980 mgy as described in section 5.11.2. Since the City thus far has only obtained permanent rights to slightly over half of this 980 mgy, the UWMP lacked analysis and failed to show how water supply would be impacted should the City's petition be rejected. As stated in 5.11.2, the City was granted an extension in the mid-1980's and then again in the mid-1990's, but in the 1990's it was only granted after a Memorandum of Agreement with the California DFG amid their concern for fish habitat. What is different now is the further degradation of habitat in the San Lorenzo watersheds, the now endangered status of coho salmon and steelhead trout, and the identification of the San Lorenzo as a priority in the draft CCC coho salmon recovery plan. With current inadequate stream flows for sustainable fish habitat, it is doubtful whether the SWRCB will grant another extension. Therefore, the UWMP should be revised to reflect this uncertainty and include water supply projections that do not include the almost 500 mgy that the City includes as supply, but does not actually have a right to at this point.

The UWMP also fails to link the cumulative impacts, direct and indirect, of growth inducement on the status of coho and steelhead and the habitat conditions necessary to support these listed species.

The lack of analysis cited above are critical shortcomings of the draft 2010 UWMP. A revised draft should be developed to include the missing analysis and then released for public review.

Thank you very much for you attention.

Sincerely,
Don Stevens
President
Habitat And Watershed Caretakers
320 Cave Gulch
Santa Cruz, CA 95060

COOPERATIVE AGREEMENT
FOR GROUNDWATER MANAGEMENT WITHIN THE SOQUEL-APTOS BASIN

THIS COOPERATIVE AGREEMENT, made and entered into this 1st day of November, two thousand and five, by and between Soquel Creek Water District, City of Santa Cruz, Central Water District, and the County of Santa Cruz, all of which represent agencies with interests in groundwater management within the area known regionally as the Soquel-Aptos Basin, hereby join together for a common and specific purpose.

ARTICLE I. BACKGROUND AND OBJECTIVES

RECITALS

1. The parties to this interagency cooperative agreement, pursuant to their respective statutory authorizations, are engaged in programs and projects intended to further the assurance of a long–term, sustainable, reliable, good quality groundwater supply in Santa Cruz County;

2 In 1994 and 1996, the Soquel Creek Water District and the Central Water District entered into a Joint Exercise of Powers Agreement and created the *Ground-Water Management Plan – Soquel-Aptos Area*, respectively, to manage the groundwater in their service areas under the provisions of AB3030, as set forth in Part 2.75 of Division 6 of the California Water Code;

3. The Department of Water Resources (DWR) has added Amendments to Sections 10750 et.seq. whereby the managing entity shall "involve other agencies that enables the local agency to work cooperatively with other public entities whose service area or boundary overlies the groundwater basin." (Water Code # 10753.7 (a)(2)) The County of Santa Cruz and the City of Santa Cruz are both agencies whose boundaries overlie the Soquel-Aptos Area groundwater basin;

4. The Soquel-Aptos Basin is currently in overdraft and susceptible to seawater intrusion and, in an effort to include locales that are outside the existing AB 3030 boundaries in order to provide consistent, basin wide management practices, the parties to this agreement are interested in developing an expanded regional Groundwater Management Plan (GWMP); GMB

5. The City of Santa Cruz and the County of Santa Cruz have agreed to join the continued efforts by Soquel Creek Water District and Central Water District to manage the basin and update/expand the regional GWMP, although the extent of their participation has not yet been defined; GMB

QB regional

6. All parties to this agreement wish to join in a common effort to create an updated/expanded GWMP which shall include, but not be limited to: 1) Establishing management objectives for the Soquel-Aptos Basin, including components relating to monitoring and controlling saline intrusion, monitoring and managing groundwater levels and storage, groundwater quality, inelastic land surface subsidence, and changes in surface flow and surface water quality that directly affect groundwater levels or quality or are caused by groundwater pumping; and 2) Adopting monitoring protocols for the above referenced components;

7. The parties to this agreement are empowered by law to enter into this agreement.

ARTICLE II. STATEMENT OF WORK

NOW THEREFORE, the parties to this agreement mutually agree to:

1) Establish the Soquel-Aptos Groundwater Management Alliance (SAGMA). The agency members of the Alliance shall form a committee comprised of one representative from each party to this agreement, accompanied by support staff and consultants, as needed. The committee shall meet on a regular basis and establish programs and policies consistent with the alliance's objectives, review data and coordinate groundwater pumping to the extent possible to both meet demand and avoid exacerbating undesirable coastal groundwater conditions.

2) Undertake ongoing and comprehensive efforts to collect, maintain, and share groundwater data with respect to water levels and quality.

3) Support and provide technical assistance in updating the 1996 AB 3030 Groundwater Management Plan for the Soquel-Aptos Area.

4) Collaboratively review and update the database for private wells within the Soquel-Aptos Basin.

5) Prepare a map showing the area of the groundwater basin(s), as defined by DWR Bulletin 118, with area(s) subject to the Groundwater Management Plan as well as the boundaries of other local agencies that overlie the Soquel-Aptos Basin.

6) Develop and foster relationships with regional, state, and local governments, individuals, and other interested organizations to develop protocols that recognize the importance of groundwater management practices to preserve and protect this natural resource.

7) Establish cooperative relationships with state, local, and other public entities within this region that regulate groundwater matters.

8) Undertake cooperative research and resource management initiatives that are regional in scope and disseminate information resulting from these activities.

9) Establish and implement management objectives (MOs) for the Soquel-Aptos Groundwater Basin (Water Code 10753.7 (a)(1)).

10) Coordinate Urban Water Management Plans and Groundwater Emergency Plans.

11) Jointly pursue groundwater management grants or studies, such as grants available from the State under AB303 and Proposition 50 and studies undertaken by the University of California or United States Geological Survey.

12) Consider the benefits of and form for entering into an arrangement that expands the AB3030 Groundwater Management Authority established under the Joint Exercise of Powers Agreement between Soquel Creek Water District and Central Water District to include those areas within the Soquel-Aptos Groundwater Basin that are under the jurisdiction of the City and/or County of Santa Cruz.

13) Review land use plans and coordinate with land use planning agencies to assess activities and potential impacts of activities that have an impact on groundwater quantity and quality.

14) Produce and share relevant informational materials among the members of SAGMA

15) Recommend to the respective governing boards actions necessary to protect the groundwater basin.

ARTICLE III. TERM OF AGREEMENT gVB

This agreement shall be evaluated and reviewed by staff no later than one year after its implementation at which time, recommendations for improvements and modifications shall be considered by all ~~parties~~ approving bodies gVB. Any amendment or modification to this agreement shall be in writing, agreed upon by all signatories, executed by the duly authorized representatives of the parties hereto, and incorporated into this agreement by reference.

ARTICLE IV. KEY OFFICIALS

Laura D. Brown, General Manager, Soquel Creek Water District
Clarke Wales, General Manager, Central Water District
Bill Kocher, Director, City of Santa Cruz Water Department
John Ricker, Water Resources Program Coordinator, Santa Cruz County Environmental Health Services

ARTICLE V. AWARD

This basic agreement does not provide for any financial obligation and is a vehicle for determining agency agreement on basic premises, goals, and objectives. Subsequent work requiring the transfer of funds between member agencies may be made by amendment of this basic document with the approval of the legislative bodies of the participating agencies and the SAGMA.

Preliminary discussions regarding any costs associated with projects developed under this agreement may use a formula based on estimated net pumpage from the basin by member agencies.

ARTICLE VI. TERMINATION

Agencies can terminate their participation in the Soquel-Aptos Groundwater Management Alliance by providing 60 days written notice to all signatory parties.

SIGNATURES

Laura D. Brown
General Manager
Soquel Creek Water District

10/07/05
~~Bill Kocher~~ Richard C. Wilson
~~Director~~ City Manager
City of Santa Cruz, ~~Water Department~~

Clarke Wales
General Manager
Central Water District

~~John Ricker~~ Rama Khalsa
~~Water Resources Program Coordinator~~ Health Services Agency Director
County of Santa Cruz ~~Environmental Health Services~~

Approved as to Form:

Bosso Williams

____
District Counsel, Soquel Creek Water District & Central Water District

County Counsel

Harry A. Oberhelman III 9/14/05
County Counsel, County of Santa Cruz

City Attorney

10-5-05
City Attorney, City of Santa Cruz

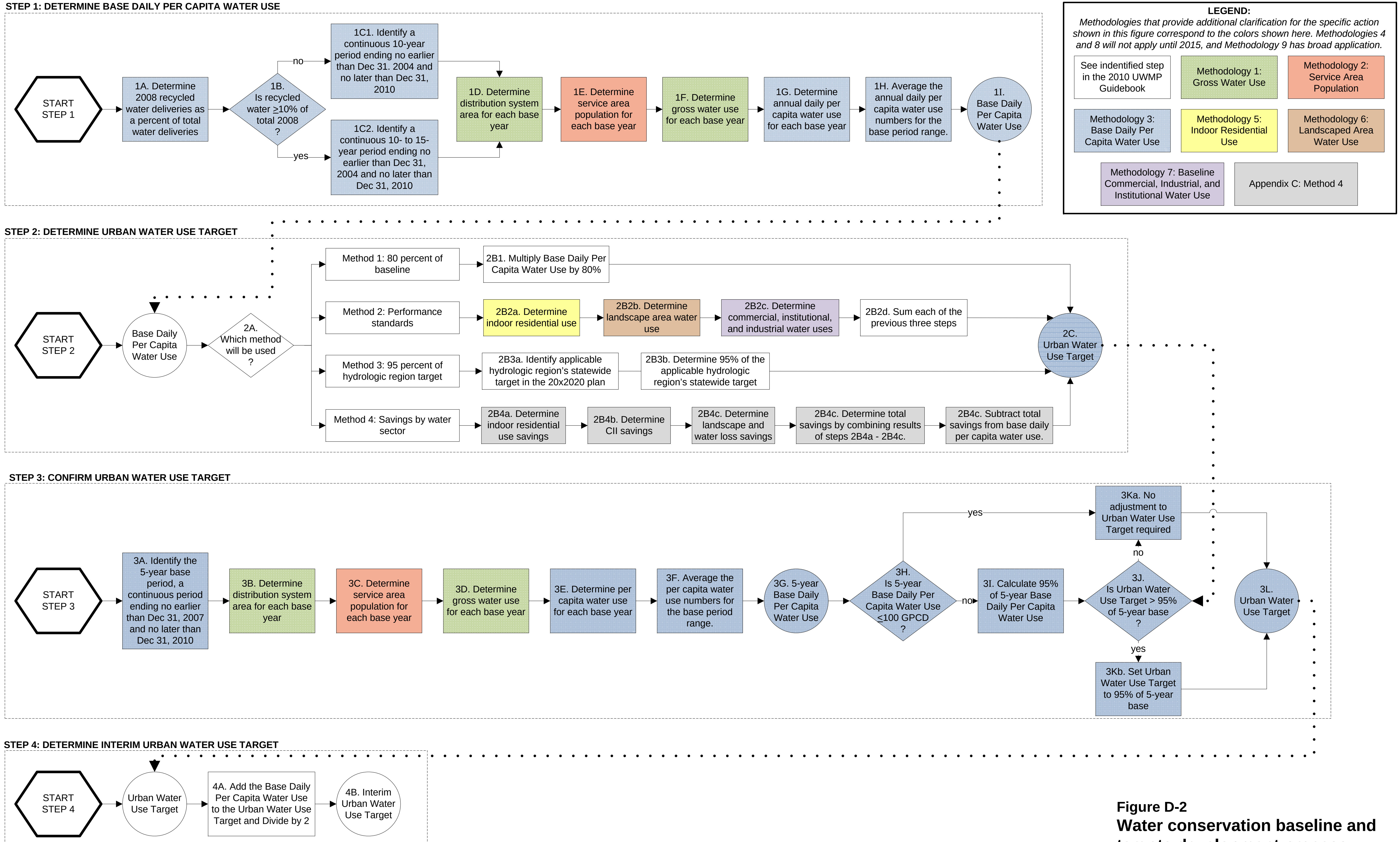
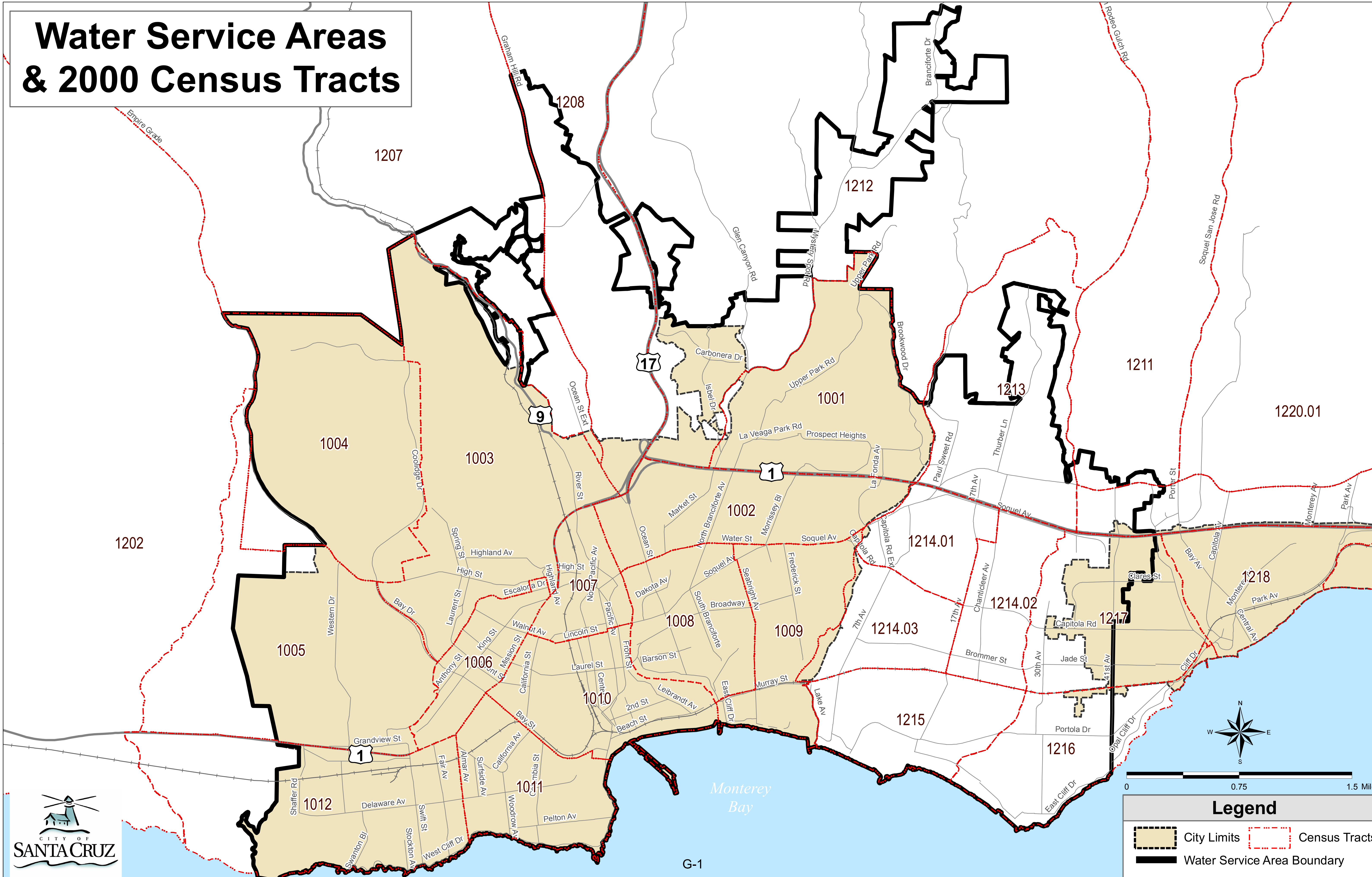


Figure D-2
Water conservation baseline and targets development process

Water Service Areas & 2000 Census Tracts



G-1

SUMMARY OF PROPOSED *GENERAL PLAN 2030*

SUMMARY OF PROJECT

The proposed project consists of the City's Draft *General Plan 2030* (dated February 27, 2009), which is an update of the City's existing *General Plan and Local Coastal Plan 1990- 2005* that was adopted in 1992 and subsequently amended. The draft *General Plan 2030* extends to the year 2030 to coordinate with the U.S. Census timeframe. The proposed General Plan, when adopted, will supersede the 1990-2005 General Plan and its several amendments.

Pursuant to State law, a General Plan must include the following elements: Land Use, Circulation, Housing, Conservation, Open Space, Safety, and Noise. The draft General Plan (except for Housing as discussed below) addresses the State's requirements and also includes optional subjects set forth in the State General Plan Guidelines related to community design and economic development. Goals, policies and actions are provided for each element. the *General Plan 2030* is organized in the following chapters which address state-mandated topics, as well as community design and economic development.

- Historic Preservation, Arts, and Culture
- Community Design
- Land Use
- Mobility
- Economic Development
- Civic and Community Facilities
- Hazards, Safety, and Noise
- Parks, Recreation, and Open Space
- Natural Resources and Conservation

For each of the above topics, the draft General Plan provides goals, policies and actions to address the topics. "Goals" are endstate—the long-range answers to what the community wants to accomplish to resolve a particular issue or problem. Each of the Plan's goals relates to fulfilling the City's Vision and at least one of the Guiding Principles. "Policies" and "actions" are medium-range or short-range.

The General Plan also includes a Land Use Map as required by State law. The map graphically depicts the arrangement and location of land uses. The *General Plan 2030* Land Use Map and land use designations are largely unchanged from the 1990-2005 General Plan and Local Coastal Program, except for the following:

- **NEW DESIGNATIONS & APPLICATION:** Three new mixed use land designations have been developed and applied to the following areas.
    - Mixed use high density designation is applied to segments of Soquel Avenue and Water Street that are designated Community Commercial in the existing General Plan.
    - Mixed use medium density designation is applied to segments of Mission Street and Ocean Street that are designated Community Commercial in the existing General Plan.

- Mixed use visitor serving designation is applied to segments of Ocean Street that is designated Community Commercial in the existing General Plan.

- **LAND USE MAP CHANGES:** Land Use Map Changes:
  - Golf Club Drive Property: Change the existing General Plan land use designation from Low Density Residential (1.1-10 DU/acre) to Very Low Density Residential (.1-1 DU/acre). **[**However, a residential density of 10.1-20 dwelling units per acre could be applied to the 20-acre area with preparation and adoption of an area plan. This could result in more residential units (200+) than allowed in the existing General Plan (up to 100 units).
  - Swenson Property: Change the existing General Plan land use designation from Low Density Residential (1.1-10 DU/acre) to Low Medium Density Residential (10.1-20 DU/acre)/Neighborhood Commercial/Office.

GENERAL PLAN 2030 BUILDOUT ESTIMATES

To aid the environmental analysis, a "buildout" projection was developed by the City's land use consultant, Design, Community and Environment (DC&E), which is included following this summary. The projection considers the development potential of land permitted under the proposed General Plan that is estimated to occur in Santa Cruz by the year 2030. The projections are based on the draft Land Use Map, and take into account land use map changes, vacant lands, sites subject to reuse or redevelopment, and underutilized parcels. The buildout projections estimates by the year 2030 and by geographic area are summarized on Table B-1 on the following page.

Several General Plan actions support specific types of development that would be accounted for in the buildout estimates. However, these buildout estimates do not account for some major pending or recently approved projects, most notably the Delaware Mixed Use Project, the Tannery Arts Center non-residential uses, the La Bahia Hotel Project, and several hotel projects in the beach and downtown area as summarized in Table B-2 below. These projects have been added onto the buildout projections to ensure that all potential development that would occur during the General Plan's timeframe is considered in the EIR impact analyses.

Table B-1: Estimated *General Plan 2030* Buildout

General Plan Area	Dwelling Units	Commercial Square Footage	Office Square Footing	Industrial Square Footage
Beach Area	54	21,872	0	0
Carbonera Sphere	0	0	0	0
Downtown	299	38,913	4,495	0
Eastside Sphere	82	52,925	106,522	0
Golf Club	245	0	0	00
Harvey West	66	278,929	156,751	162,123
Lower Eastside	141	40,066	60,367	24,706
Lower Westside	188	0	0	0
Mission Street	314	68,409	203,829	0
Ocean Street	144	298,697	87,492	0
River St/Front Street	337	70,058	91,587	0
Soquel Avenue	690	60,938	248,422	0
Upper Eastside	143	3,415	12,311	0
Upper Westside	171	658	1,316	0
Water Street	280	36,274	118,667	0
Westside Industrial	34	116,828	77,384	194,714
Subtotal	**3,189**	**1,087,983**	**1,273,913**	**381,544**
Other Pending Development	161	310 hotel rooms	0	395,382
TOTAL	**3,350**	**1,087,983** & 311 hotel rooms	**1,273,913**	**776,926**

SOURCE: Design, Community & Environment, October 29, 2009 and City of Santa Cruz Planning and Community Development Department

TABLE B-2: Pending/Approved Projects
Added to the *General Plan 2030* Buildout Estimates

Area	Project	Description
Beach	La Bahia	125-room hotel with restaurant, meeting, spa
Beach	313 Riverside	155-room hotel with 200-seat banquet hall, café, pool, exercise room - replace 3 existing motels (64 rooms and manager unit) for net increase in 91 rooms and new ancillary facilities
Beach	550 Second	13-room addition to existing 21-room hotel
Downtown	555 Pacific Avenue	82 room hotel
Lower Westside	Delaware Mixed Use	Use worst-case numbers for EIR traffic:395,382 sf industrial, office AND 161 MFD units

DESIGN, COMMUNITY & ENVIRONMENT

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MEMORANDUM

DATE October 29, 2009

TO Michelle King
City of Santa Cruz

FROM Jeff Williams

RE **Methodology for Estimating General Plan 2030 Buildout Potential**

This memorandum explains the methodology that DC&E used to estimate the buildout potential of Santa Cruz's General Plan 2030. This analysis is intended to provide a realistic estimate of the amount of development that could be accommodated in Santa Cruz between adoption of the revised General Plan and the year 2030, which is the planning horizon for the revised General Plan. The buildout analysis includes land within Santa Cruz's city limits and sphere of influence.

This analysis is meant to help the City plan for the infrastructure and services that will be needed to support growth and change through 2030. It is also intended to be used as a starting point for further assessment of the General Plan through the environmental review process.

I. HOW BUILDOUT POTENTIAL WAS ESTIMATED

At the City's request, DC&E prepared an analysis that explored three possible scenarios for the Mixed Use Medium Density (MXMD) and Mixed Use High Density (MXHD) land use designations. The MXMD designation applies to some properties along Mission Street, and the MXHD designation applies to some properties along Water Street and Soquel Avenue. After consideration of the buildout potential for the three scenarios, the City identified a Preferred Alternative. The Preferred Alternative assumes a maximum residential density of 35 dwelling units per acre (du/ac) in the MXMD designation, and 55 du/ac in the MXHD designation.

DC&E also analyzed the "no project" buildout potential, which estimates the amount of development that could reasonably be accommodated through 2030 if the existing land use designations were left unchanged.

To assess the buildout potential, we made several assumptions to address the fact that not all development would occur at the maximum possible intensity, and not every parcel with development potential would be redeveloped by 2030. To adjust for these conditions, we applied percentages, or "factors," to the development potential in order to avoid substantially overestimating how much development could be accommodated. These factors are explained in detail in Section III of this memo.

The analysis reflects the potential for higher-intensity redevelopment of properties that have already been developed. On these properties, the existing development has been "netted out," so that the analysis more accurately reflects the amount of change that could occur through infill redevelopment. To net out existing dwelling units, DC&E used parcel-level data from the City's Land Use Information System (LUIS). To net out existing commercial, office and industrial square footage, DC&E made assumptions about the typical development intensities of actual buildings in each General Plan land use designation.

The analysis does not reflect potential new development on properties owned by the University of California (UC), or on properties that are in the City's development pipeline. Based on direction from City staff, we have assumed that the City's environmental review consultant will incorporate this potential development into the buildout calculations before they are used for technical analysis.

The buildout model that was used to complete the analysis was created in Excel. It uses parcel-level data exported from GIS, which includes information about acreages, land use designations, potential development opportunities, improvement-to-land value (I/L) ratios and existing dwelling units.

II. IDENTIFYING DEVELOPMENT POTENTIAL

DC&E used several different criteria to determine whether each parcel in Santa Cruz has the potential for new development in the future. We assumed that a parcel had development potential if it was not owned by UC or in the development pipeline, and if it fell into one of the following categories:

- ♦ **Vacant.** The parcel is currently undeveloped. Vacant parcels within the city limits were identified using a field survey conducted by City of Santa Cruz staff. Vacant parcels within the sphere of influence (SOI) were identified based on assessor data.
- ♦ **Reuse Potential.** The parcel is underutilized and could be developed more intensively in the future. Parcels with reuse potential were identified as follows, and validated using an aerial photo:
  - In the MXMD and MXHD land use designations, all parcels were assumed to have reuse potential.

- In areas covered by the Ocean Street Area Plan, the "opportunity sites" identified in the Ocean Street Opportunities and Constraints Report were assumed to have reuse potential.
- In all other commercial, office and industrial land use designations, parcels with an improvement to land value (I/L) ratio below 0.5 were assumed to have reuse potential.
- Parcels that are designated as Very Low Density Residential (VL) or Low Density Residential (L), are at least one acre in size, and are currently developed with only one or two dwelling units were assumed to have reuse potential.

♦ **Seabright LM/M Parcels.** The Seabright neighborhood has many areas that are designated for Low Medium Density Residential (LM) or Medium Density Residential (M) development, but that are currently developed with single-family homes. We assumed that some of these properties would be redeveloped at higher densities. (The properties in Seabright were treated separately from other parcels with reuse potential, because we have assumed that a relatively small percentage of Seabright parcels will be redeveloped.)

There are three areas in the city where development potential was analyzed based on a different land use designation than what is shown on the General Plan land use map, to reflect land use changes that are either expected to occur in the future or explicitly called for in General Plan 2030:

♦ **Swenson Property.** This undeveloped parcel, located near Antonelli Pond and the Westside Industrial district, is 11.1 acres and is designated as Low-Density Residential (L). It was analyzed as Low Medium Density Residential (LM).

♦ **Golf Club Drive Properties.** These six largely undeveloped parcels in Harvey West total 20.6 acres and are designated as L, but were analyzed as LM.

♦ **Harvey West Large-Format Retail.** General Plan 2030 calls for large-scale retail uses to be directed to Harvey West. The analysis assumes that a 7.7 acre site that is currently designated Industrial (I) will be redesignated as Community Commercial (CM) and redeveloped for retail use.

III. FACTORS FOR ADJUSTING DEVELOPMENT POTENTIAL

As noted on page 2, the analysis of buildout potential assumes that 1) not all development will happen at the maximum possible intensity, and 2) not every parcel with development potential will be redeveloped by 2030.

To address the first assumption, the analysis assumes that on average, all new development in Santa Cruz will occur at 80 percent of the permitted residential density or floor area ratio

(FAR)[1]. This standard percentage accounts for hard-to-develop sites and places where people simply choose to build less than the maximum that is allowed, due to economic factors or other reasons.

To address the second assumption, we assign a probability of redevelopment based on the type of development opportunity that exists. The probabilities are assigned as follows:

- **Vacant:** 90 percent within city limits; 70 percent in sphere of influence
- **Reuse Potential:** 75 percent within city limits; 60 percent in sphere of influence
- **Seabright LM/M Parcels:** 10 percent

Lower probabilities were used within the sphere of influence because many of these parcels are affected by biological resources, steep slopes or other natural factors that limit their development potential.

In addition, General Plan 2030 allows residential development to exceed the maximum allowed density if it incorporates single-room occupancy (SRO) units or small ownership units (SOUs). The analysis assumes that SRO/SOU development will cause the total amount of residential development to increase by up to 5 percent, depending on the General Plan land use designation.

To estimate buildout potential, these various factors are combined into a single adjustment factor for each parcel, as shown in the example below.

IV. SAMPLE CALCULATIONS

This section provides two hypothetical examples to show the steps for estimating buildout potential, using a one-acre vacant parcel that is designated Low Medium Density Residential (LM) and a one-acre reuse parcel designated Office (OF).

A. LM Parcel

The LM parcel in this example is one acre and is vacant. The steps for estimating its development potential are as follows:

1. Calculate Gross Potential Development

This is calculated by multiplying a parcel's acreage by the allowed density (the total number of dwelling units per acre (du/ac)) or FAR permitted under that parcel's land use designation.

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[1] Floor area ratio (FAR) is the total square footage of the buildings on a site, divided by the total square footage of the underlying site.

The LM designation permits up to 20 du/ac, so the parcel's gross potential development is:

1 ac x 20 du/ac = 20 du

2. Calculate Net Potential Development

Net potential development equals the gross potential development on a parcel minus any existing development (number of existing dwelling units or non-residential square footage).

The LM parcel is vacant, so its net potential development is:

20 du – 0 du = 20 du

3. Calculate the Adjustment Factor

The adjustment factor is the standard assumed development intensity (80 percent for all parcels), times the likelihood of development based on the development opportunity (90 percent for vacant parcels), plus the increased amount of residential development that is expected to result from SRO/SOU units (2 percent in the LM designation).

For the LM parcel, the adjustment factor is:

(80% x 90%) + (2% x (80% x 90%)) = 73.4%

4. Calculate Final Buildout

This is calculated by multiplying net potential development by the appropriate adjustment factor.

Since only residential development is permitted on LM parcels, the final estimate of buildout potential for this parcel by 2030 is:

20 du x 73.4% = 14.7 du

B. OF Parcel

The OF parcel in this example is one acre, has reuse potential and has 12,000 sf of existing office development. The steps for estimating its development potential are as follows:

1. Calculate Gross Potential Development

For purposes of estimating potential development on OF parcels, we assume a commercial FAR of .25 and an office FAR of 1.5, so the parcel's gross potential development is:

Commercial: 43,560 sf x .25 = 10,890 sf
Office: 43,560 sf x 1.5 = 65,340 sf

2. Calculate Net Potential Development

The OF parcel has 12,000 sf of existing office development, so its net potential development is:

65,340 sf – 12,000 sf = 53,340 sf

3. Calculate the Adjustment Factor

For the OF parcel, the adjustment factor equals the standard assumed development intensity (80 percent for all parcels), times the likelihood of development based on the development opportunity (75 percent for reuse parcels), plus the increased amount of residential development that is expected to result from SRO/SOU units (0 percent in the OF designation).

Therefore, the adjustment factor is:

(80% x 75%) + (0% x (80% x 75%)) = 60%

4. Calculate Final Buildout

The final estimate of buildout potential for the OF parcel by 2030 is:

Commercial: 10,890 sf x 60% = 6,534 sf
Office: 53,340 sf x 60% = 32,004 sf

V. GROWTH POTENTIAL UNDER GENERAL PLAN 2030

As the analysis shows, some development potential exists in Santa Cruz even under its current General Plan. However, General Plan 2030 would increase this potential so that the City can accommodate an appropriate amount of growth over the next 20 years. The land use changes in General Plan 2030 are meant to allow Santa Cruz to accommodate significantly more residential units; to provide for modest increases in commercial and office development; and to create a slightly reduced, but still adequate, potential for industrial growth.

The following sections highlight significant changes in development potential that are expected to result from General Plan 2030.

A. Residential

General Plan 2030 would substantially increase the number of new residential units that can be accommodated over the next 20 years. The buildout analysis shows that 1,655 units could be accommodated under the current General Plan, which would increase to 3,189 units under the Preferred Alternative for General Plan 2030.

The increase reflects the following notable differences in several General Plan change areas:

- ♦ **Golf Club Drive:** A future redesignation of these parcels from L to LM would increase the potential amount of residential development.
- ♦ **Harvey West:** A future redesignation of some land as CM could create limited potential for additional residential units.
- ♦ **Lower Westside:** A future redesignation of the Swenson parcel from L to LM would accommodate more residential development.
- ♦ **Mission Street, Ocean Street, Soquel Avenue, Water Street:** New mixed-use designations on these commercial corridors would allow for increased residential growth in the future.

B. Commercial

The analysis shows a very slight increase in commercial development potential as a result of the land use changes that were analyzed. The analysis shows that 1,038,456 square feet of commercial development could be accommodated under the current General Plan, compared to 1,087,983 square feet under General Plan 2030.

This increase reflects the following notable differences from the current General Plan:

- ♦ **Harvey West:** A future redesignation of some land as CM would increase the potential for retail development in Harvey West.
- ♦ **Mission Street, Ocean Street, Soquel Avenue, Water Street:** New development on these corridors is expected to emphasize office uses somewhat more than commercial uses, slightly reducing the potential for commercial development under General Plan 2030.

C. Office

The analysis shows a modest increase in office development potential as a result of the land use changes that were analyzed. Under the current General Plan, 942,101 square feet of office development could be accommodated, compared to 1,273,913 square feet under General Plan 2030.

This increase reflects the following notable differences from the current General Plan:

- ♦ **Harvey West:** A future redesignation of some land as CM could potentially result in some additional office development along with the new retail.
- ♦ **Mission Street, Ocean Street, Soquel Avenue, Water Street:** New development on these corridors is expected to emphasize office uses somewhat more than commercial uses, increasing the potential for office development under General Plan 2030.

D. Industrial

General Plan 2030's land use changes do not affect the potential for industrial development in Santa Cruz. However, the analysis assumes that some land in Harvey West will be redesignated for commercial use. While this change has not yet occurred, it is supported by policies in General Plan 2030.

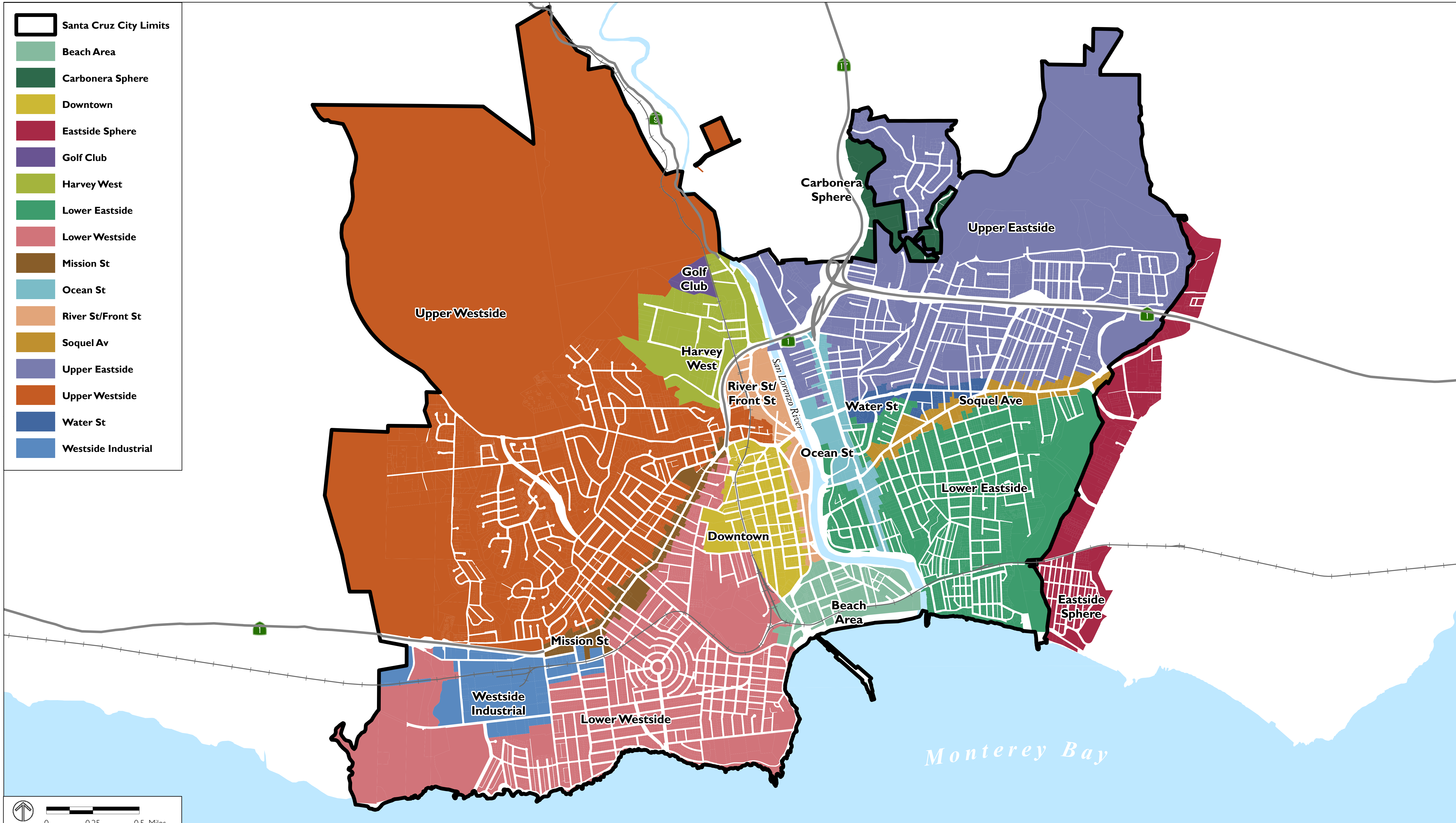
As a result, the analysis shows less potential for industrial expansion in the future, as compared with the "no project" scenario. The "no project" scenario projects 482,065 square feet of industrial development potential, compared to 381,544 square feet under General Plan 2030. The City anticipates that the slightly reduced industrial land supply will be sufficient to meet future demand.

VI. GRADUATED DENSITY ZONING

The City is considering graduated density zoning as an implementation tool for General Plan 2030. The concept behind graduated density zoning is simple: Maximum densities are set very low on small properties, and they are increased on larger properties, up to a set limit. For example, a zoning ordinance could set a maximum density of 5 dwelling units per acre on an 0.2-acre site, increasing up to 50 units per acre on a site that is 1 acre or larger.

By increasing development potential based on a property's size, graduated density zoning provides a financial incentive for property owners to assemble small, hard-to-develop parcels—such as those on many of Santa Cruz's commercial corridors—into larger sites that allow for higher-quality development. This strategy would be consistent with an action in General Plan 2030 to offer incentives for consolidation of underdeveloped parcels.

There is no guarantee that parcel assembly would actually occur under graduated density zoning. However, the analysis of General Plan 2030's buildout potential assumes that if graduated density zoning is used in the future, parcels will typically be assembled so that new development can achieve the maximum densities specified in the General Plan. If this parcel assembly does not occur, the actual buildout would likely be lower than the findings in our analysis. Therefore, this analysis may represent a conservative estimate of future growth under General Plan 2030, in the sense that it may overestimate the amount of development that could be accommodated.



Source: City of Santa Cruz GIS, 2008.

EXHIBIT B

GENERAL PLAN CHANGE AREAS: DECEMBER 2008

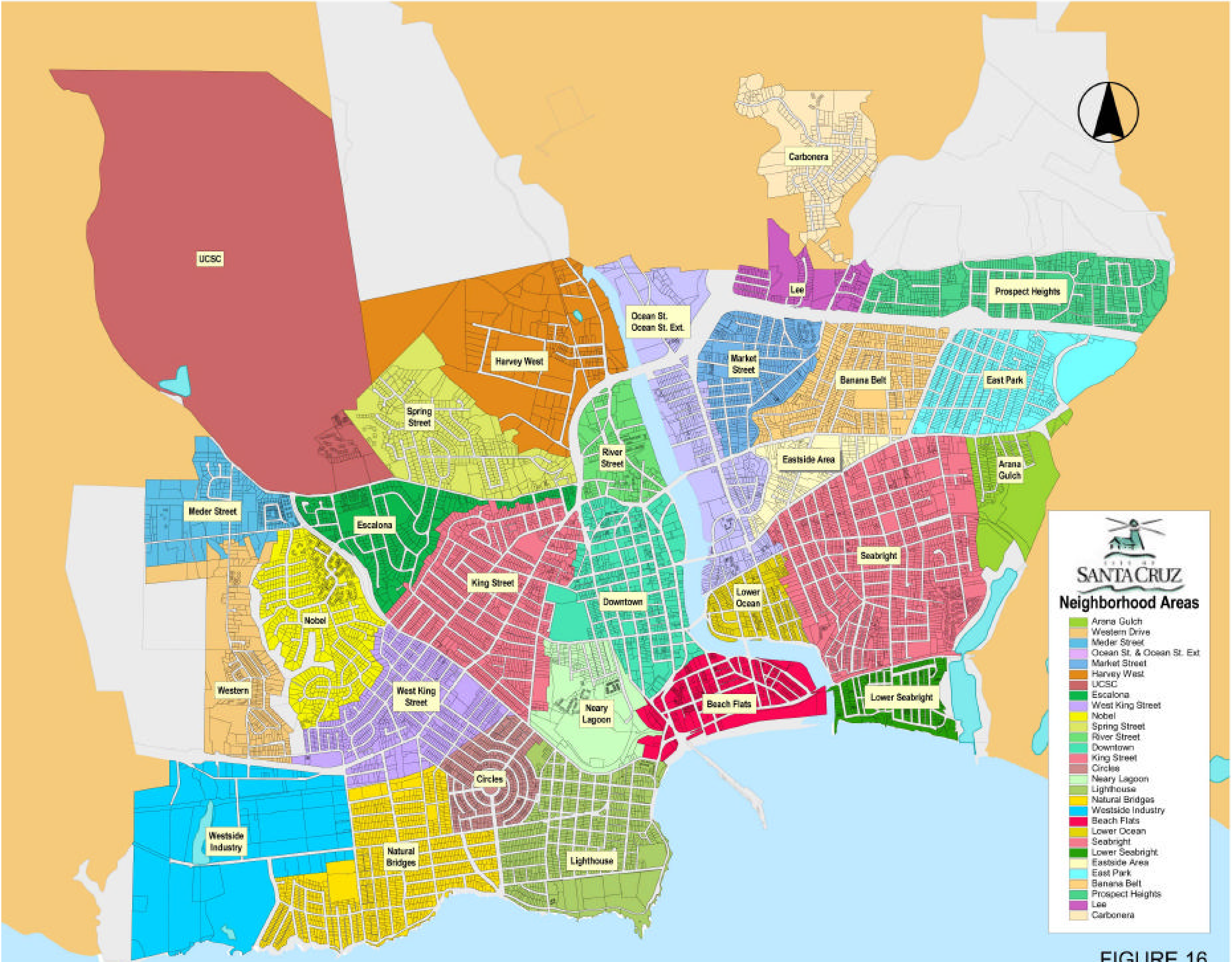

UCSC
Harvey West
Ocean St.
Ocean St. Ext.
Carbonera
Lee
Prospect Heights
Market Street
Banana Belt
East Park
Spring Street
River Street
Eastside Area
Arana Gulch
Meder Street
Escalona
Seabright
King Street
Downtown
Lower Ocean
Nobel
West King Street
Western
Neary Lagoon
Beach Flats
Lower Seabright
Circles
Westside Industry
Natural Bridges
Lighthouse
CITY OF SANTA CRUZ
Neighborhood Areas
Arana Gulch
Western Drive
Meder Street
Ocean St. & Ocean St. Ext
Market Street
Harvey West
UCSC
Escalona
West King Street
Nobel
Spring Street
River Street
Downtown
King Street
Circles
Neary Lagoon
Lighthouse
Natural Bridges
Westside Industry
Beach Flats
Lower Ocean
Seabright
Lower Seabright
Eastside Area
East Park
Banana Belt
Prospect Heights
Lee
Carbonera

FIGURE 16

Buildout Projections
Units and SF by MTS Neighborhood

	Preferred Alternative	No Project
Sum of Factored DU		
MTS	Total	Total
Arana Gulch	5	5
Banana Belt	178	20
Beach Flats	94	94
Carbonera	12	12
Carbonera Sphere	0	0
Central Eastside	68	68
Circles	0	0
Downtown	560	550
East Park	41	41
Eastside Area	370	29
Eastside Heights	0	0
Escalona	5	5
Harvey West	311	143
King Street	117	31
Lee	6	6
Lighthouse	1	1
Lower Ocean	-19	-21
Lower Seabright	0	0
Market Street	46	30
Meder Street	60	60
Natural Bridges	1	1
Neary Lagoon	0	0
Nobel	0	0
Ocean Street	185	57
Prospect Heights	43	43
River Street	37	37
Seabright	530	154
South Eastside	14	14
Spring Street	92	92
UCSC	0	0
West King Street	223	56
Western	13	13
Westside Industry	196	113
Grand Total	**3,189**	**1,655**

	Preferred Alternative	No Project
Sum of Factored Comm SF		
MTS	Total	Total
Arana Gulch	11,632	11,632
Banana Belt	12,805	15,722
Beach Flats	21,872	21,872
Carbonera	0	0
Carbonera Sphere	0	0
Central Eastside	46,160	46,160
Circles	0	0
Downtown	44,274	38,913
East Park	25,117	25,117
Eastside Area	22,378	47,227
Eastside Heights	0	0
Escalona	923	923
Harvey West	278,929	158,303
King Street	18,813	27,409
Lee	0	0
Lighthouse	0	0
Lower Ocean	8,559	12,949
Lower Seabright	0	0
Market Street	70,639	45,655
Meder Street	0	0
Natural Bridges	4,622	4,622
Neary Lagoon	0	0
Nobel	0	0
Ocean Street	234,834	289,699
Prospect Heights	0	0
River Street	65,355	65,355
Seabright	53,427	60,523
South Eastside	6,766	6,766
Spring Street	0	0
UCSC	0	0
West King Street	51,489	50,220
Western	0	0
Westside Industry	109,390	109,390
Grand Total	**1,087,983**	**1,038,456**

	Preferred Alternative	No Project
Sum of Factored Office SF		
MTS	Total	Total
Arana Gulch	23,263	23,263
Banana Belt	56,479	31,445
Beach Flats	0	0
Carbonera	0	0
Carbonera Sphere	0	0
Central Eastside	92,319	92,319
Circles	0	0
Downtown	-27,562	-32,923
East Park	50,234	50,234
Eastside Area	111,307	94,454
Eastside Heights	0	0
Escalona	1,847	1,847
Harvey West	156,751	106,490
King Street	67,878	54,818
Lee	0	0
Lighthouse	0	0
Lower Ocean	14,304	5,369
Lower Seabright	0	0
Market Street	34,117	86,886
Meder Street	0	0
Natural Bridges	3,081	3,081
Neary Lagoon	0	0
Nobel	0	0
Ocean Street	183,584	18,858
Prospect Heights	0	0
River Street	120,864	120,864
Seabright	162,333	101,280
South Eastside	14,203	14,203
Spring Street	0	0
UCSC	0	0
West King Street	135,982	96,685
Western	0	0
Westside Industry	72,927	72,927
Grand Total	**1,273,913**	**942,101**

	Preferred Alternative	No Project
Sum of Factored Ind SF		
MTS	Total	Total
Arana Gulch	0	0
Banana Belt	0	0
Beach Flats	0	0
Carbonera	0	0
Carbonera Sphere	0	0
Central Eastside	0	0
Circles	0	0
Downtown	0	0
East Park	0	0
Eastside Area	0	0
Eastside Heights	0	0
Escalona	0	0
Harvey West	162,123	262,645
King Street	0	0
Lee	0	0
Lighthouse	0	0
Lower Ocean	0	0
Lower Seabright	0	0
Market Street	0	0
Meder Street	0	0
Natural Bridges	7,703	7,703
Neary Lagoon	0	0
Nobel	0	0
Ocean Street	0	0
Prospect Heights	0	0
River Street	0	0
Seabright	24,706	24,706
South Eastside	0	0
Spring Street	0	0
UCSC	0	0
West King Street	4,695	4,695
Western	0	0
Westside Industry	182,317	182,317
Grand Total	**381,544**	**482,065**

Buildout Projections

Dwelling Units and SF by GP Change Area

	Preferred Alternative	No Project
Sum of Factored DU		
GP_CHGAREA	Total	Total
Beach Area	54	54
Carbonera Sphere	0	0
Downtown	299	299
Eastside Sphere	82	82
Golf Club	245	117
Harvey West	66	27
Lower Eastside	141	141
Lower Westside	188	105
Mission St	314	61
Ocean St	144	-1
River St/Front St	337	328
Soquel Av	690	68
Upper Eastside	143	143
Upper Westside	171	171
Water St	280	27
Westside Industrial	34	34
Grand Total	**3,189**	**1,655**

	Preferred Alternative	No Project
Sum of Factored Comm SF		
GP_CHGAREA	Total	Total
Beach Area	21,872	21,872
Carbonera Sphere	0	0
Downtown	38,913	38,913
Eastside Sphere	52,925	52,925
Golf Club	0	0
Harvey West	278,929	158,303
Lower Eastside	40,066	40,066
Lower Westside	0	0
Mission St	68,409	75,736
Ocean St	298,697	327,489
River St/Front St	70,058	64,697
Soquel Av	60,938	88,684
Upper Eastside	3,415	8,895
Upper Westside	658	658
Water St	36,274	43,390
Westside Industrial	116,828	116,828
Grand Total	**1,087,983**	**1,038,456**

	Preferred Alternative	No Project
Sum of Factored Office SF		
GP_CHGAREA	Total	Total
Beach Area	0	0
Carbonera Sphere	0	0
Downtown	4,495	4,495
Eastside Sphere	106,522	106,522
Golf Club	0	0
Harvey West	156,751	106,490
Lower Eastside	60,367	60,367
Lower Westside	0	0
Mission St	203,829	151,471
Ocean St	195,855	69,483
River St/Front St	87,492	82,130
Soquel Av	248,422	177,369
Upper Eastside	12,311	17,791
Upper Westside	1,316	1,316
Water St	118,667	86,780
Westside Industrial	77,886	77,886
Grand Total	**1,273,913**	**942,101**

	Preferred Alternative	No Project
Sum of Factored Ind SF		
GP_CHGAREA	Total	Total
Beach Area	0	0
Carbonera Sphere	0	0
Downtown	0	0
Eastside Sphere	0	0
Golf Club	0	0
Harvey West	162,123	262,645
Lower Eastside	24,706	24,706
Lower Westside	0	0
Mission St	0	0
Ocean St	0	0
River St/Front St	0	0
Soquel Av	0	0
Upper Eastside	0	0
Upper Westside	0	0
Water St	0	0
Westside Industrial	194,714	194,714
Grand Total	**381,544**	**482,065**

Preferred Alternative Development Standards

FARs and DU/ac

Land Use Designa	Comm FAR	Office FAR	Ind FAR
VL	0	0	0
L	0	0	0
LM	0	0	0
M	0	0	0
H	0	0	0
NC	0.5	0.25	0
OF	0.25	1.5	0
CD	0	0	0
CM	0.75	0.75	0
CM_OCEAN	1.25	0.25	0
RVC_75	0.75	1.25	0
RVC_50	0.75	0.75	0
RVC_35	0.75	0.5	0
RVC	0.75	0.5	0
RVC_OCEAN	1.25	0.25	0
IND	0.15	0.5	0.5
AG	0	0	0
PK	0	0	0
NA	0	0	0
UC	0	0	0
CR	0	0	0
CF	0	0	0
MXHD	0.5	0.5	0
MXMD	0.5	0.5	0
MXMD_OCEAN	0.75	0.5	0
MXVC_7	1.5	1	0
MXVC_6	1.25	1	0
MXVC_4	1	0.5	0
MXVC_3	0.75	0.5	0

Assumed Development Intensity

Percent of Maximum	80%

Likelihood of Development (OPPT field)

VAC	90%
REUSE	75%
REUSE_MX	75%
SEABRIGHT	10%
XX	0%
VAC_Sphere	70%
REUSE_Sphere	60%

SRO/SOU Unit Bonus

Land Use Designation	%
VL	0%
L	0%
LM	2%
M	5%
H	5%
NC	2%
OF	0%
CD	0%
CM	5%
CM_OCEAN	0%
RVC_75	5%
RVC_50	5%
RVC_35	5%
RVC	5%
RVC_OCEAN	0%
IND	0%
AG	0%
PK	0%
NA	0%
UC	0%
CR	0%
CF	0%
DTC	5%
MXHD	5%
MXMD	2%
MXMD_OCEAN	2%
MXVC_7	2%
MXVC_6	2%
MXVC_4	2%
MXVC_3	2%

No Project Scenario Development Standards

FARs and DU/ac

Land Use De	*DU/ac*	*Comm FAR*	*Office FAR*	*Ind FAR*
VL	1	0	0	0
L	10	0	0	0
LM	20	0	0	0
M	30	0	0	0
H	55	0	0	0
NC	20	0.5	0.25	0
OF	0	0.25	1.5	0
CD	0	0	0	0
CM	10	0.75	0.75	0
CM_OCEAN	5	1.25	0.25	0
RVC_75	70	0.75	1.25	0
RVC_50	55	0.75	0.75	0
RVC_35	25	0.75	0.5	0
RVC	20	0.75	0.5	0
RVC_OCEAN	5	1.25	0.25	0
IND	2	0.15	0.5	0.5
AG	0.1	0	0	0
PK	0	0	0	0
NA	0	0	0	0
UC	0	0	0	0
CR	0	0	0	0
CF	0	0	0	0

Assumed Development Intensity

Percent of Maximum	80%

Likelihood of Development (OPPT field)

VAC	90%
REUSE	75%
REUSE_MX	0%
SEABRIGHT	10%
XX	0%
VAC_Sphere	70%
REUSE_Sphere	60%

SRO/SOU Unit Bonus

Land Use Designation	*%*
VL	0%
L	0%
LM	2%
M	5%
H	5%
NC	2%
OF	0%
CD	0%
CM	5%
CM_OCEAN	0%
RVC_75	5%
RVC_50	5%
RVC_35	5%
RVC	5%
RVC_OCEAN	0%
IND	0%
AG	0%
PK	0%
NA	0%
UC	0%
CR	0%
CF	0%
DTC	5%
MXHD	5%
MXMD	2%
MXMD_OCEAN	2%
MXVC_7	2%
MXVC_6	2%
MXVC_4	2%
MXVC_3	2%

Assumptions for Existing Non-Residential Development

FARs

Land Use De	*Comm FAR*	*Office FAR*	*Ind FAR*
VL	0	0	0
L	0	0	0
LM	0	0	0
M	0	0	0
H	0	0	0
NC	0.5	0	0
OF	0	1	0
CD	0	0	0
CM	0.5	0.25	0
CM_OCEAN	0.5	0.25	0
RVC_75	0.75	1.25	0
RVC_50	0.75	1	0
RVC_35	0.5	0.5	0
RVC	0.5	0.5	0
IND	0	0.4	0.25
AG	0	0	0
PK	0	0	0
NA	0	0	0
UC	0	0	0
CR	0	0	0
CF	0	0	0

Note: existing residential development was obtained from the City's Land Use Information System (LUIS).

WATER DEPARTMENT
MEMORANDUM

DATE: March 16, 2011

TO: Bill Kocher, Water Director

FROM: Toby Goddard, Water Conservation Manager

SUBJECT: Updated 2010-2030 Water Demand Forecast (corrected, revised)

The purpose of this memo is to describe and document the various methods and assumptions used to develop an updated water demand forecast for the Santa Cruz City water service area.

BACKGROUND: The last time the City's water demand forecast was updated was in 2005, as part of the Urban Water Management Plan. There were two "scenarios" developed at the time, one based on a continuation of existing trends at a growth rate of 0.4 percent annually and another, higher forecast reflecting the potential for housing growth contained on local plans involving an 0.8 percent annual growth rate. The forecast horizon extended only to 2020. Most recently, this forecast was used in developing the Water Supply Assessment for the Sphere of Influence Amendment EIR.

With another Water Supply Assessment needed for the City's 2030 General Plan, rather than rely on the previous forecast, the decision was made, considering the many changes that have occurred since the last forecast was made and the need to update it soon for the next Urban Water Management Plan, that a new forecast should be developed based on the potential growth foreseen in the City's new General Plan.

DISCUSSION: The format for the forecast differs somewhat from previous versions. The timeline extends from 2010 to 2030, in five year increments, as does AMBAG's population forecasts, similar to previous forecasts. The service area, however, is divided into two major categories, within Santa Cruz City, and outside the city, which includes unincorporated Santa Cruz County, the City of Capitola and the north coast. Within these two basic geographic areas, there are separate line items for each major customer category. The University of California is treated separately on its own line item. The purpose of this arrangement is to allow for an analysis of the growth in demands within just the city of Santa Cruz, excluding UCSC, for the EIR on the 2030 General Plan and the accompanying water supply assessment, and to develop a forecast for the service area as a whole needed for the next Urban Water Management Plan.

We use different forecasting approaches inside and outside the city. Within the City, we developed water duties from the utility billing system for various residential and commercial sectors listed in the 2030 buildout projections (DC&E, 2009). Those buildout projections were combined with water duties to estimate 2030 water demand in the City, and then interpolated between 2010 and 2030 to arrive at 5-year increments. For UC Santa Cruz, we used figures referenced in Water Supply Assessment for the Sphere of Influence Amendment EIR that are based on the latest long range development plan (as modified by the final EIR and settlement agreement) out to the year 2020. Outside the city, there is no land use information available to inform future water demand. Instead, existing water demands were scaled up in all relevant customer categories in proportion to population growth forecast in 2008 by AMBAG of about 8 percent over 20 years, or about 0.4 percent annually[1]. Finally, an additional line was added to account for miscellaneous uses and water losses to develop the total annual water requirements for the entire water service area.

The two scenarios differ mainly based on assumptions about the level of water use at existing accounts. The lower scenario (Scenario 2) relies on average water use for each sector (expressed in gallons per account per day) that occurred during the 2007-08 baseline time period prior in the recent water restrictions. The higher scenario (Scenario 1) relies on normal water use levels that were stable for many years during an earlier baseline period, from 1999 through 2004, prior to several changes that took place with regard to weather, water rates and the economic downturn. Both represent actual usage levels in the relatively recent past. In both scenarios, the consumption levels used were obtained from the Water Demand Modeling and Analysis report/models prepared by Weber Analytical (2010) and were normalized for weather effects.

The 2010 starting point both inside and outside the City was developed by combining per account water use levels with the current number of water accounts in each class. Since 2010 figures for the number of accounts is not available yet, we used a count of accounts from the end of calendar year 2009 and escalated them one year based on current growth rates.

The following discusses the forecasting particulars within each sector.

Inside Santa Cruz

Single Family Residential: For 2010, it is assumed there are there are 12,121 existing accounts, using an average of 218.1 gpd/a (S-1) or 189.7 gpd/a (S-2). New accounts are assumed to use an average of 194gpd/a based on actual data collected on new accounts added from1996 to present. The 2030 General Plan foresees 840 new SFR homes possible in 2030.

Multi-family Residential: For 2010, it is assumed there are there are 1,771 existing accounts, using an average of 730.1 gpd/a (S-1) or 631.9 gpd/a (S-2). New accounts are assumed to use an average of 70 gpd/dwelling unit based on actual data collected on new accounts added from1996 to present. The 2030 General Plan foresees 2,510 new MFR homes possible in 2030.

Business/Industrial: For 2010, it is assumed there are there are 1,265 existing business accounts, using an average of 917.2 gpd/a (S-1) or 866.8 gpd/a (S-2). Industrial usage in both cases is assumed to be 25 mgy. There are four types of commercial growth listed in the 2030 General Plan buildout analysis: Commercial, Hotel, Office and Industrial. We developed water factors for

[1] AMBAG projections revised 6/10/11show the outside City population increasing from 33,246 in 2010 to 35,816 in 2030, for an increase of 2,570.

each type based on billing data and square footage available on the County Assessor's web site at various accounts. We used a median water duty of 66 gpy/sq ft for the commercial category, 93 gpd/room for the hotel category, 18 gpy/sq ft for the office category and 12 gpy/sq ft for industrial land use type. This is compared to 65 gpy/sq ft for the high use commercial category, 90 gpd/room for the hotel category, 23 gpy/sq ft for the office category and 23 gpy/sq ft for industrial land use type used in other environmental impact studies and that were based on rates developed by the Monterey Peninsula Water Management District. The General Plan buildout analysis foresees 1,087,933, sq ft of new commercial space, 311 new hotel rooms, 1,273,913 sq ft of new office space and 776,926 sq ft of new industrial space. These combine to produce 114.6 mgy in new business/industrial water demand by 2030.

Municipal: For 2010, it is assumed there are there are 227 existing accounts, using an average of 671.3 gpd/a (S-1) or 657.6 gpd/a (S-2). According to Parks staff, there is potentially 3.5 acres in new park development in the future that would add 2 mgy in new water demand.

Irrigation/Golf: For 2010, it is assumed there are there are 240 existing irrigation accounts, using an average of 885.4 gpd/a (S-1) or 755.4 gpd/a (S-2). The De Laveaga Golf Course is assumed to use 139,487 gpd/a (S-1) or 134,824 gpd/a (S-2). It is assumed there is no growth in golf demand but irrigation accounts are grown in proportion to average growth rate of SFR, MFR and BUS/IND combined (12 percent over 20 years, or about 0.6 percent per year)

UC Santa Cruz: For UCSC, it is assumed that 2010 usage runs around 212 mgy (200 mgy for the main campus, 2 mgy for the Delaware facility, and 10 mgy for the marine science campus), which was used as 2007 existing water demand in the recent Water Supply Assessment for the Sphere of Influence Amendment EIR. We scale this up by 126 mgy by 2020 in accordance with the figures referenced in the Water Supply Assessment/Sphere of Influence Amendment EIR for both the University Main campus and Marine Science Campus. After that, an additional 10 million gallons is included for the period 2020-2030 representing an assumption for continuing enrollment growth of about 350 students per year, of which the demand estimate is based on actual historic rate of growth in water demand and enrollment/on campus population that occurred between 1987 and 2008.

Outside Santa Cruz

Single Family Residential: For 2010, it is assumed there are there are 6,755 existing accounts, using an average of 235.8 gpd/a (S-1) or 203.7 gpd/a (S-2). New accounts are increased in proportion to population increase per AMBAG of 8.2% over 20 years (0.4% per year).

Multi-family Residential For 2010, it is assumed there are there are 945 existing accounts, using an average of 1,184 gpd/a (S-1) or 974.2 gpd/a (S-2). New accounts are increased in proportion to population increase per AMBAG of 8.2% over 20 years.

Business/Industrial: For 2010, it is assumed there are there are 630 existing accounts, using an average of 1,186.1 gpd/a (S-1) or 1003.6 gpd/a (S-2). New accounts are increased in proportion to population increase per AMBAG of 8.2% over 20 years.

Municipal: Not applicable outside the City.

Irrigation: For 2010, it is assumed there are there are 201 existing irrigation accounts, using an average of 956.6 gpd/a (S-1) or 765.1 gpd/a (S-2). The Pasatiempo Golf Course is assumed to use 139,487 gpd/a (S-1) or 134,824 gpd/a (S-2). In addition 25 mgy is added to this category to account for to coast agriculture. New accounts are increased in proportion to population increase per AMBAG of 8.2% over 20 years.

Other Miscellaneous Uses and Water Losses. Miscellaneous uses consist of construction accounts, and bulk water use, and average 4 mgy. Water losses (which includes physical leakage, apparent losses from meter error, as well as unmetered authorized uses such as system flushing, process water use at the treatment plant, fire usage, sewer flushing and other similar uses) are estimated at 7.5 percent of overall treated water production, which represents, in round numbers, the average level of annual loss experienced on the city water system over the past 10 years.

Total Water Demand

For Scenario 1, Total Water Demand is estimated to be 3,993 mgy in 2010, growing to 4,537 mgy by 2030, an increase of 544 mg or 14 percent over 20 years, or 27.2 mgy and 0.7 percent annually.

For Scenario 2, Total Water Demand is estimated to be 3,522 mgy in 2010, growing to 4,046 mgy by 2030, an increase of 524 mg or 15 percent over 20 years, or 26.2 mgy and 0.7 percent annually.

CITY OF SANTA CRUZ
WATER DEPARTMENT
Policy No. E-2006-5

SUBJECT: Water Service for Affordable Housing

REFERENCE: 1) Chapter 727, Statutes of 2005 (SB 1087)
2) Government Code Section 65589.7
3) Water Code Section 10631.1

PURPOSE: The purpose of this policy is to comply with state law with regard to the provision of water service to proposed housing developments for lower income households.

BACKGROUND: State law requires each city and county to adopt a general plan for its jurisdiction that contains certain mandatory elements, including a housing element. The law requires that the adopted housing element be delivered to all public agencies providing water service within the territory of the jurisdiction, and that agencies providing water service grant a priority for the provision of services to proposed housing developments that help meet the legislative bodies' share of the regional housing need for lower income households.

In October 2005, SB 1087 was enacted to improve the effectiveness of the law in facilitating housing development for lower income households.

POLICY: The City of Santa Cruz Water Department shall not deny or limit water service to a proposed housing development that includes housing units affordable to lower income households unless the Department makes a specific written finding due to the existence of one or more of the following:

(1) That it does not have sufficient water supply,
(2) That it is subject to State Department of Health Services compliance order that prevents new water connections, or
(3) That the applicant has failed to agree to reasonable, generally applicable terms and conditions of water service.

In accordance with SB1087, the City of Santa Cruz shall include in its adopted Urban Water Management Plan, the projected water use for single-family and multifamily housing needed for lower income households.

If, in the future, the situation arises that two or more housing projects are before the City or other jurisdiction receiving water service from the City for consideration and there is not sufficient water supply capacity to serve them all, priority will be give to the housing project with the largest number of affordable units.

PROCEDURE: Procedures and definitions for implementing this policy shall be consistent with Government Code Section 65589.7, and shall take into account any water shortage regulations and restrictions adopted pursuant to Water Code Section 350 *et seq.*, and the availability of water supplies according to the City's adopted Urban Water Management Plan. This policy shall be reviewed by the Director at least once every five years.

EFFECTIVE DATE: August 1, 2006 (Reviewed: July 13, 2011)

This policy shall be effective (08-01-06) and remain effective until revised or rescinded.

Submitted:	Approved
Engineering Manager	Water Director

GARY FISKE AND ASSOCIATES, INC.
Water Resources Planning and Management

Date:	August 1, 2011
From:	Gary Fiske
To:	Linette Almond
Re:	Integrated Water Plan Supply Model Update

Introduction

The Santa Cruz Integrated Water Plan (IWP) was completed in 2003, with a brief addendum in May 2005 which validated the plan in light of some minor water rights assumption changes. The primary purpose of the IWP was to 1) reduce near-term drought year shortages; and 2) provide a reliable supply that meets long-term needs while ensuring protection of public health and safety. The IWP developed and evaluated a set of water resource strategies that were intended to meet the needs of the City's water customers over a planning horizon that extended through the year 2030. Each strategy included different mixes of water conservation, customer curtailments during times of drought, and new water supplies and infrastructure.

Through the IWP process, the ability of the Santa Cruz water supply and delivery system to serve current and future customer demand under differing hydrologic conditions (the "water supply reliability") was assessed, and alternative strategies to ensure that the system achieves and maintains an acceptable level of reliability in the future were evaluated. In November 2005, the Santa Cruz City Council adopted the IWP which recommended implementation of the Water Conservation Plan, curtailment of water deliveries of up to 15% during drought, and construction of a 2.5 million gallon per day desalination plant with the ability to expand the plant to 4.5 million gallons per day to meet future needs. The Council also certified the IWP Program Environmental Impact Report and selected a cooperative operational scenario of the desalination plant with the Soquel Creek Water District (SqCWD) as the preferred alternative.

The City continues to evaluate a possible desalination plant and examine ways to protect anadromous species as it develops a Habitat Conservation Plan (HCP), both of which could significantly change the operation of the City's water supply system and represent potentially large financial outlays. Because many of the key assumptions upon which the IWP was based have changed in the intervening years, the Santa Cruz Water Department (SCWD) believed it was prudent to update the IWP supply modeling to test how these changed assumptions affect the need for a new supply source, and to ensure that the analysis of HCP options are accurately portraying their impacts on water supply reliability.

Key Changes since the IWP

The supply modeling update incorporated a variety of changed assumptions, which are detailed in Appendix A. The key changes include:

1. Demand. Actual demands have been significantly lower than originally forecast in the original IWP (2005). As a result, SCWD staff developed a revised forecast envelope. The original IWP analysis was based on a demand forecast which increased from 4.6 to 5.3 billion gallons per year

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(BGY) between 2010 and 2030. The new “low” forecast grows from 3.5 BGY in 2010 to 4.0 BGY in 2030. The “high” forecast grows from 4.0 to 4.5 BGY. A staff memorandum providing a detailed description of this forecast is included as Appendix B. The two demand forecasts represent an estimated range of water demands likely to be encountered between 2010 and 2030.

The use of an envelope spanning 2010 to 2030 enables easy comparisons to other documents such as the City’s General Plan as well as the original IWP work. While actual 2010 water demands were lower than the forecast 2010, it must be understood that actual water demands vary from year to year due to many factors including temperature and rainfall patterns as well as economic conditions and are unlikely to exactly match the forecast in any given year. The forecast however represents the City’s best estimate of water needs based on population, employment, and land use for the service area and factors such as temperature and precipitation, which are taken into account within the Confluence model. In addition, it should be noted that all water demands within the envelope have actually occurred in the water system since 2000 indicating that they represent a very realistic range of water needs.

2. <u>Stream flows</u>. The hydrologic data that formed the basis of the IWP have been revised. The original IWP supply modeling was based on hydrologic data developed by Linsley Kraeger Associates in 1980 and later updated for the Alternative Water Supply Project (Carollo, 2000). As part of the HCP process, Balance Hydrologics further updated the stream flow data to include historical stream flow data through 2009 and, using a new hydrologic model, developed stream flow data for the period 1937 – 2009 for the North Coast streams. In addition to updating the “unimpaired” flows of the IWP, the HCP process also developed alternative flow bypass scenarios to enhance fish habitat. As described in the April 5, 2011 Habitat Conservation Plan Update presented to City Council, environmental flow “types” are categorized as Tier 1, 2, and 3 for ease of explanation.

   - Unimpaired refers to North Coast stream flows available to the City for diversion without consideration of habitat needs.
   - Tier 1 refers to the flows that would simply maintain current fish habitat levels. The City began voluntarily releasing these environmental flows in 2007 and 2008. No water supply reliability analysis was conducted with these flows due to their voluntary nature and the very low probability that these flows might be found acceptable for protecting habitat.
   - Tier 2 refers to flows that would improve habitat compared to what now exists.
   - Tier 3 flows would significantly improve stream flows to provide 80% of optimum flows for fish habitat.

   Each of the stream flow scenarios results in reduced flow volumes available for SCWD diversion. The rule tables that define the scenarios are included as Appendix C.

3. <u>Newell Creek/Loch Lomond Reservoir</u>. The water rights assumptions for Newell Creek remain the same, namely:

   - Maximum annual withdrawal limit of 3200 acre-feet.
   - No storage of Newell Creek inflows in months of June-September.
   - Minimum downstream release of 1 cfs.

Due to updated bathymetry data, the reservoir's "dead" storage volume has been reduced from 100 mg to 70 mg. Reservoir rule curves have been adjusted to accommodate this as well as the other changes in system demand and supply

4. Groundwater supply. A key SCWD supply source is the Beltz well field. In the IWP, it was assumed that there would be 2 mgd of well capacity available to the SCWD system during times of drought when Loch Lomond reservoir is drawn down, with 1 mgd available at all other times. Based on recent monitoring well data, the Soquel Creek Water District's (SqCWD) Well Master Plan and associated environmental review, and an ongoing effort to cooperatively manage the Purisima basin with SqCWD, the City has determined that 2 mgd will not be available during drought. Rather, a limit on the average annual pumping has been established for the SCWD. On an annual basis, SCWD will limit its withdrawal to no more than 520 acre-feet per year (afy) (approximately 170 million gallons per year (mgy)) of Purisima pumping on average. Groundwater production from the Purisima may jump to as much as 645 afy (approximately 210 mgy) in times of drought.

   Operationally, the City intends to maintain at least 0.8 mgd of capacity at its coastal production well system, shifting a portion of its pumping inland during drought periods if it can drill and operate a new inland well.

   For purposes of the supply model update, three Beltz operational scenarios were analyzed:

   - 1.0 mgd available in non-drought years in the months of May-October; 0.8 mgd available during these months in drought years.
   - 0.8 mgd available every year during the months of April-November.
   - 0.8 mgd available every year during the months of April-November, with an additional 0.3 mgd available during the months of June-August in drought years.

   While all of these Beltz operational assumptions result in a significant reduction in system reliability when compared to the original IWP groundwater assumption, the reliability impacts of the three scenarios were virtually indistinguishable from one another. The City is currently pursuing an inland production well to achieve the third operational scenario noted above.

5. Transmission losses. The IWP assumed substantial losses in the North Coast transmission system. Specifically, the loss rate was assumed to ramp down from 15% in 2009 to 1% by 2021 as repairs were made. Since the IWP was completed, SCWD has carefully monitored the North Coast system and concluded that the losses are not as high as originally assumed. Additionally, since the repair project will span a much longer period than originally anticipated (the first segment of pipe was installed in 2006 and will be 25 years old when the project is completed), a slightly larger long term future leakage rate is anticipated. Based on this monitoring, and the anticipated rate of repair, the update is assuming that North Coast transmission losses will ramp down from 8% in 2011 to 3% in 2031.

6. Turbidity. During high-rainfall events, the North Coast streams and the San Lorenzo River supply can be unavailable due to high turbidity. These events result in increased drawdown of Loch Lomond. In the IWP model update, turbidity constraints were revised to better calibrate modeled results with actual operations during the wet season.

7. Desalination. Since the original IWP, an agreement has been reached with SqCWD regarding how the capacity of a 2.5 mgd plant would be shared between the two water utilities in different months of the calendar year. That agreement is reflected in the supply modeling update. Furthermore, the earliest on-line date for this 2.5 mgd plant is assumed to be 2015, with additional capacity potentially available at 5-year increments. New supply is added only when needed to maintain an adequate level of system reliability. A key purpose of the updated modeling is to test the near-term sufficiency of the 2.5 mgd project, and to better understand long-term needs under different demand and stream flow scenarios.

ANALYTICAL RESULTS

The detailed results are tabulated in Appendix D. Following are discussions of the key analytical outcomes of the supply model update.

Comparative Results: Unimpaired Flows

While there are many ways to measure water supply reliability, for purposes of this memorandum we have chosen two key metrics that are relevant to the SCWD's water supply system and consistent with the original IWP analysis:

- **Drought-year peak season shortage**. The percentage peak-season (May-October) shortage in the second year of the 1976-1977 drought, the worst shortage that SCWD customers would be expected to experience.
- **Curtailment profile**. The frequency of occurrence of peak season shortages of various magnitudes. The original IWP structured curtailment profiles in accordance with the Water Curtailment Study (Gary Fiske and Associates, 2001) as smaller than 10%, between 10% and 20%, between 20% and 30%, and exceeding 30%. However, as the IWP developed, shortage levels of 15% and 25% became key decision points. After the IWP was completed, the City's Water Shortage Contingency Plan (SCWD, 2009) defined activities and actions to be undertaken by City staff and customers by shortage levels less than 5%, between 5% and 15%, between 15% and 25%, and exceeding 25%. This IWP model update maintains this latest shortage level categorization to be consistent with the most current planning efforts.

All results in this memo should be compared to the water supply reliability targets adopted by the Santa Cruz City Council to guide the IWP, which are shown in Table 1. Note that the occurrence frequencies in the original IWP curtailment profiles did not reflect years with peak-season shortages of zero. For purposes of the HCP analysis, it was important to include those years in the lowest peak-season shortage category. Therefore, for ease of comparison, Table 1 shows the "<10% peak-season shortage" category in both ways.

Table 1. IWP Model Water Supply Reliability Targets

PROBABILITY OF:			WORST-YEAR PEAK-SEASON SHORTAGE (%)
<10% Peak-Season Shortage	10-20% Peak-Season Shortage	>20% Peak-Season Shortage	
6-9 in 59 (0.10-0.15) [a] 58 in 59 (0.98) [b]	1 in 59 (0.02)	0	15%

a. Excluding zero shortages
b. Including zero shortages

The IWP water supply reliability target limits the maximum peak season shortage to 15% occurring once in the historical record of 59 years. Smaller peak season shortages of less than 10% happen more frequently, up to 9 times in the 59 year record.

Table 2 shows the corresponding water supply reliability profile based on the updated assumptions described above. The figures in the table reflect current supplies and unimpaired flows with no HCP bypass (environmental flow) requirements and are expressed as a range to reflect future water demand uncertainty. Subsequent sections will address the impacts of HCP-induced reductions in available flows.

In this and subsequent tables, the "<5% peak-season shortage" category includes years with zero peak-season shortage.

Table 2. Updated Baseline of Water Supply Reliability

	PROBABILITY OF:				WORST-YEAR PEAK-SEASON SHORTAGE (%)
	<5% Peak-Season Shortage	5-15% Peak-Season Shortage	15-25% Peak-Season Shortage	>25% Peak-Season Shortage	
Near-term (2010)	66 - 72 in 73 (0.90 - 0.99)	1 - 2 in 73 (0.01 0.02)	0 - 4 in 73 (0.00 - 0.06)	0	12% - 30%
Long-term (2030)	51 - 64 in 73 (0.70-0.88)	7 - 13 in 73 (0.09 - 0.18)	0 - 3 in 73 (0.00 - 0.04)	2 - 6 in 73 (0.03 - 0.08)	23% - 37%

When compared to the original IWP, the updated assumptions improve system reliability. Drought year shortages are reduced and shortages in other hydrologic years are generally smaller. However, even with low demands, the system still falls significantly short of the Council-adopted target in the long-term, indicating a need for additional supply. With high demands, system reliability misses the target by a substantial margin in both the short and long term.

Table 3 shows the cumulative totals of desalination capacity needed to achieve and maintain the IWP reliability target through 2030. The updated assumptions result in a significantly-reduced need for new supply over the next 20 years.

Table 3. Total Desalination Capacity Needed to Maintain 15% Drought-Year Peak-Season Shortage Target (mgd)

Scenario	2015	2030
IWP Update	0 - 1.50	0.75 - 3.25
Original IWP	2.50 [a]	4.50

a. Initial capacity increment assumed in original IWP to be operational in 2009.

Comparative Results: Tier 2 Environmental Flows

The modeling update also examined the impacts of two flow scenarios developed in the HCP process. As described above, Tier 2 flows represent an increasing degree of habitat protection, and therefore a decreasing volume of stream flows available for diversion to meet water demands. Table 4 shows the Tier 2 reliability impacts with current supplies.

Table 4. Water Supply Reliability: IWP Model Update with Tier 2 Flows

	PROBABILITY OF:				WORST-YEAR PEAK-SEASON SHORTAGE (%)
	<5% Peak-Season Shortage	5-15% Peak-Season Shortage	15-25% Peak-Season Shortage	>25% Peak-Season Shortage	
Near-term (2010)	64 - 67 in 73 (0.87-0.92)	2 - 4 in 73 (0.03 – 0.05)	1 - 3 in 73 (0.02 – 0.04)	1 - 4 in 73 (0.01 – 0.06)	37% - 43%
Long-term (2030)	13 - 65 in 73 (0.18-0.89)	1 - 39 in 73 (0.02 – 0.53)	3 - 12 in 73 (0.04 – 0.16)	4 - 9 in 73 (0.05 – 0.13)	42% - 51%

Comparing these results to those in Table 2, we see that, as expected, if SCWD were to implement Tier 2 releases under all hydrologic conditions, the reductions in flows available for diversion result in marked degradations of reliability. Both near-term and long-term water supply reliability is unacceptably low. However, Table 4 also shows that, under many, if not most, hydrologic conditions, Tier 2 releases could be made without imposing significant shortages on SCWD customers.

Table 5 shows that, if Tier 2 releases were implemented under *all* hydrologic conditions, achieving the IWP reliability target would require a total of between 2.50 and 4.25 of desalination capacity by 2030.

Table 5. Total Desalination Capacity Needed to Maintain 15% Drought-Year Peak-Season Shortage Target AND Tier 2 Environmental Flows (mgd)

Scenario	2015	2030
Tier 2 Flows	2.25 – 3.25	2.50 – 4.25
IWP Update	0 - 1.50	0.75 - 3.25
Original IWP	2.50 [a]	4.50

a. Initial capacity increment assumed in original IWP to be operational in 2009.

If SCWD relaxed the drought year reliability target to 25% rather than 15%, the required Tier 2 2030 desalination capacity is reduced to between **1.50 and 3.25** mgd.

Comparative Results: Tier 3 Environmental Flows

Of the flow scenarios examined in the HCP process, Tier 3 is the one that leaves the most water in the streams for fish habitat, and thus results in the smallest volumes available for diversion.

If the foregoing increments of desalination capacity necessary to maintain the IWP reliability targets with Tier 2 flows were brought to fruition, a critical question is how the system would then perform with Tier 3 flows under differing hydrologic conditions. Table 6 addresses this question for the high demand forecast, and shows that, even with the new supply capacity required to enable Tier 2 releases under all hydrologic conditions, Tier 3 releases in all conditions would result in unacceptably low water supply reliability. However, the table also shows that, even assuming high demands, the peak-season shortage is less than 5% in nearly half of the hydrologic conditions. These are conditions under which SCWD could comfortably implement Tier 3 instream flows.

Table 6. Water Supply Reliability: IWP Model Update with Tier 3 Environmental Flows and Tier 2 Desalination Capacities

	PROBABILITY OF:				WORST-YEAR PEAK-SEASON SHORTAGE (%)
	<5% Peak-Season Shortage	5-15% Peak-Season Shortage	15-25% Peak-Season Shortage	>25% Peak-Season Shortage	
Near-term (2015)	34 - 55 in 73 (0.47 - 0.75)	8 - 23 in 73 (0.11 - 0.31)	3 - 7 in 73 (0.04 - 0.10)	7 - 9 in 73 (0.10 - 0.12)	48% - 57%
Long-term (2030)	34 - 49 in 73 (0.47 – 0.67)	13 - 25 in 73 (0.18 - 0.34)	4 - 7 in 73 (0.05 - 0.09)	7 in 73 (0.10)	48% - 53%

Table 7 shows the extremely large desalination capacity levels required to achieve the IWP reliability target with Tier 3 flows.

Table 7. Total Desalination Capacity Needed to Maintain 15% Drought-Year Peak-Season Shortage Target AND Tier 3 Environmental Flows (mgd)

Scenario	2015	2030
Tier 3 Flows	7.5 - 8.75	8.0 - 9.75
Tier 2 Flows	2.25 - 3.25	2.75 - 4.25
IWP Update	0 - 1.50	0.75 - 3.25
Original IWP	2.50 [a]	4.50

a. Initial capacity increment assumed in original IWP to be operational in 2009.

If SCWD relaxed its drought year reliability target to 25% rather than 15%, the required Tier 3 2030 desalination capacity is between **6.5 and 8.0** mgd.

CONCLUSION

This update of the IWP analysis yielded the following key conclusions:

- Prior to consideration of HCP and diminished supplies resulting from environmental flows, the updated assumptions result in an improved water supply reliability outlook when compared to the original IWP. While current supplies are still inadequate to achieve the target reliability levels, the needed new supply capacity is significantly smaller over the planning period than projected in the 2005 IWP.

- Environmental flows being considered in the HCP process significantly degrade water supply reliability:

    - Under both the high and low demand forecasts, Tier 2 environmental flows result in reliability levels significantly below targeted levels. Assuming low demand growth, the 2.5 mgd desalination plant currently being evaluated by SCWD is sufficient to improve reliability to the IWP targets through 2030. Assuming high demands, achievement of the targets through 2030 would require an additional 1.75 mgd (for a total of 4.25 mgd).

    - Assuming the high demand forecast, these Tier 2 desalination capacities would permit Tier 3 instream flows without unacceptable water supply reliability impacts in approximately half of the historical hydrologic conditions. With a low demand forecast, this would occur in two-thirds to three-quarters of hydrologic conditions.

    - Provision of Tier 3 environmental flows *every* year would require infeasible levels of new supply capacity to maintain the IWP reliability targets.

APPENDIX A

ASSUMPTION CHANGES IN IWP MODEL UPDATE

The following table shows only the assumptions that have changed between the original IWP and the update.

DESCRIPTION	ORIGINAL ASSUMPTIONS	MODIFIED ASSUMPTIONS
General Assumptions		
Daily temperature & rainfall	Historical record through 2000	Extend through 2009
Monthly Loch Lomond evaporation and rain on surface	Historical record through 1996	Extend through 2009
Demand forecast	4.6 (2010) - 5.3 (2030) BGY	Low: 3.5 (2010) – 4.0 (2030) BGY High: 4.0 (2010) – 4.5 (2030) BGY
Stream flows	Daily historic flow data (1937-1996) developed by Linsley Kraeger. Peak-season flows reduced by 10%.	Daily historic flow data (1937-2009) developed by Balance Hydrologics under varying HCP scenarios. No peak-season reduction.
North Coast Supplies		
Transmission losses	Losses between North Coast and Coast Pump Station are assumed to ramp down from 15% prior to 2009 to 1% in 2021.	Losses between North Coast and Coast Pump Station are assumed to ramp down from 8% prior to 2011 to 3% in 2031.
Beltz Wells		
Available capacity	1 mgd assumed available at all times; additional 1 mgd assumed available in drought years.	0.8 mgd available every year during the months of April-November, with an additional 0.3 mgd available during the months of June-August in drought years.
Felton Diversion		
Turbidity constraint	If current day rainfall at weather station exceeds 0.67 inches, shut down current day plus (3x current day rainfall) additional days.	If current day rainfall at weather station exceeds 0.67 inches, shut down current day plus 2 following days.
Water rights	Instream: Nov-May: 23 cfs Sept: 13 cfs Oct: 28 cfs Diversion: Nov-May: 20 cfs Oct: 20 cfs	Instream - Greater of HCP reqmt &: Nov-May: 25 cfs * Sept: 15 cfs * Oct: 30 cfs * Diversion: Nov-May: 20 cfs Sept: 7.8 cfs Oct: 20 cfs * Includes 5 cfs operational margin
Tait Street Diversion		
Tait Street wells	Assumed to add 1.86 cfs to available river flows	Assumed to add 1.78 cfs to available river flows
Turbidity constraint	If current day rainfall at weather station exceeds 0.67 inches, shut down current day plus (3x current day rainfall) additional days.	If current day rainfall at weather station exceeds 0.67 inches, shut down current day plus 2 following days.

Loch Lomond		
“Dead” storage	100 mg	70 mg
Rule curves	Set to result in Oct 31 lake level of: • Dead Storage plus • 1 billion gallons minus • Potential peak-season desalination production	Modified as necessary for consistency with changes in demand and supply assumptions
Desalination		
Availability of initial capacity increment	2009	2015
Monthly availability	Full capacity available to SCWD year-round	Per agreement with Soquel Creek Water District, first 2.5 mgd available to SCWD as follows: Nov: 50% Dec-Mar: 0 Apr: 50% May-Oct: 100% Additional capacity 100% available to SCWD year-round.
Local Treated Water Storage		
Storage capacity	22 mg	14.8 mg

APPENDIX B

DESCRIPTION OF UPDATED DEMAND FORECASTS

WATER DEPARTMENT

MEMORANDUM

DATE: March 16, 2011

TO: Bill Kocher, Water Director

FROM: Toby Goddard, Water Conservation Manager

SUBJECT: Updated 2010-2030 Water Demand Forecast (corrected, revised)

The purpose of this memo is to describe and document the various methods and assumptions used to develop an updated water demand forecast for the Santa Cruz City water service area.

BACKGROUND: The last time the City's water demand forecast was updated was in 2005, as part of the Urban Water Management Plan. There were two "scenarios" developed at the time, one based on a continuation of existing trends at a growth rate of 0.4 percent annually and another, higher forecast reflecting the potential for housing growth contained on local plans involving an 0.8 percent annual growth rate. The forecast horizon extended only to 2020. Most recently, this forecast was used in developing the Water Supply Assessment for the Sphere of Influence Amendment EIR.

With another Water Supply Assessment needed for the City's 2030 General Plan, rather than rely on the previous forecast, the decision was made, considering the many changes that have occurred since the last forecast was made and the need to update it soon for the next Urban Water Management Plan, that a new forecast should be developed based on the potential growth foreseen in the City's new General Plan.

DISCUSSION: The format for the forecast differs somewhat from previous versions. The timeline extends from 2010 to 2030, in five year increments, as does AMBAG's population forecasts, similar to previous forecasts. The service area, however, is divided into two major categories, within Santa Cruz City, and outside the city, which includes unincorporated Santa Cruz County, the City of Capitola and the north coast. Within these two basic geographic areas, there are separate line items for each major customer category. The University of California is treated separately on its own line item. The purpose of this arrangement is to allow for an analysis of the growth in demands within just the city of Santa Cruz, excluding UCSC, for the EIR on the 2030 General Plan and the accompanying water supply assessment, and to develop a forecast for the service area as a whole needed for the next Urban Water Management Plan.

We use different forecasting approaches inside and outside the city. Within the City, we developed water duties from the utility billing system for various residential and commercial sectors listed in the 2030 buildout projections (DC&E, 2009). Those buildout projections were combined with water duties to estimate 2030 water demand in the City, and then interpolated between 2010 and 2030 to arrive at 5-year increments. For UC Santa Cruz, we used figures referenced in Water Supply Assessment for the Sphere of Influence Amendment EIR that are based on the latest long range development plan (as modified by the final EIR and settlement agreement) out to the year 2020. Outside the city, there is no land use information available to inform future water demand. Instead, existing water demands were scaled up in all relevant customer categories in proportion to population growth forecast in 2008 by AMBAG of about 8 percent over 20 years, or about 0.4 percent annually

[1]. Finally, an additional line was added to account for miscellaneous uses and water losses to develop the total annual water requirements for the entire water service area.

The two scenarios differ mainly based on assumptions about the level of water use at existing accounts. The lower scenario (Scenario 2) relies on average water use for each sector (expressed in gallons per account per day) that occurred during the 2007-08 baseline time period prior in the recent water restrictions. The higher scenario (Scenario 1) relies on normal water use levels that were stable for many years during an earlier baseline period, from 1999 through 2004, prior to several changes that took place with regard to weather, water rates and the economic downturn. Both represent actual usage levels in the relatively recent past. In both scenarios, the consumption levels used were obtained from the Water Demand Modeling and Analysis report/models prepared by Weber Analytical (2010) and were normalized for weather effects.

The 2010 starting point both inside and outside the City was developed by combining per account water use levels with the current number of water accounts in each class. Since 2010 figures for the number of accounts is not available yet, we used a count of accounts from the end of calendar year 2009 and escalated them one year based on current growth rates.

The following discusses the forecasting particulars within each sector.

Inside Santa Cruz

Single Family Residential: For 2010, it is assumed there are there are 12,121 existing accounts, using an average of 218.1 gpd/a (S-1) or 189.7 gpd/a (S-2). New accounts are assumed to use an average of 194gpd/a based on actual data collected on new accounts added from1996 to present. The 2030 General Plan foresees 840 new SFR homes possible in 2030.

Multi-family Residential: For 2010, it is assumed there are there are 1,771 existing accounts, using an average of 730.1 gpd/a (S-1) or 631.9 gpd/a (S-2). New accounts are assumed to use an average of 70 gpd/dwelling unit based on actual data collected on new accounts added from1996 to present. The 2030 General Plan foresees 2,510 new MFR homes possible in 2030.

Business/Industrial: For 2010, it is assumed there are there are 1,265 existing business accounts, using an average of 917.2 gpd/a (S-1) or 866.8 gpd/a (S-2). Industrial usage in both cases is assumed to be 25 mgy. There are four types of commercial growth listed in the 2030 General Plan buildout analysis: Commercial, Hotel, Office and Industrial. We developed water factors for each type based on billing data and square footage available on the County Assessor's web site at various accounts. We used a median water duty of 66 gpy/sq ft for the commercial category, 93 gpd/room for the hotel category, 18 gpy/sq ft for the office category and 12 gpy/sq ft for industrial land use type. This is compared to 65 gpy/sq ft for the high use commercial category, 90 gpd/room for the hotel category, 23 gpy/sq ft for the office category and 23 gpy/sq ft for industrial land use type used in other environmental impact studies and that were based on rates developed by the Monterey Peninsula Water Management District. The General Plan buildout analysis foresees 1,087,933, sq ft of new commercial space, 311 new hotel rooms, 1,273,913 sq ft of new office space and 776,926 sq ft of new industrial space. These combine to produce 114.6 mgy in new business/industrial water demand by 2030.

Municipal: For 2010, it is assumed there are there are 227 existing accounts, using an average of 671.3 gpd/a (S-1) or 657.6 gpd/a (S-2). According to Parks staff, there is potentially 3.5 acres in new park development in the future that would add 2 mgy in new water demand.

Irrigation/Golf: For 2010, it is assumed there are there are 240 existing irrigation accounts, using an average of 885.4 gpd/a (S-1) or 755.4 gpd/a (S-2). The De Laveaga Golf Course is assumed to use 139,487 gpd/a (S-1) or 134,824 gpd/a (S-2). It is assumed there is no growth in golf demand but irrigation accounts are grown in proportion to average growth rate of SFR, MFR and BUS/IND combined (12 percent over 20 years, or about 0.6 percent per year)

UC Santa Cruz: For UCSC, it is assumed that 2010 usage runs around 212 mgy (200 mgy for the main campus, 2 mgy for the Delaware facility, and 10 mgy for the marine science campus), which was used as 2007 existing water demand in the recent Water Supply

Assessment for the Sphere of Influence Amendment EIR. We scale this up by 126 mgy by 2020 in accordance with the figures referenced in the Water Supply Assessment/Sphere of Influence Amendment EIR for both the University Main campus and Marine Science Campus. After that, an additional 10 million gallons is included for the period 2020-2030 representing an assumption for continuing enrollment growth of about 350 students per year, of which the demand estimate is based on actual historic rate of growth in water demand and enrollment/on campus population that occurred between 1987 and 2008.

Outside Santa Cruz

Single Family Residential: For 2010, it is assumed there are there are 6,755 existing accounts, using an average of 235.8 gpd/a (S-1) or 203.7 gpd/a (S-2). New accounts are increased in proportion to population increase per AMBAG of 8.2% over 20 years (0.4% per year).

Multi-family Residential For 2010, it is assumed there are there are 945 existing accounts, using an average of 1,184 gpd/a (S-1) or 974.2 gpd/a (S-2). New accounts are increased in proportion to population increase per AMBAG of 8.2% over 20 years.

Business/Industrial: For 2010, it is assumed there are there are 630 existing accounts, using an average of 1,186.1 gpd/a (S-1) or 1003.6 gpd/a (S-2). New accounts are increased in proportion to population increase per AMBAG of 8.2% over 20 years.

Municipal: Not applicable outside the City.

Irrigation: For 2010, it is assumed there are there are 201 existing irrigation accounts, using an average of 956.6 gpd/a (S-1) or 765.1 gpd/a (S-2). The Pasatiempo Golf Course is assumed to use 139,487 gpd/a (S-1) or 134,824 gpd/a (S-2). In addition 25 mgy is added to this category to account for to coast agriculture. New accounts are increased in proportion to population increase per AMBAG of 8.2% over 20 years.

Other Miscellaneous Uses and Water Losses. Miscellaneous uses consist of construction accounts, and bulk water use, and average 4 mgy. Water losses (which includes physical leakage, apparent losses from meter error, as well as unmetered authorized uses such as system flushing, process water use at the treatment plant, fire usage, sewer flushing and other similar uses) are estimated at 7.5 percent of overall treated water production, which represents, in round numbers, the average level of annual loss experienced on the city water system over the past 10 years.

Total Water Demand

For Scenario 1, Total Water Demand is estimated to be 3,993 mgy in 2010, growing to 4,537 mgy by 2030, an increase of 544 mg or 14 percent over 20 years, or 27.2 mgy and 0.7 percent annually.

For Scenario 2, Total Water Demand is estimated to be 3,522 mgy in 2010, growing to 4,046 mgy by 2030, an increase of 524 mg or 15 percent over 20 years, or 26.2 mgy and 0.7 percent annually.

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[1] AMBAG projections revised 6/10/11 show the outside City population increasing from 33,246 in 2010 to 35,816 in 2030, for an increase of 2,570.

APPENDIX C

HCP FLOW RULE TABLES

	Minimum Flow at Liddell Creek Anadromous Gage[2] (in cfs)								
	Rearing Baseflow					Migration		Spawning	
	80-100% Exc. Category	60-80% Exc. Category	40-60% Exc. Category	20-40% Exc. Category	0-20% Exc. Category	Adult[3]	Smolt	Spawn[4]	Incubate[5]
	TIER I								
Jan	0.7	1.1	1.4	2.1	4.4				
Feb	1.0	1.5	2.6	4.2	5.9				
Mar	1.1	2.0	2.8	4.1	5.8				
Apr	1.0	1.7	2.3	3.8	5.6				
May	0.6	1.4	2.0	2.9	4.5				
Jun	0.4	0.9	1.3	1.9	2.9				
Jul	0.3	0.6	0.9	1.2	1.8				
Aug	0.2	0.5	0.7	0.9	1.3				
Sep	0.2	0.4	0.6	0.7	1.0				
Oct	0.2	0.4	0.6	0.7	0.9				
Nov	0.4	0.7	0.9	1.0	1.2				
Dec	0.7	0.9	1.1	1.3	1.9				
	TIER II								
Jan	0.7	1.1	1.4	2.1	4.4	11.3		7.4	2.0
Feb	1.0	1.5	2.6	4.2	5.9	11.3		7.4	2.0
Mar	1.1	2.0	2.8	4.1	5.8	11.3		7.4	2.0
Apr	1.0	1.7	2.3	3.8	5.6	11.3		7.4	2.0
May	0.6	1.4	2.0	2.9	4.5				2.0
Jun	0.4	0.9	1.3	1.9	2.9				
Jul	0.3	0.6	0.9	1.2	1.8				
Aug	0.2	0.5	0.7	0.9	1.3				
Sep	0.2	0.4	0.6	0.7	1.0				
Oct	0.2	0.4	0.6	0.7	0.9				
Nov	0.4	0.7	0.9	1.0	1.2				
Dec	0.7	0.9	1.1	1.3	1.9	11.3[6]		7.4[15]	2.0[15]
	TIER III								
Jan	1.7	2.1	3.0	3.9	5.5	11.3		7.4	2.0
Feb	1.9	2.9	3.9	4.9	5.9	11.3		7.4	2.0
Mar	2.1	2.8	3.7	4.7	5.8	11.3		7.4	2.0
Apr	1.7	2.2	2.8	3.8	5.6	11.3	2.0	7.4	2.0
May	1.5	2.0	2.5	3.3	4.5		2.0		2.0
Jun	1.3	1.6	1.9	2.3	3.0				
Jul	1.2	1.4	1.6	1.8	2.3				
Aug	1.1	1.3	1.4	1.6	1.9				
Sep	1.1	1.2	1.3	1.5	1.6				
Oct	1.2	1.3	1.4	1.5	1.7				
Nov	1.4	1.5	1.6	1.8	2.2				
Dec	1.5	1.7	2.0	2.4	3.9	11.3		7.4	2.0

[2] These values represent a floor for City diversions such that diversions would not reduce flow below these levels. Actual flows are often substantially higher than maximum diversion rates so flow in the anadromous reach is often substantially higher than the numbers in the table. If the proposed minimum instream flow is greater than flow without the City diversion, then the City diversion would not operate. All flow above the proposed level for each time period is available for diversion, up to the diversion limit for each facility.

[3] Coincident with each occurrence of daily average flow in the anadromous reach (absent City diversion) at or exceeding minimum migration flow. Reverts to spawning flow if daily average flow without City diversion falls below minimum migration flows after migration event. A migration event occurs when the stream mouth is open and daily average flow in the anadromous reach without City diversion equals or exceeds minimum migration flow for at least 2 days.

[4] 80% of peak steelhead spawning weighed useable area (WUA) for 14 day period after any potential migration event.

[5] For 60 day period following occurrence of spawning flow or until June 1.

[6] Provided in 0% to 60% excerdence categories only for Tier II.

	Minimum Flow at Laguna Creek Anadromous Gage[7] (in cfs)								
	Rearing Baseflow					Migration		Spawning	
	80-100% Exc. Category	60-80% Exc. Category	40-60% Exc. Category	20-40% Exc. Category	0-20% Exc. Category	Adult[8]	Smolt Migration Threshold	Spawn[9]	Incubate[10]
	TIER I								
Jan	0.6	1.4	1.4	1.9	3.6				
Feb	0.9	1.5	2.7	3.6	5.8				
Mar	1.2	2.1	2.7	3.4	6.5				
Apr	0.4	0.8	0.9	1.6	4.2				
May	0.4	0.7	0.9	1.4	2.2				
Jun	0.3	0.5	0.7	1.0	1.2				
Jul	0.1	0.3	0.3	0.6	0.6				
Aug	0.1	0.2	0.2	0.3	0.4				
Sep	0.1	0.2	0.5	0.4	0.4				
Oct	0.4	0.6	0.8	1.0	1.2				
Nov	0.4	0.9	1.1	1.2	1.4				
Dec	0.6	1.0	1.2	1.4	1.6				
	TIER II								
Jan	1.1	1.4	1.4	3.2	4.9	15.5		9.4	4.0
Feb	1.0	1.9	2.7	4.6	6.5	15.5		9.4	4.0
Mar	1.1	2.1	2.7	4.6	6.5	15.5		9.4	4.0
Apr	1.2	2.0	2.8	4.1	6.3	15.5	3.8[11]	9.4	4.0
May	0.8	1.7	2.6	3.5	4.9		3.8		4.0
Jun	0.6	1.1	1.7	2.4	3.0				
Jul	0.3	0.4	0.4	0.6	0.8				
Aug	0.2	0.3	0.4	0.7	0.9				
Sep	0.2	0.4	0.5	0.9	1.2				
Oct	0.6	0.7	0.8	1.0	1.2				
Nov	0.8	1.0	1.1	1.4	1.6				
Dec	0.9	1.1	1.3	1.6	1.8	15.5		9.4	4.0
	TIER III								
Jan	1.7	2.4	3.7	4.8	6.5	15.5		9.4	4.0
Feb	2.0	3.4	4.9	5.8	6.5	15.5		9.4	4.0
Mar	2.4	3.4	4.5	5.8	6.5	15.5		9.4	4.0
Apr	1.4	2.1	2.8	4.1	6.3	15.5	3.8	9.4	4.0
May	1.0	1.7	2.6	3.5	4.9		3.8		4.0
Jun	0.6	1.1	1.7	2.4	3.5				
Jul	0.3	0.7	1.0	1.5	2.4				
Aug	0.2	0.5	0.8	1.1	1.7				
Sep	0.2	0.5	0.7	1.0	1.4				
Oct	0.6	0.9	1.2	1.4	1.7				
Nov	0.9	1.4	1.7	1.9	2.4				
Dec	1.0	1.7	2.2	2.8	4.5	15.5		9.4	4.0

[7] These values represent a floor for City diversions such that diversions would not reduce flow below these levels. Actual flows are often substantially higher than maximum diversion rates so flow in the anadromous reach is often substantially higher than the numbers in the table. If the proposed minimum flow is greater than flow without the City diversion, then the City diversion would not operate. All flow above the proposed level for each time period is available for diversion, up to the diversion limit for each facility.

[8] Coincident with each occurrence of daily average flow in the anadromous reach (absent City diversion) at or exceeding minimum migration flow. Reverts to spawning flow if daily average flow without City diversion falls below minimum migration flows after migration event. A migration event occurs when the stream mouth is open and daily average flow in the anadromous reach without City diversion equals or exceeds minimum migration flow for at least 2 days.

[9] 80% of peak steelhead spawning WUA for 14 day period after any potential migration event.

[10] For 60 day period following occurrence of spawning flow.

[11] No smolt migration flows in 80-100% and 60%-80% exceedence categories for Tier II.

	Minimum Flow at Majors Creek Anadromous Gage[12] (in cfs)								
	Rearing Baseflow					Migration		Spawning	
	80-100% Exc. Category	60-80% Exc. Category	40-60% Exc. Years	20-40% Exc. Category	0-20% Exc. Category	Adult[13]	Smolt	Spawn[14]	Incubate[15]
	TIER I								
Jan	0.1	0.2	0.5	1.0	4.5				
Feb	0.2	0.7	1.4	2.9	6.0				
Mar	0.3	1.0	1.6	3.4	5.7				
Apr	0.1	0.4	0.8	1.8	4.9				
May	0.1	0.1	0.6	1.2	2.7				
Jun	0.1	0.1	0.2	0.5	1.2				
Jul	0.1	0.1	0.1	0.1	0.6				
Aug	0.1	0.1	0.1	0.1	0.4				
Sep	0.1	0.1	0.1	0.1	0.2				
Oct	0.1	0.1	0.1	0.1	0.4				
Nov	0.1	0.1	0.1	0.2	0.3				
Dec	0.1	0.1	0.3	0.4	1.0				
	TIER II								
Jan	0.1	0.2	0.5	1.0	4.5	16.0		12.1	2.9
Feb	0.2	0.7	1.4	2.9	6.0	16.0		12.1	2.9
Mar	0.3	1.0	1.6	3.4	5.7	16.0		12.1	2.9
Apr	0.1	0.4	0.8	1.8	4.9	16.0		12.1	2.9
May	0.1	0.1	0.6	1.2	2.7				2.9
Jun	0.1	0.1	0.2	0.5	1.2				
Jul	0.1	0.1	0.1	0.1	0.6				
Aug	0.1	0.1	0.1	0.1	0.4				
Sep	0.1	0.1	0.1	0.1	0.2				
Oct	0.1	0.1	0.1	0.1	0.4				
Nov	0.1	0.1	0.1	0.2	0.3				
Dec	0.1	0.1	0.3	0.4	1.0	16.0[16]		12.1[21]	2.9[21]
	TIER III								
Jan	1.0	1.4	2.0	3.0	5.2	16.0		12.1	2.9
Feb	1.2	1.9	2.9	3.7	6.0	16.0		12.1	2.9
Mar	1.3	1.7	2.7	3.7	5.7	16.0		12.1	2.9
Apr	0.9	1.2	1.6	2.2	4.9	16.0	3.4	12.1	2.9
May	0.6	1.0	1.4	1.8	2.7		3.4		2.9
Jun	0.5	0.8	1.0	1.2	1.7				
Jul	0.4	0.6	0.7	0.9	1.3				
Aug	0.4	0.5	0.6	0.7	1.0				
Sep	0.3	0.4	0.5	0.6	0.8				
Oct	0.5	0.6	0.7	0.8	1.0				
Nov	0.7	0.9	1.0	1.1	1.4				
Dec	0.9	1.0	1.3	1.7	3.2	16.0		12.1	2.9

[12] These values represent a floor for City diversions such that diversions would not reduce flow below these levels. Actual flows are often substantially higher than maximum diversion rates so flow in the anadromous reach is often substantially higher than the numbers in the table. If the proposed minimum flow is greater than flow without the City diversion, then the City diversion would not operate. All flow above the proposed level for each time period is available for diversion, up to the diversion limit for each facility .

[13] Coincident with each occurrence of daily average flow in the anadromous reach (absent City diversion) at or exceeding minimum migration flow. Reverts to spawning flow if daily average flow without City diversion falls below minimum migration flows after migration event. A migration event occurs when the stream mouth is open and daily average flow in the anadromous reach without City diversion equals or exceeds minimum migration flow for at least 2 days.

[14] 80% of peak steelhead spawning WUA for 14 day period after any potential migration event.

[15] For 60 day period following occurrence of spawning flow.

[16] Provided in 0% to 60% exceedence categories only for Tier II

	Minimum Flow at Newell Creek below Dam[17] (in cfs)								
	Rearing Baseflow					Migration		Spawning	
	80-100% Exc. Category	60-80% Exc. Category	40-60% Exc. Category	20-40% Exc. Category	0-20% Exc. Category	Adult	Smolt Migration	Spawn	Incubate
	ALL TIERS								
Jan	1.0	1.0	1.0	1.0	1.0				
Feb	1.0	1.0	1.0	1.0	1.0				
Mar	1.0	1.0	1.0	1.0	1.0				
Apr	1.0	1.0	1.0	1.0	1.0				
May	1.0	1.0	1.0	1.0	1.0				
Jun	1.0	1.0	1.0	1.0	1.0				
Jul	1.0	1.0	1.0	1.0	1.0				
Aug	1.0	1.0	1.0	1.0	1.0				
Sep	1.0	1.0	1.0	1.0	1.0				
Oct	1.0	1.0	1.0	1.0	1.0				
Nov	1.0	1.0	1.0	1.0	1.0				
Dec	1.0	1.0	1.0	1.0	1.0				

[17] These values represent a floor for City diversions such that diversions would not reduce flow below these levels. Actual flows are often substantially higher than maximum diversion rates so flow in the anadromous reach is often substantially higher than the numbers in the table. If the proposed minimum flow is greater than flow without the City diversion, then the City diversion would not operate. All flow above the proposed level for each time period is available for diversion, up to the diversion limit for each facility.

	Minimum Flow below Felton Diversion[18] (in cfs)								
	All Life Stages								
	80-100% Exc. Category	60-80% Exc. Category	40-60% Exc. Category	20-40% Exc. Category	0-20% Exc. Category				
	ALL TIERS								
Jan	20.0	20.0	20.0	20.0	20.0				
Feb	20.0	20.0	20.0	20.0	20.0				
Mar	20.0	20.0	20.0	20.0	20.0				
Apr	20.0	20.0	20.0	20.0	20.0				
May	20.0	20.0	20.0	20.0	20.0				
Jun	No Diversion								
Jul									
Aug									
Sep	10.0	10.0	10.0	10.0	10.0				
Oct	25.0	25.0	25.0	25.0	25.0				
Nov	20.0	20.0	20.0	20.0	20.0				
Dec	20.0	20.0	20.0	20.0	20.0				

[18] These values represent a floor for City diversions such that diversions would not reduce flow below these levels. Actual flows are often substantially higher than maximum diversion rates so flow in the anadromous reach is often substantially higher than the numbers in the table. If the proposed minimum flow is greater than flow without the City diversion, then the City diversion would not operate. All flow above the proposed level for each time period is available for diversion, up to the diversion limit for each facility. From ENTRIX 2004 PRR, Table 1

	Minimum Flow in the San Lorenzo River below Tait Street[19] (in cfs)								
	Rearing Baseflow					Migration		Spawning[20]	
	80-100% Exc. Category	60-80% Exc. Category	40-60% Exc. Category	20-40% Exc. Category	0-20% Exc. Category	Adult	Smolt Migration	Spawn	Incubate
	TIER I								
Jan	3.0	8.0	15.8	16.4	17.5				
Feb	5.0	14.9	15.9	16.7	18.0				
Mar	7.0	15.1	16.3	17.3	18.2				
Apr	5.0	15.8	17.2	17.9	18.4				
May	4.0	15.0	17.7	18.2	18.5				
Jun	1.0	6.0	15.0	18.1	18.5				
Jul	1.0	2.0	8.0	14.0	18.2				
Aug	1.0	1.0	4.0	9.0	12.0				
Sep	1.0	1.0	5.0	6.0	10.0				
Oct	1.0	1.0	4.0	6.0	8.0				
Nov	1.0	4.0	4.0	10.0	12.0				
Dec	2.0	8.0	14.0	16.0	17.6				
	TIER II								
Jan	4.0	13.0	15.8	16.4	17.5	25.2[21]			
Feb	6.0	14.9	15.9	16.7	18.0	25.2			
Mar	8.0	15.1	16.3	17.3	18.2	25.2			
Apr	5.0	15.8	17.2	17.9	18.4	25.2	10.0[22]		
May	4.0	15.0	17.7	18.2	18.5		10.0		
Jun	3.0	6.0	16.6	18.1	18.5				
Jul	3.0	2.0	10.0	14.0	18.2				
Aug	3.0	3.0	6.0	9.0	12.0				
Sep	3.0	3.0	6.0	6.0	10.0				
Oct	3.0	3.0	6.0	6.0	8.0				
Nov	3.0	4.0	6.0	12.0	12.0				
Dec	2.0	13.0	14.0	16.2	17.6	25.2			
	TIER III								
Jan	12.7	14.9	15.8	16.4	17.5	25.2			
Feb	14.2	14.9	15.9	16.7	18.0	25.2			
Mar	14.2	15.1	16.3	17.3	18.2	25.2			
Apr	14.4	15.8	17.2	17.9	18.4	25.2	10.0		
May	11.6	16.6	17.7	18.2	18.5		10.0		
Jun	8.8	13.0	16.6	18.1	18.5				
Jul	6.6	9.7	12.4	15.8	18.2				
Aug	5.9	7.9	9.8	11.9	16.4				
Sep	5.8	7.6	9.0	11.1	13.3				
Oct	6.4	8.4	9.8	11.4	13.3				
Nov	8.1	10.9	12.5	14.1	16.4				
Dec	11.0	13.1	15.1	16.2	17.6	25.2			

[19] These values represent a floor for City diversions such that diversions would not reduce flow below these levels. Actual flows are often substantially higher than maximum diversion rates so flow in the anadromous reach is often substantially higher than the numbers in the table. If the proposed minimum flow is greater than flow without the City diversion, then the City diversion would not operate. All flow above the proposed level for each time period is available for diversion, up to the diversion limit for each facility .

[20] No spawning occurs in this reach.

[21] Adult migration in 0% to 60% exceedence flow conditions only for Tier II. Coincident with each occurrence of daily average flow in the anadromous reach (absent City diversion) at or exceeding minimum migration flow. Reverts to rearing flow if daily average flow without City diversion falls below minimum migration flows after migration event. A migration event occurs when the stream mouth is open and daily average flow in the anadromous reach without City diversion equals or exceeds minimum migration flow for at least 2 days)

[22] Smolt migration in 0%-60% exceedence flow conditions only for Tier II

APPENDIX D

DETAILED MODELING RESULTS

Unimpaired Flows
Drought Years

2010
Low Demand

Year 1	% Shortage	Production/Flow	
			Annual
Drought-Year Peak-Season Shortage	1.4%		
Source Production (mg):			
N Coast (Total @ CPS)			712
SL River			2,121
Beltz			177
Loch Lomond			436
Total Source Production			3,446

Year 2	% Shortage	Production/Flow	
			Annual
Drought-Year Peak-Season Shortage	12%		
Source Production (mg):			
N Coast (Total @ CPS)			715
SL River			1,938
Beltz			182
Loch Lomond			397
Total Source Production			3,231

2010
High Demand

Year 1	% Shortage	Production/Flow	
			Annual
Drought-Year Peak-Season Shortage	17%		
Source Production (mg):			
N Coast (Total @ CPS)			712
SL River			2,286
Beltz			177
Loch Lomond			355
Total Source Production			3,530

Year 2	% Shortage	Production/Flow	
			Annual
Drought-Year Peak-Season Shortage	30%		
Source Production (mg):			
N Coast (Total @ CPS)			715
SL River			2,095
Beltz			183
Loch Lomond			218
Total Source Production			3,211

2030
High Demand

Year 1	% Shortage	Production/Flow	
			Annual
Drought-Year Peak-Season Shortage	31%		
Source Production (mg):			
N Coast (Total @ CPS)			751
SL River			2,432
Beltz			177
Loch Lomond			174
Total Source Production			3,533

Year 2	% Shortage	Production/Flow	
			Annual
Drought-Year Peak-Season Shortage	37%		
Source Production (mg):			
N Coast (Total @ CPS)			754
SL River			2,227
Beltz			186
Loch Lomond			226
Total Source Production			3,394

Unimpaired Flows
All Years

2010
Low

	% Shortage	Production/Flow	
			Annual
Average Peak-Season Shortage	0.3%		
Average Source Production (mg):			
N Coast (Total @ CPS)			1,151
SL River			1,779
Beltz			136
Loch Lomond			436
Total Source Production			3,501

	Fraction
Peak-Season Shortages (fraction of hydro yrs):	
<5%	0.99
5-15%	0.01
15-25%	0.00
>25%	0.00

2010
High

	% Shortage	Production/Flow	
			Annual
Average Peak-Season Shortage	1.7%		
Average Source Production (mg):			
N Coast (Total @ CPS)			0
SL River			1,213
Beltz			2,059
Loch Lomond			157
Total Source Production			858

	Fraction
Peak-Season Shortages (fraction of hydro yrs):	
<5%	0.90
5-15%	0.02
15-25%	0.06
>25%	0.02

2030
High

	% Shortage	Production/Flow	
			Annual
Average Peak-Season Shortage	5.8%		
Average Source Production (mg):			
N Coast (Total @ CPS)			1,213
SL River			2,059
Beltz			157
Loch Lomond			858
Total Source Production			4,288

	Fraction
Peak-Season Shortages (fraction of hydro yrs):	
<5%	0.70
5-15%	0.18
15-25%	0.04
>25%	0.08

Tier 2 Flows
Drought Years

2010
Low Demand

Year 1	% Shortage	Production/Flow	
			Annual
Drought-Year Peak-Season Shortage	6.8%		
Source Production (mg):			
N Coast (Total @ CPS)			571
SL River			2,024
Beltz			177
Loch Lomond			547
Total Source Production			3,319

Year 2	% Shortage	Production/Flow	
			Annual
Drought-Year Peak-Season Shortage	37%		
Source Production (mg):			
N Coast (Total @ CPS)			500
SL River			1,764
Beltz			184
Loch Lomond			213
Total Source Production			2,660

2010
High Demand

Year 1	% Shortage	Production/Flow	
			Annual
Drought-Year Peak-Season Shortage	30%		
Source Production (mg):			
N Coast (Total @ CPS)			571
SL River			2,186
Beltz			177
Loch Lomond			238
Total Source Production			3,172

Year 2	% Shortage	Production/Flow	
			Annual
Drought-Year Peak-Season Shortage	43%		
Source Production (mg):			
N Coast (Total @ CPS)			500
SL River			1,903
Beltz			197
Loch Lomond			264
Total Source Production			2,864

2030
High Demand

Year 1	% Shortage	Production/Flow	
			Annual
Drought-Year Peak-Season Shortage	38%		
Source Production (mg):			
N Coast (Total @ CPS)			602
SL River			2,338
Beltz			185
Loch Lomond			215
Total Source Production			3,340

Year 2	% Shortage	Production/Flow	
			Annual
Drought-Year Peak-Season Shortage	51%		
Source Production (mg):			
N Coast (Total @ CPS)			527
SL River			2,006
Beltz			212
Loch Lomond			210
Total Source Production			2,954

Tier 2 Flows
All Years

2010
Low

	% Shortage	Production/Flow	
			Annual
Average Peak-Season Shortage	1.1%		
Average Source Production (mg):			
N Coast (Total @ CPS)			868
SL River			1,942
Beltz			149
Loch Lomond			521
Total Source Production			3,480

		Fraction
Peak-Season Shortages (fraction of hydro yrs):		
<5%		0.92
5-15%		0.05
15-25%		0.02
>25%		0.01

2010
High

	% Shortage	Production/Flow	
			Annual
Average Peak-Season Shortage	3.2%		
Average Source Production (mg):			
N Coast (Total @ CPS)			868
SL River			2,089
Beltz			161
Loch Lomond			789
Total Source Production			3,907

		Fraction
Peak-Season Shortages (fraction of hydro yrs):		
<5%		0.87
5-15%		0.03
15-25%		0.04
>25%		0.06

2030
High

	% Shortage	Production/Flow	
			Annual
Average Peak-Season Shortage	12.5%		
Average Source Production (mg):			
N Coast (Total @ CPS)			915
SL River			2,197
Beltz			173
Loch Lomond			816
Total Source Production			4,101

		Fraction
Peak-Season Shortages (fraction of hydro yrs):		
<5%		0.18
5-15%		0.66
15-25%		0.05
>25%		0.11

Tier 3 Flows with Tier 2 Desal Volumes (15%)
Drought Years

2015
Low

Year 1	% Shortage	Production/Flow	
			Annual
Drought-Year Peak-Season Shortage	33.3%		
Source Production (mg):			
N Coast (Total @ CPS)			297
SL River			1,666
Beltz			192
Desal			404
Loch Lomond			271
Total Source Production			2,830

Year 2	% Shortage	Production/Flow	
			Annual
Drought-Year Peak-Season Shortag	48.2%		
Source Production (mg):			
N Coast (Total @ CPS)			169
SL River			864
Beltz			223
Desal			441
Loch Lomond			731
Total Source Production			2,428

2015
High

Year 1	% Shortage	Production/Flow	
			Annual
Drought-Year Peak-Season Shortage	38.5%		
Source Production (mg):			
N Coast (Total @ CPS)			297
SL River			1,742
Beltz			207
Desal			595
Loch Lomond			366
Total Source Production			3,208

Year 2	% Shortage	Production/Flow	
			Annual
Drought-Year Peak-Season Shortag	57.4%		
Source Production (mg):			
N Coast (Total @ CPS)			169
SL River			864
Beltz			223
Desal			678
Loch Lomond			712
Total Source Production			2,647

2030
Low

Year 1	% Shortage	Production/Flow	
			Annual
Drought-Year Peak-Season Shortage	34.0%		
Source Production (mg):			
N Coast (Total @ CPS)			310
SL River			1,714
Beltz			197
Desal			500
Loch Lomond			320
Total Source Production			3,041

Year 2	% Shortage	Production/Flow	
			Annual
Drought-Year Peak-Season Shortag	50.1%		
Source Production (mg):			
N Coast (Total @ CPS)			176
SL River			864
Beltz			223
Desal			554
Loch Lomond			732
Total Source Production			2,549

2030
High

Year 1	% Shortage	Production/Flow	
			Annual
Drought-Year Peak-Season Shortage	32.3%		
Source Production (mg):			
N Coast (Total @ CPS)			310
SL River			1,760
Beltz			223
Desal			789
Loch Lomond			449
Total Source Production			3,531

Year 2	% Shortage	Production/Flow	
			Annual
Drought-Year Peak-Season Shortag	48.2%		
Source Production (mg):			
N Coast (Total @ CPS)			176
SL River			864
Beltz			223
Desal			897
Loch Lomond			817
Total Source Production			2,978

Tier 3 Flows with Tier 2 Desal Volumes (15%)
All Years

2015
Low Demand

	% Shortage	Production/Flow	
			Annual
Average-Year Peak-Season Shortage	4.5%		
Source Production (mg):			
N Coast (Total @ CPS)			635
SL River			1,918
Beltz			162
Desal			79
Loch Lomond			732
Total Source Production			3,526

		Fraction
Peak-Season Shortages (fraction of hydro yrs):		
<5%		0.75
5-15%		0.11
15-25%		0.05
>25%		0.09

2015
High Demand

	% Shortage	Production/Flow	
			Annual
Average-Year Peak-Season Shortage	7.3%		
Source Production (mg):			
N Coast (Total @ CPS)			635
SL River			2,035
Beltz			176
Desal			231
Loch Lomond			863
Total Source Production			3,939

		Fraction
Peak-Season Shortages (fraction of hydro yrs):		
<5%		0.47
5-15%		0.31
15-25%		0.09
>25%		0.12

2030
Low Demand

	% Shortage	Production/Flow	
			Annual
Average-Year Peak-Season Shortage	6.0%		
Source Production (mg):			
N Coast (Total @ CPS)			660
SL River			1,979
Beltz			168
Desal			145
Loch Lomond			810
Total Source Production			3,762

		Fraction
Peak-Season Shortages (fraction of hydro yrs):		
<5%		0.67
5-15%		0.18
15-25%		0.05
>25%		0.10

2030
High Demand

	% Shortage	Production/Flow	
			Annual
Average-Year Peak-Season Shortage	8.7%		
Source Production (mg):			
N Coast (Total @ CPS)			660
SL River			2,079
Beltz			185
Desal			414
Loch Lomond			866
Total Source Production			4,204

		Fraction
Peak-Season Shortages (fraction of hydro yrs):		
<5%		0.47
5-15%		0.34
15-25%		0.09
>25%		0.10

CITY OF SANTA CRUZ
AND
SOQUEL CREEK WATER DISTRICT

AGREEMENT ENDORSING RECOMMENDATIONS OF JOINT TASK FORCE ON SEAWATER DESALINATION FACILITY

This Agreement is entered into as of April 6, 2010 by and between the City of Santa Cruz, a body politic and charter city (hereinafter "CITY") and the Soquel Creek Water District (hereinafter "SqCWD") a County Water District organized pursuant to sections 30000 *et seq.* of the California Water Code.

RECITALS

A. In August 2007, the CITY and SqCWD entered into a "Memorandum of Agreement to Create a Joint Task Force to Pursue the Feasibility of Construction and Operation of a Seawater Desalination Facility" (hereinafter "2007 Agreement"). This 2007 Agreement was consistent with then-existing City and SqCWD policies as set forth respectively in the City's 2005 Integrated Water Plan and 2006 Urban Water Management Plan and the SqCWD's 2006 Integrated Resources Plan and 2005 Urban Water Management Plan. All of these documents contemplate the City and SqCWD ultimately developing some sort of desalination facility, either locally or regionally in partnership with each other.

B. The 2007 Agreement remains in full effect and is attached to this Agreement.

C. The 2007 Agreement authorized the Task Force to, among other things:

- Oversee and direct preparation and development of studies and plans for a 2.5 million gallons per day (mgd) seawater desalination project, including, but not limited to, design, environmental review, and permitting for the proposed seawater desalination facility;

- Provide a forum for public input on the project; and

- Formulate an operational agreement prescribing the conditions under which each agency shall be entitled to utilize the project for supplemental supply, the contractual relationship between the two agencies and ongoing governance structure should the project proceed. (Section 10.a)

The 2007 Agreement also authorized the Task Force to adopt a work plan and schedule for the project. (Section 10.b)

D. The Task Force has met regularly, commissioned studies on various aspects of a shared desalination facility, and provided substantial public outreach through its meetings and website.

E. The Task Force has reported that all studies and analyses presented to it suggest that a shared desalination facility will help each party achieve important water supply goals, including those identified in the Recitals to the 2007 Agreement.

F. The Task Force has also submitted (1) a summary project description, (2) a current schedule extending through 2010, (3) an outline of steps to be taken by each party during the preparation and public review of documents addressing environmental aspects of the project, and (4) recommendations for elements to be incorporated into an operational agreement which will be formally adopted by both parties prior to a decision to proceed with construction of the project.

G. The purpose of this Agreement is to memorialize the Task Force's submissions and their endorsement by the governing bodies of both parties.

NOW THEREFORE, because it is in the best interests of the parties to enter into this Agreement for the reasons set forth above, the parties agree as follows:

SECTION 1. SUMMARY PROJECT DESCRIPTION FOR PURPOSES OF ENVIRONMENTAL REVIEW

For purposes of conducting environmental review, the CITY and SqCWD tentatively envision constructing and operating a seawater desalination facility with a production capacity of 2.5 million gallons per day, though the environmental impact report (EIR) for the project will consider potentially feasible alternatives to this proposal, as well as the required No Project Alternative. The project description in the EIR will include the following principal elements:

A. a seawater intake system;

B. conveyance piping from the intake to the desalination facility;

C. a desalination facility consisting of pre-treatment filtration, reverse osmosis desalination, post-treatment conditioning and disinfection;

D. potable water conveyance piping to the CITY distribution system and a new interconnection between the CITY and SqCWD distribution systems;

E. brine conveyance piping and ocean-discharge outfall.

SECTION 2. ENVIRONMENTAL REVIEW PROCESS

A. Both parties recognize the importance of conducting a thorough review of the potential impacts of the desalination project on the environment, methods of mitigating such impacts, and evaluation of potentially feasible alternatives that could achieve most of the project's basic objectives while avoiding or substantially lessening any of the significant environmental impacts of the proposed project, as well as the mandatory No Project Alternative. To that end, the CITY has awarded a contract for the preparation of appropriate environmental documents as may be required under the California Environmental Quality Act ("CEQA") and the National Environmental Policy Act ("NEPA").

B. The Task Force has recommended that, consistent with section 15051, subdivision (d), of the CEQA Guidelines, the CITY and SqCWD serve as co-lead agencies for purposes of environmental review under CEQA. Both parties are willing to do so, subject to input on this issue from the selected environmental consultant as called for in the scope of work incorporated in the Request for Proposals issued by the CITY on behalf of the Task Force.

C. The Task Force envisions the basic process through which the parties can implement the environmental review as co-lead agencies as follows:

1. At least one scoping session will be held in the CITY service area and at least one scoping session will be held in the SqCWD service area.

2. Staffs of both parties will review and comment on the administrative draft of the environmental document prior to its publication for public review and comment.

3. Following publication of the draft environmental document, at least one public comment session will be held in the CITY service area and at least one public comment session will be held in the SqCWD service area.

4. The legislative bodies of both parties will hold a joint public hearing on the environmental document. Following the public comment session, each legislative body will decide independently on whether to certify the document, and will independently adopt findings of fact, a statement of overriding consideration (if appropriate), and the mitigation monitoring and reporting program.

5. If the parties' legal counsel advise that the parties should prepare and execute a more detailed agreement for implementation of co-lead agency/joint lead agency responsibilities, the parties will promptly do so.

SECTION 3. SCHEDULE

The Task Force has submitted its most recent project schedule, a copy of which is attached marked "Attachment One." The parties encourage the Task Force to continue working diligently in order to achieve the progress outlined in the schedule.

SECTION 4. COMPONENTS OF OPERATIONAL AGREEMENTS

The Task Force has held detailed discussions and has formulated preliminary recommendations on several aspects of the project's operations, as contemplated by Section 3 of the 2007 Agreement. These preliminary recommendations are tentative in that they do not presuppose the specific location or detailed configuration of the project, and in that they remain subject to environmental review, which could result in changes to the recommendations or even a decision or decisions by either the City or SqCWD to favor the No Project Alternative and thus choose not to pursue the project at all. However, the parties agree that the Task Force recommendations do provide useful guidelines for purposes of conducting environmental review and for evaluating the technical feasibility and fiscal impacts of the project.

The Task Force's seven recommendations, each accompanied by explanatory material, are endorsed by both parties in the form attached marked "Attachment Two." In terms of scheduling, the Task Force advises, and the parties tentatively agree, that, should both the City and SqCWD, after completing environmental review, choose to proceed with the project, an operational agreement incorporating these elements in final form should be adopted by the parties prior to advertising for bids for construction of the project.

The Task Force has indicated that recommendations addressing the contractual relationship between the parties and an on-going governance structure (also contemplated by Section 3 of the 2007 Agreement) will be submitted later, after further investigation and discussion.

IN WITNESS WHEREOF, the Parties have affixed their signatures hereto.

Approved as to form:

3-29-10

City Attorney

CITY OF SANTA CRUZ

City Manager

3-29-10

Date

Approved as to form:

District Counsel

SOQUEL CREEK WATER DISTRICT

Board President

4/6/10

Date

scwd²
Collaborating to conserve, protect and create reliable water resources

Desalination Program: Schedule Milestones

2/18/2010

	2009		2010				2011	2012	2013	2014	2015
	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4					
Pilot Plant (2005-2010)			Final Report								
Watershed Sanitary Survey (2007-2010)				Final Report							
Entrainment Study (2009-2010)				Final Report							
Offshore Geophysical Survey (2009)		Begin Field Work	Final Report								
Energy Plan (2009-2010)				Final Report							
EIR (2009-2012)			Begin Work					Complete Work			
Intake: Design (2010-2012)					Begin Work		Complete Work				
Intake: Construction (2013-2014)									Begin Work		Complete Work
Full Scale Plant: Design (2010-2012)					Begin Work			Complete Work			
Full Scale Plant: Construction (2012-2015)								Begin Work			Complete Work
Infrastructure: Design (2010-2011)						Begin Work	Complete Work				
Infrastructure: Construction (2013-2014)									Begin Work		Complete Work

ATTACHMENT TWO

PRELIMINARY TASK FORCE RECOMMENDATIONS
FOR ELEMENTS TO BE INCLUDED IN AN OPERATIONAL AGREEMENT

1. Location.

The desalination facility will be located in the CITY service area.

Justification: the region's coastal infrastructure favors the CITY's service area in terms of placing the intake and outfall.

2. Delivery of actual produced water and blended system water.

The project will utilize existing water infrastructure to the extent possible. As a result, water delivered to the SqCWD will include a blend of both actual produced water and CITY water from other sources, with the total amount nominally delivered not to exceed the desalination plant production.

Justification: to minimize construction cost and the project's environmental footprint.

3. Production scheduling: priority system.

Water produced by the Project will be allocated according to a monthly priority system. Table 1 shows the priorities in millions of gallons per day (mgd), calculated on a monthly basis. Plant capacity is 2.5 mgd. In all years, from May through October the City has a right to water produced at the desalination facility up to the plant capacity (2.5 mgd). The District has a right to take any remaining water. In April and November, both Agencies share an equal first priority of up to 1.25 mgd each, and an equal second priority of up to 1.25 mgd each. If the desalination facility is unable to fulfill the entire request in these months, the amount of water delivered to each agency will be reduced proportionately, first from the 2nd priority and then from the 1st priority. From December through March, the District has a right to water produced at the desalination facility up to plant capacity. The City has a right to any remaining water. If the amount ordered exceeds actual production or production capacity, orders will be filled in order of priority. The agencies will alert each other of their orders for the coming months on March 15 (for April through October) and October 15 (for November through March).

Table 1: SCWD2 desalination plant (2.5 mgd capacity) production priority system (mgd)

	January	February	March	April	May	June
1st Priority Quantity	Soquel Creek 2.5	Soquel Creek 2.5	Soquel Creek 2.5	Shared: 1.25 each	Santa Cruz 2.5	Santa Cruz 2.5
2nd Priority Quantity	Santa Cruz 2.5	Santa Cruz 2.5	Santa Cruz 2.5	Shared: 1.25 each	Soquel Creek 2.5	Soquel Creek 2.5
	July	**August**	**September**	**October**	**November**	**December**
1st Priority Quantity	Santa Cruz 2.5	Santa Cruz 2.5	Santa Cruz 2.5	Santa Cruz 2.5	Shared: 1.25 each	Soquel Creek 2.5
2nd Priority Quantity	Soquel Creek 2.5	Soquel Creek 2.5	Soquel Creek 2.5	Soquel Creek 2.5	Shared: 1.25 each	Santa Cruz 2.5

The priority system enables desalination plant output to be scaled back to standby mode when both parties deem it necessary. This is done when neither party requests water according to its priority.

Justification: A priority system enables both parties far greater management flexibility in utilizing the desalination facility compared to a formulaic shortage trigger that would transfer desalination supply use from one party to another. The problem with a shortage trigger approach is that the complicated formulas required for the City to determine when it would take water are likely to deter the City from taking water at times when it would be prudent to do so, or to force the City to take water when conditions do not require it. To be unambiguous, a shortage trigger formula would have to be specified in immense detail, much of which cannot be known clearly in advance.

With a priority system, water is available to both parties in the quantities and at the times it is needed, as the parties have previously specified and which are consistent with each agency's long-term water supply modeling.

4. Capital cost allocation

A. Basic Principle

The basic principle is that all capital costs of the 2.5 mgd project are to be shared on the basis of proportional maximum annual utilization. This approach utilizes the priority system to calculate the maximum possible annual utilization of the facility. Each agency's total annual first priority yield and second priority yield when first priority is less than plant capacity are summed, and divided by the facility's maximum annual yield. Capital costs are allocated to each agency based on the resulting percentages.

The calculation of proportional maximum annual utilization yields a capital cost allocation as follows:

Santa Cruz: 59%
Soquel Creek: 41%

	MGD	Days	Gallons	Guaranteed AF	Guaranteed Total AF
Santa Cruz	2.50	184	460,000,000	1,412	
	1.25	60	75,000,000	230	1642
Soquel Creek	2.50	121	302,500,000	928	
	1.25	60	75,000,000	230	1158
Total		365	912,500,000	2,800	
	Santa Cruz Proportion:		0.59		
	Soquel Creek Proportion:		0.41		

B. Capital Cost Categories

The same recommended allocation formula will be applied to all capital costs directly associated with producing and delivering the supplemental water supply associated with the desalination project. Some refinements to the application of the basic principle to specific categories may be appropriate, as described below.

Intake and Outfall

A decision has not yet been made regarding whether the intake will be open ocean utilizing an abandoned outfall pipe retrofitted with low-velocity manifolds or all new subsurface construction. If the outfall pipe is retrofitted for the desalination intake, it is assumed that it will be purchased or rented by scwd2. A decision has also not yet been made about whether the intake and outfall should be sized to accommodate the possibility of future expansion of the plant capacity. An independent valuation of the intake and outfall (and any other facility assets to be purchased or leased from one of the parties) will be made.

Land

If one party chooses to purchase land in excess of what is available and needed for the plant, that party will pay the incremental cost of the additional land. An engineer will determine how much land is needed to operate the plant.

Land has a residual value that differs from the residual value of other capital costs. The implication is that either party should be compensated if the other party some day puts some or all of the land purchased for this project to other uses. If and when the land is no longer used for desalination or all or a portion of the land is put to a different beneficial use or sold by one of the parties, the other party will be paid its original proportion paid of the appraised value of the land or that portion not used for the desalination project at the time the use changes or the land is sold.

Desalination Plant

The costs of pretreatment, treatment, and buffering (if necessary) facilities will be considered a single cost.

Piping from Desalination Plant to City System, and from City System to Soquel Creek System

These piping costs are part of the project and subject to the 59-41 capital cost split. The City would be responsible for the cost of constructing or enlarging components of the project to accommodate future expansion of the project's capacity above 2.5 mgd.

Justification: (i) Partnership - The two agencies are partners which independently arrived at the value of a desalination project to their systems based on long-term planning. Both agencies independently studied the potential for desalination, but were aware that the other agency was also considering desalination. One implication of the partnership principle is that the infrastructure costs of wheeling the desalinated water through one system to the other is part of the overall cost of the project. . Additional costs to accommodate increased capacity to support the desalination project, including any piping and pumping infrastructure from the DeLaveaga storage tanks to the SqCWD boundary are to be shared.

(ii) Systems are in Good Operating Condition - Keeping the infrastructure of each system up to standard is the responsibility of each individual agency

5. Operating Costs Allocation.

There are three categories of operating costs: fixed readiness charge (allocated the same as capital costs, 59/41); water charge (allocated as each agency's share of total orders); and capital refurbishment charges (allocated the same as capital costs, 59/41). Examples of each category, based on discussions with other water agencies, consulting engineers, and staff, follow. This list may be modified over time and is not intended to be all-inclusive

Fixed Readiness Cost Categories (R) *activities or items that must be maintained regardless of whether the plant is operating so as to "stand ready" to produce water*

Brine Equalization Tank
Brine Pipeline maintenance
Standby Engine Generator System
Operations Building System
Plant SCADA Systems
Plant Electrical System
Plant Security and Landscape
Intake Screens and Pipeline
Intake Pump Station (parts subject to constant corrosion)
Source Water Pipeline
Rapid Mix (parts subject to corrosion)
High-Rate Clarification
Permeate Tank
Chlorine Contact Tank
Brine Pump Station (parts subject to constant corrosion)
Water quality testing
Labor for stand-by operations

Water Charge Categories (W) *items or activities directly related the amount of water produced*
Power

Intake pump stations (parts degraded by use)
Rapid Mix (parts degraded by use)
Strainers and MF/UF Membrane Filters, or media replacement
Filtrate and Backwash Supply Tank
SWRO Feed Pump Station
1st pass SWRO membrane elements
Distribution Booster Pumps
Liquid Chemical Storage and Feed
Dry Chemical Storage and Feed
Carbon Dioxide Storage and Feed
Backwash Supply Pump Station
Backwash Equalization Basin
Gravity Thickeners
Centrifuges
Brine Pump Station (parts subject to degradation by use)
Labor for in-use operations
Additional water quality tests

Capital Refurbishment Categories (C) *generally longer term maintenance and replacement of components to maintain the facilities in useful condition for the life of the plant*

Building
Piping
Valves
RO element pressure vessels
Equipment for changing, removing, replacing RO elements in pressure vessels
Measurement instruments
SCADA systems
Chemical cleaning systems
Intake and outfall equipment (alternative location to the above two categories)

Power equipment (on-site generators, transformers)
Energy recovery devices
Screens

Calculations of operating costs are as follows:

	Col. 1 **Fixed Readiness Charge (R)**	*Col. 2* **Water Charge (W)**	*Col. 3* **Capital Refurbishment (C)**
City	% of plant capacity	% of total orders	% of plant capacity
SqCWD	% of plant capacity	% of total orders	% of plant capacity

Note: the "% of plant capacity" for each agency is SqCWD: 41%, City: 59%

Scenario 1:

Plant operates normally

SqCWD pays: (.41*(R+C)) + (SqCWD proportion of water orders * W)

City pays: (.59* (R+C)) + (City proportion of water orders * W)

Scenario 2:

Plant does not produce sufficient water to meet orders

SqCWD pays: (.41*(R+C)) + (SqCWD proportion of water taken * W)

City pays: (.59* (R+C)) + (City proportion of water taken * W)

Many of these categories are already being tracked by the City Water Department cost tracking system. As the time of plant operation nears, these categories can be identified in or added to the existing accounting system.

An adjustment charge for normal system leakage/losses of 1.5% of deliveries will be added to the water charge paid by the Soquel Creek Water District.

<u>Incidental overproduction</u>. In the event that the facility occasionally or for short durations overproduces water as a result of operating conditions, and the over production exceeds ordered water, the cost of its production will be added to the cost of the ordered water, in proportion to the amounts ordered.

Justification: To the extent possible, the direct beneficiary should cover operating costs of the plant. In some cases, operating costs are not linked to water produced, and are appropriately allocated on the same basis as are capital costs.

6. Emergencies- Principles and Procedures

<u>"Emergency Call for Desalinated Water"</u>

An Emergency Call for Desalinated Water can be made as a result of an incident that suddenly and unexpectedly curtails water supply for either agency. Emergencies are curtailment events whose details, timing, and severity cannot reasonably be anticipated by water managers. Examples include seismic damage to facilities, unexpected loss of multiple wells, treatment plant breakdowns, damage to reservoirs, and other similar impacts that cause immediate and unexpected loss of water supply. Emergencies do not include droughts, water shortages due to growth, or other changes in demand or supply that should be subject to regular water supply planning.

Concurrent with such an incident, either or both agencies may issue an Emergency Call for Desalinated Water. An Emergency Call for Desalinated Water triggers the following provisions. It does not trigger any other emergency-related actions or responses at or between the Agencies unless such actions or responses are specified in other documents.

Single-agency Emergency

An Emergency Call for Desalinated Water occurs when one Agency Manager delivers a written communication to the other requesting emergency use of the desalination facility. The timing of the event begins upon delivery of the communication either electronically or in hard copy.

The Agency Manager of the declaring agency has the authority to implement immediate changes to the priority system.

Having made an Emergency Call for Desalinated Water, the declaring agency may request up to the entire output of the desalination plant for a period of up to 15 days from the day of declaration. This request will be honored by the other agency.

During this period, the Emergency Call for Desalinated Water allocation replaces the priority system. At any time, the Agency Manager of the declaring Agency may end the Emergency Call for Desalinated Water, at which point desalinated water is again allocated according to the priority system.

After 15 days of continuous Emergency Call for Desalinated Water, the priority system will be reestablished and followed for allocation of desalinated water unless the Agency Managers jointly declare an Ongoing Emergency.

During an Ongoing Emergency allocation of desalinated water will be subject to negotiation and agreement between the two agencies.

Agency Managers will meet prior to the conclusion of the initial 15-day emergency period to discuss whether to end or continue the Emergency Call for Desalinated Water. If they agree to continue it by declaring an Ongoing Emergency, they will then agree on an allocation of water from the facility. The continuation can last up to 15 days without repeating this process.

In the event that the Agency Managers cannot agree on whether to continue the Emergency Call for Desalinated Water, the issue will be resolved through arbitration as provided in Section 7.

Operating expenses during the emergency will be allocated according to the proportion of water delivered to each agency during that period.

Regional Emergency

Both parties may make an Emergency Call for Desalinated Water at the same time or in overlapping periods.

If this occurs, the Agency Managers will attempt to negotiate an allocation of water from the Desalination Facility. This allocation will replace the regular priority system detailed in this agreement. If the Agency Managers are not able to reach an agreement, the issue will be resolved through Arbitration.

Justification: In case either agency or both agencies experience an unexpected severe shortage of water supply, the desalination facility provides an opportunity to meet short-term supply needs. These incidents are expected to occur rarely and are expected to last from a few days to *one week but could last longer. The following two principles influence the utilization of desalination water during an emergency.*

(1) *In the event of an emergency, each agency will retain its independence of action subject to any agreements the agencies have reached in advance.*

(2) *In the event of an emergency that impacts both agencies, a principle of equity will be used in discussions over water curtailments.*

7. Arbitration Procedures for Disputes Over Allocation of Water in Emergencies.

In the case of emergencies, a simple, clear and speedy procedure is needed to allocate water from the desalination plant. Mandatory, binding arbitration conducted by a single, technically-knowledgeable arbitrator is most likely to meet that objective. To accomplish that, the Task Force recommends the following:

Panel of Arbitrators

The parties will establish by agreement a panel of neutral third parties who are acceptable to both as potential arbitrators. Experience and qualifications desirable for potential arbitrators include experience in civil engineering and/or municipal water supply management and operation. To be eligible for inclusion on the panel, a person must not be an employee of or consultant to either of the parties or have served in that capacity for a period of time agreed to by the parties. Also, potential arbitrators must agree in advance on dates of availability, compensation, the need for quick action and decision, as well as on procedural rules the parties may have established.

The parties will keep the list of potential arbitrators up-to-date.

Selection of Arbitrator

The arbitrator may be any person on the approved list who is immediately available to serve.

Process of Arbitration

The process should be efficient, informal and fair. Basic groundrules will include:

- prohibitions on individual contacts by either party with the arbitrator (other than to explain the nature of the decision and establish meeting logistics);
- providing a copy of all information submitted to the arbitrator to the other party;
- time limits for submission of written information to the arbitrator, for meetings to present information and argument to the arbitrator, and for the issuance of the arbitrator's decision;
- the scope of the arbitrator's decision and the length of time it can be in effect.

Finality

The parties agree that the arbitrator's decision will be final and not subject to review in court.

Justification: The parties should establish in advance a procedure for prompt resolution of any dispute about the existence of an emergency and the reallocation of the output of the project by a knowledgeable, independent third party.

CITY OF SANTA CRUZ
AND
SOQUEL CREEK WATER DISTRICT

MEMORANDUM OF AGREEMENT TO CREATE A JOINT TASK FORCE TO PURSUE THE FEASIBILITY OF CONSTRUCTION AND OPERATION OF A SEAWATER DESALINATION FACILITY

This Agreement is entered into by and between the City of Santa Cruz, California, a body politic and charter city (hereinafter "CITY") and the Soquel Creek Water District (hereinafter "SqCWD") a County Water District organized pursuant to sections 30000 et. seq. of the California Water Code.

RECITALS

A. City is responsible for providing water to the residents of the City of Santa Cruz and additional customers outside the City limits within the County of Santa Cruz and a portion of the City of Capitola.

B. SqCWD is responsible for providing water to citizens in the City of Capitola and the unincorporated communities of Soquel, Seacliff, Aptos, Rio Del Mar, Seascape and La Selva Beach.

C. City's main sources of supply for water are surface water diversions with some groundwater sources; SqCWD's sole sources of supply for water are groundwater wells.

D. City has conducted extensive studies demonstrating the need to supplement its water supplies during periods of drought and has concerns about the potential of seawater intrusion impacts on its groundwater sources; SqCWD has concerns about over pumping of its groundwater supply and the potential of seawater intrusion.

E Both parties have conducted extensive public studies on various alternative supplemental supplies that have concluded that a jointly operated seawater desalination facility is the preferred project to meet the needs of both parties. The parties recognize the mutual benefit of a desalination facility which would permit SqCWD to provide a supplemental source of supply to relieve the pressure on its groundwater resources and, in time of drought, provide an alternate source of supply to City.

F The parties recognize that a joint effort provides economies of scale and furthers interagency cooperation, which thereby improves the public health, safety and general welfare.

G Both parties have the power to acquire, construct and operate a desalination facility and the parties propose, by this agreement, to cooperate and coordinate on a regional project in order to provide more efficient operations, lower capital and operating costs and greater public benefit than acting independently

H. The parties wish to enter into an agreement to complete the investigative process, including the construction and operation of a pilot plant, that could lead to implementing the construction and operation of a 2.5 million gallon per day full-scale seawater desalination facility to serve both parties.

I. Both parties agree that this process needs to move as quickly as possible because of the critical water shortages both agencies face and because of the increasing cost of construction over time.

NOW THEREFORE, because it is in the best interests of the parties to enter into this Agreement for the reasons set forth above, the parties agree as follows:

1. **Creation of Joint Task Force.**
To carry out the terms of this Agreement, the parties have elected to create a joint task force (hereinafter referred to, interchangeably, as either "Joint Task Force" or "Task Force") composed of members of both agencies to carry out the activities described herein on the terms and conditions hereinafter provided.

2. **Effective Date.**
The effective date of this Agreement is the date this Agreement is signed by the latter of the Parties to do so, or any such other date mutually selected by the parties for convenience.

3. **Purpose.**
The purpose of this Agreement shall be to cooperatively complete the investigative phase, including required studies, design, environmental review, and permitting for the proposed 2.5 mgd seawater desalination facility, provide a forum for public input on the project, and formulate an operational agreement prescribing the conditions under which each agency shall be entitled to utilize the project for supplemental water supply, the contractual relationship between the two agencies and ongoing governance structure should the project proceed. It is understood that the City of Santa

Cruz has anticipated the need for future desalination capacity in excess of 2.5 mgd and that plant expansion is outside the purpose of this Agreement and will be pursued independently by and at the sole discretion of the City.

4. **Designation of Joint Desalination Task Force.**
The work program set forth in this Agreement shall be directed by a Joint Task Force, the members of which shall be selected and serve as follows:

a. Each Party shall designate and appoint two members of its governing body to serve as Members of the Joint Task Force, each of whom shall have a single vote on matters coming before the Task Force. To the extent possible, the Parties shall attempt to select Task Force Members that have different terms of office to provide continuity on the Task Force.

b. Each Party shall also designate one Alternate Task Force Member who shall also be a member of that Party's governing body who shall be authorized to act only in the absence of his or her corresponding Task Force Member with the same vote and authority as such Task Force Member. An alternate attending meetings at which he/she is not filling in for an absent member shall have the same status as a member of the public.

5. **Officers of the Joint Task Force.**
The officers of the Joint Task Force shall consist of a chair and vice-chair. The chair and vice-chair shall be selected by a majority vote of the Task Force. The chair and vice-chair shall serve one-year terms co-extensive with the fiscal year. When the chair is elected from one agency, the vice-chair shall be from the other.

6. **Compensation.**
Neither officers nor Members of the Joint Task Force shall receive compensation other than that provided by their respective affiliate jurisdiction for attendance at meetings as a member of the governing board and for service rendered as a Board/Council member by request of the Board/Council.

7. **Joint Task Force Meetings.**

a. **Meetings:** The Task Force shall determine the frequency of regular meetings and shall specify by motion, the date, hour and place at which regular public meetings shall be held; the Chair may call a special meeting.

b. **Call, Notice and Conduct of Meetings:** All meetings of the Task Force, including without limitation, regular, adjourned and special meetings, shall be called, noticed, held and conducted in accordance with the provisions of the Ralph M. Brown Act (California Government Code Section 54950 et. seq.)

c. **Minutes:** A qualified staff member from one of the Parties or an independent contractor specifically retained for this purpose shall serve as the Secretary of the Task Force and shall cause minutes of all meetings to be kept and shall cause copies of the minutes to be provided to each Member and Alternate Member in a timely manner and made available to the public.

d. **Quorum:** A quorum of the Task Force shall consist of three Members or Members and Alternate Members. Less than a quorum may adjourn a meeting.

e. **Rules:** The Task Force may adopt from time to time such rules and regulations to conduct its affairs as may be required.

f. **Vote or Assent of the Task Force:** It is the hope that the Joint Task Force shall arrive at decisions by consensus, but in the event consensus is not possible, at least three votes of the Task Force shall be required to approve any matter before it.

8. Agents and Employees

The City of Santa Cruz Water Director and the Soquel Creek Water District General Manager shall have joint responsibility for supervising and directing the work program as set forth in this Agreement and otherwise carrying out direction from the Task Force, and both shall answer to the Task Force with respect to their performance in this role. Any officer, agent or employee serving the Task Force can also be an officer, agent or employee of either Party. Assignment to activities in support of the Task Force of such a person shall evidence that the two positions are compatible. All of the privileges and immunities from liability, exemption from laws, ordinances, and rules, and all pension, relief, disability, workers' compensation, and other benefits which apply to the activity of officers, agents or employees of any of the Parties when performing their respective functions shall apply to them to the same degree and extent while engaged in the performance of any of the functions and other duties under this Agreement. Any agent exclusively serving the Task Force shall be under the direction of both the City of Santa Cruz Water Director and the Soquel Creek Water District General Manager. The manner of compensating said agents shall be determined by the Task Force with the approval of the agencies.

Both agencies shall insure that its employees and agents working for the Task Force shall have the same insurance, immunities and benefits that they would have as employees or agents of the respective entities.

9. **General Authority**

The Joint Task Force shall have the authority to take the following actions:

a. To oversee and guide the project through the investigative stage, including reviewing results and making decisions among options.

b. To establish such bylaws and rules and regulations as may be necessary for the operation and conduct of the Task Force's business.

c. To review and recommend the proposal, scope of work, and terms and conditions of consulting agreements associated with the project.

d. To exercise any power conferred upon it by agreement of the Parties provided said power is in furtherance of this Agreement.

e. To review and approve applications for permits on behalf of the Parties in connection with any Project or Projects as authorized by the Parties.

f. With approval of the Parties, to apply for, receive and disburse funds whether provided by the Parties or any other third party source, including but not limited to, grant funds from the State of California or the United States of America.

10. **Specific Authority**

The Joint Task Force is hereby empowered to:

a. Oversee and direct preparation of and development of studies and plans for a 2.5 mgd seawater desalination Project, including, but not limited to, design, environmental review, permitting for the proposed seawater desalination facility, provide a forum for public input on the project and formulate an operational agreement prescribing the conditions under which each agency shall be entitled to utilize the project for supplemental supply, the contractual relationship between the two agencies and ongoing governance structure should the project proceed and similar activities with respect to the Pilot Project currently being undertaken by the City of Santa Cruz.

b. Adopt a work plan and schedule on an annual basis or more frequently as deemed appropriate. Oversee a public outreach program intended to inform the public about all aspects of the Project and provide opportunities for public input.

c. Recommend to the governing bodies approval of contracts with public or private entities, firms, corporations, partnerships or persons for expert professional consulting services or technical assistance for purposes of implementing the aforementioned project.

d. Recommend to the governing bodies retention of dedicated staff and consultants as necessary to complete the scope of work approved by the Task Force.

e. Prepare and recommend adoption of an annual fiscal year budget for costs associated with the seawater desalination Project investigation and development.

f. Receive, accept and utilize the services of personnel offered by any of the Parties, or their representatives or agents; receive, accept, and utilize property, real or personal, from any of the Parties or their representatives or agents.

g. Develop the concepts for an operational plan for the Facility for presentation to and final approval by the full legislative bodies of the respective parties. This operational plan shall include, but not be limited to, policies for determining when each agency would have primary use of the plant, including defining drought conditions and allowing for the possibility of joint operation in order to achieve groundwater recovery following a drought or to address groundwater issues of mutual concern to both parties.

h. Should both Parties ultimately agree to proceed with constructing the full-scale Facility, develop recommendations for ongoing governance, cost sharing, ownership and operation of the full-scale Facility.

11. Restrictions

The scope of the Joint Task Force is limited as follows:

a. The Joint Task Force is limited to: 1) consideration of matters related to investigative phase, including required studies, design, environmental review, and permitting for the proposed 2.5 mgd seawater desalination facility, including a pilot facility; and 2) formulating an operational agreement prescribing the conditions under which each agency shall be entitled to utilize the project for supplemental water supply, the contractual relationship between the two agencies and ongoing governance structure should the project proceed. The Joint Task Force has no power with respect to the operation of either of the Parties' other water supply, storage, transmission, or other water operations.

b. The Joint Task Force has no ability to make financial commitments on behalf of either of the Parties, although it can make recommendations and requests to the respective legislative bodies of the Parties concerning financial matters.

12. Committees

The Joint Task Force may establish such advisory committees as it deems appropriate to advise the Task Force on matters relating to implementation of any aspect of the Project or associated Program. Such committees shall be composed of such persons as the Task Force shall determine; provided, however, that such membership shall not necessarily be limited to persons representing, or associated with, the Parties. The purpose and the function of any such committee or committees shall be specified by the Task Force.

13. Funds and Expenditures

This Agreement requires strict accountability of all funds and reporting of all receipts and disbursements as follows:

a. Each and every expenditure of moneys shall be authorized or approved by the legislative bodies of both Parties or by the City of Santa Cruz Water Director and the Soquel Creek Water District General Manager that is within their respective administrative authority.

b. Before the Task Force may expend any moneys or incur any financial obligation, it shall adopt an annual Fiscal Year Budget showing proposed expenditures for the applicable Fiscal Year and the proposed means of financing such expenditures. The Budget shall be adopted on or before April 30 of each year for the ensuing Fiscal Year and submitted to the parties along with their respective funding obligations for inclusion in their individual budget development. Provided, however, that for the first Fiscal Year of the Task Force's existence, the budget shall be adopted by the Task Force within ninety (90) days of the effective date of this Agreement.

c. The Finance Officer of the City of Santa Cruz shall be appointed as Treasurer for the Project. The Treasurer shall periodically present to the Task Force during each Fiscal Year a financial report accounting for all moneys received and disbursed for the report period.

d. The Treasurer shall be the depository and custodian of all dedicated Project funds.

e. All books and accounts shall be maintained for the Project in accordance with practices established by, or consistent with, those utilized by the Controller of the State of California for like public entities. In particular, the Treasurer shall ensure strict accountability of all funds and reporting of all receipts and disbursements associated with the Project in accordance with Generally Accepted Accounting Principles (GAAP) and the accounting rules and policies applicable to government agencies within the State of California.

f. As part of the City of Santa Cruz annual audit, the records and accounts of the Task Force shall be audited annually by an independent certified public accountant and copies of such other reports shall be filed with each Member within six (6) months of the end of the Fiscal year under examination.

g. The governing body of the Party employing the Treasurer shall determine the charges to be shared by the Parties for the services of the Treasurer, provided, that such charges shall not exceed the actual costs for such services.

14. Member Contributions

The parties agree that the costs for the investigative phase of the Project will be shared as follows:

a. **Pilot Plant Costs**. The parties shall contribute equal shares for all of the costs incurred for designing (including all studies required), developing, constructing and operating the pilot plant for the duration of the test period after deduction of any grant funds received from third parties.

b. **Investigative Studies and Full Scale Facility Costs**. The parties shall contribute equal shares of the costs for investigative studies, design, environmental review, and permitting associated with the full scale Facility after deduction of any grant funds received from third parties.

c. **Acquisition of Property and Construction.** The parties shall contribute equal shares for commitments necessary to secure a site and associated rights-of-way for the full scale project excluding any rights-of-way or easements that solely benefit only one agency. Actual purchase of property and construction will be by separate agreement as it is beyond the scope of the Task Force.

d. **Staffing.** Both parties will provide support from existing staff and dedicated staff or independent contractors may be retained as needed to support the Project. Actual costs incurred by each party for staff and/or independent contractors will be tracked and submitted to the Treasurer on an annual basis to issue reimbursements as appropriate to result in the equal sharing of costs by both parties.

e. **Reimbursement of Existing Costs.** Each party shall reimburse the other for 50% of any costs described above which have been incurred prior to this agreement.

15. Amendments

This Agreement may be amended at any time, or from time to time, except as may be limited by contract with holders of bonds or other evidences of indebtedness issued jointly or independently by the Parties or by applicable regulations or laws of any jurisdiction having authority, by one or more supplemental agreements executed by all of the Parties who are then Parties hereto, either as required in order to carry out any of the provisions of this Agreement, or for any Project, or for any other purpose, including without limitation, addition of new Parties, including any legal entities heretofore or hereafter created, in pursuance of the purposes of this Agreement.

16. Addition of Parties

A Party or Parties may be added to this Agreement, upon request, evidenced by submission of a certified copy of a resolution adopted by the governing body of the public agency requesting to be a Party to the Agreement. Such requests, as pertain only to the initial 2.5 mgd facility, must be approved by the governing bodies of all of the existing Parties to the Agreement. The Joint Task Force may require a party seeking to join the Agreement to meet any terms and conditions the Task Force deems appropriate.

17. Withdrawal of Party

Either Party may withdraw from this Agreement at any time until both Parties are prepared to award a contract for the construction of the permanent Facility. Any withdrawal prior to that time shall be on not less than thirty (30) days written notice to the other Party provided, however, that no award of bid for the Full Scale Plant Project shall take place until the amount of all bids has been communicated to all Parties for at least a 60-day period prior to any award. Upon providing a notice of withdrawal, the withdrawing Party shall be responsible for its contractual share of all costs and expenses and other obligations assumed by the Parties as provided herein up to the date of withdrawal. The withdrawing party shall reimburse the remaining party for said costs, expenses and other obligations within 90 days of the date of notice of withdrawal.

18. Term and Termination

This Agreement shall continue until terminated as specified in this paragraph. This Agreement may be terminated upon the conclusion of any Fiscal Year by an agreement executed by all of the Parties which are then parties hereto, which agreement shall be approved by the governing bodies of each of such Parties, and shall include satisfaction of all outstanding debts, obligations and liabilities for Capital Expenditures, debt services for bonds or other evidences of indebtedness, and Operation and Maintenance Costs incurred by the Task Force. Upon termination, each Party shall be entitled to receive such property and surplus money of the Task Force as lawfully may be distributed in proportion to each Party's respective contribution to all of the Projects of the Task Force or in such other manner as shall be agreed upon by all of said Parties. Until such distribution is agreed upon, such property and money shall be held in trust by the Treasurer for all of said Parties.

19. Successors; Assignment

This Agreement shall be binding upon and inure to the benefit of the successors or assigns of the Parties. No Party may assign any right or obligation herein without the written consent of each of the other Parties.

20. Governing Law

The parties agree that this agreement is executed in the State of California and that the law of the State of California shall govern this agreement.

21. Severability

Should any portion, term, condition, or provision of this Agreement be decided by a court of competent jurisdiction to be illegal or in conflict with any law, or otherwise rendered unenforceable or ineffectual, the validity of the remaining portions, terms, conditions, or provisions shall not be affected thereby.

IN WITNESS WHEREOF, the Parties have affixed their signatures hereto.

CITY OF SANTA CRUZ

Emily Reilly	23 Sep 07
Mayor	**Date**

9-21-07	
Asst **City Manager**	**Date**

Approved as to form

9-21-07

City Attorney

SOQUEL CREEK WATER DISTRICT

Bruce Daniels	9-19-2007
Board President	**Date**

Regulatory Agency	Regulatory Permit, Authorization or Approval	Key Requirements and General Permit Acquisition Approach	Anticipated Permit Acquisition Timeline
U.S. Fish and Wildlife Service (USFWS), Ecological Services Branch	Incidental Take Statement and coordination under Section 7 Endangered Species Act of 1973, as amended (ESA)	Under Section 7 of the ESA, Federal agencies must consult with the USFWS to determine the potential for effects to protected species and whether an Incidental Take Statement may be required. Key permit acquisition steps include: • Identify federally listed species potentially affected • Initiate early, informal Section 7 consultation and provide a project description with existing special studies • Conduct any additionally required flora and fauna surveys and evaluate the potential for 'take' • Prepare draft Biological Assessment (BA) for federal agency • Coordinate final BA with federal agency and SCWD[2] prior to submittal to USFWS/NMFS • Obtain USFWS/NMFS review and Biological Opinion (BO), and determine need for formal Section 7 consultation • Support USFWS consultation under Section 106 of the National Historic Preservation Act (NHPA), as described below • As necessary, complete consultation and obtain Incidental Take Statement.	6 – 12 months
	Incidental Take Permit (ITP) under the Migratory Bird Treaty Act (MBTA) (16 USC 703–711)	This Act prohibits the take of any migratory bird or any part, nest, or eggs of any such bird without an Incidental Take Permit from USFWS. For acquisition of this permit, we will: • Coordinate with USFWS simultaneously with the Section 7 ESA review regarding potential "take" and the need for a MBTA ITP • Obtain formal USFWS comment and, if needed, a ITP.	
	Consultation under the Fish and Wildlife Coordination Act (16 U.S.C. 661-667c)	This Act authorizes USFWS to review and comment on project effects to fish and wildlife for activities undertaken or permitted by a federal agency. To assist this federal consultation, we will: • Coordinate with USFWS simultaneously with Section 7 ESA process regarding the need for a ITP under MBTA • Obtain USFWS comment under the Act.	

Regulatory Agency	Regulatory Permit, Authorization or Approval	Key Requirements and General Permit Acquisition Approach	Anticipated Permit Acquisition Timeline
NOAA National Marine Fisheries Service (NMFS)	Consultation and biological opinion in accordance with Section 7 ESA	Any federal permitting agency for this project must consult with the NMFS to determine whether the proposed action is likely to have an adverse effect to a federally listed marine species or designated critical habitat for such species; jeopardize the continued existence of such species that are proposed for listing under the ESA; or adversely modify proposed critical habitat. An ITP may be required. Consultation with the NMFS is the same as that described above for the USFWS under Section 7. (If no federal approval is required, an ITP would be issued in accordance with ESA Section 10.)	6 – 12 months
	ITP per Section 104, Marine Mammal Protection Act of 1972 (MMPA) (16 U.S.C. § 1374)	The MMPA prohibits unauthorized "take" of marine mammals in U.S. waters. NOAA NMFS will review project impacts to marine mammals and may authorize an incidental take. Staff will coordinate with the NMFS for ITPs under the MMPA simultaneously with consultation under Section 7 of the ESA, as discussed above, and assist with federal agency consultation under Section 106 of the National Historic Preservation Act (NHPA), as discussed below.	
	Consultation under Section 305(b), Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1855(b))	NMFS consultation is required whenever a federal or state approval is required for an activity that may adversely affect designated essential fish habitat (EFH). Coordination with NMFS would occur for the Sustainable Fisheries Act simultaneously with consultation under Section 7 of the ESA.	

Regulatory Agency	Regulatory Permit, Authorization or Approval	Key Requirements and General Permit Acquisition Approach	Anticipated Permit Acquisition Timeline
National Oceanic & Atmospheric Administration (NOAA), National Marine Sanctuary Program (NMSP), Monterey Bay National Marine Sanctuary (MBNMS)	Authorization under the MBNMS Management Plan and the National Marine Sanctuary Program (15 Code Fed. Regs. Part 922)	Authorization is required from the MBNMS Superintendant for any permit, lease, license, approval or other authorization issued or granted by a federal, state or local agency for activities within the sanctuary. The following three Sanctuary regulations and inter-agency agreements related to MBNMS authorization of desalination projects need to be addressed. • Sanctuary authorization to issue Regional Water Quality Control Board (RWQCB) permits to dispose of brine concentrate, and other materials, into Sanctuary waters. • Sanctuary authorization to issue RWQCB permits to dispose of brine concentrate, and other materials, outside of the Sanctuary boundaries but which subsequently enter Sanctuary waters and negatively impact MBNMS resources. • Sanctuary authorization to issue a California Coastal Commission Coastal Development Permit, per MBNMS authority to prohibit activities that cause alteration of the seabed.	6 – 12 months
U.S. Army Corps of Engineers (USACE)	Individual Permit in accordance with Section 404 Clean Water Act (33 U.S.C. § 1344)	Activities that result in discharges of dredged or fill material into Waters of the United States are regulated by the USACE. Staff will perform the following steps to facilitate acquisition of a Department of the Army permit: • Coordinate early with USACE and other reviewing agencies (USFWS, NMFS, RWQCB, US Coast Guard) • Confirm permit type (Individual or Nationwide), application content, public notification process and likely permit stipulations • Prepare diagrams of alternatives and jurisdictional delineations of affected wetlands/Waters of the US • Prepare Engineer Form 4345, *Application for a Department of the Army Permit* for an Individual Permit • Coordinate with USACE regarding reviewing agency/public comments and permit conditions.	6 –18 months

Regulatory Agency	Regulatory Permit, Authorization or Approval	Key Requirements and General Permit Acquisition Approach	Anticipated Permit Acquisition Timeline
	Individual Permit under Section 10 Rivers and Harbors Act (33 U.S.C. § 403)	Under section 10 of the Act, the building of any wharfs, piers, jetties, pipelines and other in-water structures is prohibited without the approval of the USACE. USACE concerns include contaminated sediments from dredge or fill activity in navigable waters. Staff will: • Submit Section 10 permit application simultaneously with a CWA §404 permit application • Monitor U.S. Coast Guard consultation with the USACE regarding marine traffic safety and navigational hazards, including underwater intake and outfall pipelines • Coordinate under Section 106 of the National Historic Preservation Act • Consult under Section 7 of the federal ESA • Consult under Section 305(b), Sustainable Fisheries Act.	6 – 18 months
Regional Water Quality Control Board (RWQCB)	National Pollutant Discharge Elimination System (NPDES) General Permit For Storm Water Discharges Associated With Construction Activity (WQO No. 99-08-DWQ)	A NPDES General Construction Permit is required for stormwater discharges associated with construction activity totaling over 1 acre that would result in waste discharges into surface waters of the state. Staff will: • Conduct early coordination with the RWQCB regarding the proposed action and anticipated post-project monitoring and annual certification requirements • Compile data on content and rate of discharge anticipated for the proposed action • Submit a Notice of Intent (NOI) to the RWQCB for a General Construction Permit. • Prepare and implement a Storm Water Pollution Prevention Plan (SWPPP) specifying best management practices (BMPs) and pollution prevention monitoring • Obtain General Permit and implement monitoring plan with monthly reports to RWQCB • Submit a Notice of Termination to the RWQCB upon completion of the project.	12 – 24 months
	NPDES Permit in	The proposed project will mix waste brine with City of Santa Cruz WWTF	

Regulatory Agency	Regulatory Permit, Authorization or Approval	Key Requirements and General Permit Acquisition Approach	Anticipated Permit Acquisition Timeline
	accordance with Clean Water Act Section 402 (33 U.S.C. § 1342)	treated effluent and discharge through the City's deepwater outfall. scwd[2] will need to either: 1) obtain a separate NPDES Permit, or 2) modify the City's existing NPDES permit. As the City has an existing NPDES Permit, certain technical studies have already been completed for the outfall. The approach includes: • Develop and submit a Report of Waste Discharge (ROWD) describing the nature of the discharge including chemical testing results • Facilitate RWQCB technical analysis to determine the applicable receiving water quality objectives and effluent limitations (with conditions) • Consultation with NMFS under Section 305(b) of the Sustainable Fisheries Act • Draft NPDES permit is developed as a Tentative Order • Ensure CEQA and NEPA requirements are fulfilled prior to a public hearing for this permit • The Draft Permit may be altered based on public comment and is adopted as a Final Permit. The RWQCB then sends the Permit to the SWRCB and EPA for approval • Existing or planned studies to determine the effects of mixing brine with the treated effluent would provide the technical analysis needed in the CEQA/NEPA document.	
	Waste Discharge Requirements (WDR) per Porter-Cologne Water Quality Control Act (Water Code § 13000 et seq.)	Any activity that results or may result in a discharge of waste that directly or indirectly impacts the quality of waters of the State (including groundwater or surface water) or the beneficial uses of those waters is subject to WDRs. Staff will identify the need for WDRs under the Porter-Cologne Water Quality Control Act and coordinate with RWQCB to confirm required WDRs.	

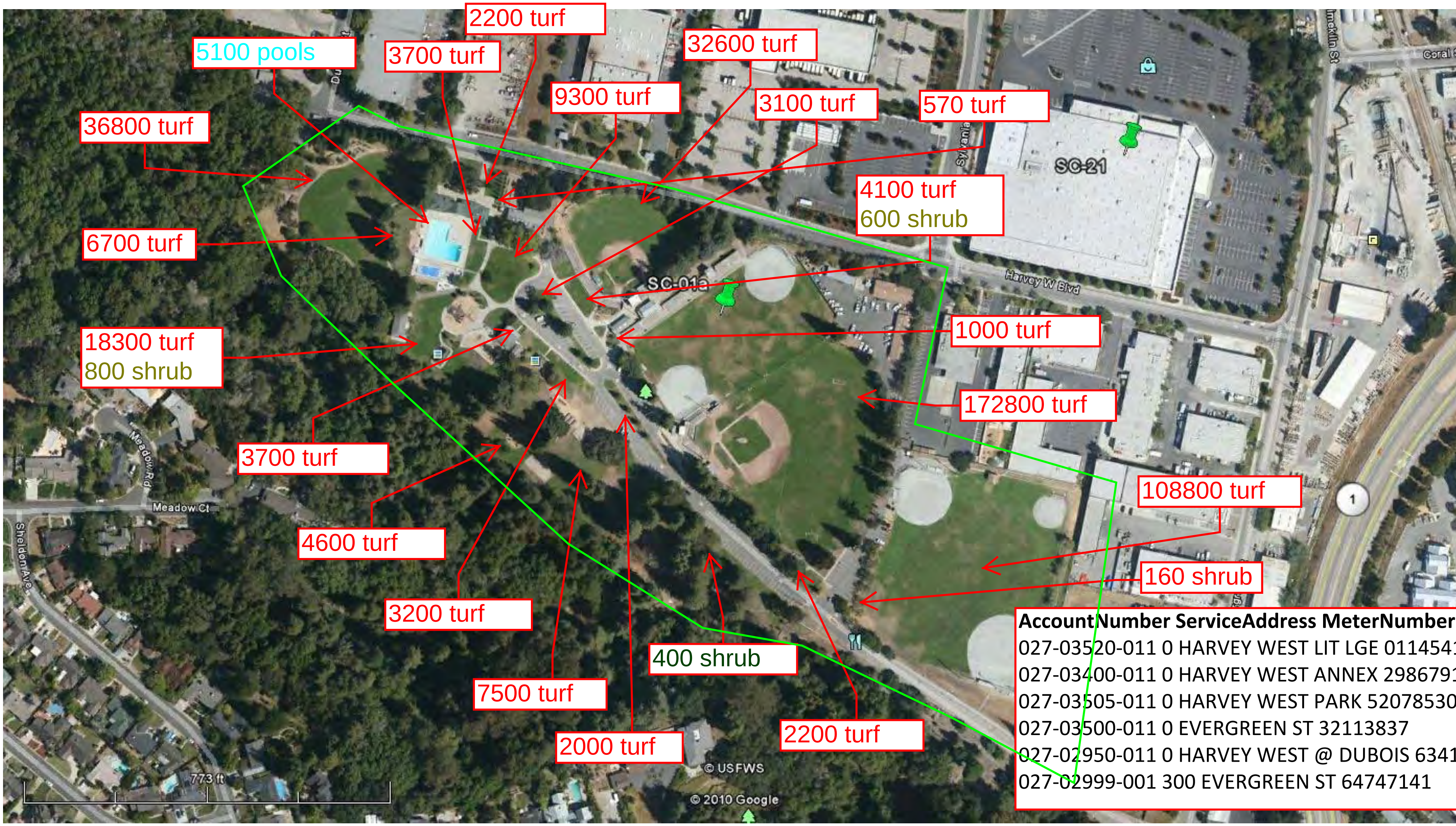
Regulatory Agency	Regulatory Permit, Authorization or Approval	Key Requirements and General Permit Acquisition Approach	Anticipated Permit Acquisition Timeline
	Water Quality Certification in accordance with Section 401 Clean Water Act (33 U.S.C. § 1341)	Any applicant for a federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into navigable waters, must provide the licensing or permitting agency a certification that the activity meets State water quality standards. Staff will initiate Section 401 Water Quality Certification studies and seek approval concurrent with the USACE Section 404 CWA application process.	
California State Lands Commission	Land Use Lease (Right-of-Way Permit) (Pub. Res. Code § 6000 et seq.; 14 Cal. Code Regs. § 1900 et seq.)	A Right-of-Way Permit for use of state tidelands and submerged lands within 3 nautical miles seaward of the ordinary high water mark is required.	12 – 24 months
California Department of Fish and Game (CDFG)	Incidental Take Permit in accordance with the California Endangered Species Act (CESA) (Fish & Game Code § 2081)	A “take” of any endangered, threatened or candidate species may be allowed by permit if it is incidental to an otherwise lawful activity and if the impacts of the authorized “take” are minimized and fully mitigated. CDFG maintains a list of threatened and endangered species designated under California Fish and Game Code 2070. Staff will: • Coordinate with CDFG regarding affected habitats that may support state-listed rare, threatened, and endangered species and species of special concern • Determine whether a “take” of species designated by the California Fish and Game Commission as endangered or threatened • Apply for Incidental Take Permit, if required.	6 – 12 months

Regulatory Agency	Regulatory Permit, Authorization or Approval	Key Requirements and General Permit Acquisition Approach	Anticipated Permit Acquisition Timeline
	Lake/Streambed Alteration Agreement (Fish & Game Code § 1602)	Under California Fish and Game Code Sections 1600–1607, CDFG may require agreements for projects that would substantially divert, obstruct, or change the natural flow of a river, stream, or lake; substantially change the bed, channel, or bank of a river, stream, or lake; or use material from a streambed. Staff will: • Coordinate with CDFG regarding jurisdiction and potentially affected stream, riparian and floodplain systems • Seek CDFG determination whether a Section 1601 agreement is necessary for the proposed project • Prepare Notification of Lake or Streambed Alteration (FG 2023) and Project Questionnaire (FG 2024) • Coordinate with CDFG regarding site inspections, additional information, approvals and conditions • Facilitate consultation under Section 305(b) of the Sustainable Fisheries Act and the Fish and Wildlife Coordination Act.	6 – 12 months

Regulatory Agency	Regulatory Permit, Authorization or Approval	Key Requirements and General Permit Acquisition Approach	Anticipated Permit Acquisition Timeline
California Coastal Commission (CCC)	Coastal Development Permit in accordance with the California Coastal Act (Pub. Res. Code § 30000 et seq.)	Development proposed within the state Coastal Zone requires a Coastal Development Permit issued by the CCC, except where a Local Coastal Plan (LCP) applies. Staff will: • Consult early and continuously with the CCC regarding the proposed action, and physical and technological alternatives • Identify affected and important coastal zone resources • Coordinate the scope of marine biology and other marine resource evaluations • Facilitate review of proposed actions under the Coastal Act with the CCC, and actions evaluated under the City's LCP • Facilitate consultation under Section 305(b) of the Sustainable Fisheries Act • Facilitate a Coastal Act consistency determination for lead federal agency involvement • Respond to CCC inquiries and comments • Provide approved CEQA/NEPA documents and other information required for permit approval	12 – 24 months
California Department of Public Health (CDPH)	Permit to Operate a Public Water System (Health & Safety Code § 116525)	A permit from CDPH to operate a public water system is required to manage water quality and protect public health. Staff will: • Define project design elements and alternatives • Initiate early agency communication with local CDPH office • Prepare or provide Water System Technical Report per DHS requirements, including monitoring prior to use • Prepare Application for Domestic Water Supply Permit (or submittal to amend existing permit) • Obtain CDPH permit and, upon construction, prepare Inspection Sheets	12 – 24 months

Regulatory Agency	Regulatory Permit, Authorization or Approval	Key Requirements and General Permit Acquisition Approach	Anticipated Permit Acquisition Timeline
California Department of Parks and Recreation Office of Historic Preservation	Coordination under Section 106 of the National Historic Preservation Act (NHPA) (16 USC 470 et seq.)	Section 106 of NHPA requires a federal agency with jurisdiction over a federally funded, federally assisted, or federally licensed activity to consider the effects of the agency's action on properties listed or eligible for listing in the NRHP. Staff will: • Consult with the State Historic Preservation Officer (SHPO) • Identify and evaluate historic properties (literature search and Phase 1 terrestrial survey) • Evaluate properties eligible for listing in the NRHP • Formally consult with the SHPO seeking agreement on effect and treatment of historic properties (if any).	6 – 12 months
California Department of Transportation (Caltrans)	Encroachment Permit (Streets & Highway Code § 660 et seq.)	Encroachments in, under, or over any portion of a state highway right-of-way, such as state Highway 1. Staff will: • Coordinate with Caltrans District 5 Permit Engineer • Complete an Encroachment Permit Application, including project information, drawings, plans and any prior approvals • Respond to Caltrans inquiries and facilitate permit approval process, as needed.	12 – 24 months
City of Santa Cruz Water Department	Regulation of Water Wells (Chapter 16.06)	This chapter of the City Code regulates the construction, repair and reconstruction of all wells through: • Preparation of plans for review and use by the public • Well standards and setbacks • Variances for public use • Inspections and Completion Reports • Public Hearings Staff will comply with these regulations, if required.	6 – 12 months
City of Santa Cruz Planning and Community	Use Permit	It is expected that permits or approvals will be required for review under City planning, zoning, building and local coastal regulations. Staff will comply with these regulations, if required.	12 months

Regulatory Agency	Regulatory Permit, Authorization or Approval	Key Requirements and General Permit Acquisition Approach	Anticipated Permit Acquisition Timeline
Development	Coastal Development Permit in accordance with the California Coastal Act (Pub. Res. Code § 30000 et seq.)	Development proposed within the Coastal Zone where the City has jurisdiction through its existing Local Coastal Plan, except where the CCC retains primary permit authority. See California Coastal Commission permit discussion above.	See CCC above
Monterey Bay Unified Air Pollution Control District (MBUAPCD)	Authority To Construct in accordance with Local Rule 3.1	The building, erection, alteration, or replacement of any article, machine, equipment or other contrivance which may cause the issuance of air contaminants from a stationary source or the use of which may eliminate or reduce or control the issuance of air contaminants requires an Authority to Construct to be issued by the Air Pollution Control Officer. Depending on equipment used and requirements for backup power, agency consultation would be initiated and, if required, an Application for Authority to Construct and Permit to Operate would be prepared and submitted to the MBUAPCD.	12 – 18 months
	Permit To Operate in accordance with Local Rule 3.2	The operation or use of any article, machine, equipment or other contrivance that may emit air contaminants from a stationary source requires a Permit to Operate to be issued by the Air Pollution Control Officer or the District's Hearing Board. Depending on equipment used and requirements for backup power, agency consultation would be initiated and, if required, an Application for Authority to Construct and Permit to Operate would be prepared and submitted to the MBUAPCD.	12 – 18 months



AccountNumber	ServiceAddress	MeterNumber
027-03520-011	0 HARVEY WEST LIT LGE	01145417
027-03400-011	0 HARVEY WEST ANNEX	29867913
027-03505-011	0 HARVEY WEST PARK	52078530
027-03500-011	0 EVERGREEN ST	32113837
027-02950-011	0 HARVEY WEST @ DUBOIS	63418214
027-02999-001	300 EVERGREEN ST	64747141

Landscape Water Use Reports
Estimated Landscape Area: 6/10/2010
SC-01a. HARVEY WEST PARK
Turf: 423,170 FT2
Shrub/Tree: 1,960 FT2
Pools: 5,660 FT2
Please forward corrections to Info@WaterUseReports.com or (800) 800-9519.

Landscape Water Use Report

August 2011
SiteID: SantaCruz-01a

Prepared For:

Site Name:	HarveyWestPark
Main Contact:	Meta Rhodeos - Parks Manager
Landscape Firm:	
Other Contacts:	Dave Rosener

Acct# and Service Address:

027-02950-011 0 Harvey West @ Dubois
027-02999-001 300 Evergreen St
027-03400-011 0 Harvey West Annex
027-03500-011 0 Evergreen St
027-03505-011 0 Harvey West Park
027-03520-011 0 Harvey West Lit Lge

Site Description:

Measurement Method:	Aerial Imagery
Measurement Date:	6/15/2010
Irrigated Turf Area (FT2):	423,170
Irrigated Other Area (FT2)	1,960
Pool/Pond Area (FT2):	5,660
Indoor Water Ccf/Bill:	0

CITY OF SANTA CRUZ
HARVEY WEST PARK
809 CENTER ST RM 101
SANTA CRUZ CA 95060-3826

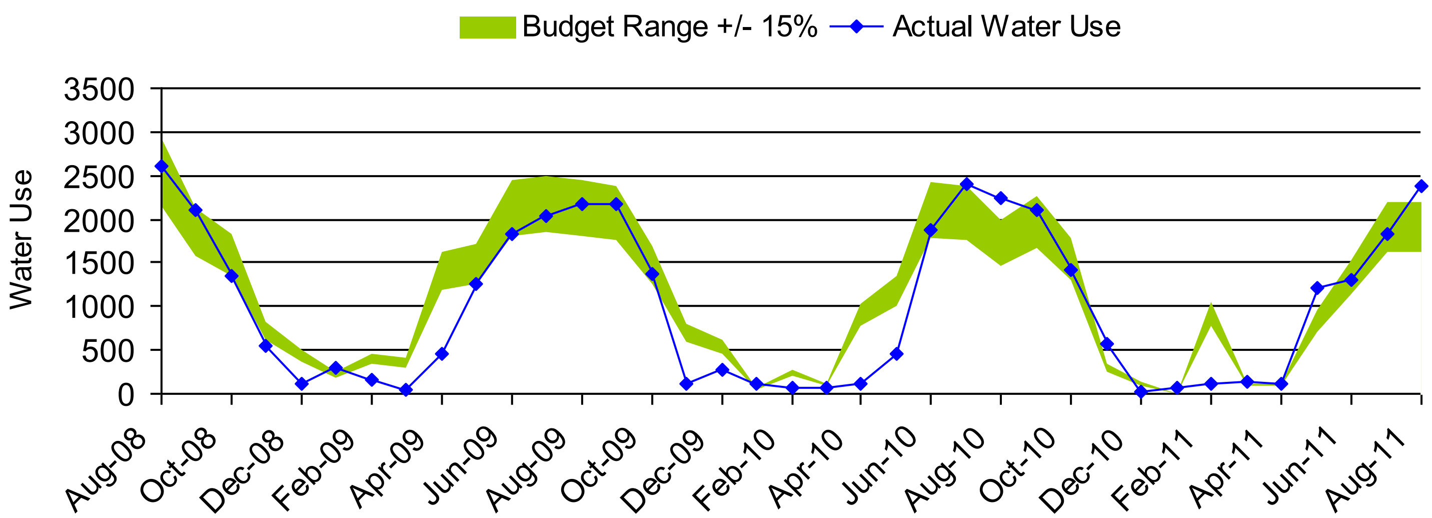
Site Percentile

This site's irrigation performance over last 12 months compared to peer sites. See FAQ for details.

90

100=top score

Water Use History



Savings Potential	Last Month	Last 12 Months	Last 24 Months	Last 36 Months
Over Water Ccf	483	1,417	2,427	2,803
Over Water %	20%	13%	11%	8%
Dollars Lost $	$1,930	$5,670	$9,710	$11,211

Read Date	Actual Water Ccf	Budget Water Ccf	Over Water Ccf	Over Water %	Weather ETo-Rain Inches
8/12/2011	2,390	1,907	483	20%	4.66
7/12/2011	1,838	1,915	0	0%	4.68
6/13/2011	1,301	1,337	0	0%	3.28
5/12/2011	1,209	839	370	31%	2.05
4/14/2011	124	97	27	22%	0.24
3/14/2011	146	101	45	31%	0.25
2/14/2011	110	921	0	0%	2.26
1/12/2011	63	0	63	100%	0.00
12/13/2010	26	121	0	0%	0.30

Comments

Site Map


City of Santa Cruz
Water Conservation
Large Landscape Program
Legend
Irrigation Budget Participants
Water Service Area
N
W
E
S
0
0.25
0.5
1 Miles

Draft Recycled Water White Paper
Opportunities and Limitations for Recycled Water Use
Santa Cruz Water Department & Soquel Creek Water District

INTRODUCTION

To ensure reliable, high quality drinking water supplies, the City of Santa Cruz Water Department (SCWD), and the Soquel Creek Water District (SqCWD) have joined together to conserve, protect and create a diverse water supply portfolio. The two agencies have partnered, forming the **scwd^2** Task Force to implement the **scwd^2** Seawater Desalination Program.

The SCWD Integrated Water Plan (IWP, 2005) and the SqCWD Integrated Resources Plan (IRP, 2006) provide a flexible, phased approach for providing a reliable supply of water during a drought, preserving coastal aquifers from saltwater intrusion, and ensuring protection of public health and safety. Both agencies are looking at the following four components.

- **Conservation** – Permanently reduce customer demand for water and increase water use efficiency to obtain the greatest public benefit from available supplies.

- **Rationing** – Further reduce water use, by up to 15-percent, through temporary water restrictions during times of drought.

- **Supplemental Supply** – Construct a desalination plant to provide supplemental water during drought and to help protect our coastal aquifers.

- **Recycled Water** – Develop and use recycled water for non-potable irrigation and other uses where feasible.

SUMMARY

This white paper introduces **scwd^2**, discusses recycled water and its benefits, and describes the opportunities and limitations with recycled water as an opportunity to offset potable water needs for these two agencies. Major findings of this recycled water white paper include:

- Both SCWD and SqCWD have implemented and/or are investigating recycled water programs as part of their integrated water portfolios.

- Current California (CA) regulations do not allow recycled water (i.e., highly-treated wastewater) to be discharged directly into a potable/drinking water distribution system (otherwise known as direct potable use) and therefore would not meet SCWD's drought water supply needs.

- Current California (CA) regulations do allow recycled water to be used for indirect potable reuse whereby highly-treated wastewater is injected into the ground via percolation ponds or pumping, and extracted later for use. However indirect potable reuse is not practical for SqCWD or SCWD because 1) it requires blending recycled water with surface or groundwater prior to injection and both surface and groundwater supplies are already limited; 2) injection wells are required to be located a prescribed distance away from any public or private drinking water well which is difficult due to the thousands of wells within Soquel-Aptos area groundwater basin; and, 3) local land limitations are not conducive to percolation/blending ponds.

- Recycled water for SCWD and SqCWD could potentially provide irrigation water for parks, sports fields, and/or golf courses during a drought, but would require a new dedicated distribution system that would be prohibitively expensive compared with the relatively small volumes of water delivered for appropriate use.

BACKGROUND

SCWD Water Supply Portfolio

The City of Santa Cruz (SCWD) relies primarily on surface water runoff that is captured in reservoirs or withdrawn through stream diversions. The SCWD also has a small well field that seasonally supplies about 5-percent of their water supply. The SCWD water supply facilities include:

- Surface water storage in Loch Lomond Reservoir,
- Surface diversions from two locations on the San Lorenzo River,
- Surface diversions from three coastal streams and a natural spring (i.e. North Coast sources), and
- Groundwater from the Live Oak Wells.

The SCWD system relies on surface runoff from local rainfall and groundwater infiltration. No water is purchased from State or Federal sources or otherwise imported to the region from outside the Santa Cruz area. The primary threat to the SCWD water supply is the lack of water during a drought. If the City were faced with drought conditions similar to the 1976-1977 drought, the SCWD does not have enough water to meet current demands and would require rationing of approximately 45-percent. Even with a plan of ongoing conservation efforts and 15-percent additional rationing/water-use restrictions during drought, additional water supplies are needed to meet potable water needs for public health and safety and economic stability during drought.

SqCWD Water Supply Portfolio

SqCWD obtains all of its water supply from two separate groundwater aquifers. Approximately two-thirds of SqCWD’s supply comes from the Purisima Formation and one-third from the Aromas Red Sands. Similar to SCWD, no water is purchased from State or Federal sources or imported to the region from outside the Santa Cruz area.

The primary threat to the SqCWD water supply is overdrafting of the aquifers and the subsequent potential for seawater intrusion. The Soquel-Aptos area groundwater basin provides water supply for more than just SqCWD. It is also pumped by several mutual water districts, SCWD and over a thousand private well owners. The basin is in overdraft and the cumulative impact of pumping in excess of sustainable yield will eventually lead to seawater intrusion and resulting contamination of the groundwater basin.

SqCWD has practiced groundwater management for over 25 years and continually monitors for changes in water quality and groundwater levels. In addition, to protect their potable water supply, SqCWD has an aggressive water conservation program and has joined SCWD to address common water supply issues. SqCWD needs to find a supplemental water supply that will permit them to reduce pumping from the over-drafted groundwater aquifers. This will permit the groundwater levels to rise and prevent seawater intrusion.

RECYCLED WATER – WHAT IS IT?

People generally associate “recycling” with recovering materials such as aluminum cans, newspapers, etc. in order to reuse the material and minimize waste. Recycled water involves a similar concept, where treated water (effluent) from a municipal wastewater treatment plant is further treated to a high level of quality so it is suitable for beneficial uses like irrigation, commercial or industrial use, or in some cases, indirect potable reuse. Recycled water can also include the onsite reuse of water at an industrial facility, such as water that is used for cooling processes.

The natural water cycle includes recycling/reusing through natural processes such as precipitation, infiltration, evaporation and evapotranspiration. Wetlands, for example, act as Mother Nature’s treatment systems; filtering runoff from storms to provide high quality water in the environment.

As urbanization has increased, water recycling/reusing also occurs as one city draws their drinking water supply from the same river into which an upstream city has discharged its treated wastewater. Water from most major rivers has been used, treated, and reused a number of times before the last downstream user withdraws their water supply.

Figure 1 illustrates the relative quality of water used for municipal water supplies.

More intentional recycled water projects are being developed with specific goals to beneficially reuse treated water from municipal wastewater treatment plants. These projects include water that is reused for both non-potable and indirect potable purposes, and are subject to specific regulatory requirements to ensure public health.

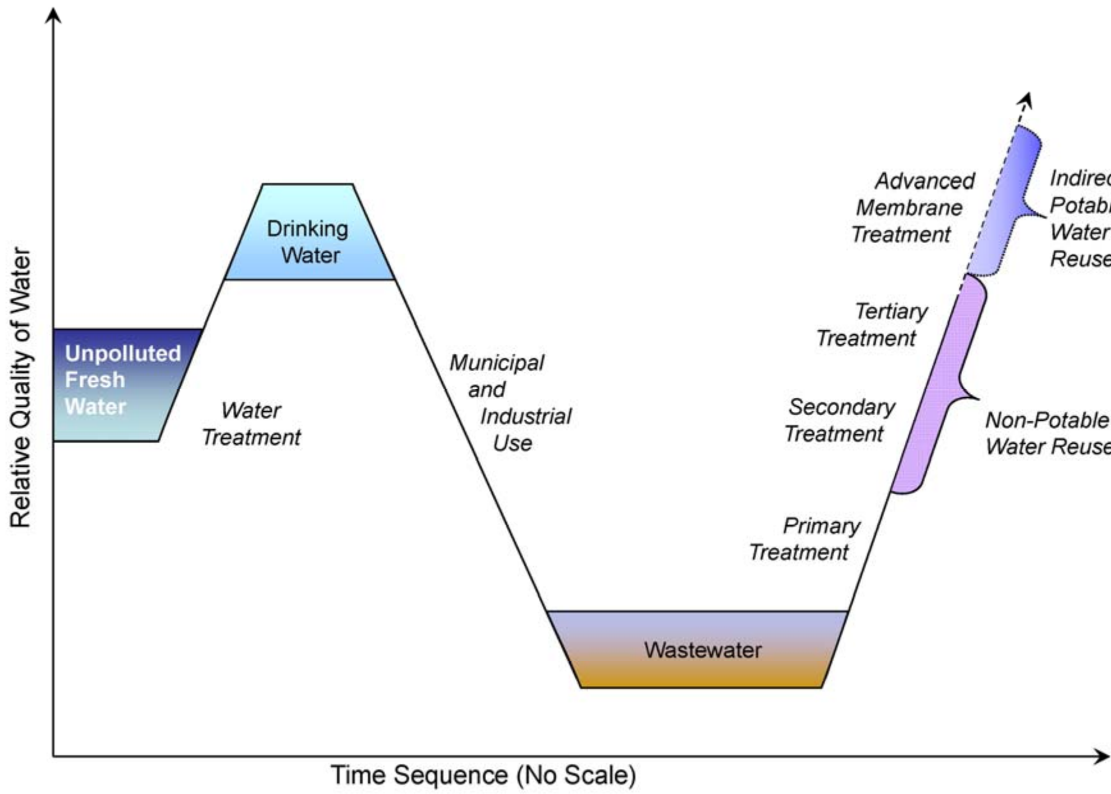


Figure 1: Relative Water Quality of Municipal Water Supplies
Source: Adapted from Water quality changes during municipal uses of water in a time sequence and the concept of water recycling (Asano, T., Water Science & Technology, Vol. 45, No. 8, p. 29, 2001.)

THE BENEFITS OF RECYCLED WATER

Recycled water is generally used as an alternative to potable water for irrigation and other non-potable uses such as commercial car-washing and industrial washwater. The benefits of implementing a municipal recycled water program include:

- Reducing potable water demands from irrigation and other non-potable uses;
- Drought protection for irrigation, and other non-potable uses; and
- Potential groundwater replenishment through recharge with blended recycled water (indirect potable reuse).

Currently, recycled water is not approved or permitted for discharge directly into a potable water distribution system (a.k.a. direct potable reuse).

Approved Uses of Recycled Water

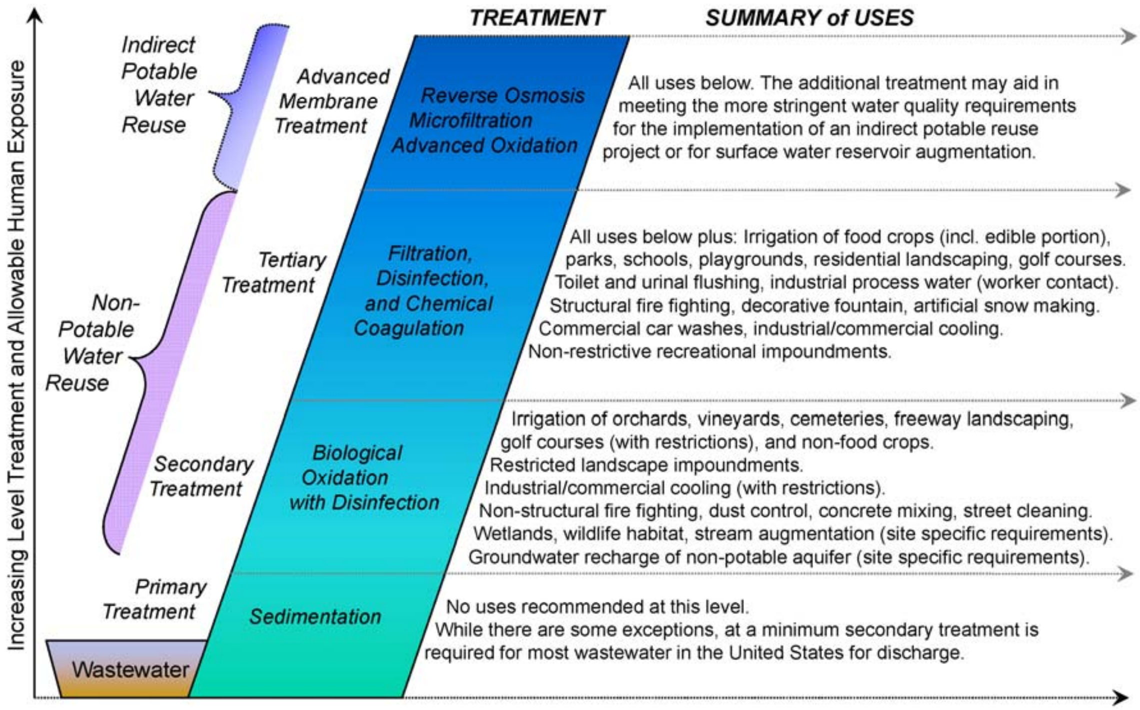


Figure 2 summarizes the generally recommended uses for recycled water based on the level of treatment (EPA, 2004). Because state regulations and groundwater management plans may have site-specific treatment requirements, the approved uses for recycled water must always be evaluated on a case by case basis.

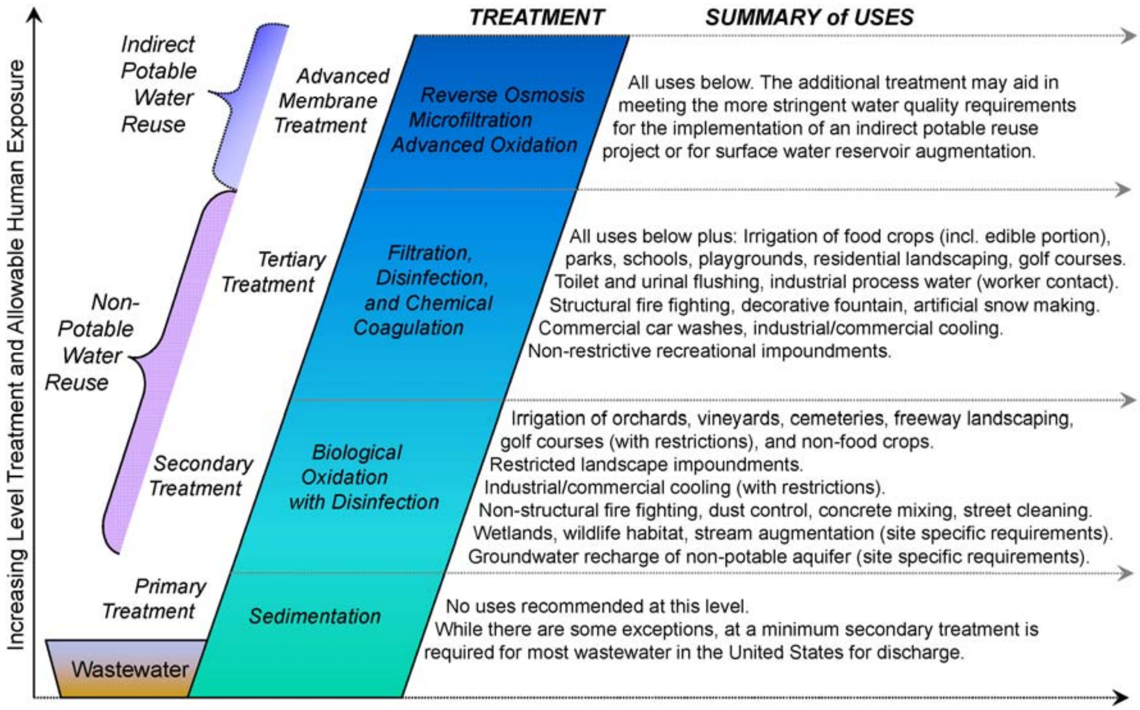


Figure 2: Suggested Uses for Recycled Water based on Level of Treatment

Understanding the relationship between water quality requirements for potential uses, health related water quality requirements, and other regulatory water quality requirements related to the use of recycled water is critical to identifying the suitability and benefits of recycled water use.

Recycled Water Regulations and Permitting

The production, discharge, distribution, and use of recycled water are subject to federal, state, and local regulations, the primary objectives of which are to protect public health. In the State of California, recycled water requirements are administered by the State Water Resource Control Board (SWRCB), individual Regional Water Quality Control Boards (RWQCBs), and the California Department of Public Health (CDPH).

The regulatory requirements for recycled water projects in California are contained in the following sources:

- California Code of Regulations (CCR), which includes Title 22 and Title 17
- California Health and Safety Code
- California Water Code.

Applicable excerpts from Title 22, Title 17, and the California Health and Safety Code are documented in "*The Purple Book,*" which provides a single source of guidelines and requirements for recycled water production, distribution and use in California. Appendix

A to this paper provides a more in-depth discussion of the current recycled water regulations in California.

OPPORTUNITIES & LIMITATIONS OF RECYCLED WATER USE

Recycled Water Options and Limitations for SCWD

The City of Santa Cruz owns and operates a regional wastewater treatment facility which provides secondary treatment to meet State and Federal waste discharge requirements. Treated wastewater is discharged to Monterey Bay through a deep water outfall. The plant is not currently permitted to produce recycled water for use offsite; however, recycled water is used at the plant to help meet its major process water needs such as chemical mixing, cooling water, equipment washing, and irrigation.

The SCWD investigated the potential for using recycled water as a supplemental water supply in two studies:

- The City of Santa Cruz Alternative Water Supply Study. Carollo Engineers, 2000.
- The City of Santa Cruz/Soquel Creek Water District Evaluation of Regional Water Supply Alternatives. Carollo Engineers, 2002.

There were several water reuse concepts evaluated in the two studies, including:

- Direct potable reuse;
- Urban landscape irrigation;
- Agricultural application for the North Coast;
- Using recycled water from Scotts Valley Water District; and,
- Using recycled water for groundwater recharge. (I.e., “indirect potable reuse” or “GRRP.” See section below.)

Direct Potable Reuse

As stated above, recycled water, regardless of level of treatment provided, is not currently approved or permitted for discharge directly into a potable water distribution system. (I.e., direct potable reuse.) This is not to say the regulations will not change in the future. Should regulations change and allow for direct potable reuse following treatment, a seawater desalination facility could be modified to treat effluent from a wastewater treatment facility.

Urban Landscape Irrigation

Recycled water may not be added to the pipelines of an existing drinking water distribution system, so a new pipeline distribution system (commonly referred to as “purple pipes”) must be constructed to deliver recycled water to customers. This can be very costly in an urban environment when neighborhoods have already been developed and the larger irrigation demands like parks and schools are spread out across a large geographic area.

In addition, the City of Santa Cruz made the decision to enforce water use restrictions, targeted mainly towards outdoor uses such as irrigation, as a strategy in the SCWD IWP (SCWD, 2005) for meeting demands during drought. As a result, water demand projections during a drought assume that very little potable water is used for irrigation. Therefore, while recycled water use for urban irrigation could help maintain public parks and sports field irrigation during a drought, it would not provide the potable needs for the SCWD during a drought when additional supplies are in need.

Agricultural Application for the North Coast

This concept involved construction of a 4-7 mgd tertiary wastewater treatment plant and associated facilities to deliver treated wastewater to North Coast farmers for irrigation purposes. The plant would be located either on the existing wastewater treatment plant site, or in the industrial area of Santa Cruz and would include construction of approximately 45,000 feet of 18-inch pipe and pump station. In return, the City would get access to the groundwater supplies currently being used by these farmers.

Several major, if not fatal, flaws occurred during the evaluation of this option including most critically the following:

1. After gathering and evaluating available data on groundwater supply on the North Coast, the City discovered that there was insufficient groundwater to provide a reliable source of supply in the second year of a prolonged drought.
2. The overlying land owner, California Department of Parks and Recreation, felt the exchange involved "uncharted legal and complex policy issues having serious long-term implications of statewide consequence… ." And further that "it is the Department's assessment that the use of reclaimed wastewater at Wilder Ranch could result in potential adverse impacts to sensitive natural resources, place possible constraints on recreational usage and adversely impact organic agricultural leasing operations at Wilder Ranch State Park."
3. This opinion was shared with the organic farmers: "We are in favor of recycling reclaimed water on golf courses, car washing, commercial landscaping and home landscaping but not on plants grown for food, and especially not on plants that are eaten uncooked."

Given these three factors, this concept was removed from further consideration during the analyses done in the SCWD Integrated Water Plan.

Using Recycled Water from Scotts Valley Water District

Importing recycled water from a nearby producer is an alternative to producing recycled water at the City of Santa Cruz wastewater plant. The Scotts Valley Water District (SVWD) and the Pasatiempo Golf Course (Pasatiempo), which presently receives potable water from SCWD for irrigation, entered into a Memorandum of Agreement (MOA) expressing the intent to implement a "Pasatiempo Water Conservation Initiative" in cooperation with the City of Santa Cruz. This MOA initiated discussion regarding the supply of potable water from Santa Cruz, when excess wintertime surface water is available, in exchange for an equal volume of recycled water provided by SVWD to Pasatiempo to meet the golf course irrigation demands in the summer.

However, similar to the Urban Irrigation concept, this solution does not significantly offset potable water needs for SCWD during drought.

Recycled Water Options and Limitations for SqCWD

SqCWD does not currently treat or reclaim any wastewater. Wastewater collected in the SqCWD's service area is treated at the Santa Cruz wastewater treatment facility located approximately five miles from the SqCWD's western service area boundary.

Use of recycled water from the Santa Cruz wastewater plant by SqCWD is therefore limited by the relatively long distance from the treatment plant to the SqCWD boundary, the limited irrigation market within the SqCWD service area, and constraints on the ability to use recycled water for groundwater recharge (SqCWD, 2005). The cost/benefit ratio to produce recycled water at the Santa Cruz wastewater treatment plant and deliver it to irrigation users within SqCWD's service area in a new recycled water distribution pipeline is very high compared to other supplemental supply alternatives that could use the existing potable water distribution piping system to deliver water.

The SqCWD recently investigated the potential for using recycled water as a supplemental water supply in the study:

- Water Recycling Facilities Planning Study. Black and Veatch, 2009.

This study evaluated potential applications of a newer concept of using satellite reclamation plants (SRPs) to locally treat and reuse wastewater. The concept is to divert wastewater from the sewer system for localized treatment and subsequent use by large-scale irrigation users. SRPs would allow water agencies to provide recycled water without the expense of dedicated distribution systems since the source, treatment and use would be in close proximity to one another. However, a primary limitation in making SRPs a cost-effective option is finding large irrigation demands near equally large wastewater flows.

SqCWD evaluated a total of 25 potential recycled water users. This number was limited to two based on the amount of (waste) water supply and irrigation demand. Preliminary cost estimates provided to SqCWD for a 0.12 mgd (134afy) SRP at one of the sites, the Seascape Golf Course, were approximately $9 million in construction costs with the cost of water ranging from $20-25/1000gal. Besides being more expensive than other supplemental supply projects, this particular user is not actually a customer of SqCWD. Therefore, while this project may help the overall aquifer, this particular SRP would not reduce the water demand placed on the aquifer by SqCWD.

GROUNDWATER RECHARGE WITH RECYCLED WATER (GRRP)

Another option for re-use of recycled wastewater is groundwater recharge, or GRRP. A GRRP program injects advance treated recycled water into a groundwater basin for future extraction-treatment-potable water use. Locally, a GRRP would help replenish the over-drafted Soquel-Aptos area groundwater basins.

The treatment requirements for recycled water for indirect potable reuse include advanced filtration and oxidation processes such as reverse osmosis (RO) membrane separation and ozone oxidation. The regulatory requirements governing GRRPs are discussed in more detail in Appendix A to this white paper and include compliance with:

- Blending with dilution water
- Underground residence time
- Compliance with water quality limits
- Monitoring and reporting of results.

Figures 3 and 4, below, show how recycled water would be blended with dilution water (typically filtered surface water or groundwater) for recharge into a ground water basin through percolation ponds and injection wells, respectively.

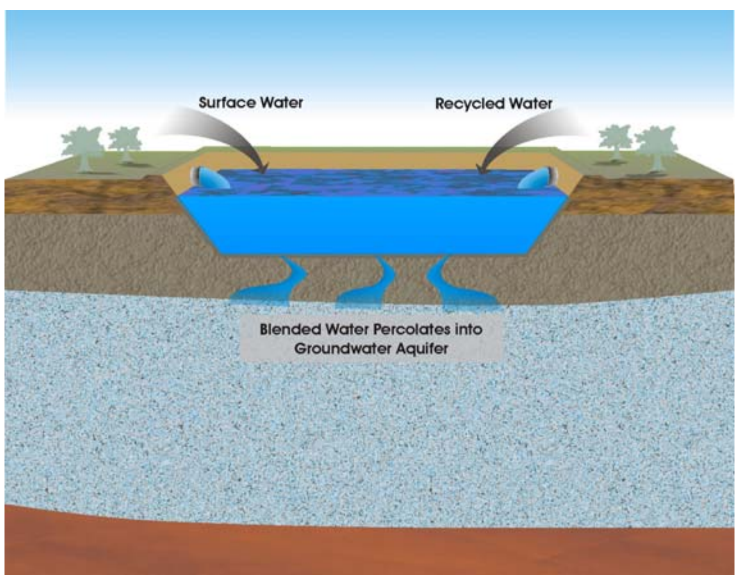


Figure 3: Dilution water and recycled water added to a percolation pond for groundwater recharge.

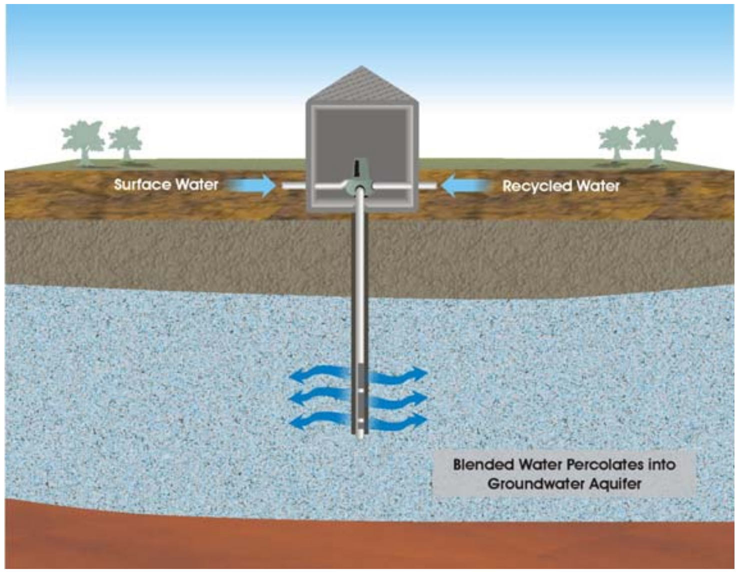


Figure 4: Dilution water and recycled water combined at an injection well for groundwater recharge.

Table 1 shows the blending percentages that are permitted for each recharge approach. In the case of a percolation pond only 20% of the percolating water is initially permitted to be recycled water. For an injection well only 50% of the percolating water is permitted to be recycled water.

Table 1: Summary of Initial Blending Requirements for Groundwater Recharge

Application	Initial Blending Requirements - Max. Recycled Water % [1]	Minimum Underground Residence Time
Surface spreading (recharge ponds)	20%	6 months
Surface spreading (recharge ponds) with reverse osmosis and advanced oxidation treatment	50%	6 months
Subsurface injection (injection wells)	50%	6 months

Source: California Code of Regulations (CCR) Title 22, Article 5.1, Groundwater Recharge Reuse Draft Regulation Table 60320.041 (dated August 5, 2008)
[1] These percentages can be increased over time based on the results of an extensive groundwater monitoring program to demonstrate that no degradation of groundwater quality is occurring, as discussed in Appendix A.

Figure 5 shows the minimum underground residence time requirement for the percolation pond or injection well with respect to a potable water source. The “groundwater travel time” separation requirement is the distance over which groundwater must travel in 6 months before it can be extracted for use.

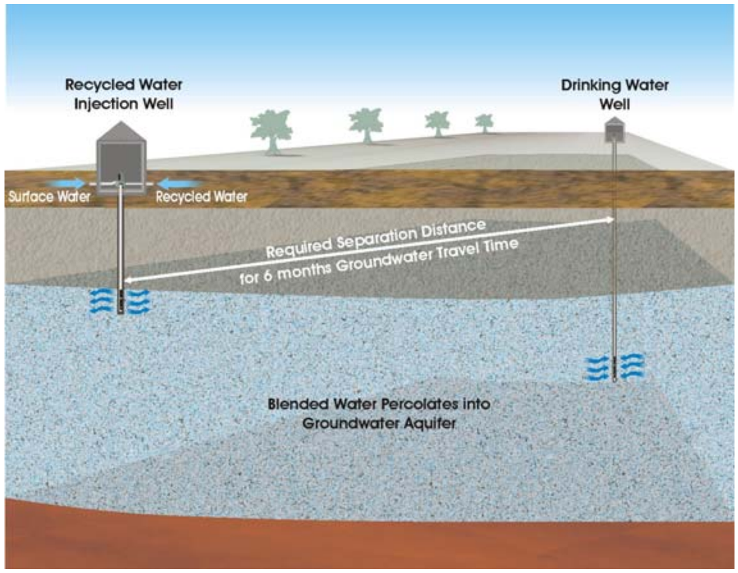


Figure 5: GRRP injection well for groundwater recharge must be separated from public and private potable wells by 6 months groundwater travel time.

GRRP for SCWD and SqCWD

Geologic, financial, regulatory, and operational constraints make it difficult for a GRRP to supply SCWD and SqCWD with sufficient water to meet their average annual and drought year demands. Constraints on a GRRP program include:

1. Numerous wells would be required to inject a sufficient quantity of recycled water to meet the average annual and drought year demands. Local geology is not conducive to the type of large, high-capacity injection wells.

2. Locating GRRP injection wells to meet the physical and travel time separation requirements would be very challenging. The injection wells would be required to be separated from all public and private wells by a minimum 6-month travel time[1] ("groundwater travel time separation distance"). There are over a thousand private potable water wells within the area referred to as the Soquel/Aptos groundwater basin, as well as the nineteen public wells for SqCWD and SCWD.

3. Blending water requirements with other surface or groundwater sources puts additional demands on these already-insufficient sources.

[1] The 6-month minimum travel time requirement is only applicable after substantial testing has occurred. Initially, a 12 to 24-month separation between injection wells and production wells would be required, further limiting the available injection well locations.

4. Because of the urban nature of the SCWD and SqCWD groundwater basin areas, percolation ponds are not practical.

5. The recycled water must be piped long distances from the treatment plant to the injection sites further limiting potential injection locations to areas in or near the City of Santa Cruz.

A specific GRRP project that may benefit the over-drafted aquifer is an injection barrier that raises groundwater levels to prevent seawater intrusion. However, the constraints identified above prevent GRRP projects from being considered in this region.

CONCLUSION

The major conclusions of this recycled water white paper include:

- Both SCWD and SqCWD have implemented and/or are investigating small recycled water programs as part of their integrated water portfolios.

- Under current CA regulations, highly-treated recycled water is not permitted for discharge into the potable water distribution system (direct potable use) and therefore would not meet SCWD's drought water supply needs.

- Groundwater recharge with recycled water (indirect potable reuse) is not practical for SCWD or SqCWD because of the requirements that 1) recycled water be blended with up to 50% of another water source before recharge and 2) extraction by any public or private potable drinking water well must occur at a prescribed distance from the point of injection measured in terms of travel time.

- Recycled water for SCWD and SqCWD could potentially provide irrigation water for parks, sports fields, and/or golf courses, but could be prohibitively expensive both from the wastewater treatment facility and satellite reclamation plants (SRPs). From the Santa Cruz Wastewater Treatment Plant a lengthy new "purple pipe" distribution system would be required and relatively small volumes of water would be delivered. In addition, this would not satisfy SCWD's potable water supply needs during a drought. SRPs within SqCWD's service area have very limited feasible application due to the few sites with both large scale irrigation and sufficient wastewater flow and are also prohibitively expensive.

REFERENCES

Water Recycling Facilities Planning Study for Soquel Creek Water District. Black and Veatch, 2009.

California Health Laws Related to Recycled Water "The Purple Book." June 2001.

City of Santa Cruz Alternative Water Supply Study. Carollo Engineers, 2000.

City of Santa Cruz/Soquel Creek Water District Evaluation of Regional Water Supply Alternatives. Carollo Engineers, 2002.

City of Santa Cruz Water Department 2005 Urban Water Management Plan. City of Santa Cruz Water Department, 2005.

City of Santa Cruz Water Department Integrated Water Plan. Gary Fiske and Associates, 2005.

"2004 Guidelines for Water Reuse." Environmental Protection Agency, 2004.

Soquel Creek Water District Integrated Resources Plan. ESA, 2006.

Soquel Creek Water District Urban Water Management Plan Update. Soquel Creek Water District (SqCWD), 2005.

Appendix A: Recycled Water Regulations

A.1 Summary of Groundwater Recharge Reuse Project Regulations

The following discussion provides an overview of the regulatory requirements governing Groundwater Recharge Reuse Projects (GRRP). Implementation of groundwater recharge with recycled water requires compliance with:

- Residence time
- Blending with dilution water
- Compliance with water quality limits
- Extensive monitoring and reporting of results

The Groundwater Recharge Reuse Draft Regulations (Draft Regulations), contained in Article 5.1 of Title 22 of the California Code of Regulations (CCR), dated August 5, 2008 were used as a guide to identify the steps that may be required to evaluate the feasibility of using recycled water for groundwater recharge. These requirements may change once the Draft Regulations are finalized. A GRRP is defined as

> *"a project that uses recycled municipal wastewater, has been planned and is operated for the purpose of recharging a groundwater basin designated in the Water Quality Control Plan [defined in Water Code section 13050(j)] for use as a source of domestic water supply, and has been identified as a GRRP by a RWQCB [Regional Water Quality Control Board]."* (Title 22, Division 4, Chapter 3, Article 1)

The intent of the Draft Regulations is to protect the beneficial uses of the aquifer and demonstrate that the project will not degrade any groundwater aquifers. The feasibility of a GRRP will depend on the recycled water quality, availability and quality of diluent water, and geology, hydrogeology. Another critical component of any GRRP project is to maintain public, policy maker and government agency confidence.

CDPH and RWQCB approvals are required for all aspects of the GRRP. Communication with these agencies from project conception is highly encouraged as agency input is integral to the development of the GRRP engineering report and associated monitoring program.

A summary of the requirements for developing a GRRP is provided in the following sections.

A.1.1 Required Residence Time

For control of pathogenic microorganisms (Section 60320.010), the wastewater must be filtered and meet the definition of disinfected tertiary recycled water. In addition, the underground residence time must be ≥ 6 months prior to extraction for use as a drinking water supply for both surface spreading (i.e. recharge ponds) and subsurface injection (i.e. injection well) projects.

A.1.2 Blending Requirements

Diluent water is defined as water, other than treated wastewater, that actively or passively is used to dilute treated wastewater in a GGRP. Diluent water requirements (Section 60320.035) may be satisfied by using surface water, stormwater, or groundwater. The amount of diluent water required is a function of the water quality of the recycled water and diluent water.

The Recycled Water Contribution (RWC) is defined by the following equation in Section 60320.041:

$$RWC = \frac{\text{Recycled Water}}{\text{Recycled Water + Diluent Water}}$$

The initial RWC is based on CDPH's review of the engineering report, information from public hearings, but shall not exceed the following.

- $RWC_{initial} \leq 0.2$ for surface spreading (i.e. 20% recycled water)
- $RWC_{initial} \leq 0.5$ for surface spreading projects that provide reverse osmosis and subsequent advanced oxidation treatment (i.e. 50% recycled water)
- $RWC_{initial} \leq 0.5$ for subsurface injection (i.e. 50% recycled water)

Increasing the allowable RWC is dependent on the Total Organic Carbon (TOC) in the recycled water (Section 60320.045) and would require approval by CDPH and the RWQCB modified in the permit. To increase the RWC, the previous year's TOC 20-week average must not have exceeded the following equation and the stipulations in Tables A-1 and A-2 must be met. Typically Reverse Osmosis (RO) would be required to increase the allowable RWC beyond the initial value.

$$TOC_{max} = \frac{0.5 \text{ mg/l}}{RWC_{proposed}}$$

Table A-1. GRRP RWC Operating Range Requirements – Surface Application Projects

For Operating Ranges A through E, where A = 0.00 ≤RWC < 0.20 B = 0.20 ≤RWC < 0.35 C = 0.35 ≤RWC < 0.50 D = 0.50 ≤RWC < 0.75 E = 0.75 ≤RWC ≤1.00	**RWC Operating Range**				
	A	B	C	D	E
1. Provide documentation that a groundwater monitoring well located between the GRRP and a drinking water well has received recharge water from the GRRP for at least six months such that the fraction of the GRRP's recycled municipal wastewater in the monitoring wells equals a value of at least 0.50 multiplied by $RWC_{proposed.}$		✓	✓	✓	✓
2. The groundwater impacted by a GRRP from a monitoring well and a drinking water well meets all drinking water standards and the requirements of section 60320.020 (Control of Nitrogen Compounds).		✓	✓	✓	✓
3. Provide a proposal to the Department prepared and signed by an engineer licensed in California with at least three years experience in wastewater treatment and public water supply. The proposal shall include:	✓	✓	✓	✓	✓
A. GRRP operations, monitoring, and compliance data;	✓	✓	✓	✓	✓
B. Evidence that a groundwater monitoring well located between the GRRP and a drinking water well has received recharge water from the GRRP for at least one year such that the fraction of the GRRP's recycled municipal wastewater in the monitoring well equals a value of at least 0.8 multiplied by $RWC_{maximum.}$		✓	✓	✓	✓
C. Validation of appropriate construction and siting of monitoring wells pursuant to section 60320.070.	✓	✓	✓	✓	✓
D. A scientific peer review by an independent advisory panel that includes, as a minimum, a toxicologist, a registered engineering geologist or hydrogeologist, an engineer licensed in California with at least three years experience in wastewater treatment and public water supply, a microbiologist, and a chemist.				✓	✓
E. Submittal of an updated engineering report and operations		✓	✓	✓	✓
4. At a minimum, for that portion of the recycled municipal wastewater stream needing additional treatment to meet the TOC limit in section 60320.045, provide reverse osmosis treatment as well as subsequent advanced oxidation treatment. The advanced oxidation treatment shall provide, at minimum, a level of treatment equivalent to a 1.2 log NDMA reduction and 0.5 log 1,4-dioxane reduction, whether NDMA or 1,4-Dioxane are present or not.	✓	✓	✓	✓	✓

Table A-2. GRRP RWC Operating Range Requirements – Subsurface Application Projects

For Operating Ranges A through C, where A = 0.00 ≤RWC < 0.50 B = 0.50 ≤RWC < 0.75 C = 0.75 ≤RWC < 1.00	**RWC Operating Range**		
	A	B	C
1. Provide documentation that a groundwater monitoring well located between the GRRP and a drinking water well has received recharge water from the GRRP for at least six months such that the fraction of the GRRP's recycled municipal wastewater in the monitoring wells equals a value of at least 0.50 multiplied by $RWC_{proposed.}$		✔	✔
2. The groundwater impacted by a GRRP from a monitoring well and a drinking water well meets all drinking water standards and the requirements of section 60320.020 (Control of Nitrogen Compounds).		✔	✔
3. Provide a proposal to the Department prepared and signed by an engineer licensed in California with at least three years experience in wastewater treatment and public water supply. The proposal shall include:	✔	✔	✔
A. GRRP operations, monitoring, and compliance data;	✔	✔	✔
B. Evidence that a groundwater monitoring well located between the GRRP and a drinking water well has received recharge water from the GRRP for at least one year such that the fraction of the GRRP's recycled municipal wastewater in the monitoring well equals a value of at least 0.8 multiplied by $RWC_{maximum.}$		✔	✔
C. Validation of appropriate construction and siting of monitoring wells pursuant to section 60320.070.	✔	✔	✔
D. A scientific peer review by an independent advisory panel that includes, as a minimum, a toxicologist, a registered engineering geologist or hydrogeologist, an engineer licensed in California with at least three years experience in wastewater treatment and public water supply, a microbiologist, and a chemist.		✔	✔
E. Submittal of an updated engineering report and operations		✔	✔
4. For the entire municipal wastewater stream, provide reverse osmosis treatment as well as subsequent advanced oxidation treatment. The advanced oxidation treatment shall provide, at minimum, a level of treatment equivalent to a 1.2 log NDMA reduction and 0.5 log 1,4-dioxane reduction .	✔	✔	✔

Source: California Code of Regulations (CCR) Title 22, Article 5.1, Groundwater Recharge Reuse Draft Regulation Table 60320.041 (dated August 5, 2008)

A.1.3 Water Quality Limits

The GRRP includes stringent water quality limits for recycled water intended for groundwater recharge. Certain treatment technologies such as nitrification and denitrification will aid in meeting monitoring requirements. Reverse osmosis is the preferred method of treatment to achieve the water quality standards and limits laid out in the GRRP and to support increasing the RWC. Advanced oxidation may also be required to reduce concentrations of NDMA and other constituents of concern.

Nitrification and denitrification in the treatment process is recommended to make meeting monitoring requirements for control of nitrogen compounds easier. Three methods, with varying monitoring programs, sampling frequencies and constituent limits, are permitted to demonstrate control of nitrogen compounds (Section 60320.020).

As described in Section 60320.030, regulated chemicals and physical characteristics of the recycled water should:

- meet most drinking water standards (primary and secondary)
- not exceed MCLs for inorganic chemicals,
- not exceed MCLs for disinfection byproducts,
- have lead concentration ≤ 0.015 mg/l,
- have copper concentration ≤ 1.3 mg/l, and
- meet secondary MCLs defined in Tables 64449-A and B in Chapter 15 of the Water Code (salinity can be a problem)

Additional constituent monitoring of unregulated contaminants such as pharmaceuticals, endocrine disrupting chemicals, and other indicators will be required based on a review of the GRRP engineering report (Section 60320.047). Monitoring of unregulated contaminants is for informational use, rather than for compliance, to assist in addressing public perception about the safety of the GRRP.

A.1.4 Monitoring and Reporting Requirements

The following sections of the Draft Regulations stipulate monitoring and reporting requirements prior to initiating the GRRP, during the first year of operations, and annual reporting requirements thereafter; Operation Optimization (Section 60320.065), Monitoring between the GRRP and Down Gradient Drinking Water Supply Wells (Section 60320.070), and Annual Five-Year Reporting (Section 60320.090). Approaches to meet the requirements will be described in the engineering report and will require approval by the CDPH and RWQCB. Requirements for monitoring well locations and sampling frequency are also detailed to provide assurance that the GRRP are meeting the required residence time, travel time, and water quality constituents specified by the CDPH.

To demonstrate successful implementation of strategies to meet these requirements, the site-specific Engineering Report (Article 7, Section 60323) will need to include the following:

- Description of the existing geologic and groundwater characteristics around the GRRP area, including identification of potable water wells in the area, prepared by a registered engineer and registered geologist
- Description of the proposed RWC and anticipated TOC.
- Evaluation of how the groundwater basin would respond to recycled water recharge based on groundwater modeling and monitoring. This would include but not be limited to:
    - Provide evidence that it is possible to track the movement of water from the GRRP facility to the downgradient extraction point(s)
    - Provide evidence the GRRP would not result in an exceedence of the MCLs at any downgradient extraction points(s).
    - Provide evidence the GRRP would meet groundwater quality requirements, underground residence time, assimilative capacity requirements', other requirements specified in the groundwater management plan.
- Description of the operation of the recharge facility and how it would be connected to the recycled water lateral.
- Discussion of plan to provide an alternative source of domestic water supply, or a department approved treatment mechanism to any user of a producing drinking water source that may be affected by the groundwater.
- Description of proposed means for compliance with groundwater recharge regulations and water recycling criteria.
    - Demonstrate recycled water has been treated to meet water quality treatment and groundwater standards for control of microorganisms, nitrogen compounds, dissolved oxygen, regulated chemicals, total organic carbon, and additional constituent as needed (i.e. non-regulated contaminants).
    - Develop comprehensive operations, sampling, and monitoring plan to meet the required reporting requirements for the aforementioned water quality constituents. Construction of monitoring wells between the GRRP and down gradient drinking water supply wells are required.
- Meet all RWC requirements specified by the CDPH and/or RWQCB, as described in Table 1 GRRP RWC Operating Range Requirements.
- Develop the following plans:
    - a contingency plan which will assure that no untreated or inadequately treated wastewater will be delivered to the use area.
    - an operations plan to ensure optimization during the first year of operation.

- o a plan to meet public notification and hearing requirements.
- o a plan to meet annual and five-year reporting requirements

The groundwater recharge facility plans would be developed and submitted to CDPH for review and approval. CDPH will hold a public meeting for the GRRP prior to submitting recommendations for the initial permit to the RWQCB. This process would also be required any time an increase in the RWC is proposed.

A.2 Evaluation of Seasonal Storage in Groundwater Aquifer

Recycled water could be used seasonally to recharge the groundwater aquifer. Typically, these projects are designed to increase the volume of groundwater in aquifer storage to build up long-term water supplies for the area. Recycled water is currently being used for groundwater recharge projects in California with the following agencies:

- Orange County Water District
- Inland Empire Utilities Agency
- West Basin Water District
- Sanitation Districts of Los Angeles County

In developing a groundwater recharge project, finding an available water source is a common limiting factor. Water rights may not exist to use available natural sources and importing water can be expensive. Recycled water provides a potential local water source. Recycled water is anticipated to be available seasonally during the winter and early spring when irrigation demand is at its lowest. Rather than allowing the water to be discharged to the ocean, the recycled water could be incorporated into a groundwater recharge project.

A.2.1 Recharge Methods

Surface spreading (i.e. recharge ponds) and subsurface injection (i.e. injection wells) are the two primary methods for groundwater recharge. Recharge ponds are large, shallow ponds enclosed by dikes or levees that are filled intermittently with water and the water is allowed to percolate into the ground. The pond bottom is situated above the water table, so the recharge flow percolates through the unsaturated soils to reach groundwater. Surface recharge facilities have lesser regulatory requirements than subsurface injection primarily because percolation of recycled water through the vadose zone is considered to provide a water quality benefit.

Groundwater recharge using subsurface injection consists of a series of wells drilled into a suitably transmissive zone in the underlying groundwater aquifer. Water is pumped under low pressures into these wells and allowed to infiltrate into the aquifer. Recycled water is discharged directly to the saturated zone bypassing the unsaturated zone. Therefore, the injection well option would produce the water quality benefits from flow through the aquifer, but not the benefits from flow through the unsaturated soils (Bouwer, 1997, 2002; Morris and Quinn, 1999; Asano, 1985).

A.2.2 Aquifer Characteristics

Local aquifers must be characterized to evaluate their feasibility for recharge with recycled water. Aquifers that occur at the surface can be used for surface spreading, while aquifers that overlain by other formations can be used for well injection. Aquifers that occur at great depths are less likely to be candidates for recharge. Other factors considered in evaluating recharge potential are hydraulic conductivity, porosity, existing groundwater levels, and groundwater flows.

A.2.3 Assessment

Water quality is a major issue when using recycled water; therefore, the addition of recycled water to a groundwater aquifer used for drinking water supplies is regulated by the CDPH. The regulations require a residence time and setback distance from a drinking water source for control of pathogenic microorganisms. Site specific evaluations would be necessary for areas under the influence of large pumping wells or other hydrologic conditions that produce higher hydraulic gradients.

The regulations also limit the initial recycled water contribution for a groundwater recharge reuse project to 20%. These percentages can be increased over time based on the results of an extensive groundwater monitoring program to demonstrate that no degradation of groundwater quality is occurring.

RESOLUTION NO. NS-27,653

RESOLUTION OF THE CITY COUNCIL OF THE CITY OF SANTA CRUZ DECLARING ITS INTEREST IN PURSUING A RECYCLED/POTABLE WATER EXCHANGE ARRANGEMENT WITH THE SCOTTS VALLEY WATER DISTRICT

WHEREAS, the Scotts Valley Water District has proposed a recycled/potable water exchange arrangement with the City involving an exchange of Scotts Valley Water District reclaim water to the City in its summer high delivery period for the City of Santa Cruz delivery of potable water to Scotts Valley Water District in winter non-peak periods, and;

WHEREAS, recycled water is a missing element from the City's Integrated Water Plan, and having a recycled water component in the City's overall water portfolio is advantageous to the City for the purpose of making any grant applications, and;

WHEREAS, Such an arrangement effectively shifts some of the peak summer demand to winter when the City is not drawing from surface storage and has no difficulty in meeting demands, even in drought years no more severe than the City has seen historically, and;

WHEREAS, this project is intended to increase water levels in the Santa Margarita aquifer and that there would be an increase in river flows if groundwater levels can be restored, and;

WHEREAS, an intertie would establish a link between the two water agencies that does not now exist, and would afford a means by which the agencies could modify their systems to provide help to each other in water emergencies, and;

WHEREAS, the capital components will be at no cost to the City and the operational agreement will be revenue-neutral to the City;

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Santa Cruz that the City is interested in pursuing this project including:

1. Working together immediately to resolve questions regarding any required changes to the City's water rights, and;

2. Providing information on the City system that is necessary for Scotts Valley Water District to design the necessary facilities, and;

3. Working to structure an operational agreement for recycled/potable water exchange with Scotts Valley Water District that is agreeable to both agencies.

PASSED AND ADOPTED this 27th day of November, 2007, by the following vote:

AYES:	Councilmembers Porter, Robinson, Mathews, Madrigal, Rotkin, Vice Mayor Coonerty; Mayor Reilly.
NOES:	None.
ABSENT:	None.
DISQUALIFIED:	None

APPROVED: Emily Reilly
Mayor

ATTEST: Leslie Cook
City Clerk

RESOLUTION NO. NS-28,024

RESOLUTION OF THE CITY COUNCIL OF THE CITY OF SANTA CRUZ
ADOPTING THE 2009 WATER SHORTAGE CONTINGENCY PLAN

WHEREAS, the City Council of the City of Santa Cruz in 2003 adopted a long range planning document known as the Integrated Water Plan, which was intended to provide a flexible, phased approach for reducing near-term drought year shortages and to provide a reliable supply that meets long-term needs while ensuring protection of public health and safety; and

WHEREAS, in addition to implementing water conservation programs to reduce average daily water use and pursuing a cooperative desalination project to increase the supply of water, the Integrated Water Plan includes a curtailment component calling for temporary cutbacks of water use by up to 15 percent to help balance available water supply against demand in drought years; and

WHEREAS, the need to better prepare for the possibility of future water shortages in advance of the next major drought was identified as a top priority in the city's 2005 Urban Water Management Plan; and

WHEREAS, California Water Code section 10632 requires water agencies to plan for water shortages of up to 50 percent as part of their Urban Water Management Plan; and,

WHEREAS, development of the Water Shortage Contingency Plan was a collaborative, open, and public process among the City Water Department staff, the City's Water Commission, City Council and the public; and

WHEREAS, the Water Commission has reviewed the Water Shortage Contingency Plan and unanimously recommended that City Council adopt it to provide a framework for guiding the City's response to future droughts; and

WHEREAS, the State of California is now in its third consecutive year of drought and despite the recent rain, water conditions in Santa Cruz remain below normal; and

WHEREAS, because stream flows that constitute the City's primary drinking water source of supply are projected to run lower than usual this year, voluntary and mandatory actions to temporarily reduce water demand will likely be needed this summer to help preserve valuable reservoir storage in case dry conditions continue beyond 2009.

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Santa Cruz that it hereby adopts the 2009 Water Shortage Contingency Plan, authorizes the Water Director to file a copy with the California Department of Water Resources as an amendment to the City's 2005 Urban Water Management Plan, and directs staff to develop a water shortage ordinance that is consistent with the recommendations outlined in the plan.

RESOLUTION NO. NS-28,024

PASSED AND ADOPTED this 10th day of March, 2009, by the following vote:

AYES: Councilmembers Coonerty, Robinson, Lane, Madrigal, Beiers, Vice Mayor Rotkin; Mayor Mathews.

NOES: None.

ABSENT: None.

DISQUALIFIED: None.

APPROVED: Cynthia Mathews
Mayor

ATTEST: L Brewer
City Clerk

Chapter 16.01
WATER SHORTAGE REGULATIONS AND RESTRICTIONS

Sections:

16.01.010 FINDINGS.

Whereas, the city of Santa Cruz water system draws almost exclusively on local surface water sources, whose yield varies from year to year depending on the amount of rainfall received and runoff generated during the winter season; and

Whereas, the city water system is susceptible to water shortages in dry and critically dry years or in periods of prolonged regional drought when water conditions characterized by low surface flows in the north coast streams and San Lorenzo River sources, depleted storage in Newell Creek Reservoir, or both, reduce the available supply to a level that cannot support seasonal water demand; and

Whereas, on March 10, 2009, the city council of the city of Santa Cruz adopted an updated water shortage contingency plan that describes how the city will respond to future water shortages and lists the various actions the city would take to reduce water demand under different water shortage scenarios ranging from five percent or less up to and including a fifty percent seasonal water supply deficiency; and

Whereas California Water Code Sections 350 et seq. authorize water suppliers, after holding a properly noticed public hearing and after making certain findings, to declare a water shortage (emergency) and to adopt such regulations and restrictions to conserve the water supply for the greatest public benefit with particular regard for domestic use, sanitation, and fire protection; and

Whereas, the voluntary and mandatory water conservation measures and progressive restrictions on water use and method of use set forth herein provide an effective and immediately available means of conserving water which is essential during periods of water shortage to ensure a reliable and sustainable minimum supply of water for the public health, safety, and welfare and to preserve valuable limited reservoir storage, avoid depleting water storage to an unacceptably low level, and thereby lessen the possibility of experiencing more critical shortages if dry conditions continue or worsen; and

Whereas, the usage allotments hereinafter established will equitably spread the burden of restricted and prohibited usage in a manner prescribed by the city's water shortage contingency plan over all city water department customers and other consumers of city water; and

Whereas, the purposes of this chapter are to conserve the water supply of the city of Santa Cruz for the greatest public benefit, to mitigate the effects of a water supply shortage on public health and safety and economic activity, and to budget water use so that a reliable and sustainable minimum supply of water will be available for the most essential purposes for the entire duration of the water shortage.

(Ord. 2010-12 § 2 (part), 2010).

16.01.020 DECLARATION OF WATER SHORTAGE.
The provisions of this chapter shall take effect whenever the director, upon engineering analysis of city water supplies, finds and determines that a water shortage exists or is imminent within the city of Santa Cruz water service area and a declaration of a water shortage is made by a resolution of the city council, and they shall remain in effect for the duration of the water shortage set forth in the resolution.

(Ord. 2010-12 § 2 (part), 2010).

16.01.030 APPLICATION OF REGULATIONS.
The provisions of this chapter shall apply to all persons using or consuming water both inside and outside the city and within the city water service area, and regardless of whether any person using water shall have a contract for water service with the city.

(Ord. 2010-12 § 2 (part), 2010).

16.01.040 PRECEDENCE OF REGULATIONS.
Where other provisions of the municipal code, whether enacted prior or subsequent to this chapter, are inconsistent with the provisions of this chapter, the provisions of this chapter shall supersede and control for the duration of the water shortage set forth in the resolution of the city council.

(Ord. 2010-12 § 2 (part), 2010).

16.01.050 DEFINITIONS.
(a) "Director" refers to the director of the city of Santa Cruz water department.

(b) "Water" refers to water produced and served by the city of Santa Cruz water department.

(c) "City" refers to the city of Santa Cruz.

(d) “Water department” refers to the city of Santa Cruz water department.

(e) “Seasonal water demand” refers to the demand, measured in gallons, placed by customers on the city water supply between April 1st and October 31st each calendar year.

(f) Issue/Declare. Whenever this chapter references the director’s issuance or declaration of an alert, warning, emergency, or regulation, said alert, warning, emergency or regulation shall be put into effect by the placement of a legal advertisement in a newspaper of general circulation, by a posting on the city’s Internet website and by a posting in the following public places: Santa Cruz City Hall, 809 Center Street, Santa Cruz; Santa Cruz Water Department Office, 212 Locust Street, Santa Cruz; Capitola City Hall, 420 Capitola Avenue, Capitola; and the Santa Cruz County Governmental Center, 701 Ocean Street, Santa Cruz. Any such alert, warning, emergency or regulation shall take effect upon the date of its publication in the Santa Cruz Sentinel.

(g) “Customer” shall refer to any account customer of the city of Santa Cruz water department as well as to any consumer of city water who may not be a city of Santa Cruz water department account customer.

(h) “Dry year” refers to the type of water year under the city’s water year classification system, which begins October 1st and ends September 30th, in which the total annual discharge of the San Lorenzo River at Felton measures between twenty-nine thousand and forty-nine thousand acre-feet.

(i) “Critically dry year” refers to the type of water year under the city’s water year classification system, which begins October 1st and ends September 30th, in which the total annual discharge of the San Lorenzo River at Felton measures less than twenty-nine thousand acre-feet.

(Ord. 2010-12 § 2 (part), 2010).

16.01.060 WATER WASTE PROHIBITIONS.
It shall be unlawful during any water shortage stage for any person, firm, partnership, association, corporation, political entity (including the city) or any other water department customer to use water for any of the following:

(a) Fire Hydrants. Use of water from any fire hydrant unless specifically authorized by permit from the city, except by regularly constituted fire protection agencies for fire suppression purposes, or for other authorized uses, including distribution system flushing, fire flow testing, and filling of approved vehicles for sewer system flushing, storm drain maintenance, and street sweeping purposes.

(b) Watering/Irrigation. The watering of grass, lawn, groundcover, shrubbery, open ground, crops and trees, including agricultural irrigation, in a manner or to an extent that causes or allows excessive water flow or runoff onto an adjoining sidewalk, driveway, street, gutter or ditch.

(c) Plumbing Leaks. The escape of water through leaks, breaks, or other malfunctions within the water user’s plumbing or distribution system for any period of time after such break or leak should have reasonably been discovered and corrected. It shall be presumed that a period of twenty-four hours after the water user discovers such break, leak or malfunction, or receives notice from the city of such condition, whichever occurs first, is a reasonable time within which to correct such condition or to make arrangements for correction.

(d) Washing of Exterior Surfaces. The washing of sidewalks, walkways, driveways, parking lots, patios, or other exterior surfaces unless the hose is equipped with an automatic shutoff nozzle.

(e) Cleaning of Structures and Vehicles. The cleaning of building exteriors, mobile homes, cars, boats, and recreational vehicles unless the hose is equipped with an automatic shutoff nozzle.

(f) Fountains and Decorative Water Features. The operation of a water fountain or other decorative water feature that does not use re-circulated water.

(g) Commercial Car Washes. The washing of vehicles at a commercial car wash unless the facility utilizes water recycling equipment, or operates on a timer for a limited time period and shuts off automatically at the expiration of the time period.

(h) Construction. The use of potable water for dust control or soil compaction purposes in construction activities where there is a reasonably available source of reclaimed water appropriate for such use.

(i) The indiscriminate running of water or washing with water, not otherwise prohibited in this section which is wasteful and without reasonable purpose.

(Ord. 2010-12 § 2 (part), 2010).

16.01.070 STAGE 1: WATER SHORTAGE ALERT.

(a) The director is empowered to issue a water shortage alert and to enforce the water shortage restrictions in this section upon finding that the magnitude of an anticipated water shortage, per the criteria delineated in the city's adopted water shortage contingency plan, will be five percent and a minimal consumer demand reduction is necessary to make more efficient use of water and appropriately respond to existing water supply conditions. In a Stage 1 water shortage, the city will enforce the following water shortage restrictions with the objective of realizing a seasonal water demand reduction of one hundred twenty-five million gallons or an average daily water demand reduction of six hundred thousand gallons.

(b) During Stage 1, it shall be unlawful for any person, firm, partnership, association, corporation, political entity (including the city) or any other water department customer:

1. To water or irrigate lawn, landscape, or other vegetated area between the hours of 10:00 a.m. and 5:00 p.m., except when performed with a bucket or watering can, or by use of a drip irrigation system or similar low volume, nonspray irrigation equipment, or for very short periods of time for the express purpose of allowing landscape contractors to adjust or repair an irrigation system;

2. To use a hose that is not equipped with a shutoff nozzle;

3. To use potable water to wash down hard or paved surfaces, including but not limited to sidewalks, walkways, driveways, parking lots, tennis courts, patios, or other paved surfaces, except when it is necessary to alleviate safety or sanitation hazards or to prepare paved surfaces for sealing;

4. To initially fill or to drain and refill residential swimming pools;

5. To serve water in a restaurant or other commercial food service establishment except upon the request of a patron; and/or

6. To operate a hotel, motel or other commercial lodging establishment without offering patrons the option to forego the daily laundering of towels, sheets and linens.

(Ord. 2010-12 § 2 (part), 2010).

16.01.080 STAGE 2: WATER SHORTAGE WARNING.

(a) The director is empowered to issue a water shortage warning and to enforce the water shortage restrictions in this section upon finding that the magnitude of an anticipated water shortage, per the criteria delineated in the city's adopted water shortage contingency plan, will be between five percent and fifteen percent and a moderate consumer demand reduction is necessary to make more efficient use of water and appropriately respond to existing water supply conditions. In a Stage 2 water shortage, the city will enforce the following water shortage restrictions with the objective of realizing a seasonal water demand reduction of up to three hundred seventy-five million gallons and an average daily water demand reduction of up to one million eight hundred thousand gallons.

(b) During Stage 2, it shall be unlawful for any person, firm, partnership, association, corporation, political body (including the city) or other water department customer:

1. To water or irrigate lawn, landscape, or other vegetated area between the hours of 10:00 a.m. and 5:00 p.m., except when performed with a bucket or watering can, or by use of a drip irrigation system or similar low volume, nonspray irrigation equipment, or for very short periods of time for the express purpose of allowing landscape contractors to adjust or repair an irrigation system;

2. To use a hose that is not equipped with a shutoff nozzle;

3. To use potable water to wash down hard or paved surfaces, including but not limited to sidewalks, walkways, driveways, parking lots, tennis courts, patios, or other paved surfaces, except when it is necessary to alleviate safety or sanitation hazards or to prepare paved surfaces for sealing;

4. To initially fill or to drain and refill residential swimming pools;

5. To serve water in a restaurant or other commercial food service establishment except upon the request of a patron;

6. To operate a hotel, motel or other commercial lodging establishment without offering patrons the option to forego the daily laundering of towels, sheets and linens;

7. To water or irrigate lawn, landscape, or other vegetated area on days of the week other than the two days of the week authorized and publicized by the director, except when performed with a bucket or watering can, or by use of a drip irrigation system or similar low volume, nonspray irrigation equipment, or for very short periods of time for the express purpose of allowing landscape contractors to adjust or repair an irrigation system. Hourly restrictions set forth in subsection (b)(1) continue to apply on authorized watering days. This provision shall not apply to commercial growers/nurseries or to residential vegetable gardens/edible plantings watered with a hose equipped with a shutoff nozzle;

8. To water or irrigate lawn, landscape, or other vegetated area using an automatic irrigation system for more than fifteen minutes per watering station per assigned day. This provision shall not apply to automatic irrigation systems exclusively using low output sprinkler equipment, including rotors, stream rotors, or micro-spray systems;

9. To wash the exterior of dwellings, buildings or structures (with the exception of window washing and preparation of property for painting or for sale);

10. To irrigate or water landscapes in a manner that conflicts with a customer's landscape irrigation water budget when such a budget is required by the director per the criteria delineated in the city's adopted water shortage contingency plan; and/or

11. To disobey water department direction to large commercial, industrial or irrigation customers using one thousand three hundred thirty-seven or more billing units (one million gallons) per year to conduct water use audits, to prepare water conservation plans and to submit progress reports, or to immediately repair water system leaks, including leaks attributable to faulty pipes or fixtures.

(Ord. 2010-12 § 2 (part), 2010).

16.01.090 STAGE 3: WATER SHORTAGE EMERGENCY.

(a) The director is empowered to declare a water shortage emergency and to enforce the water shortage restrictions in this section upon finding that the magnitude of an anticipated water shortage, per the criteria delineated in the city's adopted water shortage contingency plan, will be between fifteen percent and twenty-five percent and a significant consumer demand reduction is necessary to make more efficient use of water and appropriately respond to existing water supply conditions. In a Stage 3 water shortage, the city will enforce the following water shortage restrictions with the objective of realizing a seasonal water demand reduction of up to six hundred twenty-five million gallons and an average daily water demand reduction of up to three million gallons.

(b) During Stage 3, it shall be unlawful for any person, firm, partnership, association, corporation, political body (including the city) or other water department customer:

1. To water or irrigate lawn, landscape, or other vegetated area between the hours of 10:00 a.m. and 5:00 p.m., except when performed with a bucket or watering can, or by use of a drip irrigation system or similar low volume, nonspray irrigation equipment, or for very short periods of time for the express purpose of allowing landscape contractors to adjust or repair an irrigation system;

2. To use a hose that is not equipped with a shutoff nozzle;

3. To use potable water to wash down hard or paved surfaces, including but not limited to sidewalks, walkways, driveways, parking lots, tennis courts, patios, or other paved surfaces, except when it is necessary to alleviate safety or sanitation hazards or to prepare paved surfaces for sealing;

4. To initially fill or to drain and refill any swimming pools, outdoor spas, wading pools, and ornamental water features;

5. To serve water in a restaurant or other commercial food service establishment except upon the request of a patron;

6. To operate a hotel, motel or other commercial lodging establishment without offering patrons the option to forego the daily laundering of towels, sheets and linens;

7. To water or irrigate lawn, landscape, or other vegetated area on days of the week other than the specified day(s) of the week authorized and publicized by the director, except when performed with a bucket or watering can, or by use of a drip irrigation system or similar low volume, nonspray irrigation equipment, or for very short periods of time for the express purpose of allowing landscape contractors to adjust or repair an irrigation system. Hourly restrictions set forth in subsection (b)(1) continue to apply on authorized watering days. This provision shall not apply to commercial growers/nurseries or to residential vegetable gardens/edible plantings watered with a hose equipped with a shutoff nozzle;

8. To water or irrigate lawn, landscape, or other vegetated area using an automatic irrigation system for more than ten minutes per watering station per assigned day. This provision shall not apply to automatic irrigation systems exclusively using low output sprinkler equipment, including rotors, stream rotors, or micro-spray systems;

9. To wash the exterior of dwellings, buildings or structures (with the exception of window washing and preparation of property for painting or for sale);

10. To irrigate or water landscapes in a manner that conflicts with a customer's landscape irrigation water budget when such a budget is required by the director per the criteria delineated in the city's adopted water shortage contingency plan;

11. To disobey water department direction to large commercial, industrial or irrigation customers using one thousand three hundred thirty-seven or more billing units (one million gallons) per year to conduct water use audits, to prepare water conservation plans and to submit progress reports, or to immediately repair water

system leaks, including leaks attributable to faulty pipes or fixtures;

12. To violate residential customer water rationing regulations, including regulations intended to preclude excessive water usage and specifying maximum water usage limitations, issued by the director in accordance with guidelines set forth in the city's adopted water shortage contingency plan; and/or

13. To disobey water department directives issued to commercial customers requiring the prominent placement of "Save Water" signage at specified locations at the customer's premises.

(Ord. 2010-12 § 2 (part), 2010).

16.01.100 STAGE 4: SEVERE WATER SHORTAGE EMERGENCY.

(a) The director is empowered to declare a severe water shortage emergency and to enforce the water shortage restrictions in this section upon finding that the magnitude of an anticipated water shortage, per the criteria delineated in the city's adopted water shortage contingency plan, will be between twenty-five percent and thirty-five percent and an extraordinary consumer demand reduction is necessary to make more efficient use of water and appropriately respond to existing water supply conditions. In a Stage 4 water shortage, the city will enforce the following water shortage restrictions with the objective of realizing a seasonal water demand reduction of up to eight hundred seventy-five million gallons and an average daily water demand reduction of up to four million two hundred thousand gallons.

(b) During Stage 4, it shall be unlawful for any person, firm, partnership, association, corporation, political body (including the city) or other water department customer:

1. To water or irrigate landscape or other vegetated area between the hours of 10:00 a.m. and 5:00 p.m., except when performed with a bucket or watering can, or by use of a drip irrigation system or similar low volume, nonspray irrigation equipment, or for very short periods of time for the express purpose of allowing landscape contractors to adjust or repair an irrigation system;

2. To use a hose that is not equipped with a shutoff nozzle;

3. To use potable water to wash down hard or paved surfaces, including but not limited to sidewalks, walkways, driveways, parking lots, tennis courts, patios, or other paved surfaces, except when it is necessary to alleviate safety or sanitation hazards or to prepare paved surfaces for sealing;

4. To fill or to top off any swimming pools, outdoor spas, wading pools, and ornamental water features;

5. To serve water in a restaurant or other commercial food service establishment except upon the request of a patron;

6. To operate a hotel, motel or other commercial lodging establishment without offering patrons the option to forego the daily laundering of towels, sheets and linens;

7. To water or irrigate landscape or other vegetated area on days of the week other than the specified day(s) of the week authorized and publicized by the director, except when performed with a bucket or watering can, or by use of a drip irrigation system or similar low volume, nonspray irrigation equipment, or for very short periods of time for the express purpose of allowing landscape contractors to adjust or repair an irrigation system. Hourly restrictions set forth in subsection (b)(1) continue to apply on authorized watering days. This provision shall not apply to commercial growers/nurseries or to residential vegetable gardens/edible plantings watered with a hose equipped with a shutoff nozzle;

8. To water landscapes using automatic irrigation systems for more than ten minutes per watering station per assigned day. This provision does not apply to automatic irrigation systems using water-efficient devices, including but not limited to weather-based controllers, drip/micro-irrigation systems and stream rotor sprinklers;

9. To wash the exterior of dwellings, buildings or structures (with the exception of window washing and preparation of property for painting or for sale);

10. To irrigate or water landscapes in a manner that conflicts with a customer's landscape irrigation water budget when such a budget is required by the director per the criteria delineated in the city's adopted water shortage contingency plan;

11. To disobey water department direction to large commercial, industrial or irrigation customers using one thousand three hundred thirty-seven or more billing units (one million gallons) per year to conduct water use audits, to prepare water conservation plans and to submit progress reports, or to immediately repair water system leaks, including leaks attributable to faulty pipes or fixtures;

12. To violate residential customer water rationing regulations, including regulations intended to preclude excessive water usage and specifying maximum water usage limitations, issued by the director in accordance with guidelines set forth in the city's adopted water shortage contingency plan;

13. To disobey water department directives issued to commercial customers requiring the prominent placement of "Save Water" signage at specified locations at the customer's premises;

14. To violate commercial customer water rationing regulations, including regulations intended to preclude excessive water usage and specifying maximum water usage limitations, issued by the director in accordance with guidelines set forth in the city's adopted water shortage contingency plan;

15. To disobey a water department order to customers identified as "dedicated irrigation accounts" directing those customers to further limit their landscape irrigation and watering activity so as to preserve only the customers' most valuable trees and plants;

16. To water lawns or turf, unless such watering is authorized by the director in

accordance with a landscape irrigation water budget and is consistent with the guidelines set forth in the city's adopted water shortage contingency plan;

17. To install new landscaping which requires any irrigation or watering;

18. To wash or clean vehicles, including but not limited to automobiles, trucks, vans, buses, motorcycles, boats, or trailers, including the washing of fleet vehicles and the washing of vehicles on dealer lots. This restriction will not apply to commercial car wash businesses which use recycled water; and/or

19. To exercise any rights conferred by hydrant and bulk water permits that were issued prior to the severe water shortage emergency declaration absent special permission granted by the director. Said special permission may be granted only for projects necessary to protect the public health, safety and welfare where no alternative to potable water exists and for emergency response purposes.

(Ord. 2010-12 § 2 (part), 2010).

16.01.110 STAGE 5: CRITICAL WATER SHORTAGE EMERGENCY.

(a) The director is empowered to declare a critical water shortage emergency and to enforce the water shortage restrictions in this section upon finding that the magnitude of an anticipated water shortage, per the criteria delineated in the city's adopted water shortage contingency plan, shall be between thirty-five percent and fifty percent and an extreme consumer demand reduction is necessary to make more efficient use of water and appropriately respond to existing water supply conditions. In a Stage 5 water shortage, the city will enforce the following water shortage restrictions with the objective of realizing a seasonal water demand reduction of up to one billion two hundred fifty million gallons and an average daily water demand reduction of up to six million gallons.

(b) During Stage 5, it is unlawful for any person, firm, partnership, association, corporation, political body (including the city) or other water department customer:

1. To water or irrigate any outdoor landscaping, unless such watering is authorized by the director and is consistent with the guidelines set forth in the city's adopted water shortage contingency plan;

2. To use a hose that is not equipped with a shutoff nozzle;

3. To use water for any outdoor washing purpose including commercial car washing, window washing, and paint preparation;

4. To fill or to top off any swimming pools, outdoor spas, wading pools, and ornamental water features;

5. To serve water in a restaurant or other commercial food service establishment except upon the request of a patron;

6. To operate a hotel, motel or other commercial lodging establishment without offering patrons the option to forego the daily laundering of towels, sheets and linens;

7. To use water for recreational purposes;

8. To operate public swimming pools;

9. To operate public showers;

10. To disobey water department direction to large commercial, industrial or irrigation customers using one thousand three hundred thirty-seven or more billing units (one million gallons) per year to conduct water use audits, to prepare water conservation plans and to submit progress reports, or to immediately repair water system leaks, including leaks attributable to faulty pipes or fixtures;

11. To violate residential customer water rationing regulations, including regulations intended to preclude excessive water usage and specifying maximum water usage limitations, issued by the director in accordance with guidelines set forth in the city's adopted water shortage contingency plan;

12. To violate commercial customer water rationing regulations, including regulations intended to preclude excessive water usage and specifying maximum water usage limitations, issued by the director in accordance with guidelines set forth in the city's December 2008 water shortage contingency plan;

13. To disobey water department directives issued to commercial customers requiring the prominent placement of "Save Water" signage at specified locations at the customer's premises;

14. To install new landscaping which requires any irrigation or watering; and/or

15. To exercise any rights conferred by hydrant and bulk water permits that were issued prior to the critical water shortage emergency declaration absent special permission granted by the director. Said special permission may be granted only for projects necessary to protect the public health, safety and welfare where no alternative to potable water exists and for emergency response purposes.

(Ord. 2010-12 § 2 (part), 2010).

16.01.120 EXCEPTIONS.
(a) The director, upon application made in writing by a customer on a form promulgated by the water department and accompanied by supporting documentation, shall be authorized to issue an exception from the strict application of any restriction, regulation or prohibition enforced pursuant to this chapter, upon the customer's production of substantial evidence demonstrating the existence of one or more of the following circumstances that are particular to that customer and which are not generally shared by other water department customers:

1. Failure to approve the requested exception would cause a condition having an adverse effect on the health, sanitation, fire protection, or safety of the customer or members of the public served by the customer;

2. Strict application of the subject restriction, regulation or prohibition would

impose a severe or undue hardship on a particular business customer or render it infeasible for a particular business customer or class of business customers to remain in operation;

3. Alternative restrictions to which the customer is willing to adhere are available that would achieve the same level of demand reduction as the restriction for which an exception is being sought and such alternative restrictions are enforceable by the water department;

4. Circumstances concerning the customer's property or business have changed since the implementation of the subject restriction warranting a change in the customer's water usage allocation;

5. A hospital or health care facility customer using industry best management practices is eligible for an exception upon demonstrating that the subject restriction, regulation or prohibition is interfering with or preventing it from providing health care service to its customers in accordance with industry hygiene, sanitation and health care standards; or

6. A business customer has already implemented environmental sustainability measures that have reduced water consumption to the maximum extent feasible. As used in this subsection the term "environmental sustainability measures" refers to installation of high efficiency plumbing fixtures, devices, equipment, and appliances, recycled water systems, and landscaping consisting exclusively of low-water-using plant materials using drip or similar high efficiency, nonspray irrigation systems, or to buildings that are designed, built, and continuously operated according to Leadership in Energy and Environmental Design (LEED) certification standards.

(b) In order to qualify for an exception, a customer must first complete a self water audit pursuant to standards and procedures promulgated by the water department. This audit shall be made part of the customer's exception application and water conservation measures indicated by the audit may be incorporated as conditions of approval to an exception in addition to any other conditions of approval imposed by the director in connection with the director's approval of the customer's exception application.

(Ord. 2010-12 § 2 (part), 2010).

16.01.130 WATER SHORTAGE APPEAL BOARD.

(a) A water shortage appeal board is hereby established and shall be eligible to convene upon the director's issuance of any water shortage declaration and the implementation of water shortage restrictions pursuant to Sections 16.01.070 through 16.01.110. Thereafter the water shortage appeal board will remain available to convene for as long as the water shortage remains in effect.

(b) Under water shortage Stages 1 and 2, the water shortage appeal board will be comprised of members of the city water commission. Under water shortage Stages 3, 4, and 5, the water shortage appeal board will be appointed by city council and will be comprised of one member of the water commission, one business customer, one landscape industry customer, one residential customer, and two at large members who reside within the city’s water service area.

(c) Any customer who considers an action taken by the director or an enforcement official under the provisions of this chapter, including actions on exception applications and the assessment of administrative penalties, to have been erroneously taken or issued may appeal that action or penalty to the water shortage appeal board in the following manner:

1. The appeal shall be made in writing, shall state the nature of the appeal specifying the action or penalty that is being appealed and the basis upon which the action or penalty is alleged to be in error. Penalty appeals shall include a copy of the notice of violation;

2. An appeal, to be effective, must be received by the director not later than ten business days following the date of the notice of violation or the date that the director took the action which is the subject of the appeal;

(A) A water service resident who is not an account customer may notify the water department of his or her intention to file a petition to force the resident’s account customer to appeal an excess water use penalty within ten business days following the penalty;

(B) If the water department has been given a notice of intention to file a petition per subsection (c)(2)(A) by a water service area resident who is not an account customer, the appeal from the account customer must be received within fifteen business days after the account customer has been petitioned by the resident;

3. The director shall schedule the appeal for consideration by the water shortage appeal board at a water shortage appeal board meeting. The water shortage appeal board shall hear the appeal within ninety days of the date of the appeal and issue its decision within thirty days of the date of the hearing;

4. The decision of the water shortage appeal board shall be final. In ruling on appeals, the water shortage appeal board shall strictly apply the provisions of this chapter, and shall not impose or grant terms and conditions not authorized by this chapter.

(d) The chair of the water shortage appeal board shall have the discretion to divide the board into two three-member hearing panels. Each hearing panel shall have the same authority to hear and rule upon appeals as the entire water shortage appeal board. A hearing panel shall have no more than one at large appointee as a member. The decision of any hearing panel shall be final.

(Ord. 2010-12 § 2 (part), 2010).

16.01.140 ADMINISTRATIVE ENFORCEMENT.

(a) Any person, firm, partnership, association, corporation, political entity or other water department customer violating any provision of this chapter may be assessed an administrative penalty.

(b) Each and every day a violation of this chapter exists constitutes a separate and distinct offense for which an administrative penalty may be assessed.

(c) Penalties. The purpose of the administrative penalties assessed pursuant to this section is to assure future chapter compliance by the cited customer through the imposition of increasingly significant penalties so as to create a meaningful disincentive to commit future chapter violations. In acknowledgment of the fact that the city's water is a scarce and irreplaceable commodity and that this chapter is intended to equitably distribute that commodity among water department customers and to assure that, to the extent feasible, city water is conserved and used only for purposes deemed necessary for public health and safety, the penalty schedule herein prescribed is not to be construed as creating a "water pricing" structure pursuant to which customers may elect to pay for additional water at significantly higher rates. To this end, a customer's repeated violation of this chapter shall result in either the installation of a flow restriction device or disconnection of the customer's property from the city's water service system at the customer's cost.

(d) Administrative penalties for failure to comply with water waste prohibitions requirements in Section 16.01.060 or mandatory water use restrictions and regulations commencing with Stage 1 in Section 16.01.070 are as follows:

1. First Offense. Written notice of violation and opportunity to correct violation.

2. Second Offense. A second violation within the preceding twelve calendar months is punishable by a fine not to exceed one hundred dollars.

3. Third Offense. A third violation within the preceding twelve calendar months is punishable by a fine not to exceed two hundred fifty dollars.

4. Fourth Offense. A fourth violation within the preceding twelve calendar months is punishable by a fine not to exceed five hundred dollars. In addition to any fines, the director may order a water flow restrictor device be installed.

5. Large Customers. Administrative penalties for customers that use an average of one thousand three hundred thirty-seven billing units (one million gallons) or more per calendar year shall be triple the amounts listed above.

6. Discontinuing Service. In addition to any fines and the installation of a water flow restrictor, the director may disconnect a customer's water service for willful violations of mandatory restrictions and regulations in this chapter. Upon disconnection of water service, a written notice shall be served upon the customer which shall state the time, place, and general description of the prohibited or restricted activity and the method by which reconnection can be made.

(e) Excessive Water Use Penalties. An excessive use penalty shall be assessed where the customer, during any given billing cycle, uses more than the customer's water allotment per the director's water rationing regulations issued pursuant to this chapter commencing with Stage 3 in Section 16.01.090. Excess use penalties shall be in addition to ordinary water consumption charges, as follows:

1. One percent to ten percent over customer rationing allotment: twenty-five dollars/CCF.

2. More than ten percent over customer rationing allotment: fifty dollars/CCF.

3. In addition to any excess use penalties, the director may order a water flow restrictor device be installed and/or may disconnect a customer's water service for willful violations of the water rationing regulations in this chapter. Upon disconnection of water service, a written notice shall be served upon the customer which shall state the time, place, and general description of the prohibited or restricted activity and the method by which reconnection can be made.

(f) Cost of Flow Restrictor and Disconnecting Service. A person or entity that violates this chapter is responsible for payment of charges for installing and/or removing any flow-restricting device and for disconnecting and/or reconnecting service in accordance with the city's miscellaneous water service fee resolution then in effect. The charge for installing and/or removing any flow restricting device must be paid before the device is removed. Nonpayment will be subject to the same remedies as nonpayment of basic water rates.

(g) Notice and Hearing. The director will issue a notice of violation by mail or personal delivery at least ten business days before taking any enforcement action described in subsection (d). Such notice must describe the violation and the date by which corrective action must be taken. A customer may appeal the notice of violation by filing a written notice of appeal with the city no later than the close of the business day before the date scheduled for enforcement action, accompanied by a twenty-five dollar appeal fee. Any notice of violation not timely appealed will be final. Upon receipt of a timely appeal, a hearing on the appeal will be scheduled, and the city will mail written notice of the hearing date to the customer at least ten days before the date of the hearing. Pending receipt of a written appeal or pending a hearing pursuant to an appeal, the director may take appropriate steps to prevent the unauthorized use of water as appropriate to the nature and extent of the violation and the current declared water shortage condition.

(Ord. 2010-12 § 2 (part), 2010).

16.01.150 ADDITIONAL ENFORCEMENT AUTHORITY.
In addition to the remedies referenced above, the director is empowered to pursue any additional remedies necessary, including criminal, civil and administrative remedies listed in Title 4 of the Santa Cruz Municipal Code, to correct a violation of this chapter.

(Ord. 2010-12 § 2 (part), 2010).

16.01.160 SEVERABILITY.
If any portion of this chapter is held to be unconstitutional, it is the intent of the city council that such portion of the chapter be severable from the remainder and that the remainder be given full force and effect.

(Ord. 2010-12 § 2 (part), 2010).

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