SECTION 3 PROJECT BACKGROUND

3.1 Overview

This section provides relevant background information related to the proposed desalination project for both the City of Santa Cruz (City) and the Soquel Creek Water District (District). Specifically, information about water supply sources and operations, water demand, water supply limitations, and water supply planning is provided for each agency. Conclusions about the need for a supplemental water supply for both agencies are also provided.

The primary sources of information used in this section include the *City of Santa Cruz 2010 Urban Water Management Plan* (City UWMP) (City, 2011a) and the *Soquel Creek Water District Urban Water Management Plan 2010* (District UWMP) (District, 2011a). Information from these documents is incorporated by reference and summarized below. Other sources of information are cited throughout the section[1].

3.2 City of Santa Cruz Water Department

3.2.1 City Water Supply Sources and Operations

Water Service Area

The Santa Cruz Water Department is a municipal utility that is owned and operated by the City. The City provides water service to an area of approximately 20 square miles in size, including the entire City, adjoining unincorporated areas of Santa Cruz County, a small part of the City of Capitola (Capitola), and coastal agricultural lands north of the City. The water service area is shown in **Figure 3-1, City and District Water Service Areas**.

The Santa Cruz Water Department serves an estimated population of nearly 91,300 people who reside in the water service area, according to the 2010 U.S. Census. Some 59,950 people, or about two thirds of the total population, live inside the City limits. Another 31,350 people, or 34 percent of the service area population, live outside the City limits. This population is served through approximately 24,350 service connections, of which 89 percent are residential, and the remaining 11 percent are business and industry, including the University of California Santa Cruz (UCSC), large landscape irrigation, coastal agriculture, and municipal water accounts.

[1] Referenced documents in this EIR are available for review at the City of Santa Cruz Water Department offices at 212 Locust Street, Suite D, Santa Cruz, California 95060, Monday through Thursday 8:00 a.m. to Noon and 1:00 p.m. to 5:00 p.m, except holidays. Likewise, these documents are available for review at the Soquel Creek Water District offices at 5180 Soquel Drive, Soquel, CA 95073, Monday through Friday 8:00 a.m. to Noon and 1:00 p.m. to 5:00 p.m, except holidays.

Water Supply System

Water Supply Sources

The City water system is comprised of four main water supply sources: 1) the North Coast sources; 2) the San Lorenzo River; 3) Loch Lomond Reservoir; and 4) the Live Oak Wells. 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.

Recently, diversions from the City's surface water sources have been limited by Endangered Species Act (ESA) issues. All of the streams from which the City diverts water, including the North Coast sources, San Lorenzo River, and Newell Creek, provide important habitat for steelhead trout, which are listed under the federal ESA as threatened. Additionally, the San Lorenzo River and Laguna Creek also provide habitat for coho salmon, listed under the federal and state ESAs as endangered.

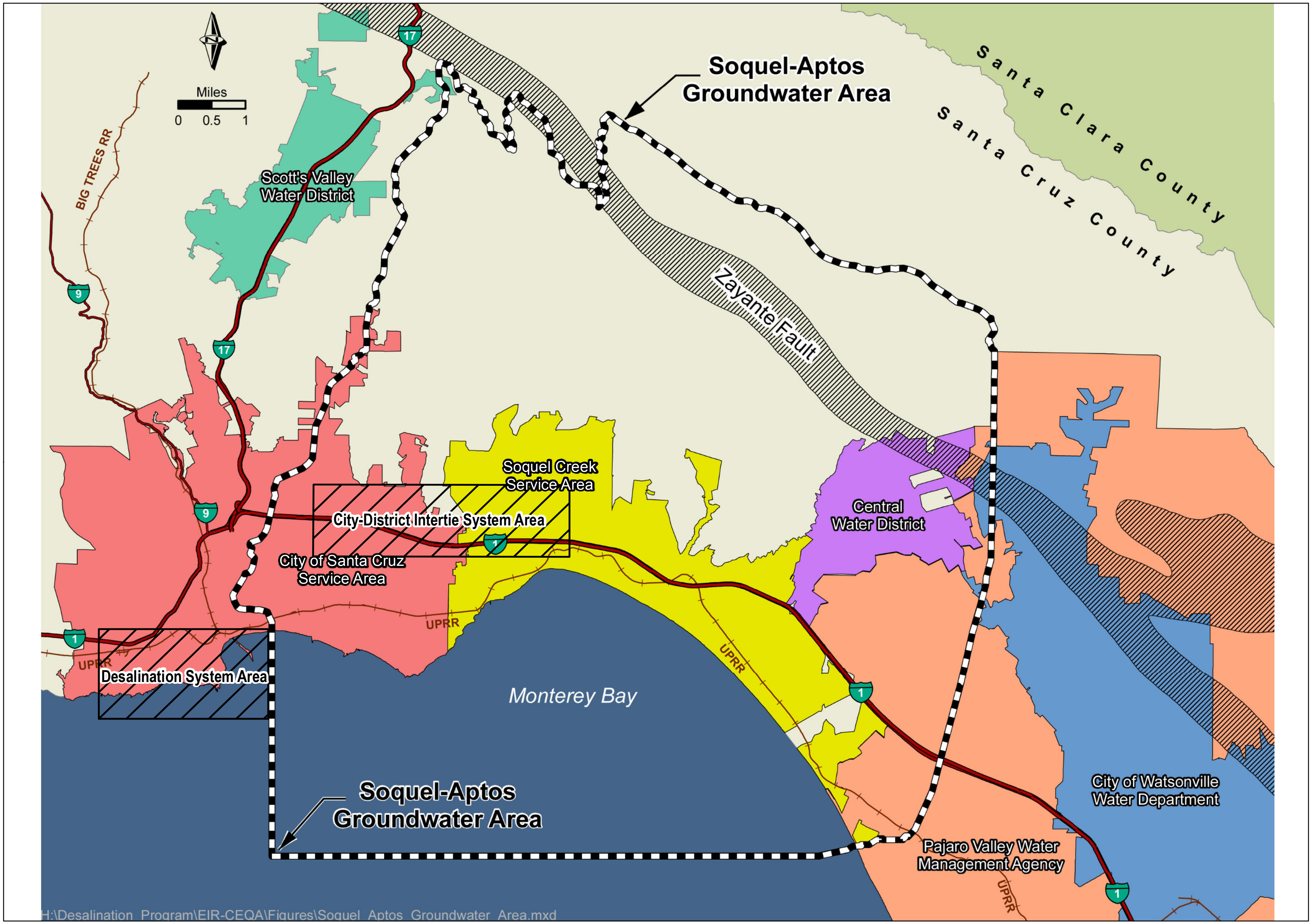
For the last ten years, the City has been in the process of developing a Habitat Conservation Plan (HCP), which is a plan prepared under the federal ESA by nonfederal parties seeking to obtain permits for incidental taking of federally-listed threatened and endangered species[2]. In 2007, the City began diverting less from the North Coast system on an interim basis in connection with the ongoing pursuit of an incidental take permit. The City anticipates diverting substantially less in the future from the North Coast sources and from the San Lorenzo River to leave more water for fisheries habitat once an agreement with regulatory agencies has been negotiated.

Each of the City's sources is further described below. See **Section 3.2.3, Water Supply Limitations for the City,** below, for information about potential limitations of these sources.

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: Majors Creek, Laguna Creek, Reggiardo Creek, and Liddell Spring. The use of these sources by the City dates back as far as 1890. Diversions from these sources have historically been limited only by natural flows; as pre-1914 rights, these sources are least affected by water rights limitations.

[2] Incidental take permit holders can proceed with an activity that is legal in all other respects, but results in the "incidental" taking of a listed species.



URS City of Santa Cruz and Soquel Creek Water District
scwd[2] Regional Seawater Desalination Project

Figure 3-1
City and District Water Service Areas

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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, which are considered to be hydraulically connected to the river and tied to the City's water right at Tait Street. The other diversion on the San Lorenzo River is the 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 Pump Station to Loch Lomond Reservoir. The facility is used to augment storage in the reservoir during dry years when natural inflow to Loch Lomond Reservoir from Newell Creek is low.

Although 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.

Newell Creek and Loch Lomond Reservoir

Loch Lomond Reservoir is located near the town of Ben Lomond in the Santa Cruz Mountains. The reservoir, which impounds water from Newell Creek, was constructed in the 1960s and has a maximum capacity of 2,810 million gallons. 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 Loch Lomond Reservoir. Withdrawals are also made from Loch Lomond during the winter season when the North Coast and San Lorenzo sources become difficult to treat with existing treatment facilities that cannot treat high-turbidity storm runoff. In accordance with the requirements of its existing water rights, and unrelated to the HCP negotiations, the City releases some flows from storage in Loch Lomond Reservoir, to support fishery resources downstream of Newell Creek Dam.

Live Oak Wells

The Live Oak Well system consists of three groundwater production wells and a treatment plant located in the southeastern portion of the City’s water service area. The system was acquired by the City from the Beltz Water Company in 1964. Collectively this groundwater system is referred to as the Live Oak system or Live Oak wells; each well and the treatment plant are individually referred to as Beltz. During the summer and fall, groundwater from these wells is used to supplement the surface water sources.

Even though groundwater constitutes a small percentage of the entire City water supply, 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 system’s acquisition, many of the individual components, including wells, have been replaced. Due to reduced groundwater availability in the Purisima Formation and potential for seawater intrusion, the City is actively pursuing inland pumping facilities (see **Section 3.2.3** for additional information regarding water supply limitations).

Water System Operations and Production

In general, the City's water system has been historically 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, described in detail in the City UWMP.

Water supplies are generally prioritized to meet daily demands in the following order: North Coast, San Lorenzo River, Live Oak Wells, and Loch Lomond Reservoir. Due to the excellent water quality and lowest production cost, the North Coast sources have historically been used to the greatest extent possible. As indicated above, the North Coast diversions are least affected by water rights limitations. Additional water needed to meet daily demands is pumped from the San Lorenzo River at Tait Street. 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. The Felton Diversion is operated intermittently as needed, normally in the winter months of dry years to augment storage in Loch Lomond.

Over the last five years (2006-2010), gross production from the North Coast sources has averaged 1,065 million gallons per year (mgy), or 30 percent of the total supply, while the San Lorenzo River supply has averaged 1,889 mgy, or about 54 percent of the total supply. Together, these flowing sources provide over 80 percent of the City's yearly water needs. Water supplied from Loch Lomond Reservoir averaged 419 mgy, or 12 percent. Groundwater from the Live Oak Wells provided an average of 156 mgy, or about 4 percent of the City's total supply. However, the aforementioned ESA issues will likely affect the priority of source selection and the relative contribution of each source to overall production. See **Section 3.2.2, Water Demand – City Service Area,** for further information.

Treatment and Distribution Facilities

The City operates two water treatment facilities. All surface water is treated at the Graham Hill Water Treatment Plant (Graham Hill plant), which currently has a maximum production capacity of about 18.5 million gallons per day (mgd). The Beltz Water Treatment Plant (Beltz plant), with a capacity of 2 mgd, treats groundwater from the Live Oak Well system.

Finished water from the Graham Hill plant and the Beltz plant is pumped directly into the distribution system. Raw water is delivered to the Graham Hill plant through various transmission facilities from respective supply sources. The 16-mile-long Coast Transmission

Main[3] delivers raw water diverted at the North Coast sources to the Coast Pump Station by gravity. 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 Graham Hill plant. The 9-mile-long Newell Creek Pipeline delivers raw water from Loch Lomond Reservoir through Henry Cowell State Park to the Graham Hill plant. The Felton Booster Pump Station is used to move water into Loch Lomond Reservoir from the Felton Diversion and out of Loch Lomond to the Graham Hill plant.

The City has 16 treated water storage facilities scattered throughout the service area. The largest was Bay Street Reservoir, which was built in 1924, and reached the end of its useful life and was deconstructed in 2008. The four temporary storage tanks on the site will be replaced with two permanent tanks between 2012 and 2015.

3.2.2 Water Demand – City Service Area

Existing Water Demand Trends

Figure 3-2, Annual Water Consumption, by Customer Category 1985-2012, shows the trend in total annual metered water use over twenty-five years by major customer category. Metered water use differs from water system demand. Water system demand is the amount entering a distribution system from treatment plants. The difference between demand and metered water use is due to unmetered uses from fire hydrants such as main flushing, fire fighting, and street sweeping, as well as losses due to underground leaks. The annual metered water consumption shown below is therefore slightly lower than actual system water demands described in the following section.

Based on average demand between 2006 and 2010, 64 percent of water use is from residential uses, 19 percent is from business uses, 7 percent is from industry and UCSC uses, 8 percent is from irrigation, and 2 percent is from municipal uses.

During the period from 1985 to 2012, water use has fluctuated from a high of 4,100 mgy in 1987 to a low of 2,900 mgy in 2009. 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 3,750 mgy. A slight drop occurred between 2001 and 2002 due to the closure of the Texas Instruments plant. Since then, total water use has declined: the first downturn, beginning in 2005, coincided with the introduction of a modified, tiered rate structure affecting single family and two-unit residential customers.

[3] The City is currently implementing a long-term rehabilitation and replacement program for the entire North Coast system, including pipeline and diversion structures, to restore its integrity and reduce transmission losses. The program includes five distinct pipeline reaches. Two of the five phases of the project have been completed.

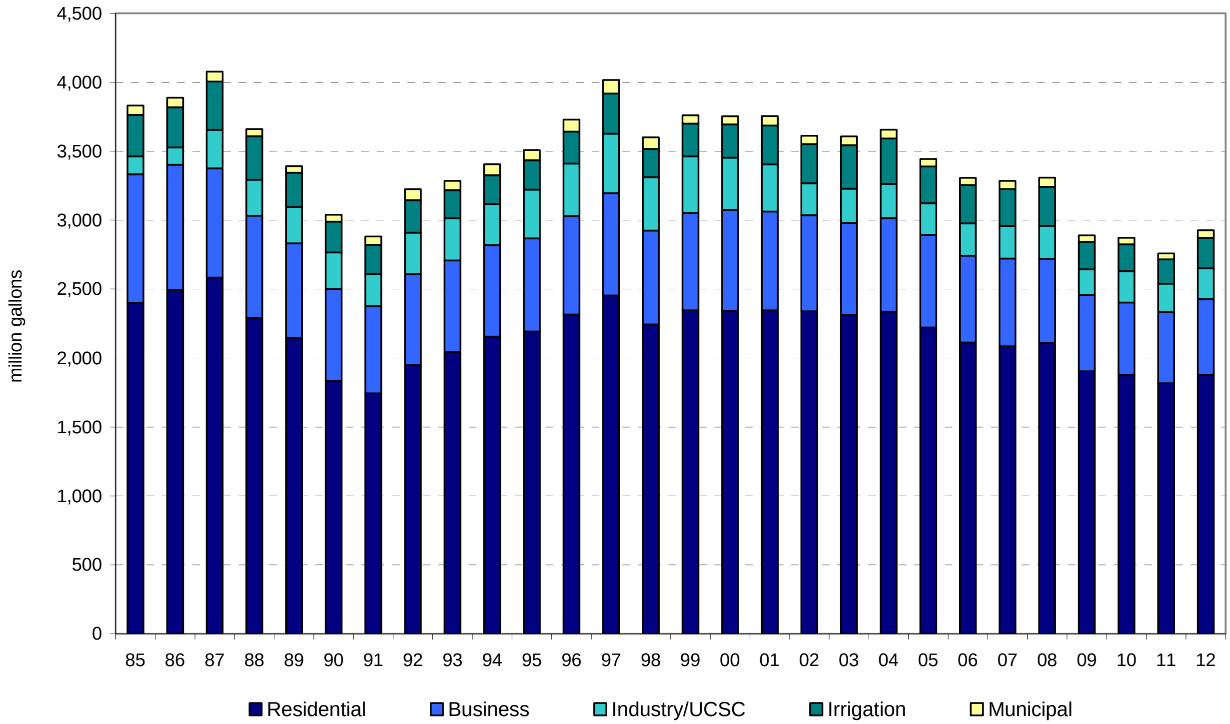

Figure 3-2. Annual Metered Water Consumption, by Customer Category 1985-2012

Source: City of Santa Cruz, 2011a. City of Santa Cruz 2010 Urban Water Management Plan, and updated by City in March 2013

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The next downturn of note was in 2009, corresponding with mandatory water restrictions and temporary demand reduction measures imposed by the City in 2009 as a result of a City-declared Stage 2 water shortage; followed by cool and foggy summer weather in 2010 and 2011. Several other factors also influenced the decline in water demand including ongoing water conservation efforts, effects of the housing market collapse, and recent economic recession with many closed businesses. As occurred after the 1976-1977 and 1987-1992 droughts, the City expects that water use will eventually return to at least the levels experienced prior to 2009. As shown in **Figure 3-2**, water use began to increase in 2012 and was approximately 168 mgy more than that seen in 2011.

Projected Water Demand

The City 2010 UWMP contains updated water demand projections that extend through 2030. As described above, total water demand includes metered water consumption (shown in Figure 3.2), as well as losses due to underground leaks and authorized unmetered water use in the system such as uses for fire hydrants, street sweeping, and main flushing. Water demands described in this section are slightly higher than the metered customer use described in the previous section. Over the past 10 years, unmetered water uses and system losses have on average been 7.5 % of overall treated water production.

As with the previous UWMP, the 2010 UWMP discusses two possible scenarios as the basis for projecting future water demand: a higher demand scenario ("Scenario 1"), and a lower demand scenario ("Scenario 2").

Potential new demand was estimated based on land use changes contemplated in the adopted *City of Santa Cruz General Plan 2030* (General Plan 2030), growth contemplated for UCSC[4], and estimates of population growth by the Association of Monterey Bay Area Governments (AMBAG) for the portion of the service area outside of the City limits[5].

The two scenarios differ primarily according to assumptions made about the level of water use at existing accounts. Both scenarios disregard the downturn in water use between 2009 and 2011 as a temporary condition as described above, not considered indicative of normal use going forward. In other words, both scenarios assume that existing (2010) demands would be higher had the economic and hydrologic climates not resulted in the downturn in water use. Scenario 1 assumes that existing water demands return to levels from an earlier period—(3,993 mgy for the period from 1999 through 2004)—when overall water consumption was highly stable for many years, prior to changes that took place with regard to weather, water rates, and the economic downturn. Scenario 2 assumes that existing water demands return to those that occurred during the 2007-2008 period (3,522 mgy) just prior to the 2009 water restrictions. Both scenarios represent actual usage levels in the relatively recent past and are therefore a reasonable basis upon which to develop demand projections.

Figure 3-3, Actual and Projected Water Demand, 1974 – 2030 shows the results of these two projections relative to historic water demands. Water demand shown includes that projected for metered water use, unmetered water use, and system losses due to leaks.

Potential new water demand associated with community growth and development over the next 20 years amounts to about 500 million gallons from current usage levels under either scenario. Projecting water demand requires many assumptions: uncertainties about growth and development, variables affecting water use such as weather, effects from future conservation programs, and possible future price-related changes or strategies. In taking all of this into

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4 Water demands for UCSC are based on the *UCSC 2005 Long Range Development Plan*, as modified by the Final EIR for the 2005 Long Range Development Plan, and the Comprehensive Settlement Agreement resulting from litigation of the EIR (UCSC, 2006). UCSC water demand was further updated/refined in the Water Supply Assessment completed for the City of Santa Cruz Sphere of Influence Amendment EIR (Erler & Kalinowski, Inc., 2009), and as part of the Water Supply Assessment (Erler & Kalinowski, Inc., 2011) prepared for the City's General Plan EIR.

5 The adopted General Plans and related planning documents for the County and Capitola were reviewed to understand the projected growth and water demands anticipated under existing adopted plans for the portion of the City's service area outside of the City limits. Potential new water demand identified in the City's 2010 UWMP is less than estimated water demand associated with the development potential of vacant and underused sites assuming development per existing General Plan designations. Current potential development and growth as accommodated by the County and Capitola General Plans is reviewed in detail in **Section 6, Growth** of this EIR.

consideration, the City UWMP concludes that Scenario 2, the lower demand forecast, is the more likely of the two scenarios for the City to use for water management planning purposes going forward.

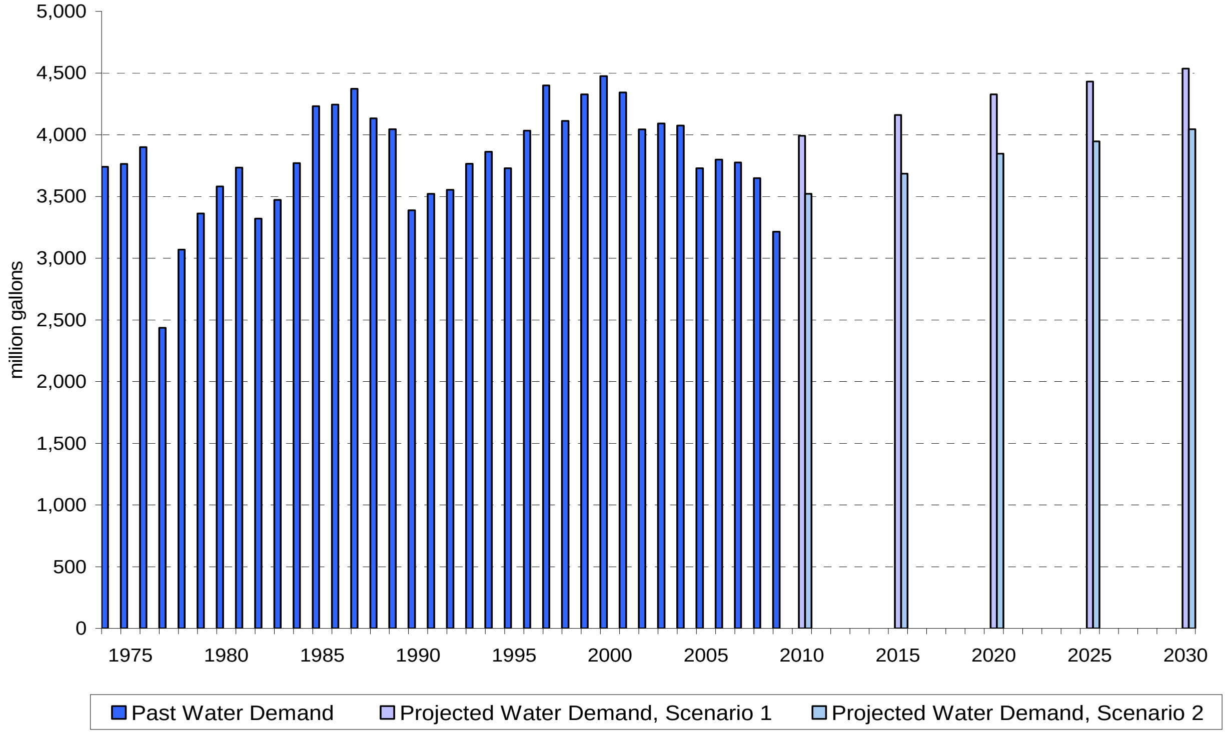

Figure 3-3. Actual and Projected Total Water Demand, 1974 – 2030

Source: City of Santa Cruz, 2011a. City of Santa Cruz 2010 Urban Water Management Plan.

One way to test the likelihood of these two scenarios is to examine the results expressed on a per capita basis. **Table 3-1, Projected Water Use on Per Capita Basis**, 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 gallons per capita per day (gpcd) (70 – 71 gpcd residential), while Scenario 2 results in gross water use ranging between 105 and 109 gpcd (61 gpcd residential). Given the state mandate to comply with a target water use of 110 gpcd in 2020 under the Water Conservation Act (Senate Bill x7-7), and in recognition of the ongoing trend toward lower water use, the City has concluded that Scenario 2 best reflects the most reasonable of the two scenarios for the City to use for water management planning purposes going forward. Scenario 2 also accounts for the fact that the City already has a very low per capita water rate as compared to other water agencies statewide, as discussed under Conservation and Demand Management in **Section 3.2.4** below. Since the completion of the 2010 UWMP, nothing has changed that would affect the water demand projections under the above scenarios or the selection of Scenario 2 as the most reasonable basis for water management planning.

Table 3-1. Projected Water Use on Per Capita Basis

Water Demand Scenarios	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

Source: City of Santa Cruz, 2011a. City of Santa Cruz 2010 Urban Water Management Plan.
Acronyms:
gpcd = gallons per capita per day

3.2.3 Water Supply Limitations for the City

The City faces two major challenges in meeting its present and future water supply needs: lack of adequate water supply especially in dry years (see Vulnerability to Water Shortages, below), and ensuring that surface water diversions are operated in a manner that protects the aquatic habitat of threatened and endangered species (see Endangered Species Act Compliance, below). These two challenges are inter-related in that reducing surface water diversions for the protection of aquatic habitat increases the potential for water supply shortages. In addition, neither is fully understood since dry years cannot be predicted either temporally or in terms of magnitude, and negotiations are still underway with regards to the ESA issues.

However, in addition to these two major challenges (lack of water in dry and critically dry years, and ESA-related issues), there are other uncertainties that also have the potential to reduce or otherwise impair the City’s water supply: pending water rights and entitlements, the reliability of the Live Oak Well system, and global climate change. Following is a brief description of each of these five challenges.

Vulnerability to Water Shortages ~ Dry and Critically Dry Years

The City water system draws exclusively on local water sources and almost exclusively on surface water. Water available for use during a specified time interval is described as “yield.” Each of the City’s supply sources has a theoretical yield which is the amount of water that is available in one year by the combination of rainfall, runoff and storage. The isolation of the City’s system makes the City’s water users comparatively more vulnerable to droughts than water users in areas physically linked to large federal, state, or regional systems, such as the Central Valley Project, the State Water Project, or the San Francisco Public Utility Commission’s regional system. Repeated dry years can lead to low stream flows, low reservoir levels, and low groundwater recharge rates, while customers, despite significantly reducing per capita usage, continue to draw on dwindling supplies.

The primary challenges for the City's water system during dry and critically dry years are: (1) a wide range in the yield of surface water sources from year to year, and (2) limited surface water storage capacity. For the City water service area, a water shortage occurs under current operating conditions 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.

In years classified as normal and wet, the water system is usually capable of meeting the community's current and projected total annual water requirements. In single dry years, there is usually sufficient storage in Loch Lomond Reservoir to carry the system through the following summer. Under such conditions, the system relies more heavily on its water storage at Loch Lomond to satisfy demand, which draws down the reservoir level lower than usual, depleting available storage for subsequent years. Compounding the situation is the need to retain a certain amount of water in the reservoir in case another dry year follows.

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 that cannot support average dry season demands. An additional factor is the City's water rights limitation of withdrawing no more than 1.04 billion gallons of water from the reservoir each year (City, 2004a).

The City has experienced two types of severe water supply deficiencies: a critical short-duration shortage from 1976-1977 and a longer yet slightly more moderate shortage from 1987-1992. In 1977, the City imposed severe water rationing in response to the critical shortage of water. Between 1987-1992, a water supply emergency was declared, and either usage restrictions or rationing was imposed each year for five consecutive years. The 1976-1977 event has been established as the most severe drought of record, corresponding to the least amount of runoff in the San Lorenzo River at 9,500 acre-feet (af). Because this is the most severe water supply situation experienced by the City in recorded history, the City uses this as a benchmark for assessing system reliability. However, for water supply planning purposes, the City made a policy decision to limit the frequency and magnitude of water supply shortages, with the worst-year peak-season shortage limited to 15 percent, thus reducing the need for supplemental supply.

These water supply reliability targets are considered to be the best overall balance between ensuring public health and safety at all times while minimizing costs and impacts on the community and environment. See **Section 3.2.4, City Water Supply Planning and Adopted Plans** for additional information about these reliability targets.

Endangered Species Act Compliance

The City's water supplies come predominantly from flowing sources such as Liddell Spring, Laguna Creek, Majors Creek, Newell Creek and the San Lorenzo River. These sources are important habitat for special-status species, including but not limited to coho salmon and steelhead trout, both in the anadromous salmonids family. As a result, the City must look seriously at activities that could impact this habitat and potentially result in “take” of listed species[6].

Any activity that may have the potential to result in a “take” of a federally listed species requires a federal Section 10(a) Permit. Leading up to the application for the permit, the City must look critically at its operations and the potential to “take” any listed species and prepare an HCP. The anadromous fisheries HCP will describe measures that the City would take to minimize and mitigate take of these species to the maximum extent practicable. It is anticipated that the implementation of the forthcoming anadromous fisheries HCP will be beneficial to special-status aquatic species found downstream of City diversions, as well as “resident” species found in the non-anadromous reaches of streams where the City diverts water (City, 2010a).

The City has been working with the National Oceanic and Atmospheric Administration – National Marine Fisheries Service (NMFS) and with the California Department of Fish and Wildlife (CDFW[7]) on the HCP and the counterpart planning under the California ESA, as well as developing master streambed alteration agreements for all its water diversions under the California Fish and Game Code. Both of these agencies are at times referred to below and throughout the EIR as “fisheries agencies.” In the absence of incidental take permits, the City faces the threat of possible enforcement actions by the fisheries agencies for unauthorized take under the state and federal ESAs. Enforcement actions alleging unlawful take could result in significant fines or issuance of an injunction.

Numerous studies undertaken in support of the HCP have evaluated how much water flow is needed in streams during various times of the year to protect the fisheries habitat during all freshwater life phases (migration, spawning, and rearing). These studies show that the City’s operations are affecting special-status anadromous salmonid species and may result in take. Generally speaking, the impacts are greatest on the North Coast streams during the dry season and during dry water years. However, potential adverse effects are not limited to those conditions and can also occur during the wet season. Given this, the City is also confronted with the requirement to provide adequate wet season in-stream flows to support anadromous salmonid migration and spawning. Additionally, given the renewed focus on the San Lorenzo River for

[6] Under the federal ESA the term “take” means to “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (federal ESA, Section 3[19]). Under the California ESA the term “take” means to "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill" (Fish and Game Code, Section 86).

[7] Prior to December 31, 2012, the California Department of Fish and Wildlife (CDFW) was known as the California Department of Fish and Game (CDFG). Throughout this EIR and supporting documentation, the name CDFW is used to refer to interactions with the organization, while the name CDFG is used to refer to documentation produced by the organization prior to this date. The Legislature did not change the name of the California Fish and Game Code, however, so many of the statutes governing the duties of the CDFW are still found in a Code that reflects the agency’s original name. Nor did the Legislature change the name of the Fish and Game Commission, an entity separate from CFDW that takes legislative actions such as setting hunting and fishing seasons.

coho salmon recovery, the conservation strategy developed for the HCP must also address the relatively complex San Lorenzo watershed.

The HCP development process began in 2002 when the City hired a firm to develop a citywide, multi-species HCP. In August 2011 the City developed the refined *Draft Habitat Conservation Plan Conservation Strategy for Steelhead and Coho Salmon* (2011 Draft Conservation Strategy) (City, 2011b) to serve as a key component of the HCP. The 2011 Draft Conservation Strategy phases improvements to in-stream flows for steelhead and coho by reducing water diversions over time, recognizing that the limitations of the existing water supply system do not allow for immediate achievement of optimal in-stream flows and a supplemental water supply would be needed to achieve optimal conditions.

The 2011 Draft Conservation Strategy identified in-stream flow targets as “Tier 1,” “Tier 2,” and “Tier 3” for ease of explanation. A Conservation Strategy is summarized in a table of months (January – December) and Exceedance Categories. There are five Exceedance Categories corresponding to the water year type from wet to critically dry. A Conservation Flow is the amount of water that needs to be in a stream per month, by Exceedance Category. For example, in March the system operator would look at the cumulative flow in any given stream and determine which Exceedance Category applied. A table is then used to determine how much water remains in that stream and therefore, how much remains for diversion.

- Tier 1 refers to the (then) current voluntary flow releases initiated by the City in 2007 and current City diversions would simply maintain current habitat levels.
- Tier 2 would limit City diversions and thereby increase baseflows in priority streams (Laguna Creek and the San Lorenzo River below Tait Street), as well as increase winter flows for adult migration and spawning in these streams. Tier 2 would also require an increase in rearing flows in other streams.
- Tier 3 would further limit City diversions to further increase baseflows in North Coast streams and the San Lorenzo River, providing 80 percent of optimum flows for fish habitat. Tier 3 leaves the most water in the streams for fish habitat, and results in the least amount of flowing water available for City diversion.

These three tiers of in-stream flow objectives were developed to move from a near-term flow condition with existing facilities and water supplies, to the longer-term flow conditions possible once a supplemental water supply is in place. In the near term, and without a supplemental supply, the City’s goal presented in the 2011 Draft Conservation Strategy is to improve stream-flow conditions by meeting Tier 2 and Tier 3 flows in as many years as possible. Over the longer term with a new supplemental supply in place, the goal is to improve stream-flow conditions by meeting Tier 2 and Tier 3 flows more often. CDFW provided comments on the above 2011 Draft Conservation Strategy indicating that they are not in support of the strategy, as it would not improve stream-flow conditions in a significant enough way (CDFG, 2011a). The City submitted the *2012 Revised Draft Conservation Strategy* (City, 2012b) to the fisheries agencies in July

2012. This revised conservation strategy proposed by the City introduces a new tier, Tier 3/2, which will be provided in a similar fashion now and in the future, eliminating the phasing strategy as outline above. This strategy continues to focus on maximizing in-stream habitat benefits in both the near and long terms, but has incorporated several new concepts and priorities as follows.

- Tier 3/2
    - Minimum in-stream flow targets have been developed to maintain all life history stages of steelhead and coho salmon.
    - Bypass flows in wet and normal years are targeted to achieve habitat values for all life stages of steelhead and coho that are approximately 80 percent of the habitat value that would occur in the absence of the City diversions.
    - In dry and critically dry years, bypass flows are targeted to provide approximately 80 percent of habitat values that would occur in the absence of City diversion in Laguna and San Lorenzo River below Tait Street, while providing habitat values in the other streams that are improvements over existing operations, but do not fully achieve 80 percent of the habitat value. Because the HCP is striving to maintain all life history stages of steelhead and coho, and due to the extreme range of seasonal and inter-annual flow variations, the conservation strategy defines five different year types as opposed to the four currently used in the UWMP by the City. Operationally, the year type would be determined as exceedence flows each month, which would set the in-stream flow target for the following month.

CDFW responded with comments to the 2012 Revised Draft Conservation Strategy in a letter dated September 18, 2012 (CDFG, 2012). Since that time, HCP negotiations have focused on evaluating the CDFW recommended flow proposal and potential water infrastructure modifications. Many of these modifications are similar in scope to improvements for maximizing existing sources and storage in Loch Lomond, as outlined in **Section 8.2.2, Alternatives to the Proposed Project Considered but Eliminated**.

CDFW's response letter focuses on two major recommendations: a modified flow proposal to achieve instream flow and life history stage goals in all conditions, and potential operational and infrastructure changes intended to increase water availability and reliability (CDFG, 2012). Extensive *Confluence*® water modeling has been initiated to evaluate the potential for decreased future water shortages with the following system infrastructure changes:

- Addition of a second, 20 cubic foot per second (cfs) pipe between Felton Diversion and the Graham Hill Water Treatment Plant.
- Addition of a second, 20 cfs pipeline between Felton Diversion and Loch Lomond Reservoir.

- Removal of turbidity constraints at Tait Street.
- Adjustment of the Loch Lomond annual withdrawal constraint to allow for increased withdrawals from Loch Lomond.

According to preliminary modeling results, adding a second pipeline between Felton Diversion and Loch Lomond yielded negligible improvements in peak-season reliability. Likewise, adding a second pipe between Felton Diversion and Graham Hill Water Treatment Plant yielded negligible improvements in peak-season reliability. Increasing the Loch Lomond annual withdrawal limit yielded no improvement in peak-season reliability. However, removing turbidity constraints at Tait Street yielded a small improvement in peak-season reliability reducing worst-year shortages by 5 percent. As discussed in **Appendix C, Evaluation of Future Water Supply Shortages and Need for Supplemental Supply Given Probable Habitat Conservation Plan Conservation Strategy Flow Requirements**, preliminary modeling results of the CDFW September 18, 2012 proposal indicate it would result in higher shortages than the 2012 Revised Draft Conservation Strategy Tier 3/2 proposal and lower shortages than Tier 3 flows.

From an operational standpoint, meeting fish flow requirements will be very complex to implement regardless of the agreed-upon strategy. The determination of whether a water supply shortage exists is a risk assessment based on the predicted end of season reservoir level and carryover storage needed in the reservoir for the next year (City, 2009a). The City's main considerations in undertaking this determination under current conditions include:

- Would allowing unrestricted water use in the current year leave insufficient reserves in Loch Lomond Reservoir if drought conditions continue into the next year?
- Knowing that another dry year could mean the City's flowing sources are even lower, how much water should be retained in the reservoir for the following year to be prudent?

There is no set formula to determine the optimal allocation for use from the reservoir. Reservoir allocation refers to the amount of water from the reservoir that can be used in a given year. In the real world, with imperfect information about both supply and demand, there is no ability to tell when dry years will end and normal to wet years will return. Therefore, protection of the long-term welfare of the City and its customers necessitates favoring a smaller reservoir allocation with a larger cutback than may actually be necessary to avoid the possibility of experiencing more critical shortages if dry conditions continue or worsen.

Conducting supply and demand risk assessments are standard operating practices for the City. However, adding the complex operating restrictions of the revised habitat conservation strategy described above, further complicates this risk assessment process. A water supply emergency in potential dry and critically dry years would need to be established early in the season (March or April) in order to develop the workforce, programs and protocols to implement summer restrictions (City, 2009a). Due to the lead time required for such planning, and the fact that use restrictions cannot be shifted on a monthly schedule as water diversions can, there is a very real likelihood that restrictions would be more frequent to ensure compliance with monthly in-stream flow requirements.

According to the City UWMP, the process to secure an incidental take permit involves many more steps and could potentially take several more years to complete. While the outcome remains uncertain, it is clear that compliance with 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, which will exacerbate the aforementioned problem of water shortage.

The City's requirement to plan for reduced reliance on its flowing sources as a result of the HCP process, combined with its ongoing vulnerability to water supply shortages, are the primary factors creating the need for additional water supply as an element of the City's strategy for dealing with future drought conditions without having to undertake extremely severe rationing. See **Section 3.2.5, City Water Supply and Demand Assessment** for additional information about the implications of the HCP process on water supply shortages.

Pending Water Rights and Entitlements

The City is seeking approval of change petitions that would add direct diversion as a method of diversion from the San Lorenzo River (at Felton Diversion) and from the Newell Creek Diversion (at Loch Lomond Reservoir). Current water rights authorize diversion to storage in Loch Lomond Reservoir but do not include the right to take the water by direct diversion; an oversight in the original filings. The City is also requesting an extension of time allowed to put the full yield from the Felton Diversion to beneficial use. These petitions are described below.

Newell Creek and Felton Diversions: The current water rights are structured to allow diversion of water from Newell Creek and the San Lorenzo River at Felton, and storage of the water in Loch Lomond Reservoir. The rights only allow withdrawal of water from the reservoir after 30 days from the last inflow. The diversions and reservoir cannot reasonably be operated in this way. The City frequently needs to withdraw water for use when, or within a short time after, it is also diverting water into the reservoir in accordance with the seasonal limitations on the water rights. This is considered 'direct' diversion instead of diversion to storage (for true storage, the water must remain in storage for thirty days.) To bring the water rights into conformity with historical operations, which have been consistent with a combined direct diversion and diversion to storage model, the City has requested the State Water Resources Control Board add a right of direct diversion to the Loch Lomond and Felton water rights. This type of right allows the City to withdraw water from the reservoir at the same time water is flowing into the reservoir. This action would not increase the amount of the City's entitlement, the season of use, or other features of the existing water rights.

Felton Diversion: Pursuant to the City's permits to divert water at Felton for storage in Loch Lomond Reservoir, the City must put the full amount allowed under its permit (3,000 acre-feet per year) to full beneficial use, in order to secure its appropriative water rights licenses. While the City has been 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 amount, and therefore has filed petitions with the State Water Resources Control Board to extend the time allowed for putting the entire annual diversion amount to beneficial use. The permitted water supply from the Felton Diversion is considered critical to meeting the City's projected future demand particularly in light of increasing fisheries requirements. This current petition is pending while the City works with the fisheries agencies on completion of the habitat conservation planning and associated permitting, described above.

Summary: The change petitions seek to conform the water right permits and license to existing and historic operations. They do not propose to change any other feature of the water rights, other than the addition of a cap on the rate of direct diversion to complete the license. The petitions to extend time allow additional time to put water to full beneficial use under the Felton permits. No other aspect of those permits would be altered by the extension petitions. However, if these petitions are not approved, the City and those reliant on it for water would be at risk of losing a critical portion of the water supply now provided by these facilities. At times, Loch Lomond Reservoir could not provide any water supply to the City even if there is ample water in storage. Furthermore, the extension petitions at the Felton Diversion are necessary to enable the City to put the volume of water already authorized under those permits to beneficial use. Both the change and the extension petitions are essential not only for off-stream water supply, but also to provide water for fishery benefits being sought by the fishery agencies.

Reliability of the Live Oak Well System

The source of water for the Live Oak Well System is the Purisima Formation (Purisima), which is the primary groundwater aquifer underlying the entire mid-County region. In conjunction with the Aromas Red Sands aquifer (Aromas), the Purisima makes up most of the groundwater resources for what is commonly referred to as the "Soquel-Aptos" area (see **Figure 3-1**). The Purisima aquifer serves as a groundwater resource for the City, the District, the Central Water District (CWD), several small water systems, and hundreds of private wells. According to the City UWMP, in the most recent reporting period, it is estimated that the District pumps approximately 55 percent of the total annual groundwater yield from the Purisima, with the remaining 45 percent pumped by all other users, including the City, which pumps about 10 percent of the annual yield.

The Purisima is a collection of distinct geologic units composed of sandstone interbedded with layers of siltstone and claystone. These units vary in thickness and hydrogeologic characteristics. 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. Recharge is thought to occur from deep percolation of rainfall in the upper watersheds and along streambeds of Branciforte Creek, Arana Creek, Rodeo Gulch, and Soquel Creek.

The Soquel-Aptos area has long been recognized locally as being threatened by the problem of overpumping, as evidenced by a decline in static groundwater levels and a broad, persistent depression consistently below sea level in some locations, signaling that cumulative groundwater production exceeds the long-term sustainable yield of the aquifer. Given that condition, there is an ongoing risk of seawater intrusion[8] into the productive units of the Purisima. Even though pumping by the City constitutes a small proportion of the total extraction from the Purisima, because the City's wells are located closest to the shoreline, they would be among the first impacted by seawater intrusion.

In 2005, the City entered into a cooperative agreement for groundwater management of the Soquel-Aptos area with the District, CWD, and the County of Santa Cruz. 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. The *Groundwater Management Plan – 2007 – Soquel-Aptos Area* was prepared in 2007 and served as the framework for management of groundwater resources within this area (District and CWD, 2007).

The City has recently been advised by its hydrogeologist that the yield of the Live Oak well field is now substantially less than previously assumed. Long-term water supply planning by the City included production capacities from the Live Oak wells of between 1 and 2 mgd (100 to 430 mgy) depending on hydrologic conditions and the availability of water from other sources. Within the framework of the 2005 Cooperative Agreement for Groundwater Management and the Beltz Well No. 12 Project EIR (City, 2011c), the City established groundwater production goals of 170 mgy in average years and up to 210 mgy during drought, which is less than half of the maximum production capacity previously assumed. 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.

For the purposes of supply modeling in the City UWMP, the following three Beltz operation scenarios were analyzed; each confined by annual yields as described above.

1. 1.0 mgd available in non-drought years from May to October; 0.8 mgd available during these months in drought years.

2. 0.8 mgd available every year from April to November.

[8] Seawater intrusion, defined as seawater contaminating fresh groundwater in an aquifer, occurs when groundwater levels along the coast are depressed to the point that seawater moves inland into the aquifer.

3. 0.8 mgd available every year from April to November, with additional 0.3 available from June to August in critically dry years.

While all of these Beltz operational assumptions result in significant reduction in system reliability when compared to the City's original long-term groundwater assumptions, the reliability impacts of the three scenarios were virtually indistinguishable from one another.

Because of reduced groundwater availability and potential for seawater intrusion, the City is currently constructing an inland well and treatment plant to achieve the third operational scenario noted above, enabling production up to 210 mgy in drought conditions. An EIR has been completed for the Beltz Well No. 12 Project (State Clearinghouse Number 2010122030), which is located on Research Park Drive in Soquel (City, 2011c). The Beltz Well No. 12 EIR indicates that the groundwater extracted from Beltz Well No. 12 would be from the same zones of the Purisima as the existing Live Oak well field, and would redistribute, not increase, the City's groundwater extraction, as compared to historical production capacities. The target yield of 210 mgy is approximately half of the maximum production capacity previously assumed. The City's production from the Live Oak wells could be further reduced due to lowered groundwater levels and the threat of seawater intrusion, resulting in either permanent loss of groundwater or the need to move pumping inland (see **Section 3.2.5** for additional information).

Likewise, the District recently reevaluated safe yield of the Soquel-Aptos area for their service area that would be in effect after groundwater levels recover. This safe yield would provide sufficient protection against seawater intrusion and is considerably lower than previously thought. See **Section 3.3.3, Water Supply Limitations for the District**, below, for additional information about groundwater conditions and the District's future safe yield.

Global Climate Change

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 the City UWMP. The City UWMP provides a summary of the major expected effects of climate change that pose a threat to the state's water resources, based on data from the California Department of Water Resources (see **Table 3-2, Summary of Potential Impacts of Climate Change on California's Water Resources**).

The City has prepared and adopted a *City of Santa Cruz Climate Adaptation Plan* (Climate Adaptation Plan) to address the potential impacts of climate change on the City (City, 2011d). The intent of this Climate Adaptation Plan is to identify the most significant potential climate change risks and vulnerabilities, and to create an action plan that will guide current and future decision makers in protecting our natural and built environment. This plan incorporates the recently completed *City of Santa Cruz Vulnerability Study* (Vulnerability Study) (Griggs and Haddad, 2011), which provides an assessment of potential effects of climate change on the City with an emphasis on how anticipated climate change may affect people, infrastructure, property and development, economy, environmental resources, and environmental health. The study indicates that over the next 40 years, the highest risk to the City related to water supply will come from water shortages due to the combination of increasing temperatures and changes in precipitation patterns.

Table 3-2. Summary of Potential Impacts of Climate Change on California's Water Resources

Potential Impact	Expected Consequences
Reduction of the state's average annual snow pack[1]	Potential loss of water storage Challenges for reservoir management
Changes in precipitation	Potential increased storm intensity and increased potential for flooding Possible increased potential for droughts
Long-term changes in watersheds	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 for maintenance of habitat for fish species
Changes in evaporation and evapotranspiration rates	Increased irrigation and domestic water demands (bathing, drinking, recreation)

Source: City of Santa Cruz, 2011a. City of Santa Cruz 2010 Urban Water Management Plan.
Notes:
1. Reduction of the state's average annual snow pack would not affect local water supply conditions in Santa Cruz County.

Based on this Vulnerability Study, the City's Climate Adaptation Plan has developed goals, objectives, and a range of potential actions that will build adaptive capacity into City policies, programs and infrastructure. In all, over 40 action items involving various City departments were identified and prioritized. Those items involving the City 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.

In 2012, the U.S. Geological Survey published its findings on how climate change affects water resources and habitats in the San Francisco Bay area in a report titled *Simulation of Climate Change in San Francisco Bay Basins, California: Case Studies in the Russian River Valley and Santa Cruz Mountains* (USGS, 2012). This report studied and documented the potential effects of climate change on future water supply and demand for the Santa Cruz Mountains among other Bay Area locations. This case study of local water resources offered a comprehensive analysis of future water supply and demand variability, and concluded the following:

> *Results indicated large spatial variability in climate change and the hydrological response across the region; although there is warming under all projections, potential change in precipitation by the end of the 21st century differed according to model. Hydrologic models predicted reduced early and late wet season runoff for the end of the century for both wetter and drier future climate projections, which could result in an extended dry season. In fact, summers are projected to be longer and drier in the future than in the past regardless of precipitation trends. While water supply could be subject to increased variability (that is, reduced reliability) due to greater variability in precipitation, water demand is likely to steadily increase because of increased evapotranspiration rates and climatic water deficit during extended summers. Extended dry season conditions and the potential for drought, combined with unprecedented increases in precipitation, could serve as additional stressors on water quality and habitat.*

Overall, the report concluded that even with greater variability in precipitation and increased rain in winter months, long-term water supply is expected to decrease. This coupled with steady increases in water demand can lead to greater water shortages in the future due to climate change. As a result, the City's vulnerability to water supply shortages over time will likely increase.

Additionally, climate change could also result in a decline in groundwater recharge rates, coupled with predicted rises in sea level, as reported on in **Section 3.3.3** below. Such conditions could further affect the City's use of groundwater from the Live Oak Well System.

3.2.4 City Water Supply Planning and Adopted Plans

Integrated Water Plan

The City has been pursuing possible new water supplies for the past 25 years to meet its needs during drought periods (Gary Fiske & Associates, 2003). In 1997, the City initiated an "integrated water planning" approach to consider all practical options for balancing its water supply by decreasing demand and increasing supply.

The City Council adopted the *City of Santa Cruz Integrated Water Plan* (IWP) in November 2005 (Gary Fiske & Associates, 2003). The City's IWP objectives are to: (1) reduce near-term drought shortages; and (2) provide a reliable supply that meets long-term needs while ensuring protection of public health and safety. The IWP components identified to meet these objectives include water conservation, curtailment of water deliveries during drought, and a new supplemental water supply.

Based on the outcome of the IWP and related background studies, seawater desalination was determined to be the most feasible and reliable alternative for a supplemental supply of drinking water. Other water supply alternatives considered during the IWP and related background studies included: reclamation/recycled water, various groundwater options, conjunctive use with the District, maximizing storage in Loch Lomond Reservoir, and reservoir storage in the Olympia Quarry (Gary Fiske & Associates, 2003; Carollo Engineers, 2000). See **Section 8, Alternatives to the Proposed Project**, for additional information about these and other alternatives. The IWP also considered a range of curtailment levels.

The IWP Program EIR (City, 2005a) evaluated two desalination strategies, D-1 (City-only Desalination) and D-2 (Cooperative Desalination). In November 2005, the City Council certified the IWP Program EIR and unanimously adopted the IWP as the City's long-term water resource strategy. The three elements of the adopted IWP are further described below:

- **Conservation.** This element of the IWP seeks to reduce water demand and increase water use efficiency in all years through long-term water conservation measures. See further discussion below about the City's conservation and demand management program.
- **Use Curtailment.** This element of the IWP calls for limiting the frequency and magnitude of water supply shortages by supplying 85 percent of normal demand in critical drought years like the 1976-1977 event, and for a corresponding reduction in peak-season water use of up to 15 percent. The IWP further limits the frequency of these curtailment levels to 17 years in 100. 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. This element is described as the water supply reliability target throughout this EIR.

- **Supplemental Supply.** This element of the IWP is intended to diversify the City's water supply through the construction of a 2.5-mgd seawater desalination plant and related facilities (with the ability to expand the plant up to a maximum of 4.5-mgd to meet future needs through 2030). The IWP Program EIR provided a programmatic analysis of a 2.5-mgd desalination facility, and incremental expansions up to 4.5 mgd. A cooperative operational scenario that involved partnering with the District was selected by the City Council as the preferred alternative. As indicated in **Section 3.3.4, District Water Supply Planning and Adopted Plans**, the District is also pursuing the construction of a 2.5-mgd desalination plant and related facilities in cooperation with the City. This supplemental supply project constitutes the proposed project being evaluated in this EIR. See **Section 3.4, scwd² Desalination Program**, for additional information about the joint water supply program being pursued by the City and the District.

A considerable passage of time has taken place since the adoption of the IWP and in that time, the City of Santa Cruz, along with most other California water agencies, has seen substantial shifts in customer water demand as a result of a number of factors, as described above. In addition, the City's future water supply is jeopardized due to the requirement to maintain habitat for endangered fish species in the San Lorenzo River and North Coast streams, as also described above. **Section 3.2.5** below looks at the changes to both the water supply and demand projection variables since the 2005 adoption of the IWP, in order to re-affirm the need for the IWP supplemental supply project.

Urban Water Management Plan Update

In December of 2011, the City Council adopted the 2010 UWMP (City UWMP), which is required to be prepared and updated every five years under the California Urban Water Management Planning Act. The City UWMP evaluates and describes the City's water resource supplies and projected needs over a 20-year planning horizon through 2030, and addresses a number of related subjects, including water conservation, water service reliability, water recycling, opportunities for water transfers, and contingency plans for drought events (City, 2011a).

The City UWMP accounts for the growth and development anticipated in the recently adopted General Plan 2030 (City, 2012c). It also serves as one of several documents that the City uses as a long-range water supply planning tool. Much of the information presented above about the City's water supply sources and operations, water demand, and water supply limitations is contained in the City UWMP. Water supply and demand projections from the UWMP are also presented and evaluated in **Section 3.2.5** below, along with more recent information on supply and demand projections that consider the likely potential outcomes of the HCP process. Additional relevant information from the UWMP is summarized below.

Conservation and Demand Management

According to the City UWMP, the City 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 additional water supply, 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 IWP, which included the *Santa Cruz Water Department Water Conservation Plan* (Water Conservation Plan) adopted by the City in 2000 (Gary Fiske & Associates, 2000) to be implemented over a period of 10 years. Additionally, in 2001, the City became a signatory to a memorandum of understanding 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 memorandum deemed to be locally cost-effective, and to periodically report progress made to the CUWCC. Some of the 14 BMPs overlapped with the 17 demand reduction programs of the Water Conservation Plan.

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.

Table 3-3, Estimated Conservation Savings by City Program, provides an estimate of water conservation savings achieved through 2010 via the various programs for which the City quantifies results. In addition, as described in **Section 3.2.2** above, very significant water savings, on the order of 400 mgy, were achieved over the 2005-2008 period that were strongly related to the combined impact from the implementation of a five-tiered rate structure and sharply higher rates for water service.

Additional temporary water savings on the order of 300 mgy were achieved through water restrictions imposed in 2009 due to water shortage. As indicated previously, several other factors influencing recent water consumption included ongoing water conservation efforts, effects of the housing market collapse, and the recent economic recession. Together, these factors account for the reduction in overall water consumption of almost 900 mgy, and a 26 percent decrease in per-capita water use over the past decade. As indicated previously, however, the City expects that water use will return to at least the levels experienced in 2007-2008. See **Section 3.2.5** below for information about water supply and demand projections.

Table 3-3. Estimated Conservation Savings by City Program

Sector/Program Name	Savings prior to 2006 (mgy)	Savings from 2006-2010 (mgy)	Cumulative Savings (mgy)
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
Commercial, Industrial, and Institutional:			
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:		Pending analysis	
Large Landscape Water Budget	--	3.3	--
Water Efficient Landscape Ordinance	11.2		14.5
Total	158.4	92.6	251.0

Source: City of Santa Cruz, 2011a. City of Santa Cruz 2010 Urban Water Management Plan.
Acronyms:
mgy = million gallons per year

In addition to the progress made by the City in reducing overall demand through conservation, per capita water use (total water production divided by service area population) has also dropped from 126 gallons per capita per day (gpcd) in 2001 to 93 gpcd in 2010 — a 26 percent decline. The City's 10-year average daily per capita water use (ending 2010) is 113 gallons per capita per day, considerably less than the 192 gpcd average for the state as a whole or 154 gpcd average for the Central Coast region. Of the 349 urban water suppliers reporting their per capita water in their latest 2010 Urban Water Management Plans, only 22 (6 percent) have less per capita water use than the City of Santa Cruz. **Figure 3-4, Statewide Urban Per Capita Water Use** provides this information graphically.

Given how much conservation has already been achieved, it will become increasingly difficult to achieve significant further gains in water conservation. However, some further conservation is achievable and is being investigated. The City is conducting a Residential and Commercial Water Use Baseline Survey. The goal of this survey 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 City's Water Conservation Plan.

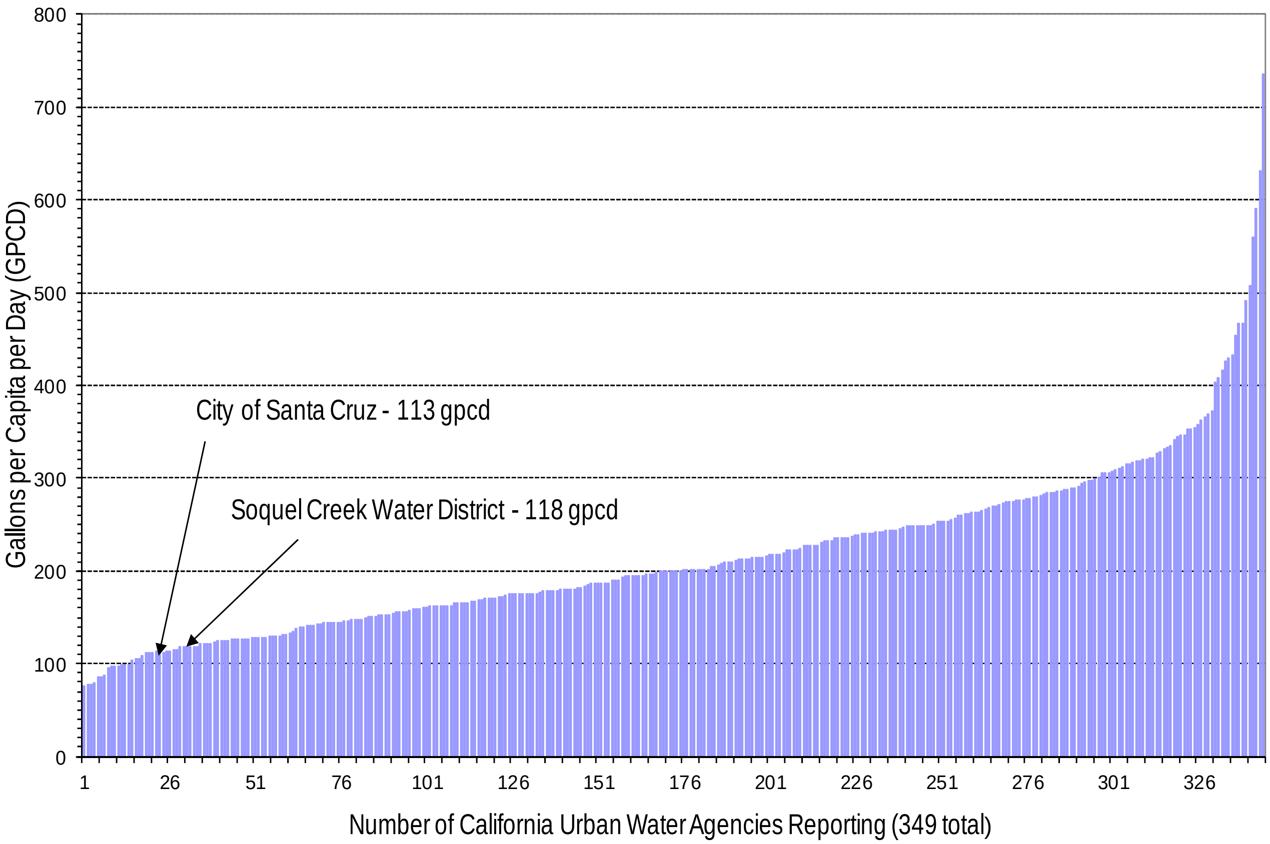

Figure 3-4, Statewide Urban Per Capita Water Use (10-year average)

Source: City of Santa Cruz, 2011a. City of Santa Cruz 2010 Urban Water Management Plan.

The data acquired through this survey will then inform a separate, technical analysis of possible water-saving technologies, programs, and services that will reduce future water demand, to identify remaining long-term water conservation potential across the service area, and to prepare a Water Conservation Plan update for the City for the next 10-year period. The project began in early 2012. When completed, the City's Water Conservation Plan update, which will be referred to as the Long-Term Water Conservation Master Plan, will provide a long-range road map for future water conservation efficiency efforts. The results will be used to help inform the City's water demand projections, and will be factored into overall water supply planning efforts. **Section 3.2.5** discusses a preliminary analysis of the potential for additional long-term reductions in water demand from on-going and potential new conservation programs that has been completed for this EIR.

Water Shortage Contingency Plan

The City completed a comprehensive update of its *Water Shortage Contingency Plan* in 2009 (City, 2009a). The plan describes the conditions that constitute a water shortage, and provides guidelines, actions, and procedures for managing water supply and demands during a declared water shortage. This plan was developed to establish the actions necessary to achieve the up-to-15 percent cutback in system-wide demand established in the City's IWP, and to describe how the City would respond if there are much larger shortages in water supply.

The 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. The overall concept is that water shortages of different magnitudes require different measures to overcome the deficiency. Each stage includes a set of demand reduction measures that become progressively more stringent as the shortage condition increases.

Normally, only one of these five stages would be put into effect early in the year at the recommendation of the Water Director, and would remain in force for the entire dry season. However, conditions and circumstances will vary with each shortage event. The City might be required to transition to the next higher stage midseason if the reduction efforts at the initial stage do not achieve the needed result, although this would not be desirable (City, 2009a). The five stages are described below in **Table 3-4, Five-Stage Structure of City Water Shortage Contingency Plan**.

Table 3-4. Five-Stage Structure of City Water Shortage Contingency Plan

Stage	Magnitude of Water Shortage	Stage Title	Water Restrictions/Prohibitions
1	0 to 5%	Water Shortage Alert	Restrict all landscape irrigation to certain hours of the day and prohibit uses defined as non-essential.
2	5 to 15%	Water Shortage Warning	Expand mandatory restrictions and limit landscape irrigation to specific days, times, and durations. Large landscape users are required to adhere to water budgets.
3	15 to 25%	Water Shortage Emergency	Require residential water rationing, require mandatory water shortage signage in commercial buildings, and reduce water budgets for large landscapes.
4	25 to 35%	Severe Water Shortage Emergency	Expand water rationing to cover all customers.
5	35 to 50%	Critical Water Shortage Emergency	Increase water rationing levels for all customers. Ban outdoor water use.

Source: City of Santa Cruz, 2011a. City of Santa Cruz 2010 Urban Water Management Plan.

Stages 1 and 2 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 IWP. Shortages of 15 percent or less, while inconvenient, do not directly threaten public safety or pose undue economic impact. Stages 3 through 5 are characterized as emergency water shortages, because they result in more widespread hardships being felt throughout the community, may threaten public health and welfare, and cause economic harm. At these stages, water rationing would be required, and minimal to no water would be allocated for outdoor use. The intent of the City's IWP, however, is to limit future water shortages to no more than 15 percent.

3.2.5 City Water Supply and Demand Assessment

The following assessment of water supply and demand is based on the information mentioned previously in this section, including: limitations and opportunities regarding existing supplies, current and projected demands, planning information, and current studies. The assessment begins with a discussion on demand projections, followed by a discussion on supply in the context of the unknowns surrounding the conclusions of the HCP development process. Because of the variables inherent in projecting water supply and demand, the assessment brackets the range of projections on the both the low and high ends.

The City UWMP provides an assessment of water supply through 2030, as described above. Estimates of supply are given by both individual sources and for the total available supply, based on data obtained from the City's updated operations model. The analysis assumes groundwater availability will be limited in future years, as discussed above in **Section 3.2.3**. In addition to the reduction in available groundwater supply described above, the City may need to further reduce pumping from the Live Oak wells due to lowered groundwater levels and the threat of seawater intrusion, as well as related reduced production capabilities. Should this occur, the City would act accordingly and only pump Beltz during a drought at 0.3 mgd or less, as further described below.

The City UWMP developed two possible demand scenarios, a higher scenario (Scenario 1) and a lower scenario (Scenario 2), as shown in **Table 3-5, Projected Water Demand Forecast – City Service Area)**. As described above in **Section 3.2.2**, the City UWMP concluded that Scenario 2 best reflected the most reasonable and likely of the two scenarios for the City to use for water management planning purposes going forward.

Table 3-5. Projected Water Demand Forecast – City Service Area

Project Water Demand Scenarios	2010	2015	2020	2025	2030
Scenario 1 – High Demand Forecast (mgy)	3,993	4,161	4,329	4,433	4,537
Scenario 2 – Low Demand Forecast (mgy)	3,520	3,684	3,847	3,946	4,046

Source: City of Santa Cruz, 2011a. City of Santa Cruz 2010 Urban Water Management Plan.
Acronyms: mgy = million gallons per year

As noted in the 2010 UWMP, the 2030 water demand projections mentioned above do not incorporate future water savings from recently adopted California green building standards codes, ongoing programs, or additional new water conservation programs.To meet the information needs of this EIR, the City's Water Conservation Office undertook a preliminary analysis of the potential for additional long-term reduction in water demand (see **Appendix B, Evaluation of Potential for Additional Long-Term Water Demand Reduction through Water Conservation Measures**). The purpose of that analysis was to develop future estimates of water savings associated with both ongoing programs, as well as with possible new programs through 2030, to serve as an interim estimate until the formal Long-Term Water Conservation Master Plan is completed. A more thorough evaluation is underway that will address the costeffectiveness of all options analyzed, incorporate public input, and formalize the programs into the long-term plan, which is anticipated to be completed in 2014.

Table 3-6, Total Water Savings from Both Ongoing and Potential New Programs summarizes the results of the analysis in terms of the potential adjustment to future water demand that could be expected. This preliminary analysis suggests that overall water demand could be reduced in 2030 from about 4,000 mgy to about 3,900 mgy, when adjusted for water savings from ongoing programs, or to about 3,700 mgy, when adjusted for water savings for both ongoing programs and potential new programs. Real world experience with existing programs suggests that incorporating the water savings from ongoing programs into the City's water demand forecast is appropriate and realistic.

Table 3-6. Adjusted Water Demand with Ongoing and Potential New Conservation Programs

Conservation Savings/Adjusted Water Demand (mgy)	2015	2020	2025	2030
Water Savings from Current and Ongoing Programs	45	89	109	122
Water Savings from Potential New Programs	52	137	169	203
Total Water Savings	97	226	278	325
Water Demand Forecast, Scenario 2 (Low Demand)	3,684	3,847	3,946	4,046
Water Demand Forecast Adjusted for Water Savings from Ongoing Programs	3,639	3,758	3,837	3,924
Water Demand Forecast Adjusted for Ongoing Programs and Potential New Conservation Programs	3,587	3,621	3,668	3,721

Source: Appendix B, Evaluation of Potential for Additional Long-Term Water Demand Reduction through Water Conservation Measures.
Acronyms: mgy = million gallons per year

However, considering the numerous uncertainties inherent in projecting water savings for potential new programs, and the likelihood that not all the water savings listed above under new programs would be realized at the exact time or in the exact amounts as indicated in **Table 3-6**, it is suggested that an intermediate value of 3,800 mgy in 2030 be used for planning purposes going forward until the time when the updated Long-Term Water Conservation Master Plan is complete. **Table 3-7, 2012 Modeled Near-Term and Long-Term Demands**, presents the range of demands included in the following supply/demand assessment.

Table 3-7. 2012 Modeled Near-Term and Long-Term Demands

	Near-Term	Long-Term (2030 with New Conservation Measures)	Long-Term (2030 without New Conservation Measures)
Projected System-Wide Demand (mgy)	3,500	3,800	4,000

Source: Appendix C, Evaluation of Future Water Supply Shortages and Need for Supplemental Supply Given Probable Habitat Conservation Plan Conservation Strategy Flow Requirements.
Acronyms: mgy = million gallons per year

The City's water supply/demand assessment is further complicated by the outstanding unknowns related to supply volumes based on the ongoing HCP development process. However, while the process is complicated and not yet complete, there is sufficient information to provide a range of near- and long-term supply conditions that are likely to result from the ongoing negotiations with the fisheries agencies. **Appendix C** was developed to describe potential near- and long-term water supply conditions given a range of possible outcomes from the HCP development process. This appendix analyzes near- and long-term demands with respect to conservation strategy scenarios for the purpose of understanding potential and likely water supply shortages.

Three Conservation Strategy Scenarios are considered in **Appendix C** and described in **Table 3-8, Description of Conservation Strategy Scenarios**. This table indicates that Tiers 3/2 and 3 were considered in the supply/demand assessment contained in **Appendix C** by coupling these scenarios with the demand projections described above in **Table 3-7** to establish a reasonable range of potential future conditions.

Table 3-8. Description of Conservation Strategy Scenarios

Conservation Strategy Scenarios[1]	Description of flow types and water year classifications	Habitat Benefits	Comments	Evaluated in 2012 Water Supply/Demand Assessment?
Tier 2	Tier 2 in all years: wet, average, dry and critically dry	Habitat improved in all years. Least conservative approach for habitat protection.	Basis for 2011 Draft Conservation Strategy.	No[2]
Tier 3/2 Hybrid	Tier 3 in wet years and average years; Tier 2 in dry and critically dry years	Habitat significantly improved in wet and average years and improved in dry and critically dry years.	Basis for 2012 Revised Draft Conservation Strategy, which is currently proposed by the City.	Yes[3] Near-Term Demand = 3,500 mgy Long-Term Demand with new conservation program = 3,800 mgy
Tier 3	Tier 3 in all years: wet, average, dry and critically dry	Habitat significantly improved in all years. Most conservative approach for habitat protection.	Conservation strategy requested by Fisheries Agencies for evaluation. Would provide the least amount of water for the City customers.	Yes[3] Long-Term Demand with new conservation program = 3,800 mgy Long-Term Demand without new conservation program = 4,000 mgy

Source: Appendix C, Evaluation of Future Water Supply Shortages and Need for Supplemental Supply Given Probable Habitat Conservation Plan Conservation Strategy Flow Requirements.

Notes:

1. Tier 1 was never furthered in the analysis because, as described in Section 3.2.3, Water Supply Limitations for the City, it represents current conditions.
2. Tier 2 was part of the analysis in Appendix C; however, due to the unlikely event that the agencies would accept anything less than Tier 3/2, it was ultimately removed from further consideration.
3. As of March 2013, the Conservation Strategy discussions with fishery agencies have narrowed focus on the September 18, 2012 recommendations by CDFW. Although not thoroughly evaluated in Appendix C, preliminary modeling results of the updated Conservation Strategy indicate it falls within the range evaluated in Appendix C, with higher shortages than the Tier 3/2 Hybrid and lower shortages than Tier 3.

Acronyms:

mgy = million gallons per year

Results of the supply/demand analysis contained in **Appendix C** are expressed in terms of frequency and severity of water supply shortage for each scenario defined above. These results are compared to the water supply reliability targets adopted by the City Council in 2005 as part of the IWP process. The IWP recommends limiting shortages of water and associated curtailment of water during times of drought by no more than 15 percent of average annual demand, and further limits the frequency of curtailments, as described in **Table 3-9, IWP Water Supply Reliability Targets**.

Table 3-9 indicates that:

- **Individual Peak Season Shortage Targets (Individual Frequency Targets):** The individual frequency target would be exceeded if peak season shortages between 0 and 10 percent occur in more than 15 percent of the years (15 years out of 100) and/or if peak season shortages of 10 to 20 percent occur in more than 2 percent of the years (2 years out of 100).
- **Cumulative Peak Season Shortage Targets (Cumulative Frequency Targets):** The cumulative frequency target would be exceeded if shortages between 0 and 20 percent occur in more than 17 percent of the years.
- **Worst-Year Peak Season Shortage Target:** The worst-year peak season shortage target would be exceeded if any shortage is greater than 15 percent.

Table 3-9. IWP Water Supply Reliability Targets

Frequency Targets (Expressed as a probability of exceeding the target)				Acceptable Worst-Year Peak-Season Shortage (%)
Individual Peak Season Shortage Targets			Cumulative Peak Season Shortage	
0-10% Peak-Season Shortage	10-20% Peak-Season Shortage	20-30% Peak-Season Shortage		
15% of years (9 in 59)	2% of years (1 in 59)	0	17% of years	15

Source: Appendix C, Evaluation of Future Water Supply Shortages and Need for Supplemental Supply Given Probable Habitat Conservation Plan Conservation Strategy Flow Requirements.
Acronyms:
IWP = Integrated Water Plan

Table 3-10, Comparison of Demands/Conservation Scenarios to IWP Reliability Targets summarizes the results of the analysis contained in **Appendix C**. As can be seen, all of the demand and conservation scenarios exceed the worst-year peak season shortage target of 15 percent, all exceed at least one of the individual frequency targets, and all exceed the cumulative frequency target.

Table 3-10. Comparison of Demands/Conservation Scenarios to IWP Reliability Targets

Demands/ Conservation Strategy	PROBABILITY OF:				MEETS IWP TARGETS?		
					Frequency		
	0-10% Peak-Season Shortage	10-20% Peak-Season Shortage	20-30% Peak-Season Shortage	>30% Peak-Season Shortage	Individual Peak Season Shortages	Cumulative Peak Season Shortage (All Ranges Combined)	Worst-Year Peak Season Shortage
IWP Reliability Targets	15% of years	2% of years	0	0		17%	15%
Near-Term Demand: 3,500 mgy HCP: Tier 3/2	8% of years	10% of years	3% of years	0	No	No 21%	No 29%
Long-Term Mid-Range Demand: 3,800 mgy HCP: Tier 3/2	23% of years	10% of years	8% of years	1% of years	No	No 42%	No 37%
Long-Term Mid-Range Demand: 3,800 mgy HCP: Tier 3	18% of years	7% of years	8% of years	15% of years	No	No 48%	No 73%
Long-Term Worst-Case Demand: 4,000 mgy HCP: Tier 3	33% of years	12% of years	10% of years	19% of years	No	No 74%	No 75%

Source: Appendix C, Evaluation of Future Water Supply Shortages and Need for Supplemental Supply Given Probable Habitat Conservation Plan Conservation Strategy Flow Requirements.
Acronyms:
IWP = Integrated Water Plan
mgy = million gallons per year
HCP = Habitat Conservation Plan

The analysis provided in **Appendix C** also addresses the ability of a supplemental water supply to achieve the IWP Targets. As can be seen in **Table 3-11, Role of a 2.5-mgd Supplemental Supply in Meeting IWP Reliability Targets**, a 2.5-mgd supplemental water supply allows the system to meet the IWP targets for the Tier 3/2 condition regardless of demand. However, 2.5 mgd of supplemental supply is not sufficient to meet the demand needs under a Tier 3 condition.

Table 3-11. Role of a 2.5-mgd Supplemental Supply in Meeting IWP Reliability Targets

Demands/ Conservation Strategy	PROBABILITY OF:				MEETS IWP TARGETS?		
					Frequency Target		
	0-10% Peak-Season Shortage	10-20% Peak-Season Shortage	20-30% Peak-Season Shortage	>30% Peak-Season Shortage	Individual Peak Season Shortages	Cumulative Peak Season Shortage (All Ranges Combined)	Worst-Year Peak Season Shortage
IWP Reliability Targets	15% of years	2% of years	0	0		17%	15%
Near-Term Demand: 3,500 mgy HCP: Tier 3/2	No years in shortage with full capacity plant dispatch[1]						
Long-Term Mid-Range Demand: 3,800 mgy HCP: Tier 3/2	No years in shortage with full capacity plant dispatch[1]						
Long-Term Mid-Range Demand: 3,800 mgy HCP: Tier 3	5% of years	3% of years	7% of years	3% of years	No	No 18%	No 47%
Long-Term Worst-Case Demand: 4,000 mgy HCP: Tier 3	11% of years	3% of years	5% of years	7% of years	No	No 26%	No 56%

Source: Appendix C, Evaluation of Future Water Supply Shortages and Need for Supplemental Supply Given Probable Habitat Conservation Plan Conservation Strategy Flow Requirements.

Notes:

1. The modeling assumed operation of the proposed project at full capacity (2.5 mgd) during the entire peak season to determine the ability of the proposed project to meet the IWP Reliability Targets. In reality, operational decisions will be made on an annual basis in an attempt to balance the social and economic costs associated with running the plant and curtailing water use. See Appendix C for more information on typical operating conditions.

Acronyms:
IWP = Integrated Water Plan
mgy = million gallons per year
HCP = Habitat Conservation Plan

The purpose of the IWP was to help the City to reduce near-term drought year shortages and provide the flexibility to allow future decisions on a reliable supply that meets long-term needs while ensuring protection of public health and safety. In addition to recommending a 2.5-mgd desalination plant, the IWP further recommended it be flexible to meet future demands and therefore be expandable to 4.5 mgd. The analysis provided in **Appendix C** also evaluates the ability of a 4.5-mgd supplemental water supply in achieving the IWP targets under the Tier 3 conditions. As can be seen in **Table 3-12, Role of a 4.5-mgd Supplemental Supply in Meeting IWP Reliability Targets**, a 4.5-mgd supplemental water supply allows the system to meet the cumulative frequency target, but not the individual frequency or worst-year peak season shortage targets. While a 4.5-mgd supplemental supply significantly reduces the shortages, by not fully meeting the IWP targets the City would need to take additional action such as reevaluation of the IWP targets and potentially accepting a lesser level of reliability, or pursuit of another water supply project in the long-term.

Table 3-12. Role of a 4.5-mgd Supplemental Supply in Meeting IWP Reliability Targets

Demands/ Conservation Strategy	PROBABILITY OF:				MEETS IWP TARGETS?		
					Frequency Target		
	0-10% Peak-Season Shortage	10-20% Peak-Season Shortage	20-30% Peak-Season Shortage	>30% Peak-Season Shortage	Individual Peak Season Shortages	Cumulative Peak Season Shortage (All Ranges Combined)	Worst-Year Peak Season Shortage
IWP Reliability Targets	15% of years	2% of years	0	0		17%	15%
Near-Term Demand: 3,500 mgy HCP: Tier 3/2	No years in shortage with full capacity plant dispatch[1]						
Long-Term Mid-Range Demand: 3,800 mgy HCP: Tier 3/2	No years in shortage with full capacity plant dispatch[1]						
Long-Term Mid-Range Demand: 3,800 mgy HCP: Tier 3	5% of years	0% of years	1% of years	0% of years	No	Yes 7%	No 28%
Long-Term Worst-Case Demand: 4,000 mgy HCP: Tier 3	4% of years	5% of years	1% of years	1% of years	No	Yes 12%	No 34%

Source: Appendix C, Evaluation of Future Water Supply Shortages and Need for Supplemental Supply Given Probable Habitat Conservation Plan Conservation Strategy Flow Requirements.

Notes:

1. The modeling assumed operation of the proposed project at full capacity (2.5 mgd) during the entire peak season to determine the ability of the proposed project to meet the IWP Reliability Targets. In reality, operational decisions will be made on an annual basis in an attempt to balance the social and economic costs associated with running the plant and curtailing water use. See Appendix C for more information on typical operating conditions.

Acronyms:
IWP = Integrated Water Plan
mgy = million gallons per year
HCP = Habitat Conservation Plan

The above analysis assumes operation of the Beltz wells as described previously in **Section 3.2.3.** As indicated previously, the City may need to further reduce pumping from the Live Oak wells due to lowered groundwater levels and the threat of seawater intrusion, as well as related reduced production capabilities. Reductions at the City coastal production wells would likely eliminate them as a source of supply since the system is already operating at extremely low rates and further reductions may render the system inoperable, leaving its new inland well as its only reliable groundwater resource. Additional reductions would likely be made should either of the following conditions (restrictive effects) be present: (1) lowered water levels that induce seawater intrusion, or (2) lowered static and pumping water levels at production wells that fall below the top of well screens or to pump suction levels.

Table 3-13, Comparison of Demands/Conservation Scenarios to IWP Reliability Targets (Reduced Beltz) summarizes the analysis in **Appendix C** for the four scenarios, with reduced groundwater from the Beltz wells. This assumes the worst-case condition with regards to the availability of groundwater: complete loss of groundwater except during the peak season of critically dry years when Beltz No. 12 would produce 0.3 mgd.

Table 3-13. Comparison of Demands/Conservation Scenarios to IWP Reliability Targets (Reduced Beltz)

Demands/ Conservation Strategy	PROBABILITY OF:				MEETS IWP TARGETS?		
					Frequency Target		
	0-10% Peak-Season Shortage	10-20% Peak-Season Shortage	20-30% Peak-Season Shortage	>30% Peak-Season Shortage	Individual Peak Season Shortages	Cumulative Peak Season Shortage (All Ranges Combined)	Worst-Year Peak Season Shortage
IWP Reliability Targets	15% of years	2% of years	0	0		17%	15%
Near-Term Demand: 3,500 mgy HCP: Tier 3/2	21% of years	7% of years	8% of years	1% of years	No	No 37%	No 39%
Long-Term Mid-Range Demand: 3,800 mgy HCP: Tier 3/2	38% of years	16% of years	7% of years	7% of years	No	No 68%	No 46%
Long-Term Mid-Range Demand: 3,800 mgy HCP: Tier 3	30% of years	15% of years	5% of years	23% of years	No	No 74%	No 80%
Long-Term Worst-Case Demand: 4,000 mgy HCP: Tier 3	40% of years	21% of years	11% of years	25% of years	No	No 96%	No 81%

Source: Appendix C, Evaluation of Future Water Supply Shortages and Need for Supplemental Supply Given Probable Habitat Conservation Plan Conservation Strategy Flow Requirements.
Acronyms:
IWP = Integrated Water Plan
mgy = million gallons per year
HCP = Habitat Conservation Plan

Without a supplemental supply project and with subsequent reduced groundwater capacity for the City as described above, all of the demand and conservation scenarios substantially exceed the worst-year peak season shortage target of 15 percent and also substantially exceed the individual and cumulative frequency targets. Under such a scenario, maximum peak season curtailment could range from 39 percent to 81 percent with shortages exceeding the cumulative frequency target 37 to 96 percent of the time.

3.2.6 Conclusions about the Need for a Supplemental Water Supply (City)

The need for a supplemental water supply for the City is due to the inability to meet demand during the dry season of dry and critically dry years. This condition is worsened by: (1) the reduction in surface water diversions from all flowing sources in all year types that will result from HCP requirements imposed by the fisheries agencies, and (2) the reduction in the production of groundwater from Live Oak wells by almost 50 percent. Water supply shortages could be further exacerbated by pending water rights and entitlements and the long-term effects of global climate change.

While the HCP negotiations are ongoing, the City has recently evaluated and modeled the likely outcomes of the HCP on water supply and the ability to meet customer demands (see **Appendix C**). The evaluation resulted in a range of likely outcomes bracketed both by demand projections, as well as limits placed on surface water supplies. The results of the evaluation indicate that the City would be unable to meet the adopted IWP water supply reliability targets, which are based on the frequency of water supply shortages and the maximum level of curtailment, under any of the scenarios evaluated.

If the City were to implement the City proposed Tier 3/2 Conservation Strategy for the HCP, the City could achieve the IWP reliability targets through implementing additional water conservation measures and by implementing a 2.5-mgd desalination plant (see **Table 3-11**). However, if the City has to further limit groundwater use at its Beltz wells due to lowered groundwater levels and the threat of seawater intrusion, as well as related reduced production capabilities, maximum peak season curtailment could be between 39 and 46 percent with some kind of shortage occurring 37 to 68 percent of the time (see **Table 3-13**).

If the City were to implement a Tier 3 Conservation Strategy, the City would not be able to achieve the IWP reliability targets by implementing a 2.5-mgd or a 4.5-mgd desalination plant. With Tier 3 in dry and critically dry years, both the magnitude and frequency of supply shortages would fall outside of the IWP reliability targets for all future near- and long-term demand projections with both of these plant capacities, as shown in **Tables 3-11** and **3-12**.

It is difficult to predict when the HCP negotiations will conclude; however, based on the process to date, water supplies will likely be restricted within the range of scenarios described above.

While fisheries agencies could require more instream flows, the analysis presented here is based on the 2011 Draft Conservation Strategy and the 2012 Revised Draft Conservation Strategy.

Given the presence of supply shortages during drought conditions, the City has been pursuing a supplemental water supply for the past 25 years. A number of water supply alternatives were investigated during a lengthy planning process, and determined not to be viable (see **Section 8** for additional information on alternatives). The City's adopted IWP contemplates conservation, curtailment during droughts, and the construction of a 2.5-mgd seawater desalination plant and related facilities (with the ability to expand the plant to 4.5 mgd to meet future needs through 2030). A cooperative operational scenario that involved partnering with the District was also selected. This supplemental supply project constitutes the proposed project being evaluated in this EIR. See **Section 3.4** below for additional information about the joint water supply program being pursued by the City and the District.

3.3 Soquel Creek Water District

3.3.1 District Water Supply Sources and Operations

Water Service Area

The District is a nonprofit, local government agency formed under the County Water District Law (Water Code, Division 12, Section 30000 et. seq.) that provides potable water service and groundwater resource management within its service area. The District's service area encompasses seven miles of shoreline along Monterey Bay, and extends from one to three miles inland into the foothills of the Santa Cruz Mountains, essentially following the County Urban Services Line (see **Figure 3-1**). The City of Capitola is the only incorporated area in the District. Unincorporated communities include Aptos, La Selva Beach, Rio Del Mar, Seascape, Seacliff Beach, and Soquel.

The District serves a population of about 37,720, based on information from AMBAG, through approximately 15,420 service connections in four service subareas within mid-Santa Cruz County. Approximately 93 percent of the District connections are residential. The remaining seven percent are comprised of commercial, institutional, dedicated irrigation, and District connections used for facility operations and maintenance. There are currently no agricultural or industrial connections to the District distribution system.

Water Supply System

Water Supply Sources

The District currently relies solely on groundwater from aquifers underlying the Soquel-Aptos area (see **Figure 3-1**). Given that, the information provided below regarding water supply is provided in acre-feet per year (afy), which is the commonly used unit for groundwater systems, in contrast to gallons used by City for their surface water system. One acre-foot (af) is equivalent to 325,851 gallons or 0.325851 million gallons.

The aquifers within the District service area are located within two geologic formations. The Purisima formation (Purisima) provides approximately two-thirds of the District's annual production and serves the communities of Capitola, Soquel, Seacliff Beach, and Aptos. The Aromas Red Sands (Aromas) aquifer provides the remaining one-third of the District's annual production, and mainly serves the communities of Seascape, Rio Del Mar, and La Selva Beach.

The District extracts groundwater from the deep water-bearing zones within the Purisima. The Purisima consists of at least nine distinct geologic units that vary in thickness and hydrogeologic characteristics. Some of the units in this formation transmit and store groundwater more effectively than others. The Unit A Aquifer is the most consistently coarse-grained aquifer in the Purisima, and is distinct and highly permeable. Several District wells are located in this unit; however, the District also operates production wells in the other units as well. It is estimated that the District pumps approximately 55 percent of the total annual groundwater yield from the Purisima.

The District also extracts groundwater from the semi-confined and unconfined units of the Aromas, a 400-foot-thick aquifer divided into two units. The uppermost unit is about 225 feet thick, and the lowermost unit is about 175 feet thick. All of the District production wells in the Aromas are located in the lowermost unit. The Aromas aquifer is composed of interbedded layers of silt and clay, and it overlies the Purisima in portions of the District service area. See **Section 3.3.3** below for information about potential limitations of groundwater within the Soquel-Aptos area.

Production, Treatment, and Distribution Facilities

The District's water supply system consists of 19 groundwater production wells, 16 of which are currently active; approximately 130 miles of pipeline; and 18 water storage tanks. The production wells are shown in **Figure 3-5, Groundwater Production and Monitoring Wells**.

The District's water production, storage, treatment, and distribution system is operated within four individual water service areas that are referred to as Service Areas 1, 2, 3, and 4. These service areas, which originated as privately owned water systems, were consolidated / acquired over the years to form the District. Service Areas 1 and 2 are intertied by the McGregor Drive Transmission Line; Service Areas 3 and 4 are intertied by the San Andreas Road Transmission Line. Although interconnections between Service Areas 1 and 2 and between Service Areas 3 and 4 allow for some movement of water between service areas, the transfer of water between Service Areas 1 and 2 and Service Area 3 is not currently possible. **Table 3-14, District Service Areas**, provides further description of facilities and conditions in each of these service areas.

Table 3-14. District Service Areas

Service Area	Location	Groundwater Source	Facilities
1	Capitola and Soquel	Purisima	6 production wells (4 in production/2 inactive) 4 water storage tanks 2 booster pump stations 5 treatment plants
2	Aptos	Purisima	5 production wells (all in production, but some are not reliable or are impaired) 6 water storage tanks 3 booster pump stations 2 treatment plants
3	Rio Del Mar, Seascape, and part of Aptos	Purisima and Aromas	6 production wells (all in production, but one well is impaired) 4 water storage tanks 5 booster pump stations 2 treatment plants
4	La Selva Beach	Aromas	2 production wells (one in production, but both wells are impaired) 4 water storage tanks 1 booster pump station

Source: Soquel Creek Water District, 2011a. Soquel Creek Water District Urban Water Management Plan 2010.

The total estimated production capacity of the system is about 21.5 acre-feet per day (afd) (7 mgd) and the total storage capacity is 23 afd (7.5 mgd). Some of the District's wells are 20 to nearly 80 years old, have lost production capacity, and have grown increasingly vulnerable to mechanical failure. The District's Well Master Plan is addressing these issues, as further described below in **Section 3.3.4**.

The District does not export water to other water suppliers. Additionally, no water is purchased from state or federal sources or imported into the District. However, the District has interties with both the City and the CWD that allow for the transfer of small volumes of water to supplement the District's supply in the event of production shortages caused by mechanical failure, planned maintenance activities, or other emergencies. These interties are not capable of transferring significant quantities of water. Over the five-year period of 2006-2010, the District received approximately 38 acre-feet from CWD to help meet water demand.

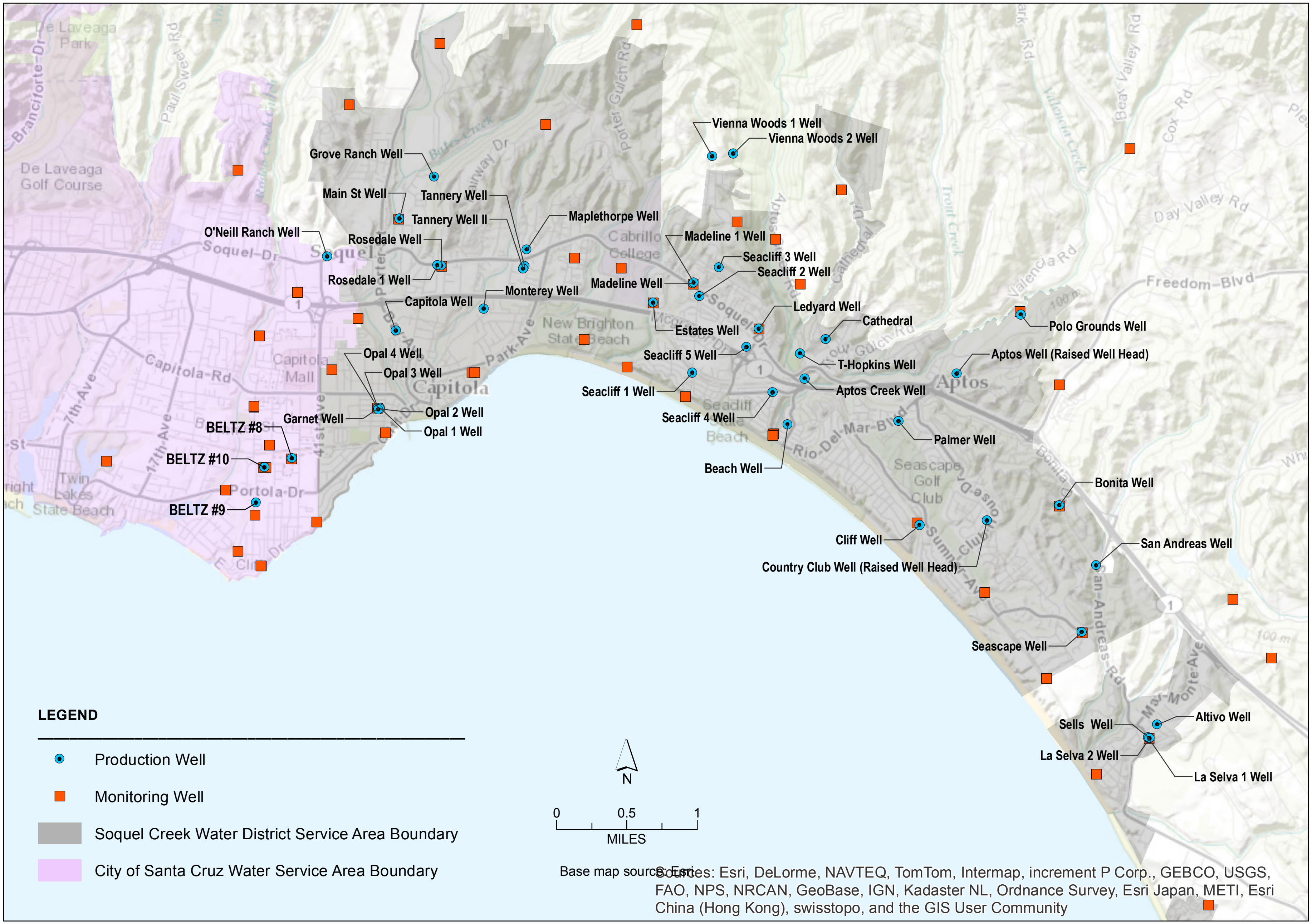

Figure 3-5
Groundwater Production and Monitoring Wells

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3.3.2 Water Demand – District Service Area

Existing Water Demand Trends

Table 3-15, Water Use – District Service Area, shows gross water use in the District's service area between 2001 and 2010. Water use, including all water supplied to the distribution system, ranged from approximately 5,430 afy in 2001 to approximately 4,080 afy in 2010. The current average annual demand in the District service area, based on average annual demand from 2006 through 2010, is 4,615 afy (approximately 1,500 mgy).

As a result of ongoing conservation efforts and other potential factors—including, but not limited to, weather, the institution of a tiered rate structure, and the economic downturn—the average annual demand has been reduced by approximately 800 afy when compared to average annual demand from 2001 to 2005, which was 5,416 afy (approximately 1,800 mgy).

Table 3-15. Water Use – District Service Area

Calendar Year	Water Use (acre-feet)	Water Purchased from Central Water District (acre-feet)	Total Water Use (acre-feet)	Total System Water Use (million gallons)
2001	5,430	0	5,430	1,769
2002	5,614	0	5,614	1,829
2003	5,546	0	5,546	1,807
2004	5,546	0	5,546	1,807
2005	4,945	0	4,945	1,611
2006	4,736	1	4,737	1,543
2007	5,048	10	5,058	1,648
2008	4,910	1	4,911	1,600
2009	4,262	22	4,284	1,396
2010	4,080	4	4,084	1,331

Source: Soquel Creek Water District, 2011a. Soquel Creek Water District Urban Water Management Plan 2010.

Projected Water Demand

The District's 2010 UWMP contains updated water demand projections that extend through 2030. As defined in the District's UWMP, the projected water demand was calculated using an average of production data from 2004 through 2008 (5,039 af) representing "normal" demand, and an average of 2009 through 2010 production data (4,184 af) representing "abnormal" demand.

This distinction between the two time periods was made to account for the unsustainable factors that undoubtedly reduced water demand in 2009 and 2010, including, but not limited to: (1) an economic recession that caused residential foreclosures and declines in the commercial sector resulting in an unusually large number of vacancies; (2) weather patterns that reduced peak irrigation demand; (3) a voluntary 15 percent curtailment in the summer of 2009; and (4) outstanding water demand offset credits[9].

It was conservatively estimated that at least one-half of the demand reduction associated with the average 2009-2010 demand (428 af) will not be sustainable in the future. The unsustainable demand value of 428 af was added back to the average 2009-2010 production rate of 4,184 af to obtain a representative baseline demand value rounded to 4,610 af. This demand value, coupled with the 2010 U.S. Census-based service area population estimate of 37,720 persons, was used to calculate a baseline per capita demand value of 0.122 af per person per year. The baseline per capita demand was multiplied by service area population estimates for 2015, 2020, 2030, and 2035, based on estimates of population growth by AMBAG, to determine projected demand for each 5-year interval[10].

Cumulative savings from conservation programs and other factors were also estimated using a semi-quantitative forecasting evaluation referred to as "Social, Economical, Political, Technological" (SEPT). Using this methodology, an additional 15 percent water savings is estimated for the period 2010 through 2030. For planning purposes, the savings are estimated to occur in a linear fashion over the 20-year period at 3.75 percent every 5 years, or 0.75 percent per year. This value was applied to the projected demand estimate for each 5-year period to determine the anticipated cumulative savings. The savings were subtracted from the projected demand for each interval to determine the adjusted projected demand after savings. The 2030 projected demand is estimated to be 4,116 af, which is an 11 percent reduction from the baseline demand value of 4,610 af.

Table 3-16, Projected Water Demand Forecast – District Service Area, summarizes the projected water demand from the District UWMP. The demand projections (adjusted with conservation savings) are lower compared to earlier demand projections. The decrease shown in the current demand projections can likely be attributed to two significant factors: (1) declines in annual water production due to conservation and other factors; and (2) decreases in baseline

9 As further described below under Conservation Demand Management, the Water Demand Offset Policy requires new development to offset its water use by retrofitting high-water-use-devices in existing development. In 2009-2010, the Water Demand Offset program was slow-moving due to the economy and lack of development. In an effort to keep the program on track and to realize the corresponding water savings in the near term, the District took on the financial responsibility of retrofitting existing devices. As a result, developers seeking to comply with the policy currently reimburse the District for retrofit projects already completed.

10 The adopted General Plans and related planning documents for the County and Capitola were reviewed for this EIR to understand the projected growth and water demands that would be anticipated under existing adopted plans for the portion of the District's service area within these jurisdictions. Potential new water demand identified in the District's 2010 UWMP is less than estimated water demand associated with the development potential of vacant and underused sites assuming development per existing General Plan designations. Current potential development and growth as accommodated by the County and Capitola General Plans is reviewed in detail in Section 6, Growth of this EIR.

population estimates. The decreases in baseline population estimates reflect the use of a different and potentially more accurate methodology in the current projections, and an actual four percent decrease in the U.S. Census population estimates between 2000 and 2010 for unincorporated Santa Cruz County.

Table 3-16. Projected Water Demand Forecast – District Service Area

	2010 Production	Baseline Demand[1]	2015	2020	2025	2030
Demand Projection Start Point (acre-feet)	4,084 (actual)	4,610				
Estimated Population of Service Area (persons)	37,720 (actual)	37,720 (actual)	37,808	38,771	39,168	39,550
Baseline Per Capita Usage (acre-feet/person/year)	0.108	0.122				
Projected Demand (before anticipated savings) (acre-feet)			4,621	4,738	4,787	4,834
Anticipated Cumulative Conservation Savings (acre-feet)			173	347	533	718
Adjusted Projected Demand (after anticipated conservation savings) (acre-feet)			4,448	4,392	4,254	4,116

Source: Soquel Creek Water District, 2011a. Soquel Creek Water District Urban Water Management Plan 2010.
Notes:
1. Baseline demand was calculated using an average of the 2004-2008 average production and the 2009-2010 average production. The rationale for this approach is provided in the text above.

3.3.3 Water Supply Limitations for the District

Current use of groundwater in the Soquel-Aptos area, which is the sole source of water supply for the District, is unsustainable and groundwater levels in the District's service area have been dropping and remain too low to protect against seawater intrusion. This shared coastal groundwater basin is in a state of overdraft because more water is being pumped out annually than is naturally recharged through rainfall. The main challenges in meeting present and future water supply needs in the District's service area include:

- **Water Supply Shortage due to Overdrafted Groundwater Basin**. The groundwater basin that supplies the District and other local pumpers (private wells, mutual water companies, Cabrillo College, CWD, and the City) is overdrafted and coastal groundwater levels are too low to protect against seawater intrusion. Despite extensive conservation efforts, the District lacks adequate water supply to restore protective groundwater levels and meet the water supply needs of its customers.
- **Seawater Intrusion and Associated Contamination.** Overdraft of the basin is not sustainable and intrusion of seawater into the freshwater of the Soquel-Aptos Basin will contaminate it, making the groundwater unusable. While seawater has not yet reached any of the District's production wells, the District's coastal monitoring network has detected seawater intrusion; and production wells within the Pajaro Valley, just south of the District's service area, have been contaminated. Reducing groundwater extraction and

raising groundwater levels will aid in restoring the basin to prevent seawater intrusion from occurring. Contamination by seawater intrusion is almost impossible to remediate, and where technically possible, remediation can be costly and time consuming.

- **Climate Change.** Current predictions and climate change research indicates a potential for more intense storms with greater runoff and less recharge into the aquifers. Additionally, climate change will cause more frequent and severe droughts and rising sea levels.
- **Water Quality.** Naturally occurring hexavalent chromium is generally present throughout the Aromas Red Sands Aquifer, which currently provides more than one-third of the District's water supply and is the primary source of water for the service area from Rio Del Mar to La Selva Beach. The California Department of Public Health is expected to establish a drinking water standard that could require the addition of expensive treatment facilities or the abandonment of impacted wells.

Each of these challenges is further described below.

Groundwater Basin Overdraft and Seawater Intrusion Potential

As indicated previously, the District currently derives all of its water supplies from the Purisima and the Aromas aquifers. Beginning in the early 1980's, the District installed a series of coastal monitoring wells and instituted a data collection program in order to have an early warning of conditions indicating seawater intrusion. Groundwater monitoring allows the District to evaluate groundwater trends and the potential impact of local and regional pumping with respect to overdraft, seawater intrusion, and groundwater quality.

According to numerous hydrogeologic studies, coastal groundwater levels are below elevations that protect the Soquel-Aptos area from seawater intrusion (protective elevations). This potential for seawater intrusion results from both historical extractions of too much groundwater from the basin and extraction wells being located too close to the coast. The amount of groundwater that can be extracted from the basin over the long term without causing seawater intrusion or other undesirable conditions is called the sustainable yield. Since at least the 1980s, the cumulative pumping by the District, the City, the CWD, and other public and private users has exceeded the sustainable groundwater yield of the Soquel-Aptos area. A 2009 study of outflow needed to achieve protective groundwater levels (HydroMetrics, 2009) concluded that the previous District pumping goal of no more than 4,800 afy was likely hundreds of acre-feet per year too high to prevent seawater intrusion after groundwater levels recover to protective elevations.

More recent modeling and evaluations conducted in 2011 provide planning-level estimates of the amount of water that the District can pump from the Soquel-Aptos area after groundwater levels recover to protective elevations (District, 2012a). The goal of the pumping guidelines is to maintain coastal groundwater levels at protective elevations to prevent seawater intrusion over the long-term. The modeling and evaluations rely on estimates that have uncertainty and may change over time. Examples of these estimates include estimates for ocean outflow needed to prevent seawater intrusion, deep recharge into the groundwater basin, non-District pumping, return flow of pumped groundwater, and groundwater flows to Pajaro Valley. Based on the modeling and evaluations, the District has established post-recovery pumping goals of 2,800 afy for District pumping from the Purisima area and 1,200 afy for District pumping from the Aromas area. The combined post-recovery pumping goal is 4,000 afy. Uncertainties in the estimates discussed previously, along with pumping constraints imposed by the District's well locations, could lead to revision of the District's post-recovery pumping goal to within a range of 3,100 to 4,800 afy (District, 2012a).

The post-recovery pumping goals are only applicable after coastal groundwater elevations in the Soquel-Aptos area recover adequately to prevent seawater intrusion. In order to recover groundwater levels to protective elevations and eliminate overdraft, the District must significantly reduce pumping to levels below the goals listed above, and other pumpers must not further impact the overdrafted portion of the basin. The recovery time, or how long pumping would need to be reduced in order to achieve protective groundwater levels, is dependent on the District's annual pumping, as shown in **Table 3-17, Estimated Time Period to Recover the Soquel-Aptos Area Groundwater Basin**.

The table refers to 50th, 70th, and 90th percentile protective outflows. Protective outflows refer to the freshwater outflows at the coast that protect the basin from seawater intrusion. A cross-sectional model for each coastal monitoring well was run with 100 reasonable parameter sets. The protective outflow for each of the 100 parameter sets is the outflow that is required to maintain the protective elevation for that set. The 50th percentile protective outflow is the outflow that is protective for at least 50 percent of the cross-sectional model runs; the 70th percentile protective outflow is the outflow that is protective for at least 70 percent of the cross-sectional model runs, and so forth. The 70th percentile was used to establish the recovery pumping goal and to address uncertainty without being overly conservative. Groundwater recovery to protective levels is predicted to take approximately 20 years if annual District pumping is limited to no more than 2,900 afy, based on the 70th percentile data.

Table 3-17. Estimated Time Period to Recover the Soquel-Aptos Area Groundwater Basin

Annual District Pumping (acre-feet per year)	Time Needed to Eliminate Pumping Deficit and Restore Basin (years)		
	50th Percentile Protective Outflows	70th Percentile Protective Outflows	90th Percentile Protective Outflows
2,500	4	14	90
2,700	4	17	140
2,900	4	20	270
3,300	5	30	never
3,700	7	70	never

Source: Hydrometrics, 2012; as provided in Soquel Creek Water District, 2012a. 2012 Integrated Resources Plan Update.

In response to continuing overdraft conditions, the District is implementing and expanding conservation programs and is pursuing a supplemental water supply so that groundwater pumping can be reduced. The District also completed a Well Master Plan (see **Section 3.3.4** below), and will be developing several new inland wells over the next five to ten years to redistribute pumping inland. These new wells will not add groundwater supply to the District's water supply; rather, they will serve as replacement wells to reduce pumping along the coast.

Groundwater management in a geologically complex coastal environment must recognize a wide range of variables and uncertainties and must be adaptive based on actual basin response to pumping changes. The District has adopted a program for ongoing and enhanced data collection and monitoring to refine the estimates for protective levels and pumping goals over time. See **Section 3.3.4** for additional information about the District's water supply and groundwater management planning.

Global Climate Change

Section 3.2.3, above, provides a summary of the major expected effects of climate change that pose a threat to the state's water resources. Changes in the magnitude, pattern, and rate of change related to rainfall intensity, sea level rise, and temperature are also of significant concern for the District's local water supply.

Regarding rainfall, climate change forecasts indicate an increase in the intensity of storms, potentially leading to higher runoff and less recharge of groundwater basins. Local groundwater recharge may be as much as 30 percent less between 2071-2100, based on 2012 findings by the U.S. Geological Survey for Santa Cruz County (USGS, 2012). A decline in groundwater recharge in the Soquel-Aptos area would exacerbate existing overdraft.

The potential decline in recharge rates, coupled with predicted rises in sea level, are of particular concern to the viability of the District's water supply. In addition to increasing the threat of coastal flooding from tidal surges, sea level rise could increase the risk and extent of seawater intrusion as increased pressure from rising seawater pushes the freshwater/seawater transition zone inland at an increased rate.

The District UWMP reports that sea level is projected to rise by as much as 20 to 55 inches along the California coast by the end of this century, based on the *2009 California Climate Change Adaptation Strategy* (California Natural Resources Agency, 2009). More recently, the Sea-Level Rise Task Force of the Coastal and Ocean Working Group of the California Climate Action Team developed interim guidelines for sea level rise (CO-CAT, 2010). According to the guidelines, 16 inches in sea level rise (above year 2000 levels) should be planned for by the year 2050, and up to 55 inches by the year 2100. This approach is consistent with the California Ocean Protection Council's (COPC) resolution on sea level rise (COPC, 2011).

Water Quality Issues

Groundwater quality issues for drinking water resources within the District have historically included impacts from potential seawater intrusion in both the Aromas and the Purisima, naturally occurring elevated metals (iron, manganese, and localized arsenic) in the Purisima, and hexavalent chromium (chromium-6), localized 1,2,3 Trichloropropane**,** and anthropogenic contamination (e.g., nitrates) in the Aromas.

During the 2005-2010 reporting period for the District UWMP, groundwater from all active wells was within current state and federal primary Maximum Contaminant Levels (MCLs), which are the primary drinking-water standards. Constituents with primary MCLs that have been detected in District wells, and are closely monitored, include naturally occurring elevated metals and nitrates due to runoff and leaching from fertilizer use and septic tanks.

In the Purisima, groundwater from 3 of 16 wells is currently treated to remove arsenic even though detected levels are well below the primary MCL for this constituent. Additionally, two naturally occurring constituents (iron and manganese) have historically exceeded secondary MCLs in 9 of 16 Purisima wells. Groundwater from these wells is treated to reduce concentrations of iron and manganese to levels below their respective secondary MCLs.

Of the groundwater quality factors mentioned above, those with the greatest potential to impact the District's water system are seawater intrusion in both the Aromas and the Purisima, and naturally occurring chromium-6 in the Aromas. Consistent future use of the Aromas Red Sands may also be affected by the presence of naturally occurring chromium-6, as a result of potential regulatory changes. Chromium-6 is a known human carcinogen for chronic inhalation exposure and a probable human carcinogen for chronic oral exposure. It is currently regulated under the MCL of 50 parts per billion (ppb) for the state, and 100 ppb for the federal government, for total chromium. In 1999, the state began to evaluate whether a specific MCL was appropriate for chromium-6, based on concerns about potential carcinogenicity when ingested.

These concerns resulted in a state law that required the development of an MCL for chromium-6 by 2004. As part of the required process for developing an MCL, the State Office of Environmental Health Hazard Assessment (OEHHA) proposed a draft chromium-6 Public Health Goal (PHG) of 0.06 ppb in 2009. PHGs are non-enforceable goals based solely on public-health considerations, and do not take practical risk-management factors (e.g., treatment technology availability, benefits, and costs) into consideration. Drinking water with contaminant levels exceeding a PHG can still be considered acceptable for public consumption.

In December of 2010, OEHHA proposed a new draft PHG for chromium-6 of 0.02 ppb, lowered from the 0.06 ppb PHG proposed in 2009. The draft chromium-6 PHG of 0.02 ppb was adopted as final by the state in July of 2011. The California Department of Public Health (CDPH) intends to issue the draft chromium-6-specific state MCL in June 2013. Depending upon the standards adopted by the CDPH, future challenges for the District may include treatment technology feasibility and performance, benefits, and cost; all of which may have an impact on the District's supply that comes from the Aromas aquifer.

The District began testing for chromium-6 in the Aromas aquifer in January 2001 in response to direction from CDPH. Since 2001, chromium-6 has been detected in six of the active water supply wells, all located within District Service Areas 3 and 4. The District has voluntarily completed repetitive tests of these six wells that measured both chromium-6 and total chromium at concentrations ranging from 0.42 ppb to 40 ppb. These levels are lower than the current state and federal MCLs of 50 ppb and 100 ppb, respectively, for total chromium. However, these chromium-6 levels are still substantially higher than the state's adopted PHG of 0.02 ppb. Because the California Health and Safety Code requires the CDPH to establish an MCL at a level as close as is technically and economically feasible to a contaminant's PHG, it is likely that the District will have to institute some level of chromium-6 treatment in the Aromas in order to continue using this source of water.

3.3.4 District Water Supply Planning and Adopted Plans

Integrated Resources Plan

By the mid-1990s, groundwater levels had begun declining and were not recovering to above sea level as necessary to maintain a barrier against seawater intrusion. In response to this change in groundwater conditions, the *Soquel Creek Water District Draft Integrated Resources Plan* (draft IRP) was developed in 1999 to define the water supply shortage and actions for addressing it, including diversifying the water supply portfolio (Montgomery Watson, 1999). The *2006 Soquel Creek Water District Integrated Resources Plan* (2006 IRP), adopted by the District in 2006, described the then-current knowledge and understanding of District's groundwater supplies and presented a long-term action plan to guide groundwater protection and water supply planning efforts (Environmental Science Associates, 2006).

Based on more recent information developed on the groundwater conditions of the Soquel-Aptos area and reduced demand projections, the District adopted the *2012 Integrated Resources Plan Update* (2012 IRP Update) (District, 2012a). The 2012 IRP Update is a long-term water plan that offers a diversified strategy emphasizing water-use efficiency through demand management (i.e. conservation and re-use), groundwater management, and supplemental supply development. This report serves as a roadmap through 2030 for maintaining water supply reliability for the District's customers and protecting the local environment. Key water supply planning objectives for the 2012 IRP Update include:

- Water supply planning objectives to recover the groundwater basin:
    - Limit groundwater pumping to 2,900 afy (also known as the recovery pumping goal);
    - Reduce groundwater pumping to the recovery pumping goal within 6-8 years; and

  - Continue to limit groundwater pumping at the recovery pumping goal to achieve basin recovery and to restore groundwater levels to prevent seawater intrusion. (Estimated to be at least 20 consecutive years, as shown in **Table 3-17**.)

- Water supply planning objectives once the groundwater basin has been restored and protective levels are achieved:
  - Limit groundwater pumping to 4,000 afy on average (also known as the post-recovery goal); and
  - Modify the post-recovery goal, as needed, based on adaptive management and observed groundwater levels.

The 2012 IRP Update components and findings that have been identified to meet the District's water supply planning objectives include the following:

Demand Management

- Continue and increase conservation efforts, focusing on conservation measures that are estimated to cost less per acre-foot of water saved than other supply options such as the operational cost of desalination; and
- Evaluate recycled water options as feasible and can be permitted.

Groundwater Management

- Limit groundwater pumping to the recovery pumping goal of 2,900 afy and restrict pumping to this level until restoration of protective groundwater levels is achieved to prevent seawater intrusion (estimated to be at least 20 consecutive years);
- Continue monitoring coastal groundwater levels and water quality;
- Redistribute groundwater pumping inland;
- Continue to encourage the Soquel-Aptos Area Groundwater Management Joint Powers Authority to establish a Groundwater Replenishment District and encourage the County to establish conservation measures for non-District pumpers;
- Support groundwater recharge protection and enhancement projects and policies;
- Re-evaluate the post-recovery pumping goal of 4,000 afy once the groundwater basin is restored to determine whether pumping may be increased or decreased; and
- Use an adaptive management approach to revise the recovery pumping goal and the post-recovery pumping goal based on observed groundwater levels and quality.

Conjunctive Use Supplemental Supply Projects

- Continue to evaluate the **scwd²** Regional Seawater Desalination Project with the City; and
- Continue to support the evaluation of a potential water exchange project with the City.

Local Supplemental Supply Alternatives

- Consider further evaluation of a District-only desalination facility or the feasibility of a modified Soquel Creek off-stream diversion project, should the **scwd²** Regional Seawater Desalination Project with the City be no longer pursued in the future; and
- Continue to evaluate and consider implementing mandatory water rationing and a moratorium on new connections should the **scwd²** Regional Seawater Desalination Project with the City no longer be pursued in the future.

Other water supply alternatives considered within the 2012 IRP Update included continuation of groundwater withdrawals as-is, satellite reclamation (small-scale recycled water), an on-stream reservoir at Glenwood, and mandatory water rationing in lieu of a supplemental supply. See **Section 8** for additional information about these supply alternatives.

Groundwater Management Plan for the Soquel-Aptos Area

In 2007, there was a comprehensive update of the 1996 Groundwater Management Plan for the Soquel-Aptos Area. The *Groundwater Management Plan – 2007 – Soquel-Aptos Area* (GMP) establishes groundwater management goals to: 1) ensure water supply reliability for current and future beneficial uses; 2) maintain water quality to meet current and future beneficial uses; and 3) prevent adverse environmental impacts (District and CWD, 2007). Basin management objectives were established to meet each goal, and specific actions were identified to achieve each objective. Actions include: regular groundwater level and quality monitoring from production wells and dedicated monitoring wells, developing a supplemental water supply, managing pumping through redistribution inland and away from critical coastal areas, water conservation and re-use, interagency coordination, and public education.

The Annual Review and Report (ARR) is part of the implementation of the GMP for the Soquel-Aptos area. This document summarizes groundwater conditions in the Soquel-Aptos area, documents the status of groundwater management activities, and recommends any amendments to the GMP. The ARR is a living document that is updated annually (starting with Water Year 2009). In accordance with the procedures as outlined in the GMP, the yearly ARRs are reviewed by the Basin Advisory Group, comprised of technically qualified staff from the District, City, County, CWD and Pajaro Valley Water Management Agency. After comments from the Basin Advisory Group have been addressed and incorporated into the updates, a draft of the updates is then provided to the Basin Implementation Group, comprised of two board members each from the District and CWD, the full Board of Directors for both districts, and also the general public.

The District is in the process of developing the 2012 ARR, which will include maps of recharge areas and is scheduled to be completed by summer 2013.

Well Master Plan

Other recent District efforts related to management of the groundwater basin include the Well Master Plan, which was approved in 2011, and provides for: (1) the development of up to four new groundwater production wells at four locations in the Purisima; (2) the conversion of an existing irrigation well in the Purisima to a municipal production well; (3) the abandonment and destruction of one deteriorated production well; and (4) the removal of two wells from production and the maintenance of those wells as inactive wells (District, 2011b). New water treatment facilities for iron and manganese removal are proposed adjacent to four of the wells, and one well would use an existing treatment facility.

Under the Well Master Plan, the District would re-distribute pumping both vertically and horizontally to achieve more uniform drawdown of groundwater in the Soquel-Aptos area, reduce susceptibility to seawater intrusion, and minimize localized pumping depressions. The plan also states that the District would take actions to limit the pumping from all active wells to no more than 4,800 afy, on average. As indicated above, more recent hydrogeological studies indicate that this previous estimate of 4,800 afy is likely hundreds of acre-feet per year too high to protect against seawater intrusion after groundwater levels recover to protective elevations.

The Polo Grounds Well in the Aptos area is the first identified project within the Well Master Plan, which converted an existing irrigation well to a production well. This project was completed and brought on-line in September 2012. The O'Neill Well in Soquel is currently under construction by the District.

Urban Water Management Plan Update

In September of 2011, the District Board of Directors adopted the 2010 UWMP (District UWMP), which is required to be prepared and updated every five years under the California Urban Water Management Planning Act. The District UWMP includes important information on the District's water supply sources, water deliveries and uses, projected water demand, drought contingency and emergency response measures, and current and planned conservation programs. It also serves as one of several documents that the District uses as a long-range water supply planning tool. The information presented above about the District's water supply source and operations, water demand, and water supply limitations is contained in the District UWMP. Additional relevant information from the District UWMP is summarized below.

Conservation and Demand Management

Like the City, the District is implementing all of the urban water conservation BMPs of the CUWCC (except those that apply only to wholesale water agencies), as well as other identified conservation measures. **Table 3-18, Estimated Conservation Savings Through 2010 by**

District Program, provides an estimate of water conservation savings achieved via the various BMP programs for which the District quantifies results. Where it is possible, the District tracks and quantifies savings on an annual basis. For these programs, cumulative savings through 2010 are provided in this table since the year that the program was put in place. For some other programs, the table provides the District's estimated reduction in water use associated with the implementation of the program.

The District implements additional measures beyond those required to be addressed in the UWMP and prescribed by the CUWCC. In particular, in 2003, the District Board of Directors adopted the "Water Demand Offset Policy" (Resolution 03-31) that requires new development to "offset" its projected water use by 120 percent. The projected water use is based on the end use and size of the proposed development. The purpose of the policy is to prevent having to declare a building moratorium and avoid exacerbating the existing groundwater overdraft situation until a sufficient supplemental supply becomes available. The requirements are met by retrofitting high-water-use devices (e.g., toilets, urinals, faucets) in existing development with lower-water-use devices. The Water Demand Offset Policy was established as an interim program for the reasons listed above and will be discontinued once a sufficient water supply is available, or earlier should no more offset credits be available in current or potential future programs.

Table 3-18. Estimated Conservation Savings Through 2010 by District Program

Program Name	Date Program Put In Place	Cumulative Water Savings Through 2010 Since Year Program Enacted (acre-feet)
Home Water Survey	2003	22.0
Toilet Rebate	1997	113.8
Direct Toilet Installation Program/Water Demand Offset Program	2003	133.8[1]
Residential and Commercial Clothes Washer Rebates	1999	71.6 (Residential 69.4; Commercial 2.2)
Program Name	**Date Program Put In Place**	**Estimated Reduction (%)**
Commercial and Institutional Programs (no industrial customers in service area)	2003	3 to 5% for those participating in the program
Large Landscape Conservation Programs	2003	14% for those participating in the program
Metering	Metering since 1964 Individual metering required since 2003	20% compared to non-metered
Conservation Pricing	1999	1% for every 10% increase in rates

Source: Adapted from Soquel Creek Water District, 2011a. Soquel Creek Water District Urban Water Management Plan 2010.
Notes:
1. The "Water Demand Offset Policy" was established as an interim program to prevent having to declare a building moratorium and avoid exacerbating the existing groundwater overdraft situation until a sufficient supplemental supply becomes available.

The District's conservation programs will continue to evolve as the current programs reach saturation (e.g., market penetration of high-efficiency toilets, showerheads, and faucets), new water-efficient technologies are developed, and new demand reduction measures or programs are implemented. As preliminary District estimates indicate that a significant portion of the service area has installed high-efficiency fixtures, future water savings from available retrofits will be significantly less. Additionally, water-efficient technology has evolved substantially over the years, therefore resulting in a smaller incremental savings. As indicated above, the District did estimate additional cumulative conservation savings using the forecasting method SEPT to determine that approximately 718 af of additional savings could be achieved by 2030. Given the limited additional conservations savings that could be achieved, the District does not expect that expansion of the current conservation program will eliminate the need for a supplemental water supply. This is supported by the fact that the District already has a very low per capita water rate as compared to other water agencies statewide (see **Figure 3-4**). See **Section 3.3.5, District Water Supply and Demand Assessment** for additional information about the District's water supply needs.

Water Shortage Contingency Plan

The purpose of the District's Water Shortage Contingency Plan (a component of the District's UWMP) is to conserve and protect the integrity of the water supply, with particular regard for domestic water use, sanitation, and fire protection; and to protect and preserve public health, welfare, and safety. The potential types of water supply shortages are categorized into three groups, as follows:

- Short-term supply shortages due to catastrophic emergencies, e.g., power outages, winter storms, earthquakes;
- Long-term supply shortages, e.g., due to prolonged drought, contamination, and destruction of critical water supply facilities; and
- Supply shortages due to groundwater overdraft exceeding the sustainable yield that threatens the public health, safety, and welfare of the community.

For the three types of water supply shortages, the District's Water Shortage Contingency Plan provides the following information: (1) actions the District will undertake to prepare for and implement during an interruption of water supply; (2) mandatory prohibitions against specific water use practices; (3) consumption reduction methods that would achieve a 50 percent reduction in water use in the most restrictive stages; (4) penalties or charges for excessive use; and (5) assessment of the impacts of prohibitions and restrictions on District revenues, and the actions that may be taken to address these impacts.

Although the groundwater resource in the Soquel-Aptos area is in overdraft, the District has not experienced a water supply shortage on a short-term regular annual, monthly, or peak-period basis due to drought periods. This is due to the capacity of the groundwater aquifers to withstand a relatively short-term drought. Modeling was recently performed to estimate the long-term impacts of drought on groundwater recharge rates to provide input for designing a drought curtailment policy. The model estimated the relationship between rainfall and deep groundwater recharge in the Soquel-Aptos area. The modeling results indicate that the effects of prolonged drought have a significant effect on recharge rates. For example, a median water year like 1984 was modeled to have contributed 5,932 af of deep recharge, and a single-dry year like 1990 was estimated to contribute approximately 767 af of deep recharge.

As shown in **Table 3-19, Five-Stage Structure of District Water Shortage Contingency Plan**, there are five curtailment stages for long-term supply shortages, with target cutback levels ranging from 5 percent to 50 percent. The trigger levels shown for each curtailment stage are based on cumulative rainfall amounts (ending in March of the current year) for all stages and dropping groundwater levels for stages 4 and 5; however, the stages and curtailments could be related to any long-term shortage cause[11] (e.g., water-quality issues).

3.3.5 District Water Supply and Demand Assessment

The 2012 IRP Update provides an assessment of water supply and demand in the service area through 2030. **Table 3-20, District Supply and Demand Comparison**, provides a comparison of the District's projected demand from **Table 3-16** with the target groundwater yield during recovery of 2,900 afy. The long-term target groundwater production goal is based on the most recent report from the District's hydrogeologist, HydroMetrics Water Resources Inc., which indicates that the District's portion of the future sustainable yield following recovery is 2,800 afy for the Purisima, and 1,200 afy for the Aromas, for a total of 4,000 afy (HydroMetrics, 2012).

In order for the groundwater basin to be protected against contamination by seawater intrusion, less water needs to be extracted to allow groundwater levels to naturally increase to protective levels. As indicated previously, the recovery pumping yield was developed by District's hydrogeologist and selected by the District's Board of Directors as a planning goal to achieve 70th percentile protective outflows without being overly conservative (District, 2012a). As shown in **Table 3-17**, the District's established recovery pumping goal is not to exceed 2,900 afy for at least 20 years.

The difference or supplemental supply needs for 2015, 2020, 2025, and 2030 have been estimated by subtracting the 2,900 afy recovery pumping goal from the adjusted projected demand from **Table 3-16**. **Table 3-20** demonstrates that about 1,500 afy is needed in the near term to allow the District to reduce its pumping to the recovery goal. The supplemental supply needs may be reduced to about 1,200 afy by 2030 if the District's projected demand occurs as estimated, conservation assumptions are achieved through 2030, and if the basin begins to show signs of recovery as anticipated in current modeling. It should be noted, however, that the

[11] The District's Water Shortage Contingency Plan does not anticipate the kind of long-term shortages that would occur over decades with a long-term groundwater emergency implemented to address groundwater overdraft.

recovery pumping goal of 2,900 afy cannot be implemented in 2015 or in subsequent years unless a sufficient supplemental supply is available to the District or mandatory rationing are enacted, which would allow the District to reduce its groundwater pumping to this level. Without a supplemental supply this would require an overall cutback of approximately 35 percent continuously for at least 20 years.

Table 3-19. Five-Stage Structure of District Water Shortage Contingency Plan

Stage	Magnitude of Water Shortage	Water Supply	Customer Demand Reduction Measures
1	0 to 5%	Water Shortage Alert	Voluntary water conservation requested of all customers Enforce water waste ordinance
2	5 to 15%	Water Shortage Warning	Stage 1 measures + Work with large landscapes on adhering to ordinances Prohibit exterior washing of structures Increase leak violation enforcement
3	15 to 25%	Emergency Water Shortage	Stages 1 & 2 measures + Work with large landscapes on water budgets Institute water rationing for residential customers if necessary Require commercial customers to display "save water" signage and develop conservation plans Increase leak detection and repair Prohibit water use for aesthetic purposes Prohibit restaurants from serving water except upon patron request No vehicle washing, except at sites that recycle 80% or more of water used
4	25 to 35%	Severe Water Shortage	Stages 1, 2 & 3 measures + Implement or reduce residential water allocations Institute water rationing for commercial and institutions Minimal water budgets for large landscapes Prohibit turf irrigation Rescind hydrant and bulk water permits No filling of nonpublic pools/hot tubs No grace period for waste violations
5	35 to 50%	Critical Water Shortage	Stages 1 through 4 measures + Further reduce residential water allocations Reduce commercial water allocations Prohibit all outdoor irrigation No water for recreational purposes, including filling public pools Continue all measures initiated in prior stages as appropriate Lock off all dedicated irrigation accounts

Source: Soquel Creek Water District, 2011a. Soquel Creek Water District Urban Water Management Plan 2010.

Table 3-20. District Supply and Demand Comparison

	2015	2020	2025	2030
Adjusted Projected Demand, includes conservation (from Table 3-16) (in afy)	4,448	4,392	4,254	4,116
Target Groundwater Yield For Basin Recovery (also known as recovery pumping goal)[1] (in afy)	None	2,900	2,900	2,900
Difference (Supplemental Supply Needs) (in afy)	NA	(1,492)	(1,354)	(1,216)

Source: Soquel Creek Water District, 2012a. 2012 Integrated Resources Plan Update.
Notes:
1. The recovery pumping goal of 2,900 afy cannot be implemented in 2015 or in subsequent years unless a supplemental supply is available to the District, or the District mandates restrictions to this level.

Acronyms:
afy = acre-feet per year
NA = not applicable

3.3.6 Conclusions about the Need for a Supplemental Water Supply (District)

As indicated above, the District relies entirely on groundwater from the Soquel-Aptos area, which is unsustainable and in a state of overdraft. The District is by far the single largest groundwater user in this area. If the total groundwater extractions from the District and other pumpers (including the City, the CWD, mutual water companies, and private well owners) continue based on current practices, the groundwater levels will continue to be too low to protect against seawater intrusion. In order to increase the amount of groundwater to protective levels by allowing the basin to naturally recover, the District, as the primary user of the basin with wells near the coast, needs to reduce its groundwater pumping. Based on the most recent report from the District's hydrogeologist, groundwater pumping by the District should be no more than 2,900 afy for at least 20 years. As indicated in **Table 3-20**, reducing pumping to 2,900 afy will require a supplemental water supply to replace a portion of the District's current supplies. This supplemental supply will need to provide about 1,500 afy (1.3 mgd) in the near term, which could be reduced over time if the District's projected demand occurs as estimated, conservation assumptions are achieved through 2030, and if the basin begins to show signs of recovery. Once the groundwater basin has been restored and protective groundwater levels are achieved, the District's current post-recovery goal is to limit pumping to 4,000 afy, which is less than projected demand. However, this goal may need to be modified over time, as needed, based on adaptive management and observed groundwater levels.

Given the groundwater overdraft conditions in the Soquel-Aptos area, climate change, and changing water quality requirements, the District has been actively pursuing a supplemental water supply, along with conservation and groundwater management. Over the last 20 years, a number of supply alternatives have been investigated during open and public planning processes and were determined not to be viable (see **Section 8** for additional information). The District's adopted 2012 IRP Update includes, but is not limited to, development of conservation and demand management programs, drought curtailment, and proactive groundwater management, as well as further evaluation of water exchanges and a supplemental water supply project identified as the proposed desalination project.

The proposed desalination project was the only feasible supply project identified in the 2012 IRP Update to meet the District's planning objectives of: (1) coming on-line within 6-8 years to effectively reduce groundwater pumping to 2,900 afy; (2) having adequate yield capacity to fully meet projected water shortages by 2018-2020, when groundwater pumping is to be reduced by 35-40 percent to 2,900 afy; and (3) allowing the District to meet projected demand while sustaining groundwater pumping at 2,900 afy for a 20-year period. The proposed desalination project was identified as the preferred supplemental supply alternative to further evaluate in the 2012 IRP Update and constitutes the proposed project being evaluated in this EIR. See **Section 3.4** for additional information about the joint water supply program being pursued by the City and the District.

3.4 scwd² Desalination Program

The City and District have partnered to develop and implement the **scwd²** Desalination Program. This program proposes to construct and operate a seawater reverse osmosis desalination plant and related facilities to provide up to 2.5 mgd of water to reduce District pumping in the Soquel-Aptos area to allow coastal groundwater levels to recover, and to help the City meet its water needs during drought periods. The City and District propose to cooperatively operate the desalination plant to provide water to each agency during different times to meet the different objectives and needs of the two agencies.

Through memoranda of agreement (see **Appendix P, City of Santa Cruz and Soquel Creek Water District Agreements Related to the Proposed Seawater Desalination Projects**), the City and District are evaluating the potential development of a 2.5-mgd capacity shared seawater desalination plant and related facilities. The District would have priority use of the desalination plant during the wet months of the year to help supplement water demand needs while reducing groundwater pumping and the City would have priority use during the dry months. Any capacity not used by the agency with priority would be available for use by the other agency (see **Table 4-11, Desalination Project Priority System** in **Section 4, Project Description**). This partnership allows the agencies to share the costs associated with evaluating, studying, and potentially building the project. To date, the following studies have been prepared by the **scwd²** Desalination Program, to inform the development of the project description contained in this EIR:

- ***scwd²*** *Final Seawater Reverse Osmosis Desalination Pilot Test Program Report & Appendices* (Pilot Test Program Report), CDM Smith, April 2010 (**Appendix D**)
- *Proposed* ***scwd²*** *Desalination Project Watershed Sanitary Survey* (Watershed Sanitary Survey), Archibald Consulting, Palencia Consulting Engineers, and Starr Consulting, July 2010 (**Appendix E**)

- ***scwd²*** *Seawater Desalination Program Offshore Geophysical Study* (Offshore Geophysical Study), EcoSystems Management Associates, Inc., August 2010 (**Appendix F**)
- *City of Santa Cruz Water Department & Soquel Creek Water District **scwd²** Desalination Program Open Ocean Intake Effects Study* (Open Ocean Intake Effects Study), Tenera Environmental, December 2010 (**Appendix G**)
- ***scwd²*** *Seawater Desalination Intake Technical Feasibility Study* (Intake Technical Feasibility Study), Kennedy/Jenks Consultants, September 2011 (**Appendix H**)
- *Seawater Intake Facility Conceptual Design Report **scwd²** Regional Seawater Desalination Project* (Intake Facility Conceptual Design Report), URS Corporation, November 2012 (**Appendix I**)
- *Dilution Analysis for Brine Disposal via Ocean Outfall* (Dilution Analysis), Brown & Caldwell, August 2011 (**Appendix J**)
- ***scwd²*** *Seawater Desalination Plant – Phase 1 Preliminary Design: Volume 1 – Report & Volume 2 - Drawings* (Desalination Plant Preliminary Design Report), CDM Smith, October 2012 (**Appendix L**)
- *Summary of **scwd²** Energy and GHG Reduction Approach* (Energy and GHG Reduction Approach), City Water Department, October 2012 (**Appendix O**)

Section 2, Introduction, describes these studies in greater detail along with other technical appendices prepared to support this EIR. See **Section 4** for a detailed description of the proposed project.